

An Investigation into the Nature and Determinants of Maternal Morbidity Related to Delivery and the Puerperium in Rural Bangladesh

End of Study Report

prepared by

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EXECUTIVE SUMMARY

Introduction

It has been estimated that 99% of the world's maternal deaths (currently estimated to be about 500,000 per annum) occur in developing countries. In Bangladesh, as in many other resource poor countries, the maternal mortality ratio has been estimated at between 5 and 6 deaths per 1000 live births. The main medical causes of these deaths are haemorrhage, infection, eclampsia, obstructed labour and septic abortion.

Far less is known about the nature, determinants, levels and trends of maternal morbidity than is known about maternal mortality. Until recently it was thought that there might be about 16.5 morbidities for every maternal death. More recent estimates suggest that this figure is far too low and that there may be as many as 100 morbidities for every death meaning that more than 61.8 million women suffer significant ill health annually as a result of childbearing.

Studies of maternal deaths which have investigated the timing of maternal deaths show that the majority occur in the post-partum period. It seems likely that most maternal morbidities arise at this time also and are linked to events at delivery. These conditions which include pelvic sepsis, anaemia, prolapse, vesico-vaginal fistula and prolapse, may not result in death but may have serious social and physical consequences for women.

There have been very few community based studies of maternal morbidity in the post-partum period. One study from Honduras has reported that 28% of women developed complications during the puerperium, but in most countries facility based data is all that is available. Studies which have measured the prevalence of conditions which are long-term consequences of childbirth have often found that the prevalence can be very high. For instance, a recent cross-sectional community based study conducted in Egypt discovered that 56% of 508 women examined had demonstrable prolapse. A study in Birmingham UK found that the number of women suffering significant ill health as a result of childbirth was as high as 63.9%. A recent cross-sectional retrospective study of maternal morbidity in Bangladesh found that around 80% of women reported ill health associated with childbearing.

One of the major issues in the estimation of levels of maternal morbidity in the community centres around the measurement techniques needed to provide accurate information. Compared to child health, very little work has been done in this field. Since 1989 a group based at the London School of Hygiene and Tropical Medicine (LSHTM) has co-ordinated a programme of methodological research on maternal health with the objective of evaluating existing methods of measuring maternal health, particularly in the community, and of developing, piloting and promoting the use of new approaches.

Most interventions to improve maternal morbidity and mortality have focused on ante-natal care with referral of high risk cases to appropriate medical facilities. However, there has been considerable debate as to the value of ante-natal care in a situation where referral facilities are

absent or inadequate. In addition, in many countries, such as Bangladesh, where most deliveries occur at home, there have been programmes for training traditional birth attendants. However, it is uncertain how far delivery practices play a part in the aetiology of maternal morbidities, and the effectiveness of the interventions in prevention have never been adequately evaluated. Post-partum care is rarely given prominence in programmes for maternal care and no protocol for optimum surveillance has been developed despite recent interest in the potential of this period for integrated maternal, child and family planning interventions.

In order to describe the pattern of maternal morbidity during the puerperium in Bangladesh, define the most important determinants of this morbidity and suggest approaches for future postnatal programmes a collaborative research study was undertaken by BRAC, and the London School of Hygiene and Tropical Medicine (LSHTM).

Objectives

The primary objectives of the study were: identification of the levels, causes and consequences of post-partum maternal morbidity; description of the influence of maternity care on outcomes in the puerperium; preparation of a protocol for postnatal care for women; and development of lay-reporting techniques for diagnosing the most important post-partum morbidities.

Methods

The main part of the study was a prospective community-based study, with retrospective collection of data on obstetric history, history of pregnancy and delivery.

The sample size was calculated to give a precision of 1% with a confidence level of 95% when detecting morbidities expected to have a prevalence of 4%. These gave a required sample size of 1,473. Allowing for dropout, the target registration of pregnant women with pregnancies surviving to at least 28 weeks gestation and delivering in one of three areas within the demographic surveillance system maintained by BRAC since 1986 became 2099. Field work was carried out by female BRAC workers with both research and health training who were resident in the study area. Pregnant women for recruitment into the study were identified during regular monthly household visits over a 12-month period.

At around 28 weeks gestation, a detailed interview took place with each woman, covering obstetric history, problems in current pregnancy and information on socio-economic circumstances. Following notification of the delivery to the study team, the woman was visited to gather details on the labour and about specific post-partum symptoms such as bleeding, vaginal discharge, breast problems and fever. A simple physical examination was also carried out. Mothers received additional follow-up visits which also included a physical examination at 2 weeks, 6 weeks, and 12 weeks post-partum, to reassess their health status and to determine their utilization of health services and hygiene practices.

Additional data were collected through focus group discussions and a series of in-depth interviews. Focus group discussions were held with TBAs, young mothers, older mothers and health workers prior to the survey in order to provide background information for the survey, guide questionnaire development and build a vocabulary of local terms. In-depth interviews took place with a sample of thirty women. These cases were selected at the time of the 48 hour interview and visited weekly for six weeks.

Results

Most of the deliveries (97%) occurred at home while 92% of the deliveries were attended by traditional birth attendants or relatives. Fifty two percent of the women reported some action being taken to speed up labour. In 83% of these cases the activity could be considered to be harmless such as massage or homoeopathic remedies, but in 4% of cases an injection (perhaps of Oxytotic drugs) had been given. It was reported that in 98% cases the cord was cut after the placenta had been delivered. Over 52% of the deliveries were attended by trained traditional birth attendants.

Nearly one third of women had experienced one or more serious complications at the time of delivery such as duration of labour for more than 24 hours (8.4%), retained placenta (8.6%), duration of pushing for more than 1 hour (7.8%) etc. Morbid sequelae of delivery were extremely common. Ninety two percent of the women reported one or more symptoms of ill health during the 2 weeks after delivery and this remained high with over 70% of women still reporting symptoms at 6 weeks. This compares with 36% of women who reported symptoms at the registration interview. Swollen ankles were common in pregnancy, particularly in the last month but were rarely reported after delivery. Fever was reported at a steady level during pregnancy but became much more common after delivery possibly in association with infection.

Symptoms such as dysuria and perineal problems which, as might be expected, are at high level during the 2 weeks after delivery, were still being reported by over 7% of women even 12 weeks after delivery. Over 10% of women were still reporting breast problems at the end of the follow-up period.

Excess bleeding other than immediate post-partum haemorrhage (i.e., secondary postpartum haemorrhage) was common, being experienced by 16% of women in two weeks immediately after delivery and 5.6% of women between 2 and 6 weeks after delivery.

