



INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH
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Fax : 880-2-883116, 886050, 871568, 871636, Cable : Cholera Dhaka

Memorandum

31 October 1999

To : Dr. Md. Yunus
Public Health Sciences Division

From: Professor Mahmudur Rahman
Chairman, Ethical Research Committee

Sub : Approval of your protocol # 99-028

This has reference to your memo of 25th October 1999 along with a modified copy of your protocol # 99-028 entitled "Essential Obstetric Care". I am pleased to inform you that upon recommendation of the Chairman, RRC, the protocol is hereby approved upon your appropriate addressing of the issues raised by the Committee in its meeting held on 6th October 1999.

Thanking you and wishing you success in running the field study.

copy: -Division Director
Public Health Sciences Division



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Memorandum

To: Professor V.I. Mathan
Chairman, Research Review Committee

Through: Professor Lars Ake Persson
Division Director, PHSD

From: Dr. Md. Yunus
P.I. and Acting Head, Reproductive Health Programme
PHSD

Subject: Comments of ERC on the Protocol #99-028
entitled "Essential Obstetric Care"

Date: October 25, 1999

*forwarded to
ERC chairman
for necessary action
V.I. Mathan
25/10/99*

Thanks for sharing the comments of the ERC on the above mentioned protocol.

We have carefully considered the points raised by the ERC. Enclosed please find herewith our response on the ERC review and where appropriate we have incorporated the points raised by ERC. A revised version of the protocol is also enclosed herewith.

Thanks.

Encl: as above

ERC Review Response to Essential Obstetric Care

- a. The issue of sample size is addressed on the evaluation section on Page 23. This is a service delivery project with components of evaluation.
- b. 2(e), 2(f) and 4(d) has been modified in the face sheet.
- c. A questionnaire for Transportation survey has already been appended in the protocol. This is addressed in the transport survey section on page 25. No other questionnaire or interview schedule is planned.
- d. & e. The comprehensive Essential Obstetric Care (EOC) services including Caesarean Section will be provided at the Thana Health Complex (THC) by the Government of Bangladesh (GoB) Medical Officers with appropriate training. Provision of comprehensive EOC at the THC including Caesarean Section has been adopted as a policy in the Health and Population Sector Policy and will be implemented in phases. The ICDDR,B through this project will assist the GoB officials for the implementation of EOC services in Matlab thana and will be evaluating the utilisation and impact of the services through some process and outcome indicators as mentioned in the protocol in page number 23 and 24. This information for evaluation of process and outcome indicators will be collected from the FWA registers and from the routine service records kept at H&FWC and THC for EOC services. No consent is required for this purpose. Therefore, the conventional consent form routinely used by the GoB for operations will be used as a part of the routine procedure, since the operations will be performed by the GoB personnel.
- f. The training curriculum developed for EOC by the GoB at selected Obstetrics and Gynaecology Dept. of different medical colleges includes components of necessary techniques for the provision of comprehensive EOC as outlined in pages 19-20 of the protocol. It may be mentioned again that the services/activities will be provided by the GoB staff members like Medical Officers, Nurses, FWV and others. A Senior Medical Officer having special training on Obstetrics will be recruited from the project to coordinate research activities and ensure quality services. No other research personnel will be involved in conducting any procedure like Embryotomy and Partograph.
- g. Before deciding the duration and modes of training, we took advice from Professor TA Chowdhury, a member of ICDDR,B Research Review Committee and Professor Abdul Bayes Bhuiyan, Ex-Project Director, EOC project. Both are renowned specialists in this field in Bangladesh. They suggested that one year training for the physicians on Caesarean Section will be adequate provided the training is properly supervised by the head of the Dept. of Obstetrics and Gynaecology of the concerned Medical College, and simultaneously monitored by the ICDDR,B project team. So, the project will establish an institutional linkage with the concerned department head

ensuring proper supervision during the training and arrange regular monitoring. This has been stated in the training section of the protocol on page 22. Under the above circumstances, we believe that one-year training will be adequate for conducting Caesarean Section in a rural setting.

- h. A specialist Obstetrician will be hired as a Consultant who will be supervising the hands on surgical training at the THC at the beginning of implementing Caesarean operation and other procedures. The Medical Officers who have been trained on EOC will undertake the responsibility of hands on training at the Health & Family Welfare Centre (H&FWC). These points have been stated in page 22 on the training section of the protocol.
- i. The overall supervision of the EOC project will be done by an Advisory Committee as mentioned on page 21 of the protocol. Please note that at the local level, the Thana Health & Family Planning Officer (TH&FPO) who is the head of THC will supervise the activities at THC. At the H&FWC level and community level TH&FPO or his delegated Officer will supervise the activities. The project Senior Medical Officer will coordinate these activities with the GoB officials.

ETHICAL REVIEW COMMITTEE, ICDDR,B.

Principal Investigator Md. Yunus
Application No. 99-028
Title of Study Essential Obstetric
Care

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

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

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

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

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

Yunus 25/10/99
Principal Investigator

Trainee



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Memorandum

18 October 1999

To : Professor V. I. Mathan
Chairman, Research Review Committee

From: Professor Mahmudur Rahman
Chairman, Ethical Review Committee (ERC)

Sub : Decision of ERC on the protocol # 99-028 entitled
"Essential Obstetric Care" (PI: Dr. Md. Yunus)

You may kindly recall that the ERC considered the above mentioned protocol in its meeting held on 6th October 1999. After thorough discussion in the meeting, it was resolved that the protocol be referred back to the Research Review Committee for further review and consideration of the following issues related to the protocol.

- a) Sample size could not be found by the reviewer. It was, therefore, not clear whether the protocol is an intervention study or a service delivery project.
- b) Statement nos. 1(e), 1(f) and 2(d) need to be re-stated.
- c) If a questionnaire or interview schedule is planned for respondents, the same should be submitted.
- d) Proper consent form with the usual ingredients for this type of study needs to be prepared. The consent form attached to the proposal is inappropriate, as it is conventional one routinely used for operations.
- e) It is even stated that in the event of problem, the "hospital will accept no responsibility. This is clearly contrary to what is stated in the body of the proposal and is unethical for the purpose of a study.
- f) The PI has not clearly stated how and in what time training would be provided to research personnel for conducting Embryotomy and Partograph.

Handwritten notes:
Send
Unsent
After
Dr. Jans Alka
Dr. Yunus
18/10/99

- g) It is stated in page 26 that the doctors at THC have very rudimentary knowledge in obstetrics. Will one year's training to these category of doctors be adequate for conducting caesarian section in a rural setting?
- h) Who will supervise the hands-on-surgical training in the THC and FWC.
- i) Who will be responsible for the supervision of the essential obstetric care?

I would, therefore, much appreciate if you could kindly take necessary action in the matter.

With very best regards,

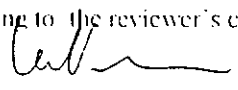
Abstract Summary

Every year millions of women in developing countries experience life threatening health problems related to pregnancy or childbirth. Bangladesh is one of those countries and maternal mortality in Bangladesh is unacceptably high. The National Programme of the Government of Bangladesh requires guidance on specific interventions for reducing maternal mortality. The specific purpose for this intervention is to test and evaluate the impact of implementing a functioning Essential Obstetric Care (EOC) intervention in Matlab Thana. The intervention will establish a functioning comprehensive EOC facility including facilities for caesarian sections and clean blood transfusion at a Thana Health Complex (THC), basic EOC at the union Health & Family Welfare Centre (H&FWC) and at the community level, and involvement of the community through meetings and surveys. The intervention will be evaluated by establishing and monitoring the relative contribution of each component to improve health services use, and to reduce maternal morbidity and mortality. Outcome measures will also include the dynamics of referral, the effect of the service on antenatal and post-natal service use, maternal perception of the services, and cost-effectiveness of the intervention at all levels. Analysis will be directed towards evaluating the impact of the intervention on the utilisation pattern of comprehensive and essential obstetric services at the facilities taken under the intervention, and also evaluate the quality of care provided both at the H&FWC and THC level.

1. This project will involve women of reproductive age (15-44 years). They will receive EOC services from the project offered through government health services. The project will not require using any special groups such as children, or groups whose ability to give voluntary written consent may be questionable.
 2. The intervention will not pose any risk to the study population. Instead, the intervention will reduce the risk of mortality and morbidity related to pregnancy related health problems. Though blood transfusion and caesarean section are procedures with some limited risk, the risk of death and disability are many times higher if those procedures are not carried out in time. Caesarean section and blood transfusion will be done only when there are no alternatives.
 3. To reduce the risks related to the procedures mentioned above the main protection will be maintaining high quality of care especially in managing complicated cases at the Thana Health Complex. To minimise the risk of complications related to cesarean section and blood transfusion high quality will be maintained and ensured. Adequate training of Medical Officers who will perform caesarian section and giving anaesthesia will be ensured. A specialist obstetrician and gynaecologist will be involved as consultant at the beginning of the project when caesarian sections will be started. In addition, the gynae and obstetric consultant of Chandpur district hospital will provide supervision and on the job refresher training to the doctors performing above procedures.
 4. All records of the subjects participating in the research component of the project will be locked in a cabinet and their identity will be kept confidential. No one will be able to access data except the investigators of the project. To protect anonymity, analysis and reporting will be done by groups without using names.
 5. Signed informed consent in standard form used by government health system will be obtained for the major procedures such as caesarian section. No minors will be involved in the study.
- When the survey on transport will be conducted, the purpose of the survey will be explained to the respondents. The survey will neither involve any sensitive question nor invade privacy and therefore verbal consent should be enough to serve the purpose.
 - The project will not need any information to be withheld from the subjects.

- The risks involved with blood transfusion and cesarean section are indeed rare. The consent form used by the government health system will be used by this project and it contains the statement that the hospital management will not be responsible for any risks related to the procedure. However, adequate precautions will be taken beforehand to minimise the risks. Yet, if any complication occur the project will assist in further treatment. We like to note again that the risks of not doing the interventions will be much higher, and we expect that the interventions in this project will be weighted against not doing the procedure and all interventions will be well justified.
6. The study will involve an interview for transport survey. The interview will be conducted at the respondents house and in an environment where the respondent feels comfortable. The interviewing would take about half an hour.
 7. The benefits to be gained by this project will be huge and pervasive, even up to the level of life saving in nature, for the individual subjects and also for the society. Since this project will deal with the women of reproductive age, this project will reduce the mortality and morbidity this group and this will add substantial benefits to the society and community in terms of child care, family care and keeping this most crucial age group economically active.
 8. This activity will require the use of the records from the Health and Demographic Surveillance conducted by ICDDR,B, records from government hospital facilities and records from the government health workers, such as Family Welfare Assistant's record book. Where applicable, the hospital records will be used in collaboration with the government health officials.

International Centre for Diarrhoeal Disease Research, Bangladesh		FOR OFFICE USE ONLY	
RESEARCH PROTOCOL		RRC Approval: Yes/No	Date:
		ERC Approval: Yes/No	Date:
1. Title of Project (Do not exceed 60 characters including spaces and punctuations) Essential Obstetric Care			
2a. Name of the Principal Investigator(s) (Last, Middle, First) Yunus Mohammad	2b. Position / Title Scientist	2c. Qualifications MBBS, MSc	
3. Name of the Division/ Branch / Programme of ICDDR,B under which the study will be carried out. Reproductive Health Programme, Public Health Sciences Division			
4. Contact Address of the Principal Investigator		4b. Fax No: +880 2 886050	
4a. Office Location: Matlab Health Research Program Public Health Sciences Division, ICDDR,B GPO Box 128, Dhaka 1000, Bangladesh		4c. E-mail: myunus@icddr.org	
		4d. Phone / Ext: 871751-60, Ext.2210	
5. Use of Human Subjects	5a. Use of Live Animal	5b. If Yes, Specify Animal Species	
Yes <input type="checkbox"/>	Yes <input type="checkbox"/>		
No <input type="checkbox"/>	No <input type="checkbox"/>		
6. Dates of Proposed Period of Support (Day, Month, Year - DD/MM/YY) Five years from the date of beginning		7. Cost Required for the Budget Period 7a. 1st Year (\$) : 814,289 2nd Year (\$) : 572,207 3rd Year (\$) : 531,038 7b. Direct Cost (\$) 2,124,136 (for five years) Total Cost (\$) 2,124,136	

8. Approval of the Project by the Division Director of the Applicant	
The above-mentioned project has been discussed and reviewed at the Division level as well by the external reviewers. The protocol has been revised according to the reviewer's comments and is approved.	
<u>Lars Åke Persson</u> Name of the Division Director	 Signature
	<u>5/9/99</u> Date of Approval

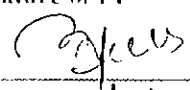
9. Certification by the Principal Investigator	10. Signature of PI
I certify that the statements herein are true, complete and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if a grant is awarded as a result of this application.	 Date: <u>5/9/99</u>

Table of Contents

	Page Numbers
Face Page.....	1
Project Summary.....	3
Description of the Research Project	
Hypothesis to be tested.....	4
Specific Aims	4
Background of the Project Including Preliminary Observations.....	5
Research Design and Methods.....	17
Facilities Available.....	25
Data Analysis.....	27
Ethical Assurance for Protection of Human Rights.....	28
Use of Animals.....	28
Literature Cited.....	29
Dissemination and Use of Findings.....	32
Collaborative Arrangements.....	32
Programme & Policy Implications	32
Biography of the Investigators	
Detailed Budget	
Budget Justifications	
<i>Appendix</i>	
Appendix I.....Transportation Survey Questionnaire	
Appendix II.....Indicators for Evaluation	

Check here if appendix is included

Principal Investigator: Last, first, middle Yunus Md.

PROJECT SUMMARY: *Describe in concise terms, the hypothesis, objectives, and the relative background of the project. Describe concisely the experimental design and research methods for achieving the objectives. This description will serve as a succinct and precise and accurate description of the proposed research is required. This summary must be understandable and interpretable when removed from the main application.*

Principal Investigator: Yunus Mohammad

Project Name: Essential Obstetric Care

Total Budget	Beginning Date	Ending Date
US \$ 2,124,136	ASAP	September, 2004

Every year millions of women in developing countries experience life threatening health problems related to pregnancy or childbirth. Maternal mortality is high in Bangladesh. About 5 women die for every 1,000 live births. The National Programme of the Government of Bangladesh requires guidance on specific interventions which may reduce maternal mortality.

The specific purpose for this intervention is to test and evaluate the impact of implementing a functioning Essential Obstetric Care (EOC) intervention in a rural area of Bangladesh. The intervention will establish a functioning comprehensive EOC facility including facilities for caesarian sections at a Thana Health Complex (THC), basic essential obstetric care at union Health & Family Welfare Centre (H&FWC) and at the community level, and involvement of the community through meetings and surveys on transportation of referred patients to the THC. The intervention will be evaluated by establishing the relative contribution of each component to improve health services use, and to reduce maternal morbidity and mortality. Outcome measures will also include the dynamics of referral, the effect of the service on antenatal and post-natal service use, maternal perception of the services, and cost-effectiveness of the intervention at all levels. Given the importance of undertaking a proper evaluation of the components of a comprehensive essential obstetric care system, the intervention will be carried out in Matlab, an area where the ICDDR,B has a comprehensive, longitudinal health and demographic surveillance system in place. The main component of this intervention will be to set-up the surgical facility, laboratory and blood transfusion at the Government THC (coverage: 500,000 population) and eight H&FWCs at the union level (coverage 20,000 population) will also be upgraded for providing basic EOC services such as normal delivery and assisted delivery other than cesarean sections. The intervention will be implemented in a step- wise fashion with upgrading the H&FWCs, two at every three months interval. The THC will be upgraded with overlapping phases of upgrading the physical facility, setting up the facility for safe blood transfusion and training the staff for performing cesarean section. At the community level, awareness will be built regarding the pregnancy related emergencies and availability of EOC services at the H&FWC and THC level. Community meetings will also be arranged to increase family's and community's awareness of the importance of timely utilisation of EOC services. It is expected that at the end of the third year upgrading all proposed facilities will be completed, and therefore full evaluation will be possible on the data for the last two years although evaluation on the EOC facility at the THC and some of the FWCs will be possible at an earlier stage.

Analysis will be directed towards evaluating the impact of the intervention on the utilisation pattern of comprehensive and essential obstetric services at the facilities taken under the intervention, and also evaluate the quality of care provided both at the H&FWC and THC level. However, both quantitative and qualitative research will be nested to investigate the issues emerged by the introduction of the intervention itself and also to investigate other issues related to safe motherhood. It is expected that this project will bring substantial benefit to the population for whom it is implemented and will also provide wider opportunity of research on reproductive health. The lessons learned from this project are expected to benefit the government of Bangladesh and other developing countries in program and policy recommendations related to safe motherhood.