Anaemia was assessed by conjunctival colorimetry and the results suggested that anaemia was common, with over 50% of women appearing to be anaemic to some degree at the 48 hour and 2 weeks examination and with over 10% of women being severely anaemic.

Using fever, foul discharge and lower abdominal pain as criteria for post-partum infections it was found that 26% of women had evidence of infection during the first 2 weeks after delivery, and 14.7% during the period 2 to 6 weeks after delivery.

Over 29% of women reported having had what they considered to be an abnormal vaginal discharge during the first 6 months of their pregnancy and 25% during the last trimester. Over 2% of women were found to be suffering from Pre-eclamptic toxemia (PET) measured by BP, proteinuria and oedema.

A significant association was found between the duration of the second stage of labour and the development of infection and also between the birth attendant having put her hands in vagina and the development of infection. Besides, the women who had a lower MUAC during pregnancy were also more likely to develop infection in the post-partum period. A significant relationship was found between continued blood loss (i.e., secondary PPH) during the two weeks after delivery, and anaemia detectable at the 2 weeks examination.

The nutritional status of the women as measured by MUAC declined towards the time of delivery and stayed low for several weeks. Towards the end of the follow-up period an improvement had begun to occur. Women in the lowest socio-economic group had poorer nutritional status throughout the study. Their decline in nutritional status was greater than for those in the better-off groups, and their recovery was slower.

Although over 58% of deliveries were conducted by trained birth attendants (trained traditional birth attendants, doctors, nurses, FWVs and others), the presence of a trained attendant at the delivery, even when procedures such as handwashing with soap were carried out, had no significant effect on symptoms of infection occurring after delivery.

Only 12.6% of women had an ante-natal check up. The most frequently cited reason for non-attendance was the perception that they had no health problem with pregnancy. Younger women were more likely than older women to attend for ante-natal care as were primigravidae. Women with some education were more likely to attend ante-natal care than those who had no education.

The MCH-FP Centre at the district town appeared to be major source of ANC (30%) followed by Satellite Clinics (23%) and Hospital (18%). Notably out of 19 women who were advised (at ANCC) to deliver at hospital, only one actually did so.

Women's use of health care providers during the post-partum period differed according to the type of problem for which they were seeking care. If the problems was of a reproductive nature they were nearly twice as likely to visit the MBBS doctor (a female) at the MCH-FP Centre than they were if the problem was non-reproductive. For non-reproductive problems they were nearly three times as likely to visit a 'Kobiraj' or other traditional practioners.

Although the majority of mothers were not practising exclusive breastfeeding and were thus at risk of conception, only 5.6% of them stated that they were using contraception when interviewed three months after delivery.

The mean birth weight was low, 2.47 kgs with the proportion of LBW babies being 46.7%. There was a strong association between both young age and primiparity, and the birth of a low birth weight (LBW) baby. Although socio-economic and maternal education were not appeared to be strong predictors of LBW but short maternal stature and low MUAC were both significantly associated with LBW.

The perinatal mortality was very high (68.4/1000 births) comprising nearly three quarters of all the deaths of infants during the study period. There was a strong association between the occurrence of a problem at delivery and the non-survival of the infant.

The qualitative data from the focus group discussions, and from the in-depth interviews indicate that women are aware of post-partum health problems, and that there are traditional remedies for many of these conditions. It was apparent that there are strong beliefs in the influence of the supernatural in health conditions related to childbirth and many of the remedies have a strong spiritual content. Seclusion practised for a variable length of time following child birth, and this can make it difficult for women to gain access to formal health services if they become ill at this time.

Major Methodological Lessons Learnt

Information that obtained sometime after the event is likely to be more reliable for the more obvious and well defined morbidities such as prolapse than it is for more general symptoms such as fever.

It was particularly useful to have undertaken focus group discussion prior to the questionnaire development as this was a relatively new field for research. Moreover, the system developed for continuous recruitment of women into the study in a fairly small geographical area helped considerably in minimising the loss to follow up which is always a problem with longitudinal studies.

Limitations of the Study

This study was carried out in a confined geographical area. Thus the results may not necessarily be completely representative of the entire population of Bangladesh but such close follow-up would not have been possible in a wider geographical area.

The repeatability checks and other quality control measures suggest that, within the constraints of the current level of knowledge about how best to measure the maternal health, the information obtained is valid.

Conclusion

- Maternal morbidity particularly during the post-partum period is very high in this area of Bangladesh . Much of this morbidity, for instance, infection could be either preventable or treatable with simple methods.
- Although women are aware of health problems associated with childbirth, their use of formal health services at this time is extremely low.
- Although the use of trained TBAs in this area is high, their presence at delivery did not have a demonstrable effect on maternal outcomes such as infection.
- Perinatal mortality is extremely high in this area of Bangladesh and is strongly associated with events at delivery.
- Low birth weight is common in this area of rural Bangladesh and is particularly associated with low age and parity of the mother and poor maternal nutrition.

The findings of the study are useful to the health managers and planners to develop a package of post-partum care for safe motherhood.

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1. INTRODUCTION

The postpartum period or puerperium, usually defined as the 42 days after delivery, is an integral part of the reproductive process of gestation and delivery. This is the period when, if all goes well, the newly delivered mother's body recovers from the birth, lactation is established and the infant is integrated as a new member of the family. However, this natural process of resolution, healing and progress often does not take place smoothly. Indeed, for many women, particularly in the developing world, the time after childbirth, instead of being a time of joy and hope for the future, becomes a time of death or illness.

Not only is maternal mortality as a whole much higher in developing countries than it is in the industrialised world, but the evidence is that most of these deaths occur during the puerperium and relate to events arising during delivery. It is likely that the bulk of maternal morbidity also arises in the puerperium. In addition to the immediate risk of death, morbidity such as infections occurring in the postpartum period may have long-term severe consequences for the women who suffer from them. Despite the probable importance of postpartum morbidities, their determinants, incidence and causes are largely unknown for developing countries. Similarly, it is not known to what extent morbidities arising postpartum are related to the circumstances surrounding delivery.

In most existing Maternal and Child Health (MCH) programmes the focus after delivery is on the infant and little work has been done on the development of protocols for post partum care in terms of prevention, early detection and treatment of morbidity in the mother. It is not known if the interventions currently included in most maternal health programs in developing countries for instance, Antenatal Care (ANC) or training of Traditional Birth Attendants (TBAs) are effective in preventing maternal morbidity arising at or after delivery. In many countries there is a period of seclusion for the mother and new born after delivery and this may make it even more difficult for her to gain access to services at this particularly vulnerable time. The best way to deliver services in the postpartum period including maternal care, child care and family planning has not been adequately worked out.