Principal Investigator: Last, first, middle Yunus Md.

KEY PERSONNEL (List names of all investigators including PI and their respective specialties)

Name	Professional Discipline/ Specialty	Role in the Project
1.Md. Yunus	Public Health Scientist	Principal Investigator
2.Ishtiaq Bashir	Health Systems Researcher	Co-Investigator
3.Rubina Shaheen	Public Health Researcher	Co -Investigator
4.Jyotsnamoy Chakraborty	Health Care Manager	Co- Investigator
5.To be named	Health Economist	Co- Investigator
6. Lars Ake Persson	Epidemiologist	Co-Investigator

DESCRIPTION OF THE RESEARCH PROJECT

Hypothesis to be tested:

Concisely list in order, in the space provided, the hypothesis to be tested in the proposed study. Provide the scientific basis of the hypothesis, critically examining the observations leading to the formulation of the hypothesis.

Provision of comprehensive essential obstetric care at the sub-district level (Thana) and basic obstetric care at the sub-centre (Union) level by government health services increases the utilisation of those services.

Studies in different developing countries have repeatedly established that when effective safe motherhood services are provided, community's and women's use of those services increases significantly. This proposition has not been tested yet in the context of Essential Obstetric Care (EOC) but it is assumed that similar findings will be detected.

Specific Aims:

Describe the specific aims of the proposed study. State the specific parameters, biological functions/rates/processes that will be assessed by specific methods (Type within limits)

The specific aim of the study follows the following general aim:

The general aim of the intervention is to provide basic and comprehensive Essential Obstetric Care (EOC) services by the government to all women who need those services and to increase utilisation of basic and comprehensive essential obstetric services provided at the Government H&FWC and THC level facility respectively.

The specific aims of the intervention are:

- I. to test whether availability of comprehensive essential obstetric care at the THC level will effectively improve referrals to the hospital in case of obstetric complications.
- II. to test whether improved basic essential obstetric care at the H&FWCs and at the community level improves the management of obstetric complications.
- III. to test the feasibility of providing obstetric care services at the THC and H&FWC levels.
- IV. to explore ways to improve community involvement and local transport to refer obstetric patients.

Principal Investigator: Last, first, middle Yunus Md.

Background of the Project including Preliminary Observations

Describe the relevant background of the proposed study. Discuss the previous related works on the subject by citing specific references. Describe logically how the present hypothesis is supported by the relevant background observations including any preliminary results that may be available. Critically analyse available knowledge in the field of the proposed study and discuss the questions and gaps in the knowledge that need to be fulfilled to achieve the proposed goals. Provide scientific validity of the hypothesis on the basis of background information. If there is no sufficient information on the subject, indicate the need to develop new knowledge. Also include the significance and rationale of the proposed work by specifically discussing how these accomplishments will bring benefit to human health in relation to biomedical, social, and environmental perspectives (DO NOT EXCEED 5 PAGES, USE CONTINUATION SHEETS).

The Safe Motherhood Initiative, launched in 1987, aimed to reduce the number of maternal deaths by the year 2000. In 1996, new estimates of maternal mortality indicated that 80,000 more women died from complications of pregnancy and labour than earlier estimates had suggested. The majority of maternal deaths seems to be directly due to obstetric complications such as hemorrhage, unsafe abortion, hypertensive disorders, sepsis, and obstructed labor. To date, the focus of safe motherhood programs in most countries has been on delivery of maternal services rather than Essential Obstetric Care (EOC). The challenge in reducing maternal mortality is to concentrate on improving efficient delivery of care for emergency obstetric complications in addition to ongoing maternal health care services. The following review discusses the barriers to timely and appropriate EOC, the cost of EOC, and research needs and information gaps. The review indicates potential interventions that can be effectively carried out at various levels of the health system starting from the community itself and the health services. Though most of the studies cited below are conducted in African countries, the finding may be equally applicable in the context of many developing countries in Asia including Bangladesh.

Throughout at least one decade there was worldwide realisation that indeed all pregnant women are at risk of developing complications though most life-threatening complications occur during labor and delivery, and within 48 hours of birth. Research repeatedly showed that prenatal screening does not identify all of the women who will develop complications, and women who are not identified as “high-risk” can and do develop obstetric complications. Research even showed that most obstetric complications occur among women with no risk factors (Rooks, Winikoff, and Bruce 1990). For example, at a health center in Kasongo, Zaire, a prenatal care program was implemented where pregnant women were screened for their risk of developing obstetric complications, and those coming in with a bad obstetric history (history of stillbirths, medical intervention during delivery) were identified as “high-risk”. The Kasongo data, however, showed that only 29 per cent of women who actually did develop obstructed labor were from the “high risk” group and more than two-thirds of the women who developed this complication were not predicted by the screening program (Kasongo project team 1984). An evaluation of antenatal and delivery care in Matlab showed that the positive predictive value of antenatal screening in predicting serious complication is almost zero (Vanneste and Francisco 1992). Furthermore, many women who were diagnosed as not at risk of developing serious complication indeed developed serious complications. Similarly, evidence that obstetric complications are common despite intensive prenatal care and screening was illustrated in a study of deliveries in non-hospital birth centers in the United States (Weatherby 1990). In that study, one of every thirteen women categorized as “low-risk” and receiving intensive prenatal care developed serious complications. Therefore, every pregnant woman has to be considered “at risk” of

Principal Investigator: Last, first, middle Yunus Md.

developing complications. These findings indicate that facilities with EOC should be available and accessible to all pregnant women since all pregnant women are at risk of developing complications at any time, and need to utilise EOC at any time.

The Safe Motherhood Initiative was launched more than a decade ago, in 1987. The prime goal of the Initiative was to reduce the number of maternal deaths by half by the year 2000. Yet, WHO report in 1996 suggest that globally each year about 500,000 women die from complications of pregnancy and labor (WHO 1996). Of these more than 95 per cent occur in developing countries, where maternal mortality ratios range from an average of 190 per 100,000 live births in Latin America and the Caribbean to 870 per 100,000 in Africa (WHO 1996). In Bangladesh, maternal mortality ratio is around 5 per 1000 live births (BBS). It is also estimated that the majority or 75 per cent of maternal deaths are direct obstetric deaths due to obstetric complications such as hemorrhage, unsafe abortion, hypertensive disorders, sepsis, and obstructed labor. Since the maternal mortality has not declined up to the expected level, the focus of Safe Motherhood today is, therefore, on Essential Obstetric Care realising the fact that the goal of reducing maternal mortality cannot be achieved if prompt and adequate care is not available for obstetric complications (Maine, 1991).

The “3 Delays Model” developed by the Prevention of Maternal Mortality (PMM) Network (Maine *et al*), involved in EOC related activities in three West African countries Nigeria, Ghana, and Sierra Leone, identifies the points at which delay to EOC can occur (1) delay in deciding to seek care; (2) delay in reaching a first referral level facility; and (3) delay in actually receiving care after arriving at the facility. The PMM Network believes the delay in actually receiving care after arriving at the facility is the most critical, and must not occur. This delay can be reduced significantly by ensuring EOC at Thana level.

Studies carried out at facilities providing comprehensive EOC showed **delay in treatment** once women arrive at the facilities to be a major contributing factor to maternal mortality with admission-to-treatment intervals ranging from a mean time of 26 hours to 15.5 hours (PMM Network 1995). Long admission-to-treatment intervals were attributed to shortage or lack of essential supplies and equipment, including drugs, gloves, sutures, and anesthetic agents at the facilities, forcing the patient to wait while relatives try to acquire required drugs and supplies in private pharmacies. In Senegal's Kaolak hospital for example, transfusion was not available for 80 per cent of women referred in labor needing Transfusion, nor was anesthesia available for 64 per cent of those who needed it (Region medical de Kaolak 1988).

Difficulty in obtaining **blood transfusion** is a major obstacle in the management of obstetric emergencies. For example, a study in rural Tanzania concluded that the difficulty in obtaining blood was responsible for 35 per cent of maternal deaths (Price 1984). In a study at the University of Nigeria Teaching Hospital in Enugu, the survival rate for patients with ruptured uterus who were unable to have a blood transfusion was 57 per cent compared to a survival rate of 76 per cent for patients who received blood transfusion (Megafu 1985). Most of the health care facilities studied either did not have blood banks or had blood banks that were inadequately stocked (PM Network 1992).

Lack of adequate operating theater space at the facility also contributed to treatment delays, since obstetric emergency cases had to compete with other surgical cases for the single general operating theater. The delays were found to be shorter during the weekends when the operating theater was more accessible because no general surgery cases were scheduled (PMM 1995).

Principal Investigator: Last, first, middle Yunus Md.

Focus group surveys with community members identified **lack of drugs, blood, essential supplies, and equipment as major barriers**. The strongest concerns voiced after lack of supplies, were shortage of staff and shortage of competent staff trained to manage obstetric complications (PMM 1992). For example, a study in four regions of Tanzania indicated that delayed diagnosis or inappropriate management or both were implicated in 36 per cent of maternal deaths (Mtimavalye 1984).

Lack of appropriately trained staff was also a major problem identified in a community-based study of maternal mortality undertaken in Zimbabwe during a two-year period from 1989 to 1990 (Fawus *et al.* 1996). Avoidable curative-care factors were responsible for 87 per cent of maternal deaths in the rural study area and for 70 per cent of maternal deaths in the urban study area. The study identified inadequate treatment by incompetent staff specifically inadequate resuscitation of women suffering from hemorrhage and septic shock, insufficient antibiotic therapy and inadequate skills in surgery and anesthesia as avoidable factors for maternal mortality.

Lack of supervision of staff was an additional avoidable factor for maternal mortality identified in the Zimbabwe study (Fawus *et al.* 1996). The study reported that the responsibility for managing emergency complications often was shouldered by relatively junior staff who failed to diagnose/recognize the severity of the complications. This was further compounded by limited supervision of the junior medical staff.

In a study in Tanzania, **complacency attitudes among staff** were identified as one of the major barriers (Mbaruku and Bergstrom 1995). The study found that most of the staff were convinced that maternal deaths were due to circumstances beyond their control such as delayed arrivals, cultural factors, and lack of drugs and equipment. All these reasons justified passivity especially when coupled with low staff morale due to low pay. Staff tended to forget their potential capacity to solve problems and few or no attempts were made to look for appropriate solutions to obvious problems.

Barriers to Reaching a Facility with EOC Capabilities. Once a decision has been made that a complication needs medical intervention, availability of transportation and easy accessibility to a facility with EOC capabilities become factors of paramount importance. The Zimbabwe maternal mortality study reported **unavailability of transportation** contributed to 28 per cent of deaths in the rural study area and 3 per cent of those in the urban study area (Fawus *et al.*, 1996) The study also reported that among the deaths in the rural area, seven were women who had been staying in a specially designed shelter (similar to a maternity waiting home) as advised, but died because of the lack of transport to a higher referral level.

In most areas, no ambulances are available and in remote villages, no car passes for days. In addition to distance and unavailability of public transportation, other factors such as **condition of the roads** (in several study sites in Africa, travelling on bad roads itself was considered a cause of hemorrhage), and travel costs have been identified as barriers to reaching a facility. Some focus group participants indicated they would go to a traditional practitioner rather than risk the frustration and expense of going to a distant facility (PMM 1992). **Distribution of facilities** is another barrier. Facilities that exist are more often concentrated around urban areas and studies have repeatedly shown that urban dwellers have better access to health facilities than rural inhabitants (Thaddeus and Maine, 1990).

Principal Investigator: Last, first, middle Yunus Md.

Even where facilities with capabilities for EOC are easily accessible, **women may not use them**. In the Zimbabwe study, delay in the decision to seek care contributed to 32 per cent of deaths in the rural study area and 28 per cent of those in the urban study area (Fawcus *et al.*, 1996).

Women's status in the immediate and extended family generally underlies and shapes the decision to seek care (PMM 1992). Many studies show that **women cannot and do not decide** on their own to seek care; the decision belongs to a spouse or senior members of the family. In a survey in six Senegalese regions, 52 per cent of the respondents said the decision would be made by the husband and 44 per cent said another family member would make the decision (Dia *et al.*, 1989).

Other factors influencing decision making under emergency conditions include **perceived severity of the complication**. Pregnancy and delivery are regarded as natural processes and signs and symptoms of complications are not always recognized as reasons for concern. For example, focus group studies in Sokoto and Zaria, Nigeria, and Bo, Sierra Leone, showed that prolonged labor was not considered a complication and reason to seek care until two to five days had elapsed (PMM 1992). Failure to recognize the severity of symptoms also was cited as a major reason for delay in seeking care in the Zimbabwe study (Fawcus *et al.* 1996).

Societal expectations interfere with the use of health services in emergency conditions. Delivery at home remains one way for women to achieve status. For example, a woman who has to go to a hospital for delivery is thought to have failed in her essential role as a woman and is stigmatized (PMM 1992). In Benin, women of the Bariba tribe are expected to be stoic during labor and delivery, and the woman who manages to deliver without calling for assistance is especially esteemed (Sargent, 1985).

Culture and tradition have great influence on the decision to seek care and, therefore, on maternal morbidity and mortality. For example, in many African and Asian settings, women's use of health facilities may be restricted by the necessity for privacy and/or the custom that a male relative must accompany them while travelling. For Saudi Arabian women, the requirement that care must be given by a woman has hindered the use of health care services.

The necessity of travelling long distances (often due to the inequitable distribution of facilities) and the **lack of transport were deterrents** in deciding to seek care, as was dissatisfaction with staff attitudes and performance.

Users' fees may influence utilization of non-emergency services, but findings from studies indicate that users' fees have little impact on seeking care at an EOC facility in emergency conditions, once the decision to seek care has been made. In fact, at several PMM study sites where fees for services were introduced, although normal deliveries decreased markedly, the number of complicated cases seen did not change.

Most studies for **improving EOC** have been carried out in Africa by the PMM Network. The following is a review of their experience. It is widely accepted by international experts that the route to safer motherhood lies not through expensive technologies but through strengthening and upgrading existing health systems to provide essential elements of obstetric care to all those in need. As shown by the following best practices, appropriate life-saving EOC capabilities can be made available at each level of the health system. For capabilities can be made available at each level of the health system. For example, staff at a rural health posts with basic EOC capabilities would not be

Principal Investigator: Last, first, middle Yunus Md.

expected to perform a cesarean section, but would be expected to make a correct diagnosis, resuscitate and stabilize the patient, and refer her.

The “Warmi” (woman) project funded by USAID/Mother Care in Inquisivi, an isolated rural province in Bolivia, focused on community level activities, such as forming and enhancing community women’s groups and strengthening **community education** in order to foster greater responsibility for self care and early decision to seek care (Kwast, 1995). The project identified and prioritised maternal and neonatal health problems prevalent in the community using community women (“auto-diagnosis”), and in collaboration with a local NGO active in the area, implemented community education programs through simple booklets and radio programs. At the end of a three-year period, the most striking result noted was the reduction in perinatal deaths (PND) from 75 deaths (pre-intervention) to 31 deaths (post-intervention). The project attributes the decline to: (1) safer birthing practices; (2) knowing when to reach out for assistance; (3) better care of neonates, and (4) increased knowledge and use of contraceptives. Although information on obstetric complications was not recorded, a decline in PND indirectly reflects a decline in some obstetric complications, such as obstructed labor and antepartum hemorrhage (third trimester bleeding), which are important causes of PND. Increased use of family planning in the area also may have had an effect on maternal mortality due to abortion.

Often, traditional birth attendants (TBAs) and community members know that a woman will die from bleeding or from eclamptic convulsions, but they frequently wait too long to seek care at a health facility. In the PM study areas in Nigeria, Ghana, and Sierra Leone, community information campaigns using local channels of communication, such as town criers and community meetings, have been used for community information campaigns. The information includes danger signs during pregnancy and labor, where to go when a complication occurs, and what the initial costs will be. In Sierra Leone and Nigeria, community motivators were trained to improve **community awareness** of obstetric complications, to establish village action groups for community loan funds, blood donation and emergency transport, to establish links with pregnant women in the community, and to facilitate referral for women with complications.

Lack of blood is a constant problem that can delay treatment and result in death. Two PMM project areas in Ghana and Nigeria established community blood donor associations to increase voluntary blood donation. These associations were established through community mobilization sessions and non-cash incentives, such as certificates of honor, free blood screening, and priority assurance if a family member needed blood.

Lack of money to buy essential drugs and supplies for EOC has been identified as one barrier to receiving treatment for complications. In a PMM project in Sierra Leone, communities were motivated to establish community loan funds. Per capita levies were set and repayment was enforced by the community chief. Funds were managed by village development committees and loans were granted to women who could not pay for treatment. Compared to communities without community loan funds, utilization of health facilities increased for Essential Obstetric Care by women from communities with community loan funds during the study period. Utilization remained unchanged in communities without community loan funds.

A strong **referral system** starts from the community level up beginning with trained traditional birth attendants at the community level, availability of emergency transportation, midwives posted at the health post level, maternity waiting homes established near a referral site, and health centers or district hospitals upgraded to provide basic EOC or comprehensive EOC at the first referral level.

Principal Investigator: Last, first, middle Yunus Md.

Following the 1978 Alma Ata conference that launched the “Health for All by 2000” strategy, the government of The Gambia formulated its primary health care (PHC) action plan. A key component of the PHC action plan was the training of the traditional birth attendants (TBAs), who together with village health workers (VHWs), form the core of the village health services. Under the PHC action plan, one TBA per village (from villages with a population greater than 400) was selected to be trained. The selected TBAs took a 10-week government training course and received birth kits that included clean dressings, scissors, string, ergometrine tablets and disinfectant. A study to assess the impact of the training on TBA practices showed a significant difference in knowledge between trained and untrained TBAs with respect to identification of high risk factors and the need for timely referral (Post *et al.*, 1991).

Timely referrals by trained TBAs also increased in the study area and TBAs also accompanied women with complications to the health center for delivery by a trained midwife. Maternal mortality ratio fell from 2716 per 100,000 live births to 1051, a 61 per cent reduction (Geenwood, 1991). However, it should be noted that the health center in the study area was upgraded to handle emergencies during the study period and emergency transport options were improved.

In some areas in Nigeria, Ghana, and Sierra Leone, the PMM teams are planning to train TBAs to provide some very basic obstetric first aid management. Hemorrhage is a major cause of maternal mortality contributing to about a quarter of direct obstetric deaths. TBAs can be taught to arrest bleeding through massage of the abdomen (fundus) or nipple stimulation, which produces uterine contractions. They also can be taught to squeeze the uterus with both hands (external bimanual compression) to slow the bleeding.

Training TBAs can have an impact on maternal health outcomes, but training TBAs alone cannot bring about significant changes in maternal mortality unless TBAs are supported by a functional referral system, effective referral facilities, and a good working relationship between the TBAs and the formal health system.

Many women die while waiting for **transportation** or during transportation to first referral level facilities, because of the inadequacy of emergency transportation. For example in Addis Ababa, Ethiopia, 13 per cent of maternal deaths recorded over a two-year period occurred on the way to the hospital. Transportation to an appropriate health facility was a major problem. In the PMM project areas, communities, and associations of transport workers were mobilized to provide transport to emergency care facilities. In Sierra Leone, where vehicles are very rare at the rural level, a system was developed whereby women with complications were conveyed to a health facility in a hammock carried by four men. In Nigeria, where roads exist and cars are more common, community leaders were mobilized to collaborate with the local transport workers union to establish a roster of vehicles that could be used for emergency transportation. Union drivers were sensitized and a revolving emergency fuel fund was established. In Ghana, communities established a roster of vehicles that could be used for emergency transport in the area. In Mali, communities established community insurance funds from which money to buy up to 100 liters of gasoline for emergency transportation can be obtained. In The Gambia, the community invented motorized carts to take the women to a point where public transport and boats are available. In some parts of Africa, women’s groups pool funds and lend them to various members in turn.

In Matlab, Bangladesh, government trained **nurse-midwives were posted to rural H&FWCs**. The nurse-midwives were supported by a strong referral system that included a maternity clinic capable of providing basic EOC, which in turn was supported by a district hospital with comprehensive EOC services. A transport system capable of referring the patient from the rural health post to the

Principal Investigator: Last, first, middle Yunus Md.

maternity clinic (via boat) and from the maternity clinic to the district hospital (via ambulance) was also in place. It was reported that the mortality ratio declined substantially from 440 to 140 deaths per 100,000 births in the study area in the three-year period 1987-1989, while in the control area the decline was not as significant the mortality ratio fell from 390 to 380 (Fauveau *et al.*, 1991). The conclusion drawn from the study was that stationing midwives in rural areas resulted in early diagnosis with treatment or stabilizing of obstetric complications and increased referral to the clinic, which was staffed by physicians (Maine *et al.* 1996). With a strong referral system and arrangements for transport in place, patients from the study area were able get to the clinic and if necessary, from there to the district hospital in greater numbers, and probably in better condition. In addition to posting midwives at the village health post level, a functioning referral system was critical to achieving the decline in maternal mortality.

The referral system was strengthened in West Kiang, a rural area of The Gambia, by establishing a midwifery outreach service. Villages of 400 or more inhabitants in the area were served by a health center staffed by a government midwife, and groups of five villages were served by a community health nurse and a government-trained traditional birth attendant (TBA). Under the improved midwifery outreach service, a second midwife was posted at each village health center. This ensured increased coverage of the villages by the midwives as well as increased supervision of the community health nurse and the TBAs. An evaluation of the project's effectiveness using a control area without midwifery outreach service showed a greater number of referrals to the referral hospital in the study area (both antepartum and intrapartum), a greater number of facility-based deliveries, and a higher proportion of women delivered by trained TBAs (Foord, 1995).

Maternity waiting homes are basic structures located near a health center or hospital for women from rural areas who are at high risk. In a rural district of Ethiopia, setting up MWHs near a rural community hospital for pregnant women at high risk led to a decline in maternal and perinatal mortality (Poovan, Kifle, and Kwast 1990). The labor and the material for building the MWHs were provided by village communities. Women using the facility supply their own food and buy firewood locally. During the study period, 13 maternal deaths occurred among women with complications who were admitted directly to the hospital, compare to no mortality among women who came to the MWH at term. A hospital-based cohort study carried out in Zimbabwe to evaluate the effect of stay in an MWH also found that women who stayed in MWHs had a lower risk of poor pregnancy outcome namely perinatal death (PND) compared to women who came directly to the hospital from home during labor. The study found that women from the obstetric risk group that stayed at the MWH reduced their risk of PND by nearly 50 per cent compared to controls (Chandramohan *et al.*, 1995). The most likely mechanism for the reduced risk of PND among women who stayed at the MWH was rapid intervention in the event of intrapartum complications, such as obstructed labor and antepartum hemorrhage, which are important causes of PND. Conversely, experience in Zaire showed that the MWHs in Karawa were underutilized primarily because of a lack of community involvement in designing and building the homes and consequent lack of consideration for community concerns, particularly related to patients' food preparation.

In Kumasi, Ghana, a general physician was trained in EOC and posted to a health center, and midwives at the health center were trained in life-saving skills. The maternity ward and operating theater were refurbished and a revolving drug fund created for procurement of essential obstetric drugs and supplies. A running water supply also was established with community involvement (Djan *et al.*, 1996). Since upgrading the health center, the number of women with complications coming for care increased almost threefold. This indicates that where quality services are available, people will use them. Most complications were ably managed at the upgraded center and the proportion of those who had to be referred to other institutions dropped from 42 per cent to 17 per

Principal Investigator: Last, first, middle Yunus Md.

cent. No deaths occurred among women treated. In addition to the salary of the physician, the cost of improvements was US \$30,000, mostly for equipment and supplies and came from project funds, established NGOs in the region, the government, and the community.

In Gambia, maternal mortality declined at the Royal Victoria Hospital, one of the two referral hospitals, after **upgrading the health centers** to basic EOC facilities. The decline was attributed to initial care received at basic EOC facilities, which stabilized the patients' conditions before referral, increasing the chances for survival. Seven health centers were upgraded and equipped to handle emergency obstetrical care and staffed with midwives and nurse-anaesthetists who had been trained in essential obstetric care, including surgical contraception. The centers were supported by two referral hospitals and, at the community level, by mobile outreach teams and government trained TBAs. Under the program, emergency transport and communications also were upgraded. A radio communication network system was established to link the health centers to the referral hospitals and ambulances were provided for some health centers.

An assessment of the Birnin Kebbi Hospital in Nigeria revealed poor **quality in care** of EOC. Focus group discussions with community members emphasized poor services as a reason for not seeking care. To improve quality, several specialist obstetricians visited the hospital on a rotating basis over a one-year period and provided training to general physicians on care of emergency obstetric complications. Midwives were trained to identify and manage obstetric complications. In addition, an obstetric first aid box with essential drugs and supplies was introduced, and a revolving fund was established through which drugs and supplies were made available. Since improving quality of care at the hospital, the number of women with complications seeking care increased while the case fatality rate dropped from 22 per cent to 5 per cent (Oyesola *et al.*, 1996).

The following studies illustrate approaches taken to improve quality of EOC. The MotherCare project, implemented in five countries including Uganda and Nigeria, aimed to improve the quality of maternal care by strengthening the knowledge and skills of midwives through life-saving skills training (Kwast, 1995). The life-saving skills (LSS) training program provided midwives with an expanded number of skills for preventing and managing obstetric emergencies. The three-week competency-based training program includes: (1) monitoring progress of labor using the partograph; (2) preventing and treating post-partum hemorrhage; (3) managing difficult deliveries focusing on vacuum extraction; (4) hydration and rehydration; (5) preventing and managing sepsis; and (6) resuscitating the adult and the newborn. The LSS training resulted in decreased postpartum hemorrhage, reduction of prolonged labor, improved infection control and reduction in postpartum sepsis. In Ghana, midwives are being trained in manual vacuum aspiration (MVA) for preventing incomplete abortions and MVA has been incorporated into Ghana's LSS training program.

Negative client-provider interactions have been identified in focus group research in several countries as a major barrier between the community and the health system. To guide client-provider interactions, the Program for Appropriate Technology in Health (PATH) in collaboration with other institutions (Georgetown University's Institute for Reproductive Health and a local NGO in Bolivia) developed a training manual to improve the interpersonal communication and counseling skills of providers. The training, focused on participatory skills, assisted providers to develop skills that enabled them to interact with clients in such a way that when information is given to the client such as recognition of complications, the importance of seeking care, or where to seek care the client can relate to the information given and therefore can make informed decisions. Most of the work related to interpersonal communication and counseling skills has been done only in Latin America and the Caribbean.

Principal Investigator: Last, first, middle Yunus Md.

Expanding the roles of non-physicians, specifically in areas where there are few or no doctors, play a pivotal role in preventing many needless maternal deaths as documented by the following best practices.

In rural northwestern Zaire, selected obstetric nurses at Karawa and Wasolo hospitals were trained to perform emergency surgery, including cesarean section and surgical management of ruptured uterus (White *et al.*, 1987). In Karawa, 278 of 321 cesarean sections were done by the trained nurse-surgeons during a period of 18 months, with two deaths (a fatality rate of 1 per cent). In Wasolo, 32 cesarean sections were done by nurse-surgeons during a course of 13 months with one death. A combined total of 16 laparotomies for ruptured uterus also were performed by nurse-surgeons in Karawa and Wasolo, with only two fatalities. Without surgery, all 16 women would certainly have died.

In Ghana, the life-saving skills training program is a continuing education project for midwives. Since 1990, nearly 400 midwives have undergone the two-week competency-based training course that provides midwives with an expanded number of skills for preventing and managing obstetric emergencies and complications. The trained midwives reported positive results including better management of postpartum hemorrhage, prolonged labor, toxemia, and infection (Taylor, 1995). The results of the program indicate that with training and support midwives are capable of performing many interventions that were hitherto carried out only by physicians and obstetricians. They constitute an army of health professionals whose potential should be fully utilized.

PMM in collaboration with hospitals, has developed “pack systems” and “emergency boxes” of supplies for treatment of obstetric complications in order that **drugs and supplies** necessary for EOC are readily available at the facility when needed. For example, teams have developed different pack systems for treatment of leading causes of maternal mortality hemorrhage, obstructed labor, sepsis, and eclampsia. Packs for cesarean section also have been developed, which include supplies such as gauze, syringes, needles, anesthetic agents, antibiotics, intravenous fluids, and ergometrine (Update 1994 PMM Network). Packs used in treating an obstetric complication are then paid for or replaced by the woman’s family. Other strategies implemented to increase availability of drugs and supplies at facilities providing services for EOC include: implementing small revolving fund schemes to purchase essential drugs and supplies for EOC and establishing 24-hour pharmacy services (PMM 1995). The pack system has been so well received by some hospital management boards that similar pack systems have been developed for treatment of illnesses other than emergency obstetric complications.

At a rural hospital in Bo, Sierra Leone, the PMM team initiated the establishment of a cost recovery system for drugs. Essential drugs and supplies were procured through a commercial source outside regular government channels and emergency obstetric drug packs were then created and made available at prices calculated to cover costs plus an 85 per cent mark-up. The drug packs were available 24 hours and prices ranged from 45 per cent to 68 per cent of the prices charged by the government hospital. Of the 26 patients who received emergency drug packs during the study period, 12 paid in full and 9 paid in part, accounting for recovery of 57 per cent of charges. Those who paid in part were given credit and followed up.

The results from an intervention program at a regional hospital in Kigoma, Tanzania, focusing on **improving hospital management** to provide a conducive working environment revealed reduction in maternal mortality from 933 to 186 per 100,000 live births over the period 1984 to 1991 (Mbaruku and Bergstrom, 1995). The intervention program focused on clarifying responsibilities, delegating more responsibility to nurses and midwives, regular monthly meetings with increased feedback,

Principal Investigator: Last, first, middle Yunus Md.

regular staff evaluation, and increased on-the-job training programs. Other interventions included: regular maintenance of equipment using local materials and resources, identification of norms for patient management and referral, and development of a detailed plan for the continuous supply of essential drugs including the initiation of a sub-store in the maternity ward.

The improved availability of essential drugs due to the buffer effect of the sub-store, the availability of basic working tools due to regular maintenance schedules using local materials and resources, increased on-the-job training programs, clarification of responsibilities, and increased feedback and information sharing through regular meetings all resulted in significant improvement in the skills and the morale of the staff.

The results of a hypothetical model developed to evaluate the **costs of providing EOC** based on a population of 300,000, 95 per cent coverage, a crude birth rate of 40, hypothetical figures related to infrastructure such as the per centage of deliveries that take place in a health service location and the average occupancy rate showed the following: salaries were the largest proportion of input costs associated with provision of EOC (31 per cent), followed by infrastructure improvements (16 per cent), drugs (10 per cent), and laboratory (9 per cent). When costs were broken down by intervention, management of normal deliveries represented the largest proportion (62 per cent), compared to management of obstetric complications (37 per cent), and neonate management (1 per cent) (Cowley, 1996).

It will be important to identify the most appropriate financing and cost-recovery measures for provision of services for EOC in different settings. In virtually all settings, people are already paying for at least some maternal care services. People traditionally pay traditional birth attendants in cash or in kind for their services and buy a variety of medicines including contraceptives. In fact, PMM studies indicate that users' fees have little impact on seeking care at an EOC facility in emergency conditions, once the decision to seek care has been made. Caution is needed, however, when fees are charged to low-income women. Fee structures based on income, fee exemptions for certain services, and subsidies for certain services have been used successfully in some countries (Tinker *et al.*, 1993). Subsidies or allowances also can be provided to nurse-midwives working in remote rural areas.

In Bangladesh, two projects of EOC were implemented, one by the Obstetrical and Gynaecological Society of Bangladesh funded by UNICEF (Bhuiyan 1997) and another by the Thana Functional Improvement Pilot Project sponsored by European Union (Begum & Muni 1997). Experiences and lessons learnt from these two projects regarding training of medical officers and implementation are taken into account and incorporated in this project.

Different components of services related to safe motherhood have been implemented at **Matlab**. Research has also been nested evaluating the impact of those activities. Subsequently, data on the project was analysed and it was found that there was significant reduction of death due to direct obstetric causes in the Matlab intervention area compared to that in the control area. Some of the earlier researchers who had worked in Matlab have attributed this reduction mainly to the posting of trained nurse/midwives to rural centres (Fauveau *et al.*, World Bank 1993:129). However, other investigators, namely Maine *et al* in 1996 and Ronsmans *et al* in 1997, have analysed subsequent data on the same area but covering a longer period for a better understanding of what caused the reduction of maternal mortality in Matlab. Maine *et al* concluded that in addition to the posting of nurse/midwives, the efficient referral system along with effective transport system provided by the program, and the quality of emergency obstetric services available at Matlab may have contributed in the decline (Maine *et al.*, 1996). Specifically, the decline was due to several reasons: greater utilisation of maternal health services at Matlab which was resulted from the posting of midwives at Matlab, considerable treatments of obstetric complications by midwives and staff including

Investigator: Last, first, middle Yunus Md.

physicians at Matlab clinic, and the functioning chain of referral and proper transport which enabled the patients from the intervention area to travel to Matlab clinic and to Chandpur. The authors also argued that the decline in maternal mortality would have been highly unlikely to have taken place in the absence of a referral point, the district hospital, which have been of reasonable quality (Maine *et al.*, 1996). The authors concluded that the contribution of community-level intervention to reducing maternal mortality depended upon the functioning of higher levels of the health system.