In response to these gaps in our knowledge and understanding of the postpartum period, a two year study was undertaken in a rural area of Bangladesh in a collaboration between the Bangladesh Rural Advancement Committee (BRAC) and the London School of Hygiene and Tropical Medicine (LSHTM). Much ill health suffered by women during the puerperium may be potentially preventable and relatively easily treated. This study was intended to raise awareness of the importance of the postpartum period, to highlight areas where further research is most needed and to give a factual basis for the design of effective and accessible services for newly delivered mothers. The study utilised a combination of quantitative and qualitative methods in order to provide a broad based view of this period of women's lives.

The qualitative part of the study comprised both focus group discussions with women and TBAs and in-depth interviews with newly delivered mothers. The quantitative study was a prospective community based survey in which information about symptoms, health seeking behaviour and

physical signs was collected by female research workers. Women were first contacted during pregnancy and followed up until 12 weeks after delivery. Retrospective information about events at delivery was collected shortly after delivery.

This study with BRAC was part of a larger programme of research at the London School which has been undertaken in order to investigate methods for measuring maternal health. The study as a whole was thus designed to contribute both substantive and methodological findings in this field.

2. LITERATURE REVIEW

2.1 Why has maternal health become a priority for resource poor countries?

It has been estimated that 99% of the world's maternal deaths occur in developing countries. Maternal mortality ratios of 500/100,000 live births are not unusual in many developing countries such as Bangladesh and much higher ratios have been reported from some of the least developed areas of the world (AbouZahr & Royston, 1991). These ratios can be compared with those in industrialised countries where they are usually below 5/100,000 (Maine, 1987). In some countries, such as those of sub-Saharan Africa and S Asia including Bangladesh, where fertility rates are high, the life time risk of dying from a pregnancy related cause may be as much as 10000 times greater than it is in, for instance, Scandinavia (Tinker & Koblinsky 1993). Awareness of these huge differentials in maternal deaths between developing and industrialised countries and the realisation that the majority of these deaths are preventable, are the main reasons behind the fact that the 1993 World Development Report has recognised maternal health as being one of the highest priority areas for the next decade (WB, 1993).

2.2 What do we know about maternal morbidity as compared with mortality?

The physical condition in which a woman finds herself as a result of a recent pregnancy and childbirth can be thought of as being part of a continuum in which complete health is at one end of the spectrum, and death is at the other, with various degrees of ill health and incapacity between them. (Graham & Campbell 1991)

The extent of maternal morbidity as a health problem is often expressed in terms of numbers of morbid events to every death. Until recently the figure of 16.5 morbidities for every death was the accepted figure. This estimate was based on a small study in India (Datta, 1980). More recent estimates suggest that this figure is far too low and that there may be as many as 100 morbidities for every pregnancy related death (Koblinsky et al, 1993). This would mean that more than 61.8 million women suffer significant ill health annually as a result of childbearing.

The relationship between maternal mortality and maternal morbidity is still incompletely understood. Models using serious morbidities or 'near miss' events as a more frequent proxy for maternal death (Stones, 1991) have been criticised because the risk factors leading to a serious morbidity which results in death may well be different from those leading to a morbidity which

does not result in death. In situations where appropriate health care is available, serious morbidities may well increase while deaths are reduced (Campbell & Graham 1991).

2.3 What is the postpartum period?

The forty two days following delivery is the generally accepted definition of the puerperium and is the definition used by WHO in defining maternal deaths (see Annex 1 for definition of Maternal Death) (International Classification of Diseases, 10th Revision (ICD 10)). However, a number of studies of maternal deaths have extended the scope of the definition to include deaths occurring up to 3 months after delivery (Koenig et al, 1988) or even one year (Walker et al, 1986). When considering morbidity, concepts of definition may cause even more difficulty since some problems, for example infertility as a result of infection incurred at delivery, may not become apparent for many years after the causative event (Campbell & Graham, 1991). Definitional problems may also arise when delineating the beginning of the postpartum period, for instance whether it starts after delivery of the child, or only after the third stage of labour ie delivery of the placenta; is complete. Thus for some conditions, for instance haemorrhage secondary to retained placenta, the distinction between intra-partum and postpartum may not be clear (Campbell & Graham, 1991).

When defining the postpartum period it is important to consider not only the scope in terms of timing, but also whether the period relates only to potentially viable births (ie including stillbirths), or also includes the period after an abortion, spontaneous or induced. Most maternal mortality statistics compile abortion related deaths into a separate category, but in fact, in biological terms many of the deaths have similar causative mechanisms to those occurring after a viable delivery. These distinctions are important, not only for measurement purposes, but also in terms of the timing and type of care required. For example, blood and antibiotics are as important in the treatment of septic abortion as they are for retained placenta.

2.4 Why focus on the postpartum period?

2.4.1 Mortality

Studies which have investigated the timing of maternal deaths, commonly show that the puerperium is the time when the majority of maternal deaths occur. For instance, Andrapradesh, India 69.4% (Bhatia, 1988), Indonesia, 72.8% (Viegas et al, 1992), and Bangladesh, 76.5%, (Chen et al, 1974).

Analysis of the causes of maternal deaths in developing countries show that puerperal sepsis and postpartum haemorrhage (PPH), both of which are, by definition, causes of postpartum deaths are two of the leading causes of maternal mortality (Maine 1988). The combination of these two causes alone make up between 32% and 50% of all maternal deaths in most studies of cause specific maternal mortality (Mola & Aitken, 1984, Viegas et al, 1992, Zhang & Ding, 1984, Fauveau et al, 1988, Makokha 1980).

In studies where there is analysis for both cause and timing, for instance the 1976-1985 study from Matlab, Bangladesh, PPH and Postpartum Sepsis together make up 67% of maternal deaths in the puerperium. Other significant causes of death during this period were found to be concomitant medical causes (16.5%) eclampsia (10%), and violence (5.3%) (Fauveau et al., 1989).

2.4.2 Morbidity

A range of postpartum morbid conditions and syndromes are described in the literature as well as in text books of medicine. However, clinical descriptions and case reports are much more frequent than estimates of incidence and prevalence. This is particularly true of developing countries.

There are also problems in defining postpartum maternal morbidity (Graham & Campbell, 1991). For instance, even at the most basic measurement level, there is no consensus on whether an event such as a postpartum haemorrhage should be classified as a complication, or as a morbidity per se. The difficulties are even greater when indirect factors for instance anaemia are considered.

Reviews of maternal morbidity (Koblinsky, 1993; Howard, 1987; Liskin, 1992) show that ill health consequent on childbearing is not only important in the immediate postpartum period but may have continuing effects on women's lives and reinforcing the view that narrow definitions of maternal morbidity, constrained to the 42 days after delivery, may be inappropriate (Campbell & Graham 1991).