Further to what Maine *et al* have shown, Ronsmans *et al* have found that maternal mortality due to direct obstetric causes declined not only in the area where maternity care services were available but also declined in the area where essential obstetric services provided by the district hospital were relatively accessible. Ronsman *et al* have also found that from 1976 till 1993 there were 624 maternal deaths which gives a figure of 510 maternal deaths per 1,00,000 live births. Of these 454 (72.8%) were due to direct obstetric causes. Among the latter group, 105 (23%) deaths were due to postpartum haemorrhage, 93 (20%) due to induced abortion, 80 (18%) due to eclampsia, 40 (9%) due to dystocia, and 37 (8%) due to postpartum sepsis. These figures represent the condition after the introduction of the community based maternity care program in Matlab (Ronsmans *et a.*, 1997), and indicated that simultaneous provision of comprehensive and basic Essential Obstetric Care at Matlab could have prevented many of these deaths. For example, if iron supplementation program during antenatal care could have been augmented by the availability of emergency blood transfusion facility at Matlab, this joint endeavour could have prevented many maternal deaths due to postpartum haemorrhage. In addition, knowing the availability of blood transfusion at the sub-district level women may also would have accepted early referral. Similarly, facility for cesarean section could have prevented deaths due to dystocia.

The experience at Matlab has shown that maternal mortality could have been declined further if EOC would have been made available at Matlab. This is because a significant proportion of women who were referred to visit Matlab hospital or even sub-centres of ICDDR,B at Matlab have declined to visit only because of the fear of further referral to Chandpur, the district hospital. The findings of research at Matlab indicated that there might be a level of maximum decline without EOC facility at Matlab. If further decline in maternal mortality is expected then efficient EOC facility need to be provided at Matlab. Review by Maine *et al* also clearly indicated the need to start such an intervention program (Maine *et al.*, 1996). Though it may not be possible to translate the achievements exactly in terms of decline in maternal mortality ratio (MMR) which needs measuring the impact for at least five years with the support of a good tracking system of all maternal deaths, the impact may be measured by other alternative process and outcome indicators that can be measured over a relatively shorter period of time such as three to five years. Researchers who worked in Matlab have also expressed that measuring MMR even by alternative methods, such as sisterhood method, which does not need strong infrastructure, is not suitable for evaluating intervention programs (Maine *et al.*, 1996). This is partly because of the sample size needed and partly because of the time frame required (Maine *et al*, 1996), since the method estimates the level of mortality a decade before the survey. Therefore, there is strong argument that instead of maternal mortality, indicators of health care use may provide nearly accurate estimate of the impact of interventions like essential obstetric care.

It is evident from the studies conducted in Matlab that a combination of factors has played major role in the current reduction of maternal mortality ratio. Yet, the rate is very high in comparison to many other developing countries even though maternal mortality due to direct obstetric causes has reduced to some extent. What is agreed by all investigators in maternal health is that when a woman visits a health facility with a serious pregnancy related complication, essential obstetric services must be present there to cease her life even if it is at the last moment (Thaddeus and Maine, 1990). The

Principal Investigator: Last, first, middle Yunus Md.

present health care facility at Matlab which is reasonably accessible to the community is unable to provide Essential Obstetric Care. Comprehensive obstetric care is only available at the district hospital at Chandpur. The socio-economic and geographical factors do not permit a majority of women to use EOC services at Chandpur. There are, therefore, very strong arguments that comprehensive essential obstetric services including cesarean section and blood transfusion should be instituted at Thana level at Matlab Thana Health Complex. So, we propose to conduct an intervention study testing a system of comprehensive EOC services at the Thana Health Complex level, basic EOC services at eight Union H&FWCs, community based interventions in order to aware and prepare families that emergencies may arise at any time, and conduct surveys to detect and improve the existing transport facilities for pregnant women.

Research Design and Methods

Describe in detail the methods and procedures that will be used to accomplish the objectives and specific aims of the project. Discuss the alternative methods that are available and justify the use of the method proposed in the study. Justify the scientific validity of the methodological approach (biomedical, social, or environmental) as an investigation tool to achieve the specific aims. Discuss the limitations and difficulties of the proposed procedures and sufficiently justify the use of them. Discuss the ethical issues related to biomedical and social research for employing special procedures, such as invasive procedures in sick children, use of isotopes or any other hazardous materials, or social questionnaires relating to individual privacy. Point out safety procedures to be observed for protection of individuals during any situations or materials that may be injurious to human health. The methodology section should be sufficiently descriptive to allow the reviewers to make valid and unambiguous assessment of the project. (DO NOT EXCEED TEN PAGES, USE CONTINUATION SHEETS).

This is a maternity care intervention project that will be carried out in Matlab thana. The project will be implemented jointly by ICDDR,B and government staff working in close collaboration. All the services will be provided by the GoB health services at Matlab and ICDDR,B will be giving necessary technical assistance to the GoB. The advantages of implementing this intervention in Matlab include the following:

1. ICDDR,B-the Centre for Health and Population Research has maintained a unique demographic surveillance system in part of the catchment area of the Matlab Thana Health Complex. This system provides baseline data to compare with future intervention and allows evaluation of indicators such as mortality and morbidity.
2. The system is probably the best posed in Bangladesh in which the use of referral system can be evaluated, by allowing linkage of health services use at various levels.
3. ICDDR,B Matlab MCH-FP Project has had extensive experience in Safe Motherhood initiatives including several major interventions designed to bring obstetric care closer to the community through establishment of basic obstetric care facility at union level health sub-centres with referral system to Matlab Primary care hospital facility. The sub-centre facilities provide delivery care including first-line treatment for complications by a nurse/midwife. This experience will be utilised in implementing the new project involving the government health workers at the community, union level Health and Family Welfare Centre (H&FWC) and the Thana Health Complex (THC).

This study will be conducted in Matlab thana at three levels:

- a. Thana Health Complex with a catchment area that has a population of 500,000.
- b. Eight Union Health & Family Welfare Centre each having a population of 20,000
- c. At the community in these eight unions.

ACTIVITIES

Over a period of five years the project will establish the maternity care services and monitor their use. The existing quality and the range of services will be improved at the Matlab Thana Health Complex instituting comprehensive EOC services that includes early detection and treatment or referral of such problems as anaemia, pre-eclampsia, and prolonged labour, as well as surgery, anaesthesia and blood transfusion (MotherCare 1999). This will be attempted with minimum input in order to provide adequate obstetric care, manage the most common complications, and provide Family Planning (FP) and Menstrual Regulation (MR) services. During the first year of intervention, the project will set up a maternity care unit at the Matlab THC and identify the incumbent doctors to be sent for training on Caesarean section techniques and anaesthesia. During the same period of time, the laboratory at Matlab THC will be upgraded and fitted with facilities to screen blood for common

Principal Investigator: Last, first, middle Yunus Md.

pathogens and to provide clean blood transfusion. The services will be provided by the government doctors, nurses, Family Welfare Visitors, etc. From the project a counterpart OT nurse, a ward nurse and a laboratory technician will be placed at the THC. A Senior Medical Officer with special training on obstetrics that includes performing Caesarean Section will be recruited and fully involved in the project for coordination of the research activities and to ensure quality care. The incumbent Senior Medical Officer will also cover any care at the THC level in the absence of the trained Government Medical Officer. In addition the Chandpur MCWC - where Caesarean Section is conducted regularly will be contacted to perform the operation at THC, if the need arises. Prior discussion will be held with the Obstetrician at Chandpur MCWC regarding this issue.

The second phase will be a stepwise upgrading of union level H&FWC. In total, eight H&FWCs will be upgraded of which four are located within the ICDDR,B comparison area and another four are located in the outside DSS area. The H&FWC have been selected on the grounds of their location as Bangladesh Association for Voluntary Sterilisation (BAVS), a national NGO is carrying out some pilot Safe Motherhood activities in some H&FWCs which are not considered for inclusion.

The upgrading of the H&FWC will be carried out in a stepwise fashion. It is envisaged that one H&FWC will be upgraded every three months. The sequence for upgrading H&FWC will be selected at random, prior to start upgrading the first one. Recording of the process and outcome indicators will be initiated in all of them at the same time before the first one is upgraded. Given that the person taking the information from H&FWC is not involved in health services provision, it is expected that this recording will not modify substantially the provision of health services or the quality of care. Comparison between 'upgraded' and 'not upgraded' H&FWC will be done on an ongoing basis. It is expected that the first H&FWC to be upgraded will be compared with the remaining seven 'not yet upgraded' H&FWCs. The second H&FWC to be upgraded (three months after the first one) compared alongside the first pair with the remaining six 'not yet upgraded' H&FWCs and so on. In this way, the maximum time for comparison of 'upgraded' versus 'not upgraded' H&FWCs will be about 24 months by which time upgradation will be completed. Given that the whole project period will be for five years, this is seen as a reasonable time. This strategy will allow the input indicators to be evaluated in the following sequence from the time the surveillance for indicators is placed:

1. Not upgraded THC for about one year during construction and training of staff
2. Upgraded THC for about one year but not H&FWCs
3. Stepwise upgrading of 8 H&FWCs within a 24 months period, the THC upgraded
4. THC and 8 H&FWCs upgraded for about three years

At the eight Health and Family Welfare Centres, basic EOC that includes all comprehensive EOC elements with the exception of surgery, anaesthesia and blood transfusion (MotherCare 1999) will be instituted. These services, which include preventive elements, can be provided at the first referral level (health centre, maternity, or basic hospital) through non-physician providers, such as medically trained midwives. This approach does not demand highly trained obs/gyn specialist or fully equipped operating theaters and therefore, has the potential to bring services closer to women. In the other fourteen unions, information will be given that the facilities of comprehensive EOC is available and utilised by the community.

At the community level, several innovative strategies have been defined in order to decrease barriers to EOC services. A series of meetings with families of women who may require eventually using the services will be conducted in order to increase the awareness that complications of pregnancy may arise. This will be carried out alongside with surveys to identify common, local transport media that could eventually be used in case of complication to refer patients. The interventions which will be implemented include active promotion of institutional deliveries at the H&FWC level, providing the pregnant women a pictorial card for creating awareness about obstetric complications and to help

Principal Investigator: Last, first, middle Yunus Md.

families to identify early detection, organizing family meetings with decision makers of the pregnant women. The Project will involve existing Traditional Birth Attendants (TBAs) in the catchment area to attend the family meetings for motivation and awareness building among the pregnant mothers and their decision-makers as well as make early referrals. The FWAs and TBAs will encourage and refer the pregnant women to the H&FWC for deliveries.

The project will benefit from the experiences of the EU funded Thana Functional Improvement Pilot Project (TFIPP). The TFIPP acquired considerable experience in upgrading Thanas that will be a beneficial to this project. Similarly, the Government of Bangladesh and the Operations Research Project of ICDDR,B has experience in upgrading Thana Health Complexes and this project intends to utilise the lessons learned from these experiences.

OBSTETRIC SERVICES TO BE MADE AVAILABLE AT THE THC

Taking into account the essential functions recommended by WHO (WHO 1986) and agreed by the GOB (GOB 1991) in the maternal and neonatal project, the following procedures will be made available during the intervention:

A) Labor monitoring and vaginal delivery:

- Vacuum delivery
- Forceps delivery
- Labor monitoring with partograph
- Artificial rupture of membranes
- Stimulation of uterus with oxytocin perfusion
- Episiotomy

B) Medical treatment:

- Treatment of shock
- Medical treatment of postpartum and post-abortion sepsis
- Medical treatment of pregnancy-induced hypertension
- Medical treatment of eclampsia
- Direct blood transfusion

C) Surgical treatment:

- Repair of 1st, 2nd and 3d degree of perineal tear
- Repair of vaginal tear
- Repair of cervical tear
- Manual removal of the placenta
- Dilatation and curettage
- Embryotomy

D) Major surgical procedures:

- Caesarean section
- Laparotomy and tubectomy for ectopic pregnancy
- Laparotomy and repair of ruptured uterus in emergency cases

Principal Investigator: Last, first, middle Yunus Md.

OBSTETRIC SERVICES TO BE MADE AVAILABLE AT THE H&FWC

A) Labor monitoring and vaginal delivery:

- Normal and assisted deliveries
- Labor monitoring with partograph
- Manual extraction of placenta
- Vacuum delivery will be conducted after an intensive on-the-job training
- Episiotomy

B) Medical treatment:

- Treatment of shock
- Initiate medical treatment of pregnancy-induced hypertension under the supervision of a physician and follow-up done by the paramedics
- Treatment of infections with parenteral antibiotics

C) Surgical treatment:

- Repair of 1st degree of perineal tear
- Repair of vaginal tear

CASE MANAGEMENT & REFERRALS

Written guidelines will be provided to the medical and nursing staff for management of the patients. This will be organised at the THC, standardised WHO guidelines will be made available for the nursing staff working at the health centres and regular supervision will be done by the trained Medical Officers.

A referral linkage will be established from the community to the H&FWC and subsequently to the THC. The FWVs and TBAs will encourage the pregnant women to deliver at H&FWC. Also, community awareness will be built on the perception of danger signs by the women, the family members and the community through meetings and information will be provided regarding the availability of basic and comprehensive EOC at H&FWC and THC. In case of emergency, an ambulance (includes a mechanised vehicle and a boat) will be kept operational at the THC, which the pregnant women will have access during the hour of their need. There will be provision of basic EOC at H&FWCs being provided by the trained nurse midwives and FWVs. They will have regular supervision and on-the-job training by trained Medical Officers of the THC. A standardised WHO guideline will be followed for the referrals and this will also be supervised by MOs and that it is strictly maintained. At the THC, comprehensive EOC will be made available and the MOs will be trained on Caesarean Sections and other assisted deliveries and anaesthesia techniques. The nurses will also be trained on Operation Theatre management and postoperative management. This team will be supervised at regular intervals from the Consultant Obstetrician of Chandpur Sadar Hospital and the project team.

SERVICES FOR FAMILY PLANNING AND MENSTRUAL REGULATION

Abortion-related mortality is high in Bangladesh. Induced abortion, except to save a woman's life, is illegal in Bangladesh. However, first trimester termination of possible pregnancy is legally widely practiced in the country under the name of menstrual regulation (MR). Well over 300,000 MR procedures are carried out annually in Bangladesh. Although it is not to be considered or promoted as a FP method, menstrual regulation will continue to be available to reduce the number of septic

Principal Investigator: Last, first, middle Yunus Md.

abortions resulting from abortive methods practiced in the field. To avoid any subsequent complicated pregnancies, women undergoing a MR procedure will strongly be advised for FP and the various methods of contraception will be offered.

INPUT

An assessment of the Matlab THC will be done at the beginning of the intervention. Comprehensive EOC services will be established in two phases. FP and Obstetric services except major surgical procedures will be established initially; major surgical procedures will be made available subsequently, after the training of staff. Health centres will be upgraded, furnished and staffed to include safe motherhood in their routine activities. Health workers will be trained to perform ante- and post-natal care and to refer if necessary. Traditional Birth Attendants (TBAs) will be included in the programme through training. They will also be trained to detect potential complications and encouraged to refer patients if required.

FACILITY AND EQUIPMENT

A maternity unit comprising of a delivery room, a post- and pre-surgical ward, and a surgical theatre and an obstetric ward and other support facilities will be made available to provide a decent space for labor, delivery and newborn care. Refurbishment of the laboratory to improve routine tests and for safe blood transfusion at the Thana Health complex will be done. An ambulance replacement to the old, existing one, and a four-wheel vehicle to distribute supplies and staff, and to implement the project, will be made available. A list of necessary equipment has been itemized. A generator to provide backup support to the Operation Theatre during electricity failure is also considered. The eight health centres require various degrees of renovation, as well as equipment to perform basic essential obstetric care. Basic computer equipment to enter information of the process and outcome indicators and analysis of data will be provided.

MANAGEMENT

An Advisory Committee will be created to set up the responsibilities of the various parties, discuss and solve problems related to the intervention at the THC and health centres. This committee may include the following:

Government of Bangladesh:

- Line Director, Essential Services Package including EOC, Directorate of Health Services -GOB
- Line Director, Essential Services Package, Directorate of Family Planning Services-GOB
- Civil Surgeon Chandpur
- Consultant, Gynaecology and Obstetrics Dept, Chandpur Sadar Hospital
- Thana Health and Family Planning Officer, Matlab Thana Health Complex,
- Medical Officer MCH, Matlab Thana Health Complex

ICDDR,B:

- Principal Investigator
- Head, Matlab Health Research Programme
- Manager, Community Health Research, Matlab
- Programme field coordinator

Principal Investigator: Last, first, middle Yunus Md.

Modest funds have been requested to carry out four coordinating meetings of the Advisory Committee. A potential problem of this intervention is the large turnover of staff described above. The coordination of the programme will attempt to minimize the out-migration of trained doctors and nurses by attempting to recruit and train doctors from the locality. This has been described as a potential risk for the intervention.

TRAINING

To gain a practical experience, training in obstetrics, anaesthetic and MR practices will be organized for the medical staff. Nursing care training in obstetrics will be provided to the nursing staff. In total, 2 doctors and 4 nurses will be trained in obstetrics, with particular emphasis on Caesarean Sections and anaesthetics. The centres selected for training will fulfill three important criteria: good quality of services, supervision, and sufficient turnover of patients. These training will be organised at the Gynaecology and Obstetrics Dept. of a teaching hospital, i.e., Dhaka or Chittagong Medical College Hospital, that will be whole-time and residential. During this period, training is provided on all aspects of comprehensive EOC techniques including Caesarean section, other surgical procedures like laparotomy, Embryotomy, Dilatation and Curettage, repair of tears and so on; partograph, vaginal and assisted delivery, etc. Contents of the training will also cover the components of comprehensive EOC as outlined in obstetric services available at different levels of service provision, i.e., THC and H&FWC. A Medical Officer will have similar training on anaesthesia. The training period for the Medical Officer on EOC techniques, i.e., Caesarean Sections, assisted and normal deliveries will be for one year; the Medical Officer on Anaesthesia techniques for one year; and nurses for Operation Theatre management, post-operative care techniques for six months. Two doctors and two nurses will be trained in a team, so that a team spirit develops among them. After completion of six months training of the two nurses, they will return back to the THC and two more nurses will join the doctors and get trained during the next six months. A modest training allowance will be provided to the trainee doctors and nurses during the training period from the project. The training will be supervised by the Head of the Department of Gynaecology and Obstetrics of the Medical College Hospital and simultaneously monitored through visits by the project team every month regarding the progress and quality of the training. This will enhance a functional linkage between the project and the hospital so that in the future complicated cases can be referred and will receive proper attention. An incentive in kind or in cash for the Department of Gynaecology and Obstetrics of the Medical College Hospital will be considered in consultation with the Advisory Committee. Currently, EOC training is provided at the respective departments sponsored by different projects and agencies. After formal training, when they resume working in the THC, they will have periodic supervision and on-the-job training from Consultant, Gynaecology and Obstetrics Dept, Chandpur Sadar Hospital. A specialist Obstetrician will be involved as Consultant at the beginning of Caesarean operation in the THC. The FWVs of the eight H&FWCs to be upgraded in a phased manner will be trained initially at the Chandpur MCWC for a month and will later receive on the job training at ICDDR,B Matlab MCH-FP sub-centres. The trained Medical Officers will in turn visit the H&FWC to provide supervision and on-the-job training to the nurse and midwives working at the union on a regular basis. An understanding will be reached with the Directorate General of Health Services office of GOB so that the trained Medical Officers are not transferred until the project is completed. Training will be provided to the laboratory technician to perform various tests, including screening for clean blood.

Principal Investigator: Last, first, middle Yunus Md.

DRUGS AND SUPPLIES

Government resources are insufficient to provide free treatment for all patients. The quantity and the types of drugs provided at the THC are inadequate to cover the needs. The practice is to prescribe the necessary drugs and disposable items to the patients. During the first year of the intervention, while the awareness of the treatment is build up, medicines will be provided free of cost or with a nominal value. However, during the second year, it is expected that some funds will be recovered from patients towards medicines. However, no medicines will be charged to patients unless the Government implements a cost recovery scheme.

CLEANLINESS AND STERILIZATION PROCEDURES

Particular attention will be stressed to maintain cleanliness of the facility. Appropriate measures for sterilization of materials will be developed.

EVALUATION

As mentioned earlier, EOC services will be provided at the following levels in Matlab Thana:

- a. Thana Health Complex with a catchment area that has a total population of 500,000. About 100,000 women of childbearing age, i.e., 15-44 years married women, who will be the reference population. Each year about 9% of these 100,000 women, that is, a total of 9000 will become pregnant and are the eligible population availing comprehensive EOC services at the THC. This reference and eligible population will be evaluated to assess the impact of comprehensive EOC services at the THC.
- b. Eight Union Health & Family Welfare Centres each having a population of 20,000 -25,000 will be upgraded for the provision of basic EOC. For the community intervention in these eight unions, total population is about 180,000. Of them, 36,000 women are in the child bearing age, i.e., 15-44 years married women will serve as the reference population and again 9% of them, that is a total of 3240 will be the eligible population and are subject for intervention that includes basic EOC at H&FWC and comprehensive EOC at THC.

IMPACT IN THE COMMUNITY

In-built monitoring system will be incorporated in the project to enhance the collection of data on process and outcome indicators. Specific indicators that are expected to be evaluated in an ongoing basis, based on WHO guidelines (WHO 1997), are the following:

- Number of health centres per 500 000 population with functioning comprehensive and basic essential obstetric care
- Percentage of women who were in prolonged labour (>24hrs) before arrival in hospital
- Percentage of women with obstetrical complications treated within 2 hours of presentation at a health facility
- Percentage of women attended at least once during pregnancy for reasons related to pregnancy.
- Percentage of pregnant women immunized against tetanus (TT2)
- Percentage of births attended by trained health personnel (excluding trained and untrained TBAs)
- Proportion of women estimated to have direct obstetric complications that are seen in EOC facilities
- Proportion of all births that occur in facilities with EOC

Principal Investigator: Last, first, middle Yunus Md.

- Caesarean sections as a proportion of all live births in the population
- Maternal deaths as proportion of all deaths among women of reproductive age.
- Case fatality rates for direct obstetric complications (facility-based)

Besides the above indicators, in the process of implementation others may evolve and will be incorporated at a later stage of the project. A detailed list of indicators is attached in Appendix II. The impact on the community does not exclusively depend on the types and the quality of services available at the THC level; it is also related to the community information and perception of the services, the geographical and financial accessibility, and cultural acceptance. Qualitative studies will also be conducted to assess the community perceptions about services available at the THC level and barriers to utilization.

QUALITY OF CARE

The quality of services will be estimated separately for each specific procedure at each level. Indicators for quality will be set up and evaluation carried out regularly for each intervention initiated.

- Percentage of pregnant women attending antenatal clinic who receive iron/ folate
- Percentage of women with obstetrical complications treated within 2 hours of presentation at a health facility
- Percentage of women who received blood transfusion at the referral hospital
- Percentage of pregnant women referred to a FWC/THC higher centre

At the facility-based information collection, service record books at the 8 H&FWCs and THC will be used for impact evaluation for different process and outcome indicators. The existing GoB Family Welfare Assistants have been collecting information on reproductive health including total pregnant women and subsequent deliveries, antenatal care, postnatal care, referrals, all births and deaths in their FWA Registers during routine visits. This system will be strengthened by regular supervision of GoB officials who will be collaborating for maintaining quality of data collection. These data will be utilised for impact evaluation of the EOC project. The Demographic Surveillance System information on vital events collected routinely by ICDDR,B will be utilised to compare with the data collected by GoB health workers, thus assisting in the improvement of quality data collection.

COST EFFECTIVENESS

The cost effectiveness analysis will be conducted to enable the efficiency of resources used in different activities associated with EOC at different levels of service delivery and to inform the policy makers and others involved about the value of EOC program.

The costs will be computed for the program that includes:

- A) Capital costs: Vehicles, equipment, buildings and other inputs like start-up training and social mobilisation activities. Current price, working life and discounting of costs will be considered.
- B) Recurrent costs: Personnel cost, supplies of drugs, reagents, needles, stationaries and other consumables goods.
- C) Operating and maintenance costs: Costs to operate and maintain vehicles, fuel, batteries and spare parts; Utility charges (electricity, water, telephone), repairs, painting, cleaning of building.
- D) Cost information on the user side will be collected regarding direct and indirect costs incurred for visits to facilities including transportation, time spent, wage loss, etc by asking the care-takers.

Principal Investigator: Last, first, middle Yunus Md.

The health effects will be measured by the process and output indicators of EOC program, e.g., maternal deaths prevented. Sensitivity analysis will also be done.

Sources of financing for the different activities will also be maintained.

TRANSPORT SURVEY

In most of the developing countries, geographical accessibility acts as a main barrier to the utilization of health services among other factors. It is well established that this factor acts as a very significant barrier causing delay to the use of health services for a pregnant woman especially if she is in labor when indeed the service are needed on an emergency basis. One of the major aims of this project is to provide intervention for complicated cases immediately. Since, being a marshy and riverine area, Matlab like other rural areas of Bangladesh, is less accessible especially during the monsoon season, it was decided that a transport survey would be conducted to assess the most available and accessible means of transport. Respondents for this transport survey will be selected from the attendants, both male and female who accompanied maternity cases admitted at the Matlab THC during last one year. These cases were admitted from all over Matlab thana. Records showed that from 1 October 1998 to 30 September 1999, a total of 146 patients were admitted in the Maternity unit of Matlab THC. Their address will be traced from the records and attendants of these patients will be interviewed with a pre-tested questionnaire. See questionnaire in Appendix I. Based on results from the transport survey, interventions will be planned to improve access of women to the EOC services.

Principal Investigator: Last, first, middle Yunus Md.

Facilities Available

Describe the availability of physical facilities at the place where the study will be carried out. For clinical and laboratory-based studies, indicate the provision of hospital and other types of patient's care facilities and adequate laboratory support. Point out the laboratory facilities and major equipment that will be required for the study. For field studies, describe the field area including its size, population, and means of communications.

The Thana Health Complex in Matlab, which is serving the largest thana of the country and where a reliable surveillance system is in place, represents an excellent place to implement this intervention. The Government and ICDDR,B staff will work in close collaboration in the area. The reasons for selecting Matlab as opposed to any other Thana in Bangladesh for this intervention are the following:

- (i) The Centre for Health and Population Research of ICDDR,B has developed a remarkable demographic surveillance system in part of the catchment area of the Thana Health Complex. This system provides baseline data to compare with a future intervention and allows evaluation of indicators such as mortality and morbidity.
- (ii) The system is probably the best posed in Bangladesh in which the use of a referral system can be evaluated, by allowing the linkage of health services use at various levels.
- (iii) Documentation from early research carried out in Matlab indicates that about 20 percent of pregnancies may be complicated, out of which about 10-15 percent may ultimately require a caesarian section (about 3% pregnancies may require comprehensive obstetric care). This indicates the requirement for establishing a system with comprehensive essential obstetric care in the area.
- (iv) Matlab is the largest Thana in Bangladesh and patients from most remote areas of the Thana are expected to benefit from this intervention.
- (v) Maternal mortality and morbidity studies require special techniques known to scientists working in Matlab.

When a woman has obstetric complications in Matlab or in any other rural area of Bangladesh, there is at present two levels where she could be referred:

- (i) The Thana Health Complex
- (ii) The District Hospital

This proposal concentrates in improving health services at the Thana. The District Hospital is at Chandpur that is about 20 km away from the Matlab thana

MATLAB THANA HEALTH COMPLEX (THC)

As stated, the Matlab THC provides health services to patients from a catchment area of about 500,000 population.

Principal Investigator: Last, first, middle Yunus Md.

INFRASTRUCTURE AND EQUIPMENT

The Matlab THC has a two-storied building for in- and outpatient care and administrative services. Besides outpatient rooms and in-patient wards (31 beds), the THC includes a delivery room, a small laboratory, a sterilization room, and an operating room and an X-Ray room. Regarding obstetrical care, some equipment is available for normal deliveries, uterine evacuation and sterilization. The laboratory, can only perform few tests: Haemoglobin estimation, blood cell count, detection of plasmodium, urine direct examination, proteinuria, glycosuria, stool direct examination, Ziehl-Nielson test, Widal test. There are at present no facilities to test for Hepatitis B or HIV. Drugs and consumable items for maternity care are, in general, sporadically available.

STAFF

Nine doctors are posted at the THC. It is worth mentioning that MBBS curriculum in Bangladesh provides very limited instruction and practical experience in Obstetrics and Gynecology. One medical officer (MO), designated as medical officer of Maternal and Child Health and Family Planning (MO/MCHFP), has primarily responsibility for administrative and technical supervision and training of staff at the Family Welfare Centre (FWC). The MO/MCHFP is also supposed to provide medical care to referred maternity patients at the THC. However, most of the MO-MCHFP's time is spent on performing surgical sterilisation and attending outdoor patients. Most of the MO/MCHFP are males with no additional training in obstetrics. One MO, designated as gynecological specialist, is mandated to provide curative services to outdoor and indoor patients including emergency cases. A six months additional training is provided for the incumbent. Every morning, the doctors do a ward round together but they usually remain busy with outpatients during most of their duty. From 2 p.m. onwards, there is only one doctor on duty until the next morning.

In total, five nurses-midwives are posted in each THC. Their four years basic education includes one-year midwifery but this training is mainly theoretical. Most of the nurses have very little practical experience. Their role in maternal health care is limited to patient admissions, normal deliveries and post-delivery care. One nurse is on duty for the whole hospital during afternoon and night, therefore, close monitoring of obstetric cases cannot be insured.

The MOs are normally posted for 3 years at the same THC but in reality there are many exceptions to the rule. When a MO or a nurse leaves, his/her replacement is not immediately placed. This creates a common problem of vacancy and a serious disruption to the programmes.

Principal Investigator: Last, first, middle Yunus Md.

Data analysis

Describe plans for data analysis: Indicate whether data will be analysed by the investigators themselves or by other professionals. Specify what statistical software packages will be used and if the study is blinded, when code will be opened. For clinical trials, indicate if interim data analysis will be required to monitor further progress of the study (TYPE WITHIN THE PROVIDED SPACE)

Analysis will be directed towards evaluating the impact of the intervention on the utilisation pattern of comprehensive EOC and basic EOC services at the facilities taken under the intervention. Data from baseline will be compared to the data after the implementation of the project. Some of these comparisons will be on the proportions of births attended by trained personnel other than TBAs, proportions of cesarean sections, proportion of fatalities at the facility level, and detailed data on the cause of all hospital based deaths.

Since this is an intervention study the analysis will be directed towards the impact of the intervention which will be implemented in phases. Therefore analysis will be based on data collected from upgrading the H&FWCs and upgradation of the THC, and so on as described in the Research Design and Methods section . Complete analysis will be possible based on data of all upgraded facilities for the last two years. Evaluation of the project will be done based on the process and outcome indicators as mentioned in Appendix II.

Principal Investigator: Last, first, middle Yunus Md.

Ethical Assurance for Protection of Human Rights

Describe in the space provided the justifications for conducting this research in human subjects. If the study needs observations on sick individuals, provide sufficient reasons for using them. Indicate how subject's rights are protected and if there is any benefit or risk to each subject of the study.

This study will be providing Essential Obstetric Care services to the women and more specifically pregnant mothers and equity will be ensured as there will be no cost recovery system. No ethnic, religious and socioeconomic barrier will be imposed for the provision of services. All maternity care interventions in the existing government system will be upgraded. The conventional consent form routinely used by the GoB for operations will be used as a part of the routine procedure, since the operations will be performed by the GoB personnel and confidentiality will be maintained. All such records will be maintained confidentially and locked in file cabinets.

Use of Animals

Describe in the space provided the type and species of animal that will be used in the study. Justify with reasons the use of particular animal species in the experiment and the compliance of the animal ethical guidelines for conducting the proposed procedures.

No use of animals in the study

Principal Investigator: Last, first, middle Yunus Md.

Literature Cited

Identify all cited references to published literature in the text by number in parentheses. List all cited references sequentially as they appear in the text. For unpublished references, provide complete information in the text and do not include them in the list of Literature Cited. There is no page limit for this section, however exercise judgement in assessing the “standard” length.