Many of the morbidities described are only of historical interest in the developed world but remain relatively common and important in the developing world, such as obstetric fistulae (WHO, 1989). Others continue to be serious or potentially serious problems in the industrialised world as well as in developing countries, such as postpartum haemorrhage (WHO, 1990).

2.5 What do we know from community based studies of maternal morbidity?

There have been few field studies or community-based surveys anywhere in the world which have attempted to measure the nature or overall levels of morbidity which women experience in the postpartum period and in many countries, facility based data may be all that is available. One study from China reported overall levels of postpartum complications as 6% (Li, 1982). Another from Honduras reported 28% of women developed complications in the puerperium (Honduran MoH, 1990). Most studies which have investigated postpartum morbidity have concentrated on one condition, or have been very limited in their scope, for instance confined to the duration of hospital stay for women delivering in hospital. Field studies in developing countries which have investigated the effects of risk factors or interventions on the outcome of pregnancy have usually confined their outcome measures to the condition of the infant or to easily definable maternal outcomes such as death (Greenwood, 1987). Other studies which have expressed the intention of investigating maternal morbidity confine their investigations to the

period of pregnancy and often consider only a very limited range of conditions (Liljstrand, 1985).

Studies which have measured the prevalence of conditions which are long-term consequences of childbirth have often found that the prevalence can be very high. For instance, a recent cross-sectional community-based study conducted in Giza Egypt discovered that 56% of 508 women examined had demonstrable prolapse (Younis 1993). A recent study in Birmingham UK of health after childbirth, found that the number of women suffering significant ill health as a consequence of delivery was as high as 63.9 % (MacArthur, 1991). Studies in the USA have found similar levels (Gjerdingen 1991).

2.6 What are the main morbidities associated with the postpartum period?

Reviews by Liskin and Howard (1992 and 1987) have brought together much of the literature describing morbidity relating to delivery in the developing world. The main morbidities usually associated with the postpartum period are post-partum haemorrhage and its consequences, infection, prolapse and damage to the perineum, stress incontinence, obstetric fistulae, breast problems, and psychological problems. Nutritional deficiencies including anaemia and other micronutrient deficiencies may be exacerbated by pregnancy delivery and lactation. In some societies, violence is a risk for women who have not produced a living child of the "right" sex.

Liskin has pointed out that research on morbidity in pregnancy has tended to focus on complications that are measurable and potentially life threatening but that 'minor complaints' such as nausea, backache and fatigue are rarely addressed even though these conditions may significantly impair a woman's well being and ability to work (Liskin, 1992). Recent research in Birmingham UK which has investigated these issues has suggested that these problems may be very common and may persist for considerable lengths of time; for instance in that study, 72% of primiparous women reported backache which lasted over six weeks and which had started for the first time within three months of delivery (MacArthur, 1992).

If postpartum ill health is prevalent, these problems represent a considerable burden on women's lives affecting their ability to work, to look after their newborn and other children and to function effectively in society. It is not known whether these kinds of problem are more or less frequent in developing societies or whether the determinants and risk factors are similar.

2.7 What do we know about the risk factors and determinants of postpartum morbidity?

Although risk factors for some individual morbid conditions and events are known the broader nature of the factors which might make a woman more likely to suffer from ill health in the period after childbirth or to develop severe or lasting sequelae as a result of an episode of ill health at this time are less well defined (Graham & Campbell, 1991).

The determinants may be considered as falling into four main categories relating to stages in the reproductive process (Maine and MacCarthy, 1992).

1. The health of the woman before pregnancy, including any residual problems from previous pregnancies;
2. The health of the woman during the index pregnancy;
3. Events at delivery;
4. Events during the puerperium.

Determinants and risk factors can also be conceptualised according to their origin :

- a. Reproductive factors include a woman's age and parity;
- b. Obstetric factors comprise a woman's previous obstetric history;
- c. Medical factors include pre existing disease which can adversely effect the outcome of pregnancy such as hypertension or cardiovascular disorders;
- d. Social and economic factors effect a woman's access to care and the environment in which she gives birth;
- e. Health care factors may have positive benefits or may have detrimental effects;
- f. Nutritional factors.

2.8 What do we know about maternal morbidity in Bangladesh?

As has been described above, most studies of maternal mortality in Bangladesh have shown that the maternal mortality ratio is very high. Under these circumstances it would be expected that maternal morbidity would also be high, but at the time when field work for this study was started there was no data on actual levels. Most studies of reproductive morbidity had focused on contraceptive users but the results were often revealing. For instance, a study in Matlab showed that 15 % of women were suffering from reproductive tract infections (Wasserheit 1989).

More recently preliminary results from a cross sectional study of parous women in the reproductive age group has suggested that women do experience considerable morbidity associated with childbirth. In this study 80% of women reported one or more morbidities, the majority linked to the postpartum period (BIRPERHT, 1994).

2.9 What about the importance of the postpartum period for the infant?

In most developing countries data on the mortality and health of infants is generally more abundant than it is for maternal health and can help in illuminating maternal problems. The post-natal period is certainly one of risk for the new-born infant as well as for the mother (Walsh et al, 1993). Although interventions such as immunisation, ORS and Vitamin A supplementation have reduced the mortality in older infants, these strategies have had very little impact on early

infant mortality (Koenig 1991). The mortality rates are usually found to be highest in the perinatal period, comprising stillbirths and deaths in the first week of life (Walsh et al, 1993). These deaths are usually associated with maternal and obstetric factors particularly with hypertensive disease of pregnancy, prolonged or difficult delivery, or with events immediately after birth such as chilling (WHO 1993), or delay in initiating breast feeding (Bhatia 1981). Low birth weight is a frequent contributing factor (Walsh et al, 1993). Slightly, later deaths are due to sepsis possibly with organisms from the mothers genital tract or through unclean cutting of the umbilical cord (Wallace & Giri, 1990). The death rate remains high throughout the neonatal period (the first month of life) though the rates reduce as the child becomes older (Koenig, 1991).

Even when perinatal and neonatal problems do not result in death, there is evidence that considerable morbidity sometimes resulting permanent disability can occur at this time (Chalmers & Enkin, 1991). The number of children suffering from long-term disability as a result of events early in infancy is likely to be much higher in developing countries than it is in industrialised societies (Wallace & Giri, 1990).