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Price T G. 1984. *Preliminary Report on Maternal Deaths in the South Highlands of Tanzania* .*Journal of Obstetrics and Gynecology of East and Central Africa*. 3 (103) : 103 - 110

Ronsmans C, Venneste AM, Chakraborty J, van Ginneken J. *Decline in maternal mortality in Matlab, Bangladesh: a cautionary tale.* *The lancet* 1997; 350, Dec 20/27: 1810-1814.

Rooks J, B Winikoff, and J Bruce. 1990. *Technical Summary : Seminar on " Reassessment of the Concept of Reproductive Risk in Maternity Care and Family Planing Services."* New York : The Population Council;

Sargent C. 1885. " *Obstetrical choice among urban women in Benin.*" *Social Science and Medicine*. 20 (3) : 287- 292

Taylor J. 1995. " *Ghana Life Saving Skills Effort" Issues in Essential Obstetric Care : Report of a Technical meeting of the IAG for Safe Motherhood.* May 31 June 2, 1995. New York : the Population Council; Family Care International.

Thaddeus S, and D Maine. 1990. *Too Far to Walk : Maternal Mortality in Context.* New York : Columbia University, enter for Population and Family Health.

Principal Investigator: Last, first, middle Yunus Md.

Tinker A. 1995. Making Motherhood Safe. Washington , DC : World Bank.

Update. 1994. Newsletter 10. Prevention of Maternal Mortality (PMM) Network

Vanneste AM, de Francisco A (1992). High risk screening in maternity care. Maternity care programme, Matlab 1987-90. ICDDR,B.

Weatherby N. 1990. "Antepartum Assessment of Intrapartum Risk : National Birth Center Study. " Paper presented at Seminar on Reassessment of the Concept of Reproductive Risk in Maternal Care and Family Planning Services, New York, The Population Council

White S, R Thorpe, and D Maine. 1987. " Emergency Obstetric Surgery Performed by Nurses in Zaire." The Lancet 2 : 612- 613. September 12, 1987

World Health Organization. 1996. Revised 1990 Estimates of Maternal Mortality : A New Approach by WHO and UNICEF. WHO/ FRH/MSM 96.11

World Health Organization. (1986) Essential Obstetric Functions at First Referral Level . Working group report, WHO, Geneva.

World Health Organization (1997) Monitoring reproductive health: Selecting a short list of national and global indicators. World Health Organization, Geneva (WHO/RHT/HRP/97.26)

Principal Investigator: Last, first, middle Yunus Md.

Dissemination and Use of Findings

Describe explicitly the plans for disseminating the accomplished results. Describe what type of publication is anticipated: working papers, internal (institutional) publication, international publications, international conferences and agencies, workshops etc. Mention if the project is linked to the Government of Bangladesh through a training programme.

The lessons learned from this project are expected to benefit the government of Bangladesh and other developing countries in program and policy recommendations related to safe motherhood. With these views the lessons learned will be published in peer reviewed international journals, working papers and presentations will be made to different national and international seminars workshops and conferences. It will also be communicated to the policy makers through at meetings, discussions and dialogues to bring about a change in maternal health services.

Collaborative Arrangements

Describe briefly if this study involves any scientific, administrative, fiscal, or programmatic arrangements with other national or international organizations or individuals. Indicate the nature and extent of collaboration and include a letter of agreement between the applicant or his/her organization and the collaborating organization. (DO NOT EXCEED ONE PAGE)

The study is jointly conducted in collaboration with the Ministry of Health & Family Welfare, Government of Bangladesh. The Advisory Committee will be formed with related GOB officials at all levels.

Programme and Policy Implications

Continuous monitoring and process evaluation will be in-built in the programme. It is expected that the project will equip us with valuable lessons especially from the process evaluations which will facilitate the government of Bangladesh as well as that of other developing countries in improving the EOC facilities. It is also expected that utilising the frame of this project, operational research projects can be nested which will provide valuable lessons related to the delivery and utilisation of safe motherhood services in rural Bangladesh. With some modifications these lessons may be used for improving the EOC services.

Principal Investigator: Last, first, middle Yunus Md.

Biography of the Investigators

Give biographical data in the following table for key personnel including the Principal Investigator. Use a photocopy of this page for each investigator.

(Please See Attachments)

C.V OF DR. MD. YUNUS

Name: MD. YUNUS
Date of birth: 5 January 1945
Present position: Scientist and Head
Matlab Health Research Programme (MHRP)
Public Health Sciences Division (PHSD)
International Centre for Diarrhoeal
Disease Research, Bangladesh (ICDDR,B)
GPO Box 128, Dhaka 1000, Bangladesh
Phone:871751-60/Ext.2210
FAX:880-2-883116, 880-2-886050
E-mail:myunus@icddr.org

Academic Qualification

Degree	Year	Institution and Location	Field of Study
M.B.B.S.	1968	Dhaka Medical College University of Dhaka Bangladesh	Medicine Surgery Midwifery
6 months House-Physicianship in Medicine in Dhaka Medical College Hospital, Dhaka, Bangladesh.			
M.Sc. in Community Health in Developing Countries	1982	London School of Hygiene and Tropical Medicine, London University, U.K.	Public Health

Professionals Experience:

A.	<u>Title of position</u>	<u>Institution</u>	<u>Place</u>	<u>Duration</u>
	Physician	Cholera Research	Matlab - Sept., 1976	Nov. 27, 1968
	Dy. Chief Physician	-Do-	Matlab -April 25,1978	October, 1976
	Physician-in-Charge	CRL & ICDDR,B	Matlab -March 24, 1980	April 26, 1978
	Head, Matlab Station	ICDDR,B	Matlab -October 2, 1985	March 25, 1980
	Coordinator, Matlab Station and MCH-FP Extension Project	ICDDR,B Matlab & Dhaka Ext. Project	October 3, 1983 - Sep. 18, 1985	
	Coordinator, Matlab Health & Research Centre	ICDDR,B Matlab	Sep. 19, 1985 -November, 1996	
	Scientist	ICDDR,B	January 1, 1993	
	Head, Matlab Health Research Programme	ICDDR,B Matlab	December 1,1996 to date	
	Acting Head Reproductive Health Programme	ICDDR,B	January 3, 1999	

C.V OF DR. MD. YUNUS

B. Other concurrent positions held:

Faculty, ICDDR,B Training Courses since 1978 to date.

Acted as Scientific Director for Matlab Station on several occasions during the absence of Scientific Directors.

Worked as Coordinator for Cholera Epidemic Control during October-November, 1982.

Member, Research Review Committee, ICDDR,B 1984-1988 June

Member-Secretary, -Do- ICDDR,B July 1988 to Dec.1988

Senior Associate, Department of International Health, Johns Hopkins University School of Public Health, USA from May 1, 1997 to 30 June, 2000

Publications

18. **Yunus M**, Rahman ASMM, Faruque ASG, Glass RI. A clinical trial of ampicillin versus trimethoprim-sulfamethoxazole in the treatment of Shigella dysentery. *J Trop Med Hyg.* 1982 Oct;85(5):195-9
23. Rahman M, Chen LC, Chakraborty J, **Yunus M**, Chowdhury AI, Sarder AM, Bhatia S, Curlin GT. Use of Tetanus Toxoid for the Prevention of Neonatal Tetanus. I. Reduction of Neonatal Mortality of Immunization of Non-pregnant and pregnant women in Rural Bangladesh. *Bull WHO* 1982, 60(2): 261-67.
26. Chen LC, Rahman M, D'Souza Stan, Chakraborty J, Sarder AM, **Yunus M**. The Mortality Impact of Family Planning. *Studies in Family Planning* 1983; 14(8/9): 199-209 (1983).
30. **Yunus M**, Koblinsky M, Simmons R, Phillips JF. Strategies for implementing change in a rural health and family planning programme in Bangladesh. In: Debbie Kluge ed. *International Health and Family Planning: Controversy and Consensus; Selected Papers of the 1984 Annual Conference of the National Council for International Health*, Arlington, Virginia, 1984. National Council for International Health, Washington, D.C. and Samaritan Medical Foundation, Phoenix, Arizona, 1984: 236-244.
32. Phillips JF, Simmons R, Simmons G, **Yunus M**. Researching the Transfer of Health and Family Planning Service Innovations: The Design for an Experiment in Organization Development. *Studies in Family Planning*, 1984; 15(2): 62-73, (1984).
35. Islam MS, Bhuiyan A, **Yunus M**. Socio-economic Differentials of Diarrhoea Morbidity and Mortality in Selected Villages of Rural Bangladesh. *J Dia Dis Res* December 1984; 2(4): 232-237.
37. Koblinsky MA, Simons R, Phillips JF, **Yunus M**. Barriers to Implementing an Effective National MCH-FP Program. In: Kluge D, ed. *International Health and Family Planning: Controversy and consensus; Selected papers of the 1984 Annual Conference of the National Council for International Health*, Arlington, Virginia, 1984. Washington, D.C: National Council for International Health, Samaritan Medical Foundation, 1984:195-207.
63. Fauveau V, **Yunus M**, Zaman K, Chakraborty J, Sarder AM. Diarrhoea mortality in rural Bangladeshi children. *J Trop Pediatr* 1991 Feb;37(1):31-6.
74. Hlady WG, Fauveau V, Khan SA, Chakraborty J, **Yunus M**. Utilization of medically-trained birth attendants in rural Bangladesh. *Asia Pacific J Public Health* 1992-93;6(1):18-24.

C.V OF DR. MD. YUNUS

83. **Yunus M**, Aziz KMA, Bhuiya A, Strong M. Feeding Practices during and after acute diarrhoea in rural area of Bangladesh. In: Mc Neish AS, Mittal SK, Smith JAW, eds. Recent trend in diarrhoea and malnutritions; Selected papers of the Second Commonwealth Conference on diarrhoea and malnutrition, New Delhi, December 1991, New Delhi; Maulana Azad Medical College, 1993:117-24.
86. Aziz KMA, **Yunus M**, Sack RB, Chowdhury AI, Carotene-rich foods: Promotion of some common and less familiar vegetables and modifications of cooking procedures in rural Bangladesh. Abstract. In: Programme and Abstracts of Vitamin A Symposium of ICDDR,B, Dhaka (Special Publication no.36), 1994:4.
87. Aziz KMA, **Yunus M**, Bhuiya A. Recent contributions of behavioral and biomedical scientists in applied anthropology on hygiene practices and management of diarrhoea in Bangladesh. *Int J Anthropol* 1994;9(4):309-16.
89. Myaux J, Chakraborty J, **Yunus M**, Khan EH, de Francisco A. The effects of health services utilization on the recovery from dysentery. *J Trop Pediatr* 1996 May; 42:38-42.
90. **Yunus M**, Aziz KMA, Islam MS. Perceptions on health and disease in the Matlab Community. In: Fauveau V, ed. Matlab: Women, Children & Health. ICDDR,B Special Publication No.35. July 1994;257-274.
100. Zaman K, Baqui AH, **Yunus M**, Sack RB, Bateman OM, Chowdhury HR, Black RE. Association between nutritional status, cell-mediated immune status and acute lower respiratory infections in Bangladeshi children. *Eur J Clin Nutr* 1996; 50:309-314.
101. **Yunus M**, Aziz KMA, Zaman K. Message for parents: Diarrhoea. *Child Health Dialogue* 4th Quarter, 1996;5:5.
102. Sack RB, Rahman M, **Yunus M**, Khan EH. Antimicrobial resistance in organisms causing diarrhoeal diseases. *Clin Infect Dis* 1997 Jan;24(1 suppl):S102-5.
103. Zaman K, Baqui AH, **Yunus M**, Sack RB, Bateman OM, Chowdhury HR, Black RE. Acute respiratory infections in children: a community based longitudinal study in rural Bangladesh. *J Trop Pediatrics* 1997;43:133-7.
104. Zaman K, Baqui AH, **Yunus M**, Sack RB, Chowdhury HR, Black RE. Malnutrition, Cell-mediated immune deficiency and acute upper respiratory infections in rural Bangladeshi children. *Acta Paediatr* 1997;86:923:7.
105. Clemens JD, Rao MR, Chakraborty J, **Yunus M**, Ali M, Kay B, Van Loon FPL, Naficy A, Sack DA. Breast feeding and the risk of life-threatening Enterotoxigenic E.coli in Bangladeshi infants and children. *Pediatrics* 1997 Dec; 100(6):1024.
106. Zaman K, Zeitlyn S, Chakraborty J, Francisco A de, **Yunus M**, Acute lower respiratory infections in rural Bangladeshi children: Patterns of treatment and identification of barriers. *Southeast Asian J Trop Med Public Health* 1997;28(1):99-106.
108. Francisco A de, Hall AJ, Unicomb L, Chakraborty J, **Yunus M**, Sack RB. Maternal measles antibody decay in rural Bangladeshi infants - implications for vaccination schedules. *Vaccine* 1998; 16(6): 564-568.

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE	DATE OF BIRTH
Jyotsnamoy Chakraborty	Senior Manager, Community Health Research Unit Matlab Health Research Programme, ICDDR,B	January 31, 1943

EDUCATION / TRAINING

INSTITUTION AND LOCATION	DEGREE / DIPLOMA / TRAINING	YEAR	FIELD OF STUDY
Board of Intermediate and Secondary Education, Dhaka	Matriculation	1961	High School Graduation
Institute of Public Health, Dhaka	Diploma in Hygiene & Sanitation	1962	Diploma
Agricultural University, Wageningen, The Netherlands	Food Science and Nutrition	1983	Post-graduate Diploma
Department of Population Planning and International Health, The University of Michigan, USA	Population and Development	1990	Certificate

PROFESSIONAL EXPERIENCES

1963-63 Malaria Inspector	Malaria Education Program
1963-64 Sanitary Inspector	Cholera Research Laboratory
1964-71 Field Surveillance Assistant	Cholera Research Laboratory
1971-72 Supervisor In-charge	Indian Red Cross Society
1972-72 Supervisor, Nutrition Survey	United Nation Relief Operation in Dhaka
1972-84 Senior Field Research Officer	ICDDR,B, Community Health Division
1984-98 Manager, Community Health Research	ICDDR,B, Public Health Sciences Division
1999- Sr. Manager, Community Health Research	ICDDR,B, Public Health Sciences Division

PUBLICATIONS

1. Ali M, de Francisco A, Khan MM, Chakraborty J, Myaux J.
'Factors Affecting the Performance of Family Planning Workers: Importance of Geographical Information Systems in Empirical Analysis'.
Int. J Pop Geogr 1999;5:19-29.
2. Carine Ronsmans, Ann Maria Vanneeste, Jyotsnamoy Chakraborty, Jeron Van Ginneken.
'Decline in maternal mortality in Matlab, Bangladesh: a continary tale'
The Lancet: 350: 1811-14) December 1997.
3. J Myaux, A Iqbal, A Uzma, J Chakraborty, M Ali and M Hussain.
'Environmental Hazards As A Leading Cause of Death in Children from Bangladesh'.
International Child Health Vol. VII, Number 4, October 1996.
4. Deborah Maine, Murat Z Akalin, Jyotsnamoy Chakraborty, Andres de Francisco and Michael Strong.
'Why Did Maternal Mortality Decline in Matlab?'
Studies in Family Planning July/August 1996;27(4) 179-187.
5. A de Francisco & J Chakraborty.
'Maternal Recall of Tetanus Toxoid Vaccination'.
Annals of Tropical Paediatrics (1996) 16, 49-54.
6. Ann P Riley, M. Kathryn Stewart, and Jyotsnamoy Chakraborty.
'Program and Method related Determinants of First DMPA use Duration in Rural Bangladesh'.
Studies in Family Planning 1994 Sept./Oct.25(5):255-267.

7. Sarah Salway, Vincent Fauveau and J Chakraborty.
'Introducing The Low-dose pill to Bangladesh: Issues of Continuation and failure'.
Contraception 1994;49, February: 171-183.
8. Attanayake N, Fauveau V, Chakraborty J.
'Cost-Effectiveness of Matlab MCH-FP Project in Bangladesh'
Health Policy and Planning 8 (4):327-28, 1993.
9. Michael A Koenig, Ubaidur Rob, Meherab Ali Khan, J Chakraborty, and Vincent Fauveau.
'Contraceptive Use in Matlab, Bangladesh in 1990: Levels, Trends, and Explanation'.
Studies in Family Planning: 1992:Nov./Dec.23(6):352-364.
10. Briend A, Fauveau V, Chakraborty J.
'Contraceptive Use and Breast-feeding Duration in Rural Bangladesh'.
Eur J Clin Nutr 1991 July; 45(7):341-6.
11. V Fauveau, MD Yunus, K Zaman, J Chakraborty, et al.
'Diarrhoea Mortality in Rural Bangladeshi Children'.
Journal of Tropical Pediatrics Vol. 37, Feb. 1991.
12. MA Koenig, MA Khan, B Wojtyniak, JD Clemens, J Chakraborty, et al.
'Impact of Measles Vaccination on Childhood Mortality in Rural Bangladesh'.
Bulletin of the World Health Organization, 68(4):441-447 1990.
13. Vincent Fauveau, Bogdan Wojtyniak, G Mostafa, AM Sarder and J Chakraborty.
'Perinatal Mortality in Matlab, Bangladesh: A Community-based Study'.
International Journal of Epidemiology 1990 Sep.19 (3):606-12.