Although many health strategies focus mainly on the infant, it is clear that the mother and the new born are a dyad. Not only may ill health in the mother have a direct effect on the infant such as the transmission of infection, or a breast abscess interfering with breast feeding, but illness in the mother may compromise her ability to care for her infant. Less well researched, at least in developing countries is the effect that ill health in the infant may have on the mother for instance the link between abnormalities in the child or its sex on her mental health or on outside factors such as the caring behaviour of family members or even her vulnerability to violence.

2.10 How important are traditional beliefs and practices in the postpartum period in non-industrial societies?

In many cultures, including Bangladesh, the period after delivery is a time of seclusion for both mother and new born infant (Karan 1983, Blanchet, 1984). It is common for the mother and baby to be considered particularly vulnerable to evil spirits at this time and a large number of practices are described which have the intention of warding off malevolent influences (WHO 1985). However, seclusion is also often enforced because the process of childbirth is viewed as polluting, particularly to men (Chalmers 1993, Blanchet, 1984), and contact with lochia, as with menstrual blood is considered to be dangerous. The length of the period of seclusion varies, for instance 8 days for Orthodox Jews, 40 days for Tunisian Muslims (Coeytaux, 1989), and one lunar month for some pagan pacific islanders. The end of the seclusion period is usually marked by some form of cleansing ritual after which the mother may return to participation in religious and social activities (Coeytaux, 1989).

A number of dietary taboos and restrictions in the post partum period have been described in the literature but the importance of these must vary depending upon the importance of the foods in

the normal diet and the length of the restriction period (Bhatia 1981, Choudhury, 1990, Katona-Apte 1977).

The period of seclusion has positive effects in that it allows the mother to rest and to be with her baby while she recovers from the delivery and breast feeding is established. However, in societies where it is strictly enforced it has the disadvantage of preventing a woman seeking essential health care at a time when she might be in most need of it.

2.11 What health care is available for women to prevent or treat problems in the postpartum period?

Programs of care for women when they are pregnant, delivering or during the postpartum period have the intention of prevention or early detection and treatment of problems including the postpartum problems discussed above. The care available usually falls into three phases, antenatal, delivery, and postpartum. Although ideally these three phases of care should be integrated and optimally provided by the same carers, they are often completely separate and communication between the various providers may be minimal. Levels of utilization may differ markedly between types of care and from country to country and between programmes within the same country (see Table 2.1). Factors affecting uptake of care include availability of services, accessibility (physical and social), cost (official and unofficial), attitudes of staff and availability of supplies. (Leslie, 1989). It is useful to consider the potential for each of these categories of care to prevent postpartum morbidities.

2.11.1 Antenatal care

Many programs of maternity care have focused their efforts on attempting to provide universal antenatal care in the assumption that this can improve the outcome of pregnancy for both mother and child (Harrison, 1985). Certainly attendance at antenatal clinics is often good, usually better than coverage for delivery or postpartum care (Table 2.1). However, there is mounting evidence, that even where attendance at antenatal care is excellent, the effectiveness of the available interventions in predicting or preventing complications of childbirth may be quite low (Rooney, 1992). Many complications of labour and the puerperium such as postpartum haemorrhage, sepsis and perineal tears cannot be predicted with any certainty. There remains very little information as to the effectiveness of antenatal care in the prevention of morbidities arising after delivery.

Table 2.1. Levels of utilization of different phases of maternity care

Country	ANC	Del Care	PNC	Source
Honduras	73%	39%	31%	Honduran MoH, 1990
Egypt	52%	37%	18%	MCHS, 1991

2.11.2 Delivery care and traditional birth practices

Several authors have recently advocated less emphasis on antenatal care and a more delivery centred approach to prevention of obstetric complications (Maine, 1987).

There is little doubt that access to medical services such as blood transfusions and antibiotics can prevent maternal deaths (Kaunitz, 1984) and many countries have begun programs to improve obstetric services at first referral level (WHO,1991). In many parts of the world medically supervised delivery is not a routine option for most women and most programmes have aimed to improve the care that women receive during home delivery. Most of these programmes have concentrated on identifying Traditional Birth Attendants and training them. TBA training programs have generally the objective of prevention of morbidity and mortality in the child particularly neonatal tetanus, and also of prevention of the main causes of maternal mortality ie sepsis and haemorrhage .They usually include the discouragement of harmful practices and the introduction of simple hygienic measures such as hand washing and boiling instruments and the recognition of conditions that require referral for emergency obstetric care (Tinker,1993).

Studies which have explored traditional birth practices by TBAs in Bangladesh and elsewhere have often found that potentially harmful procedures are fairly common (Bhatia,1981, WHO,1985). These include frequent vaginal examinations, pressure on the fundus, exhortations to push during the first stage of labour, pulling and manipulation of the infant and forced delivery of the placenta (WHO,1985). However, it is not known how far these practices play a part in the aetiology of maternal morbidities or whether training of TBAs is effective in preventing these practices or indeed leads to an improved outcome.

Few evaluations of TBA training programmes in terms of health outcomes have been completed. These have concentrated on either the outcome in terms of neonatal tetanus (Ross,1986) or on maternal mortality. In general, these studies have found that TBA training alone has little effect on maternal mortality (Greenwood, 1990). Effective TBA training programmes have been those in which both transport systems and essential obstetric services have been implemented in addition to the TBA component (Araujo, 1983).

Although some of the components of TBA training eg hygienic delivery practices might be expected to have an effect on postpartum morbidities such as sepsis, there is very little hard evidence to support this.

2.11.3 Postnatal care

Of the three phases of care for women during childbearing, postnatal care is the most neglected. Even in societies where attendance for antenatal care is high and a significant fraction of all deliveries are attended by trained attendants, the proportion of women attending for postpartum care is often very low.

There are several possible reasons why this pattern should be so common.

1. Women may be in seclusion and thus unable to attend.
2. They may be pre-occupied with the new-born and have limited time to consider their own health needs.
3. If immunisation sessions and other interventions for the infant take place at different places or times to maternal services they may not find the extra time or energy to go to them all and give priority to those for the child.
4. They may feel quite well and see no reason to go.
5. The services offered may not be appropriate to their needs or seen as frightening.
6. The main health concerns of women at this time, eg backache, fatigue may not be seen as 'important' enough for a consultation.
7. The services may of poor quality with no privacy and poor hygiene.
8. Staff may not be welcoming or sensitive to women's needs (or even present!).
9. The costs of attendance, actual and opportunity, may be too high.

A few NGOs in developing countries have implemented programs which involve home visiting in the postpartum period, usually commencing a few days after delivery . Although these programmes have not published evaluations of this approach it certainly seems that home visiting might well be more effective in the detection and treatment of postpartum problems in mother or baby than the clinic based approach, as long as adequate back up services were available. However, home visits have huge implications for cost, labour and time and any changes would need to be balanced against these factors.

2.12 What about Family Planning and the Postpartum period?

One of the main interests in the postpartum period has been in its potential for promoting family planning. This time has been seen as an ideal opportunity to educate mothers about family planning and to offer them a contraceptive method (FHI, 1990; Correu, 1991). Some programmes have been very successful such as the Sfax programme in Tunisia which linked into the traditional celebration at the end of the seclusion period at 40 days post-delivery and offered a comprehensive maternal and child health with family planning service (Coeytaux, 1989) and there is evidence that provision of family planning services at the post natal check up improves attendance in women who delivered in health facilities (Mensch, 1992). There has also been increased interest in the fertility implications of the postpartum period since the Bellagio Consensus Statement on the effectiveness of exclusive breast feeding as a family planning

method (FHI, 1988) and this has led to a Population Council Symposium entitled 'Rethinking Postpartum Care' (Brady, 1992). Despite its title the main thrust of the proceedings is towards improving family planning provision, though care for maternal and infant health problems are considered. There are a number of methods of contraception which may be used safely during the postpartum period. Although these methods are generally well known, the special problems of the postpartum period and their possible interactions with maternal health problems at this time are not so well documented. In addition there are a number of programmatic issues which remain to be addressed, such as the timing of the discussion of methods, the best time to commence using the methods, and the impact of women's and indeed men's perceptions of the use of contraceptives soon after a birth (Brady, 1992)

2.13 Summary of literature review:

This exploration of the literature has highlighted the following points:

Firstly: The nature and levels of maternal morbidity after childbirth are largely unrecorded, particularly in developing country settings where most deliveries occur at home or women are discharged from institutions without follow up.

Secondly: The determinants and risk factors for postpartum morbidity, including those relating to events at delivery, are largely unknown,.

Thirdly: The effectiveness of interventions, such as antenatal care and delivery care, in preventing ill health arising from childbirth have not been adequately evaluated.

Fourthly: The optimum way to provide services in the postpartum period including maternal care, child care and family planning has not been identified.

3. AIMS OF THE STUDY

The main AIMS of the study were as follows:

1. To define the most common maternal morbidities occurring during the puerperium and their relative frequency using a rural study site where BRAC has carried out demographic surveillance since 1987.
2. To identify the major determinants of maternal morbidity including variables such as exposure to antenatal care, the presence of a trained attendant at the delivery and events at delivery.
3. To make recommendations relevant to the development of programmes providing postpartum care.
4. To test methods in the measurement of maternal health as part of a wider programme based at LSHTM.

4. METHODS

4.1 Study Site

The field work for this study took place in three unions (Baliakora, Betila, and Jagir) of Manikganj district, a rural area about sixty miles north of Dhaka (see Annex 2 for map). The three unions were chosen for this study because BRAC has undertaken demographic surveillance there on a continuous basis since late 1986.

A baseline survey was conducted by BRAC in the three unions in late 1986 and every household together with the age and sex of the members can be identified. Since the baseline survey, all births, deaths and in/out migrations in the three sites have been recorded.

Each union has a resident team of male and female interviewers who visit each house monthly as part of the surveillance work and are well known in the area. The female workers had prior experience in collecting information on women's health, including asking questions on sensitive topics, through their participation in a BRAC study on adolescent girls, knowledge, attitude and practices about menstruation (Huq, 1991). In early 1991, as part of BRAC's Women's Health and Development Project (WHDP) all the female research workers underwent two months training, which included some practical experience, in Women's Health and Maternity Care. This training was identical to that received by workers destined to be programme organisers in the WHDP.

Two of the study unions (Betila and Jagir) are in Manikganj Sadar Thana where BRAC has both a Rural Development Project (RDP) and a Primary Health Care (PHC) and Child Survival Project (CSP). The third union, Baliakora, is in Gheor Thana, and in this union BRAC has undertaken initially and then RDP. As part of its activities in these unions BRAC has undertaken training of Traditional Birth Attendants in collaboration with the national government programme.

4.2 Study Design

4.2.1 Design Components

The study was designed with three components (see Fig 4.1):

1. Focus Group Discussions: These took place near the beginning of the study to provide background information and to guide questionnaire development for the survey.
2. Survey: A prospective community based survey of women in the puerperium, with retrospective collection of data on obstetric history, history of pregnancy and the delivery.
3. Case Studies: In-depth follow up of a small sample of the participants of the main survey using semi-structured interviews and observation.

4.3 Nature of research teams

The study used the BRAC research workers already working at the study site with one or two additional BRAC workers moved in from other BRAC research areas. Each resident team of workers consisted of five or six female interviewers with a male supervisor.

The women researchers were literate and had obtained a school leaving certificate. However, they had all come from a village background and most were married so they were able to build up a considerable empathy and rapport with the women in the study.

In many areas of Bangladesh it is difficult for women to walk around unaccompanied outside their own 'bari'. Because of the BRAC programmes in the area involving female workers and projects for women, this had become less of a problem in this study site. However, the field workers travelled in pairs wherever possible and wore a burka (a dull coloured cloak with a hood) if they felt uncomfortable in a particular area. Travel was by foot or rickshaw or boat in the wet season when travelling conditions could be very difficult.

4.4 Focus Groups

The questions and topics for the Focus Group Discussions (FGDs) were devised by a small group of researchers from BRAC and LSHTM with advice from an anthropologist with considerable experience in Bangladesh. Before finalizing the questions they were discussed with three groups of female BRAC health workers working in the same geographical area to give us an idea of the acceptability of the questions and the likely form of the responses. These sessions also served as practice for the facilitator.

The discussions were facilitated by a female BRAC research field worker with considerable experience of guiding group discussions and who had been living in the research area. This worker was given the questions for the FGDs in advance and asked to translate them from 'office' Bangla into 'village' Bangla.

In order to obtain a comprehensive view of experiences and opinions within the community, mothers of all ages, and TBAs were included. It was felt that the mothers would talk more freely of their experiences of delivery if they were separate from the TBAs and similarly that younger women would feel less inhibited if separated from the older women. Thus three types of group were devised:

- a. young less experienced mothers - women aged 25 years or less who had one to three births only.
- b. older more experienced mothers- women aged more than 25 years who had four or more births.

- c. TBAs - both trained and untrained TBAs were included in this group. All the trained TBAs had undergone BRAC's own TBA training which is very similar to that used in the government programme.

Participants for the groups were chosen by BRAC field workers who were resident at the field sites. Although the selection was not randomized participants were selected to be broadly representative of the community in terms of religion, education and socio-economic status. Field workers were particularly careful to include women from the poorest sections of the community. However, women from the richest houses were not invited as it was thought that their presence might intimidate the others. Participants were not closely related to each other or from the same 'bari' (compound) but in such small communities it was not possible to have participants who did not know each other.