Selected Publications: (1990-98)

A de Francisco, A, J. Hall, L. Unicomb, J. Chakraborty et al. 'Maternal Measles antibody decay in rural Bangladeshi Infant - implication for vaccination schedules'. *Vaccine* Vol. 16, No.6 (564-68) 1998

A de Francisco, J. Chakraborty 'Maternal re-call of Tetanus Toxoid vaccination'. *Annals of Tropical Paediatrics* 16(49-54) 1996.

Henry FJ, Briend A, Fauveau V, Huttly SRA, Yunus M, Chakraborty J, 'Risk factor for clinical marasmus: a case control study of Bangladeshi children'. *Int. J. Epidemiol* 22(2):278-83'993.

A.de Francisco, J. Chakraborty, HR Choudhury, M. Yunus, AH Baqui, AK Siddique, RB Sack. 'Acute Toxicity of Vitamin A given with EPI vaccine in infancy (report). *The Lancet* 342(562-27) 1993.

Clemens JD, Sack DA, Rao MR, Chakraborty J, et al. 'Evidence that inactivate oral cholera vaccine both prevent and mitigate *Vibrio Cholerae* O1 infections in a cholera endemic area' *J Infec dis* 166(5):1029-33, 1992.

Clemens JD, Van Loon FPL, Rao M, Sack AD, Alimmed F, Chakraborty J. 'Nonparticipation as a determinants of of adverse health outcomes in a field trial of oral cholera vaccine'. *Am J Epidemiol* 15:135(8): 865-74 1992.

Fauveau, Henry FJ, Briend A, Yunus M, Chakraborty J. 'Persistent diarrhoea as a cause of childhood mortality in rural Bangladesh' *Acta pediat* 81(381):12-4 1992.

John D. Clemens, Fedric Van Loon, David A Sack, A.Sack, J.Chakraborty et al. 'Field Trial of Cholera Vaccines in Bangladesh: Serum Vibriocidal and Antitoxic antibodies as marker of risk of cholera'. *J. of Inf. Diseases* 163(6): 123-42 1991.

Clemens JD, Sack DA, Chakraborty et al. 'Field trial of Cholera Vaccine in Rural Bangladesh: Evaluation of Anti-bacterial and Anti-toxic breast-milk immunity by response to ingestion of the vaccine'. *Vaccine* (g): 469-72 1990.

BIO-DATA

Name : Ishtiaq BASHIR
Position : Reproductive Health Programme
Public Health Sciences Division,
ICDDR,B-Centre for Health and Population Research
Date of birth : 23 March 1958

Academic Qualifications

Master of Public Health (MPH) from the Prince Leopold Institute of Tropical Medicine at Antwerp, Belgium in June 1996.
Bachelor of Medicine and Surgery (MBBS) from Rajshahi Medical College, University of Rajshahi, Bangladesh in 1984.

Research & Professional Experience

From Oct. 1985 to Jan. 1987

Medical Officer, Amo Tea Estate Hospital, Hobiganj, Bangladesh

From Dec. 1987 to Sept. 1989

Medical Officer, Epidemic Control Preparedness Program (ECPP)
ICDDR,B, GPO Box 128, Dhaka 1000, Bangladesh

From Oct. 1989 to Oct. 1990

Research Associate, Epidemiology Dept., Community Health Division,
ICDDR,B, GPO Box 128, Dhaka 1000, Bangladesh

From Nov. 1990 to Jan. 1992

Medical Officer (Project Manager),
Training Immunizers in the Community Approach (TICA)
CARE - International, Bangladesh,

From July 1992 to August 1995

Medical Officer, Community Health Division,
ICDDR,B, GPO Box 128, Dhaka 1000, Bangladesh.

From July 1996 till date

Senior Medical Officer, Public Health Sciences Division
ICDDR,B - Centre for Health and Population Research
GPO Box 128, Dhaka 1000, Bangladesh.

Membership of Professional Societies

- Bangladesh Medical Association
- Public Health Association of Bangladesh
- Canadian Society of International Health

Publications

- Bashir I. *Why slum residents use health services: Factors for demand-A study from Dhaka, Bangladesh.* Master of Public Health Thesis. Prince Leopold Institute of Tropical Medicine, Antwerpen, Belgium, 1996.

- **Bashir I**, Desmet M, Rahman H, Sayeeduzzaman M Chowdhury Q. *'Can We Provide A More Appropriate Health Care In Bangladesh?'* Proceedings of the First International and Biennial National Conference of Bangladesh Sociological Association, Dhaka, Bangladesh. November 1997. p.10.
- Chowdhury Q, Desmet M, **Bashir I**, Rahman H, Sayeeduzzaman M. *'Pluralistic Health Care Options In Bangladesh: Implications for Health Care Reform'* Proceedings of the First International Conference of Bangladesh Sociological Association, Dhaka, Bangladesh. November 1997. p.9.
- Desmet M, **Bashir I**, Sohel N. *'Effects of ill-health on income-earning capacity among urban poor in Bangladesh.'* Presented at The Second Asian -Pacific Congress of Epidemiology, January 1998, Tokyo, Japan. Abstracted at Journal of Epidemiology, Vol.8(1) January 1998; p.63
- Desmet M, **Bashir I**, Sohel N. *Demographic, socio-cultural and economic profile of Slum Residents in Dhaka-City, Bangladesh*, Health Economics Programme Working Paper series, Public Health Sciences Division, HEP working paper No. 3-98, ICDDR,B Working Paper No. 110, Dhaka, Bangladesh, May 1998
- Desmet M, **Bashir I**, Sohel N. *Illness profile and health care utilization patterns of Slum Residents in Dhaka-City, Bangladesh.*, Health Economics Programme Working Paper series, Public Health Sciences Division, HEP working paper No. 4-98, ICDDR,B Working Paper No. 111, Dhaka, Bangladesh, November 1998.
- Desmet M, **Bashir I**, Sohel N. *Direct and Indirect health care expenditure by Slum Residents in Dhaka-City, Bangladesh.*, Health Economics Programme Working Paper series, Public Health Sciences Division, HEP working paper No. 5-98, ICDDR,B Working Paper No. 112, Dhaka, Bangladesh, May 1998.
- Desmet M, **Bashir I**, Sohel N. *Health Care Seeking of Slum Residents in Dhaka-City, Bangladesh: chronic illnesses, delivery cases, hospitalisation and surgical cases.* Health Economics Programme Working Paper series, Public Health Sciences Division, HEP working paper No. 6-98, ICDDR,B Working Paper No. 121, Dhaka, Bangladesh, December 1998.

September 2, 1999

RUBINA SHAAHEEN CURRICULUM VITAE

Name : Rubina Shaheen
Date of Birth : 8 July 1964
Marital Status : Married, one daughter
Nationality : Bangladeshi

Present Address: Reproductive Health Programme
Public Health Sciences Division
International Centre for Diarrhoeal Disease Research, Bangladesh(ICDDR,B)
Mohakhali, GPO Box 128, Dhaka 1000, Bangladesh
Telephone: 880 - 2 - 871 751/60 (ext 2232)
e-mail: rubina@icddr.org

Permanent Address: c/o Abdur Rouf, Dhap Chikliroad, Rangpur 5400, Bangladesh

Educational Qualifications

- Master of Medical Science (Research) -- from the University of Western Australia in May 1999.
- Bachelor of Medicine and Bachelor of Surgery -- from Rangpur Medical College, Rajshahi University, Bangladesh in May 1987.

Professional Training

- Attended a one-month training course on obstetric care at the Holy Family Red Crescent Hospital, Dhaka from April 1, 1992 to May 1, 1993.
- Attended a four-week course on "Fertility Management" at the Bangladesh Association for Voluntary Sterilisation, Dhaka, Bangladesh, from February 4 to March 4, 1991.
- One year full time Residential Inservice Training from Rangpur Medical College Hospital completed on September 1988.

Professional Experience

As Medical Officer — ICDDR,B Matlab Health and Research Centre since July 1989 till December 1992. Responsibilities: patient care including pregnant women and underfive children for pregnancy related health problems and ARI of underfive children. Regular visit to field stations, supervise midwives, paramedics, and provide refresher training to them. Also, attend meetings with grass root level workers, Community Health Workers, and provide training on technical aspects.

As Senior Medical Officer – ICDDR,B Matlab Health and Research Centre since January 1993 till December 1997. Responsibilities: patient care including pregnant women and underfive children for pregnancy related health problems and ARI of underfive children. Regular visit to field stations, supervise midwives, paramedics, and provide refresher training to them. Also, attend meetings with grass root level workers, Community Health Workers, and provide training on technical aspects. Also, to provide Permanent Sterilisation to the willing couples. Have performed Tubal Ligation and Resection of 120 women by using Modified Pomeroy method.

As Senior Medical Officer – Reproductive Health Programme, Public Health Sciences Division, ICDDR,B. Responsibilities – involved in the development of research projects, implementing those projects and writing up reports.

As Principal Investigator

- A community based descriptive study investigating the health care utilisation by pregnant women in rural Bangladesh. Funded by AusAid through the University of Western Australia. Budget \$ AU - 2000. Responsibilities: formulation, co-ordination, and implementation of the research protocol. Analysis and writing up in the form of a thesis.
- A cohort study to estimate the optimal duration of nutritional supplementation for malnourished pregnant women and its impact on birth weights. Funded by World Bank through Bangladesh Integrated Nutrition Project (BINP). Amount US \$ 33,000 (the study is ongoing). Responsibilities: formulation, co-ordination, and implementation of the research project. Analysis of data and writing up in the form of a report.
- MR intervention in rural Bangladesh and its impact on induced abortion related complications. Funded by Swiss Development Cooperation (SDC) through ICDDR,B. Amount US \$ 49,900 (the study is ongoing). Responsibilities: formulation, co-ordination, and implementation of the research protocol. Analysis of data and publication of research findings.

Presentations

- Rubina Shaheen. Health care utilisation by pregnant, intrapartum and postpartum women in rural Bangladesh. Poster presentation in the International conference on Expanding Choices for Women – Health, Work and Human Rights. 2-4 April 1997, Esplanade Hotel Fremantle, Western Australia.
- Rubina Shaheen, Md Yunus, A de Francisco, J. Patrick Vaughan. Title: Reported morbid symptoms and conditions of pregnant, intrapartum and postpartum women: Experience from three villages. In: the proceedings of the seventh annual scientific conference. International Centre for Diarrhoeal Disease Research, Bangladesh, 1997 (oral presentation).
- Rubina Shaheen: Health Care Utilisation in three villages, Bangladesh: an empirical study. Oral presentation in the Inter Divisional Scientific Forum (IDSF) of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), April, 1998.
- Rubina Shaheen, Andres de Francisco. Nutritional supplementation for malnourished pregnant women: impact on birth weight (preliminary findings). Oral presentation in the Inter Divisional Scientific Forum (IDSF) of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), July 5, 1999.

Workshops and conferences

- Attended an International symposium and workshop on low birth weight. International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Mohakhali, Dhaka. June 14 to 17, 1999.
- Attended a workshop on the Emergency contraception arranged by Bangladesh Population Council, Dhaka Bangladesh. December 1 to 3, 1997.

Publications

- Rubina Shaheen, Md Yunus, A de Francisco, J. Patrick Vaughan. Reported morbid symptoms and conditions of pregnant, intrapartum and postpartum women: Experience from three villages. Journal of Diarrhoeal Diseases Research, 1998. June 16 (2): 98.
- Rubina Shaheen. Health Care Utilisation in rural Bangladesh: pregnant women's choices. Research dissertation towards the fulfilment of M. Med. Sc (research) degree. University of Western Australia, August 1997.

BIOGRAPHICAL SKETCHGive the following information for all *new* key personnel.

Copy this page for each person.

NAME Lars Åke Persson	POSITION TITLE Director, Public Health Sciences Division, ICDDR,B the Centre for Health and Population Research, Dhaka
------------------------------	---

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing. Include postdoctoral training.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Uppsala University, Sweden	MD	1973	Medicine
Sandöskolan, Sweden	Certificate	1972-73	Aid and disaster relief training
Swedish Board of Health and Welfare	Certificate	1973	Tropical/international medicine
Gävle Hospital and Västernorrlands landsting, Sweden	Internship	1973-74	Medicine, Surgery, General practice
Dept Pediatr, Örnsköldsviks sjukhus, Sweden	Residency	1974-76	Pediatrics
Dept Pediatrics, Umeå University, Sweden	Residency	1978-79	Pediatrics
Dept Child Psychiatry, Umeå University, Sweden	Residency	1979	Pediatrics/child psychiatry
Dept Infectious Diseases, Umeå University, Sweden	Residency	1979	Pediatrics/inf dis
Swedish Board of Health and Welfare	Specialist	1980	Pediatrics
Umeå University, Sweden	PhD	1984	Pediatrics/Pediatric Nutrition
Dept Pediatrics, Umeå University, Sweden	Docent	1990	Pediatrics

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, honors. Include present membership on any Federal Government public advisory Committee. List, in chronological order, the titles, all authors, and references to all publications during the past three years representative earlier publications pertinent to this application. If the list of publications in the past three years exceeds two pages, select the most pertinent publications. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE

1976-1978: Medical Officer, Ndolage Hospital, Tanzania
 1980-1983 Fellow, Social Medicine, Umeå University, Sweden
 1983-1984 Fellow, Dept Pediatrics, Umeå University, Sweden
 1984-1985 Medical Advisor, Institute for Protection of Children's Health, Hanoi, Vietnam
 1985-1986 Fellow, Dept Pediatrics, Umeå University, Sweden
 1986-1990 Senior lecturer/researcher in Pediatrics/Epidemiology, Umeå University, Sweden
 1990-1997 Associate professor, Dept Epidemiology and Public Health, Umeå University, Sweden
 1998- Professor in International Public Health, Umeå University, Sweden
 1999 Director, Public Health Sciences Division, ICDDR,B, Dhaka, Bangladesh

Publications**Original papers**

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Principal Investigator: Last, first, middle Yunus Md.

Check List

After completing the protocol, please check that the following selected items have been included.

- | | |
|--|-------------------------------------|
| 1. Face Sheet Included | <input checked="" type="checkbox"/> |
| 2. Approval of the Division Director on Face Sheet | <input checked="" type="checkbox"/> |
| 3. Certification and Signature of PI on Face Sheet, #9 and #10 | <input checked="" type="checkbox"/> |
| 4. Table on Contents | <input checked="" type="checkbox"/> |
| 5. Project Summary | <input checked="" type="checkbox"/> |
| 6. Literature Cited | <input checked="" type="checkbox"/> |
| 7. Biography of Investigators | <input checked="" type="checkbox"/> |
| 8. Ethical Assurance | <input checked="" type="checkbox"/> |
| 9. Consent Forms | <input checked="" type="checkbox"/> |
| 10. Detailed Budget | <input checked="" type="checkbox"/> |

BUDGET JUSTIFICATION

Project : Safe Motherhood : Essential Obstetric Care

Total Budget for 5 years : US\$ 2,124,136

The total budget amount includes the overall expenses to run the Project for five years.

The Project requires :

- To set-up Surgical Maternity Care Unit at Thana Health Complex (THC). This involves construction within the THC premises, procurement of surgical & other equipment, furniture
- To set-up eight Health & Family Welfare Centres (H&FWC). This involves reconstruction and repair, procurement of equipment, furniture.
- To set-up Blood Transfusion Unit at THC. This involves reconstruction, procurement of equipment, furniture.
- Personnel expenses : This involves recruitment of staff and charging for the services of existing staff. For successful completion of the activities of this huge Project, personnel services as indicated in the budget are required.
- Training staff : Includes expenses for training doctors, nurses, technicians and other field staff.
- Operational costs : This includes day to day operational expenses for running the overall activities of the Project for five years. For example, caesarean section, deliveries, maternal outpatient visits, water/electricity, maintenance of facilities and vehicle, country boat expenses, computer services, office stationery etc.
- Supplies : This includes procurement of ambulance, FWD vehicle, speed-boat, air conditioner, refrigerator, overhead projector, computer , other equipment.