Groups had between eight and ten participants. Sessions lasted a maximum of two hours and participants were offered refreshments during the session. Discussions were held inside a room in the BRAC base which has its own compound and were relatively private. All men, older children and onlookers of either sex were excluded. If more than ten participants arrived (as was usually the case) they were given refreshments in another room and another BRAC worker discussed topics of general interest with them. The facilitator introduced each topic or question for general discussion and then used probes as needed. The discussion was not allowed to wander off into unrelated areas. The facilitator tried to make sure that all participants were given the opportunity to speak and that the discussion was not dominated by the most vocal women.

Written records were kept by a female BRAC researcher who did not participate in the discussion. She particularly kept note of consensual opinions but also noted any opposing views and kept a record of participants' individual experiences. The entire discussion was also tape recorded and these recordings were subsequently used to check the written transcript. The tape recorder used was very small and although participants were informed that the proceedings were being taped this did not appear to inhibit them once the session had 'warmed up'. A total of nine focus group discussions were held, one of each type of group in each of the three unions of the study area.

Three main topics were introduced during the group discussions:

- * Beliefs and practices about disease causation and prevention in pregnancy and the puerperium:
 - Food restrictions
 - Restrictions on activities
 - Health care seeking
- * Delivery practices and experiences of childbirth:
 - Place of delivery and birth attendant
 - Conduct of normal labour and delivery

- Prolonged labour and other problems during labour
- Delivery of placenta
- Postpartum haemorrhage

* Postpartum health problems including

- Abnormal discharge
- Perineal tears
- Prolapse and Fistulae
- Eclampsia
- Tetanus
- Breast problems

4.5 Prospective Survey

The prospective study began in mid December 1991 and continued for 18 months. It took place in two contiguous phases, a pilot phase lasting until mid April 1992 followed by a main study which was completed in June 1993.

4.5.1 Study Population

The study population comprised pregnant women with pregnancies surviving to at least 28 weeks of gestation and delivering in the three research unions irrespective of the final outcome of the pregnancy.

Although most women in this area go to live with their husbands on marriage, many pregnant women prefer to return to their own parents home for delivery, particularly for their first child. Because of this pattern of migration it was apparent that a proportion of women initially identified as part of the study population might be lost to follow up at the time of delivery if their own parents lived outside the study site even though they might move back into the area after the birth and thus re enter the study later in the follow up period. For this reason it was decided to include in the study not only women permanently resident in the area, but also women migrating in for delivery, so long as they could be contacted before they actually gave birth.

The population of the three selected BRAC research unions in Manikganj district in 1989 was as follows:

	Total	Betila	Jagir	Baliakora
Total population	51,744	18,086	17,410	16,248
Females aged 15-49	14,343	4,721	4,994	4,628
Deliveries per annum	1,712	577	616	519

4.5.2 Sample Size

The sample size was calculated to give a precision of 1% with a confidence level of 95% when detecting morbidities expected to have a prevalence of 4%. This gave a required sample size of 1,473. Allowing for 20% drop out, the target for registrations became 1841.

In order to achieve this sample size (and allowing a six month period from registration to completion of follow up), all women detected as being pregnant in the study area within an 18 month period were included in the study.

4.5.3 Main components

The prospective survey had the following main components:

1. Development of a system ensuring identification of pregnant women by the third trimester of pregnancy and prompt reporting of deliveries.
2. Follow-up of mothers for 12 weeks following delivery starting as soon as possible after the birth.
3. Diagnosis of the most important postpartum morbidities using lay reporting and simple physical examination by community health workers.
4. Collection of information on potential determinants of postpartum morbidity, for instance obstetric history and exposure to antenatal care interventions.
5. Recording of the circumstances of the delivery, particularly those which are likely to relate to postpartum morbidity and have relevance for program planning and evaluation, for instance the participation of a trained birth attendant.

4.6 Preparation for Prospective Survey

4.6.1 Design of preliminary questionnaire

The content of the questionnaires and the actual wording of the questions was guided by the results of the focus group discussions, by reference to questionnaires used in other related studies both in Bangladesh and other countries and by discussion with colleagues at BRAC and in other organisations in Bangladesh (See Annex 3 for Vocabulary of Local Terms). The questions were reviewed by the team at LSHTM. Once a preliminary questionnaire had been completed and translated into Bangla we were able to proceed with a training course for the field workers.

4.6.2 Training of Field Workers

The initial training for the field workers was held in Dhaka and lasted six days. Both the female workers and the male supervisors attended. The first four days were an intensive revision of the material covered in the WHDP training course with particular emphasis on the knowledge and skills needed for the study. A manual describing the skills and knowledge needed for the study was developed and used as part of the training materials for the course.

The last two days of the course were devoted to trying out the questionnaire and developing a good interview technique. Feed back from the participants on the design and wording of the questionnaire was actively sought and incorporated into it when it was later revised.

A considerable part of the training course was devoted not only to the recognition but also to the appropriate management of illness in pregnant women and new born infants. Particular attention was paid to the recognition of conditions for which referral to a health facility would be indicated and also to the field workers skills in giving appropriate advice for feeding problems and other conditions of the new born.

4.6.3 Pretesting

Following the training course a three day period was spent in the field during which the questionnaire was pre-tested and the field workers gained practical experience in using it. The field workers administered the questionnaires to women selected on an ad hoc basis in the study site. The three Bangla speaking investigator listened in to the interviews. At the end of this phase a meeting was held in which the questions were finalised and feed back given to the field workers on their technique.

4.7 Pilot Phase of Prospective Study

It was clearly necessary to conduct a pilot study for such an elaborate prospective study. The objectives of the pilot study were:

1. To test questions in all questionnaires and determine responses for open questions
2. To test the practicality and acceptability of the elements of physical and anthropometric measurements
3. To check that the system developed for follow up of pregnant women would work in practice
4. To check for inter-observer error in measurements and to attempt to assess the repeatability of responses to questions.

It was not practical to undertake a separate and complete pilot study as this would have taken many months to complete thus seriously delaying the start of the main study. It was thus agreed to make the pilot study continuous with the main study. In order to test all questionnaires it was decided to enter women into the pilot phase of the study at any stage of pregnancy or the postpartum period up to 12 weeks after delivery. This would mean we could test the later questionnaires though it would also mean that we would include some postpartum registrations which might need to be excluded at the analysis stage. The number of postpartum registrations was expected to fall off as more and more women were registered into the study during pregnancy.