Details of Overall budget : Safe Motherhood: Essential Obstetric Care - (EU + ICDDR,B)

In US dollars

Input		Year 1	Year 2	Year 3	Year 4	Year 5	Total
SERVICES							
(I) Operational	PERSONNEL	389596	405180	421387	77853	80968	1374984
	NON-PERSONNEL	37104	37104	37104	13914	13914	139140
(II) Training	PERSONNEL						
	NON-PERSONNEL	16140	16140				32280
(III) Administration	PERSONNEL	17419	18115	18839	2782	2894	60049
	NON-PERSONNEL	3093	3093	3093	1160	1160	11600
MISC.(Non-personnel)		25327	25327	25327	1060	1060	78100
WORKS		80500	40000				120500
SUPPLIES		206334					206334
Contingency(5%)		38776	27248	25288	4838	5000	101149
Total US\$ (1ECU=1.149US\$)		814289	572207	531038	101607	104996	2124136
Total ECU (1 US\$=0.87 ECU)		708431	497820	462003	88398	91346	1847999

17/6/99

*This questionnaire will be administered only to the subjects who anytime in their life had accompanied an adult patient to a health facility or hospital.

*The questionnaire will be modified after pre-testing.

Transportation Survey for the Project, Essential Obstetric Care at Matlab

1. Name of the respondent	
2. Address:	
3. Age:	
4. Occupation:	
5. Years of schooling:	
6. What is your relationship with the patient?	<input type="checkbox"/>
7. What was the problem for which the patient had to transfer to the hospital or health facility?	<input type="checkbox"/> <input type="checkbox"/>
8. What transport did you use?	<input type="checkbox"/> <input type="checkbox"/>
9. Why did you use that transport?	<input type="checkbox"/> <input type="checkbox"/>
10. Did you have to change the transport on the way? Yes =1 No=2 If the answer is No skip to Q14	<input type="checkbox"/>
11. Why you had to change the transport?	<input type="checkbox"/> <input type="checkbox"/>
12. How many times did you change the transport?	<input type="checkbox"/> <input type="checkbox"/>
13. In total how many types of transport did you use?	<input type="checkbox"/> <input type="checkbox"/>
14. Who arranged the transport for you?	<input type="checkbox"/> <input type="checkbox"/>

<p>15. How much was the fair for each type of transport?</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/></p> <p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/></p> <p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/></p> <p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/></p>
<p>16. How long it took to arrange the transport?</p>	<p><input type="checkbox"/><input type="checkbox"/> Hours</p>
<p>17. Was there any delay in getting the transport?</p> <p>Yes =1 No=2</p> <p>If the answer is No skip to Q24</p>	<p><input type="checkbox"/></p>
<p>18. Why was the delay?</p> <p>.....</p> <p>If NO skip to question 25</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>19. What was done to resolve the problem of delay?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>20. Did it work?</p> <p>Yes =1 No=2</p> <p>If the answer is yes skip to Q22</p>	<p><input type="checkbox"/></p>
<p>21. Why it did not work?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>22. What can be done in future to avoid this type of problem?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>23. How it will improve the situation?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>24. Who accompanied you?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>25. Who accompanied you in the transport?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>26. Why he/she accompanied you?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>27. Do you think that enough people accompanied you to the hospital?</p> <p>Yes=1 No=2</p> <p>If the answer is yes skip to Q29</p>	<p><input type="checkbox"/></p>
<p>28. Why not?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>
<p>29. How many bamboo bridges you had to cross to reach the hospital?</p> <p>.....</p>	<p><input type="checkbox"/><input type="checkbox"/></p>

30. How many ferries you had to cross?	<input type="text"/> <input type="text"/>
31. How long did you walk?	<input type="text"/> <input type="text"/>
32. How long you had to carry the patient?	<input type="text"/> <input type="text"/>
33. What was the season at the time when you had to transfer the patient?	<input type="text"/> <input type="text"/>
34. Is there any effect of season on the availability of transport? Yes=1 No=2 Others	<input type="checkbox"/>
If No skip to question 36	
35. Does the fare vary according to the season? Yes=1 No=2	<input type="checkbox"/>
36. How much fare you had to pay?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> taka
37. How long was the distance between the health centre and the patient's residence?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Miles
38. Was the fare too much? Yes=1 No=2 If the answer is yes skip to Q40	<input type="checkbox"/>
39. Why was it too much? Yes=1 No=2 If the answer is yes skip to Q...	<input type="checkbox"/>
40. Is the situation in relation to the availability of transport is better now? Yes=1 No=2 If the answer is No skip to Q43	<input type="checkbox"/>
41. How is it better?	<input type="text"/> <input type="text"/>
42. Why it is not better?	<input type="text"/> <input type="text"/>
43. What did you consider to visit the health facility or hospital?	<input type="checkbox"/>
44. Given current problem of transport, will provision of EOC at the FWC and THC be useful? Yes=1 No=2 If the answer is yes skip to Q46	<input type="checkbox"/>
45. Why not?	<input type="text"/> <input type="text"/>

46. How can it be improved?	<input type="checkbox"/> <input type="checkbox"/>
47. Do you think that people will change their degree of effort to get a transport now, since the availability of transport has been changed now? Yes=1 No=2	<input type="checkbox"/>
48. Are the general problems related to transport is different for pregnant women than others ?	<input type="checkbox"/> <input type="checkbox"/>
49. Why is it different for pregnant women?	<input type="checkbox"/> <input type="checkbox"/>
50. Is it equally applicable for non-pregnant female patients? Yes=1 No=2 If the answer is yes stop interviewing	<input type="checkbox"/>
51. Why not?	<input type="checkbox"/> <input type="checkbox"/>

Thank the respondent and end the interview session

• जे प्रश्नपत्राचि सुरवात करीत शेरव कुर्झात पाहारा एक वन प्राप्त
 वयक्त खातीक मेया शासनाचोय किंवा शास्य करुन गिर्याहिन।

- प्रश्नपत्राचि मदीका कश्या वदन करीत शेरव
 यान्तराचोय उचिण
 प्रयोजनीय प्रवृत्ति मदीका, मत्तन

प्रश्नपत्र

1. देवदाताचो नाम _____
2. गैरना _____
3. वयस _____
4. टपना _____
5. कठ कुत्रा कुन मडाउता करुन? _____
6. खातीक शासनाचोय किंवा शास्य करुन गिर्याहिन? _____
7. खान यान्तराचोय सुरवात करुन? _____
8. खान यान्तराचोय उचो सुरवात करुन? _____
9. शास्य यान्तराचोय कि यान्तराचोय वदन करुन? _____
10. खान यान्तराचोय वदन करुन? _____
11. अर्थाचोय कठ वदन यान्तराचोय सुरवात करुन? _____
12. यान्तराचोय सुरवात करुन? _____
13. शास्य वदन करुन कठ कठ वदन करुन? _____

26. યાત્રા સમયે સુવર્ણ કાચા કાઠ
કરવા સંભવિત?

27. યાત્રા સમયે (પાઠ) કિ (દેવી)
કરવા?

શ્રી = 1, ના = 2

કેટલું યદિ ના થયું, પ્રશ્ન નં 28
જિજ્ઞાસા કરવા

28. રૂબરૂ (દેવી) કરવા?

29. (દેવી) યાત્રા નહીં, બીજા કોઈ કિ
કરવા?

30. રૂબરૂ કરવા?

શ્રી = 1, ના = 2

કેટલું શ્રી થયું, પ્રશ્ન નં 22
જિજ્ઞાસા કરવા

31. રૂબરૂ રૂબરૂ થયું ના?

32. લેખિકા સંસ્કાર થયું ના થયું,
બીજા કોઈ કિ કરવા થયું માટે?

33. કોઈ અસંસ્કાર કિ લેખિકા ઉપર
કરવા થયું

34. આસપાસ આગળ કે ગિજ્ઞાસા?

35. યાત્રા સમયે આસપાસ આગળ કે
ગિજ્ઞાસા?

36. રૂબરૂ થયું આસપાસ આગળ
ગિજ્ઞાસા?

29. आभार माय मयामु (निक
 गिराहिन ?
 शी = ०, ना = २
 यदि शी २५, प्रश्न न २० विड्या ककर ।

25. रकन न ?

22. हायमातारन टयाठ कठ उरना गौमर आँका
 मार शयहिन ?

30. कठउरना कवी मार शयहिन ?

31. कठऊन शैठेहिन ?

32. आपनार कि वार कडे रये
 निए गिराहिन ? रगन कठऊन
 रयेठ शयहिन ?

33. ययन आपनार क्युम २० ७०
 अमय (अरु) कि हिन ?

38. आपनार यारायारु मारी/यारयय
 (आगत कि अमय (अरु)र कान
 मारु हिन कि ? शी = ०, ना = २,
 आपनी _____ यदि ना २५ ७०
 प्रश्न न ७५ विड्या ककर

68. अक्षरों के लिए कि गणना देना
क्या समीप है?
हाँ = 1, ना = 2

69. गणना देना कितना है?

70. आपका क्या एक सवाल
किस/समस्याओं को हल है?

71. देना कि पूरा समीप?
हाँ = 1, ना = 2, यदि हाँ है
तो हम प्रश्न नं 80 विचार करें

72. देना कितना समीप?

80. क्या आपका समाधान मातृभाषा सुझा
कि अक्षरों को हल है?
हाँ = 1, ना = 2, यदि ना है
तो हम प्रश्न नं 86 विचार करें

81. अवस्था कि कितना यदि दिया है?

82. कितना हल है?

83. आपकी सवाल किस/समस्याओं को हल
दिया है आपका देखा है?

84. कितना आपका समाधान आपको
प्रश्न प्रकृत हल कर कि
आपका देना के लिए आपका हल
हल करें?
हाँ = 1, ना = 2, यदि हाँ है
तो हम प्रश्न नं 86 विचार करें

86. एकन नय ?

87. कि लार डेवति कय थय ?

89. एथन योहू यनराहनर सुयोग
धुविरा जोहू, लारक यन राहन
गुवहर करिब।

हाँ = 0, ना = 2

88. गडवति झरिना कय अन्यान्यदेर
झरन यनराहन गुवहरर एकन
साथरु जोहू कि ना ?

हाँ = 2, ना = 2

89. एकन साथरु ?

90. कडे प्रसन्न्या कि गडवती नन
प्रसन्न झरिना वागोदेर कय
शर साथर ?

हाँ = 0, ना = 2, यदि हाँ थय,
कडेल कय किन प्रसन्न करिब
ना।

91. एकन नय ?

डेवदाताक सिगद दिरे प्रसन्न पर
(मर कयन)

(7)

Principal Investigator: Last, first, middle Yunus Md.

Appendix II

Indicators for Evaluation

DIRECT OUTPUT INDICATORS *Availability*

Indicator	Useful	How to measure ?	Accessible from /source	Remarks
Number of health centres per 160,000 population with functioning basic EOC(includes parenteral antibiotics, oxytocics, sedatives for eclampsia and manual removal of placenta and retained products)	<ol style="list-style-type: none"> 1. Universal access to basic EOC, 2. Link between available basic EOC and health outcomes of mothers and newborn 3. Complementary to MMR 4. local level programme planning 	HC providing functioning basic EOC/ population size	Service record book at FWC for numerator and population census for denominator	<ul style="list-style-type: none"> • Information is easily accessible • Needs standard definition of basic EOC
Number of hospitals per 500,000 population with functioning comprehensive EOC(includes basic EOC plus surgery, anaesthesia and blood transfusion)	<ol style="list-style-type: none"> 1. Universal access to comprehensive EOC, 2. Link between available comprehensive EOC and health outcomes of mothers, 3. Complementary to MMR 4. local level programme planning 	Hospital providing functioning comprehensive EOC/ population size	Service record book at THC for numerator and population census for denominator	<ul style="list-style-type: none"> • Information is easily accessible • Needs standard definition of comprehensive EOC

DIRECT OUTPUT INDICATORS *Accessibilty*

Indicator	Useful	How to measure ?	Accessible from /source	Remarks
% women who were in prolonged labour (>24hrs) before arrival in hospital	<ol style="list-style-type: none"> 1. Measurement of accessibility 2. Universal access to comprehensive EOC, 	No. of women who were in prolonged labour (>24hrs) before arrival in hospital/ all hospital/ facility delivery	Service record book at THC for	

DIRECT OUTPUT INDICATORS *Quality of Care*

Indicator	Useful	How to measure ?	Accessible from /source	Remarks
% of women with obstetrical complications treated within 2 hours of presentation at a health facility	1. Measure of quality of care 2. Universal access to EOC facilities	No. of pregnant women having obstetric complications attended in EOC facilities and treated within 2 hrs / all births	Service record book at FWC and THC .	- direct obstetric complications defined
% of women who received blood transfusion at the referral hospital	1. Measure of quality of care 2. Universal access to EOC facilities	No. of pregnant women attended in EOC facilities and had blood transfusion / all births at hospital	Service record book at THC .	Hospital facility have available blood transfusion
% of pregnant women attending ANC clinic who received iron/folate	1. Measure of quality of care 2. Universal access to EOC facilities	No. of pregnant women attended in antenatal clinic at EOC facilities and had iron folate / all pregnant women attending ANC	Service record book at FWC/THC. FWA record book, survey in a subsample	Functioning of proper antenatal clinic
% of pregnant women referred to a FWC/THC	1. Measure of quality of care 2. Universal access to EOC facilities	No. of pregnant women referred/ all pregnant women	Service record book at FWC/THC. FWA record book, survey in a subsample	Regular monitoring will improve the operational aspects of EOC

INTERMEDIATE OUTPUT (PROCESS) INDICATORS *Utilisation*

Indicator	Useful	How to measure ?	Accessible from /source	Remarks
Percentage of women attended at least once during pregnancy by skilled health personnel for reasons relating pregnancy	1. Universal access to prenatal care 2. Measure of utilisation 3. Reflection of utilisation of prenatal care	Women attended at least once by skilled personnel/all pregnant women	Service record book at community clinic, FWA, FWC and THC /HDSS data. Also population based surveys is most reliable, but problems with recall bias	Skilled health personnel defined
Percentage of pregnant women immunised against tetanus(TT2 or booster)	1. Universal coverage of immunisation 2. Measure of utilisation 3. Reflection of utilisation of prenatal care	Pregnant women immunised against tetanus/all pregnant women	Service record book at community clinic, FWA, FWC and THC /HDSS data. Also population based surveys is most reliable, but problems with recall bias	Examine the coverage and put emphasis accordingly
Percentage of births attended by trained health personnel (excluding trained and untrained TBAs)	1. Universal access to intrapartum care 2. Measure of utilisation 3. As a proxy impact indicator	No. of births attended by trained health personnel / all births	Service record book at community clinic, FWA, FWC and THC /HDSS data. Also population based surveys is most reliable, but problems with recall bias	-Trained health personnel defined -ambiguity remains on trained TBA and private providers
Proportion of women estimated to have direct obstetric complications that are seen in EOC facilities	1. Measure of utilisation 2. Universal access to EOC facilities	No. of pregnant women having obstetric complications attended in EOC facilities / all births	Service record book at FWC and THC /HDSS data.	- direct obstetric complications defined
Proportion of all births that occur in facilities with EOC	1. Measure of utilisation 2. Universal access to EOC facilities	No. of pregnant women delivering in EOC facilities / all births	Service record book at FWC and THC /HDSS data.	

Caesarean sections as a proportion of all live births in the population	1. Measure of utilisation 2. Universal access to EOC facilities	No. of Caesarean sections in EOC facilities / all births	Service record book at FWC and THC /HDSS data.	
% of obstetric and gynaecological admittances/outpatients due to abortion complications(excluding planned termination of pregnancy)	1. Measure of utilisation and availability 2. Universal access to EOC facilities	No. of obstetric and gynaecological admittances / outpatients due to abortion complications / all pregnant cases	Service record book at FWC and THC /HDSS data.	Abortion cases to be defined

IMPACT INDICATORS

Maternal deaths as proportion of all deaths among women of reproductive age.	1. Measure of impact 2. Universal access to EOC facilities	All maternal deaths / all deaths among women of reproductive age.	Service record book at FWC and THC /HDSS data.	Maternal deaths defined
Case fatality rates for direct obstetric complications (facility-based)	1. Measure of impact 2. Universal access to EOC facilities	All maternal deaths at facilities / all deliveries at EOC facilities.	Service record book at FWC and THC /HDSS data.	Maternal deaths defined