The pilot phase of the study lasted for four months and it fulfilled the stated objectives. Towards the end of the pilot phase the questionnaire was revised and printed. The main study phase was deemed to have begun when these new questionnaires were fielded and from that time onwards no postpartum registrations were made.

The data from the pilot study was treated as a discrete entity for the purposes of preliminary analysis and provided useful early information for BRAC. It was later flagged and merged with the main study data for final analysis.

4.8 Survey Activities

4.8.1 Detection of pregnant women

The field workers made rounds of all the households in the union on a regular basis to detect pregnant women. Pregnancy was diagnosed on the women's own verbal report. At the beginning of the study rounds were made monthly, but this created an excessive work load so the interval was extended to two months. All pregnant women were considered eligible for inclusion in the study regardless of the stage of gestation. (Table 4.1 summarises the questions asked at each interview, Table 4.2 summarises the components of physical examination for each visit) (see Annex 4 for measurement instruments used).

Table 4.1. Data collection at each interview

<u>Registration:</u>	demographic and socio-economic factors, reproductive history, health in pregnancy and previous month(M).
<u>Antenatal:</u>	health in pregnancy, previous medical history, health care including ANC.
<u>48 hour:</u>	(All) Details of delivery. (0-5 days) Health and health care in last month of pregnancy, health and health care since delivery, condition of baby.
<u>2 Weeks:</u>	Health and health care since delivery, condition of baby.
<u>6 Weeks:</u>	Health and health care in last four weeks, condition of baby (recall of health during two weeks after delivery).
<u>12 Weeks:</u>	Health and health care in last six weeks, condition of baby (recall of health and care during pregnancy and events at delivery).
<u>Plus:</u>	Monthly follow up during pregnancy, early pregnancy losses, maternal deaths, perinatal+ deaths, late returns.

4.8.2 Registration

Following identification, a field worker visited the house and administered a registration interview. This interview collected information on demographic and socio-economic characteristics of the pregnant woman and compiled a reproductive and obstetric history. A small amount of health data was also obtained. The field worker estimated the month of gestation by asking the woman the date of her last period and asking her opinion on the month of pregnancy. The study was explained to the woman and she was asked if she would agree to participate. If she agreed she was given a form to keep at her house on which the visiting field workers recorded each visit.

4.8.3 Monthly visits in the first and second trimesters

If the woman was less than 28 weeks pregnant when registered she was visited monthly by the field worker until she reached 28 weeks. The purpose of this visit was to maintain contact with the woman, check she had remained resident at the registration address and to check whether the pregnancy was continuing. A small amount of morbidity data was also obtained at these visits.

If the woman's pregnancy had ended in miscarriage or abortion, information about this was collected on a special form. She was visited for interview on one more occasion after an interval of one month and then removed from the study.

4.8.4 Antenatal interview

At about 28 weeks of gestation, a detailed antenatal interview took place. This covered topics such as health during pregnancy, pre-existing health problems and attendance for antenatal care. A simple physical examination was performed including anthropometric measurements.

At this stage of follow up, a family member was identified to be responsible for reporting the delivery to the research team as soon as possible after it occurred (within 48 hours). An identifying slip of paper was given to this person and they were told that their transport costs would be reimbursed when the field worker visited the house after delivery.

4.8.5 Monthly visits after antenatal interview

Following the antenatal interview a field worker visited the pregnant woman at monthly intervals and conducted a very brief interview. The main purpose of this interview was to keep in contact and to check on residence. A small amount of morbidity data was also collected, and the woman's weight and MUAC measured.

4.8.6 Interview at 48 hours after delivery

When notification of the delivery was received, a field worker visited the house as soon as possible. At this interview details of the delivery were obtained including nature of birth attendant, length of labour, excessive bleeding, and other difficulties. It was decided that information would be less biased if obtained from the woman and her supporters rather than from birth attendants brought in from outside the home. No specific attempt was made therefore to elicit information from such attendants.

At this interview the woman was also asked about her health in the last month of her pregnancy, and attendance for antenatal care. A limited amount of information about the health and feeding of surviving infants was obtained and then the mother and child were examined.

Examination of the baby included weighing, chest and head circumference, simplified estimation of gestational age and observation for morbidity such as sticky eye. Examination of the mother included estimation of anaemia by conjunctival colorimetry, MUAC, examination of fundus and of perineum if she admitted to a problem and consented to examination.

4.8.7 Follow-up interviews after delivery

Follow-up interviews took place at two weeks, six weeks and twelve weeks postpartum.

At each of these follow-up interviews the health status of the mother and infant was reassessed using a combination of questions and physical examination. In addition, her utilisation of health services and hygiene practices were determined.

At interviews at six weeks and twelve weeks certain questions relating to both morbidities and care received were asked which had also been asked in prior interviews. These questions are part of the wider methodological study of which this study is a part.

Table 4.2 Physical examination at each interview

Examination	Ant	48 hr	2 wk	6 wk	12 wk
General condition	*	*	*	*	*
Conjunctiva	*	*	*	*	*
Fundus	*	*	*	*	-
Oedema	*	*	*	*	-
Breasts	-	*	*	*	*
Perineum	-	*	* (?)	* (?)	-
MUAC	*	*	*	*	*
Height	*	-	-	-	-
Weight	*	* (p)	* (p)	*	*
BP	*	*	-	*	-
Urine	*	-	-	*	-
Temperature	-	*	*	-	-
Baby Weight	-	*	-	*	*

(?) = only examined if woman complained of symptoms

(p) = pilot study only

4.9 Care for women participating in the study

This study was descriptive and although experimental interventions or invasive investigations played no part, we were concerned that we should be able to provide some services for the women or infants discovered as having significant morbidities.

As described above, an explicit part of the training course was in the recognition and appropriate management of pregnancy related conditions and problems of the new born. The field workers were instructed to give health advice and to suggest remedies where appropriate. Where necessary they were able to call on the BRAC health workers for assistance.

At the start of the study we made contact with all the relevant government and non-government health personnel in the area including the Family Welfare Visitors at the Union Family Health and family Welfare Centre and the female doctor at the Maternal and Child Health Centre in Manikganj. The MCH and FP services based in Manikganj had been the subject of a UNFPA project aimed at improving management and organisation of the services and morale was good with deliveries taking place at the MCH Centre and the possibility of a number of simple problems (eg perineal repair) being dealt with. The female doctor was receptive to our project and was agreeable to seeing women referred by our field workers. We also visited the District Hospital at Manikganj and the Health Centre at Gheor. The post of obstetrician at the District Hospital had remained unfilled for many years. However, there was a competent surgeon working at the hospital who was able to perform procedures such as manual removal of placenta, forceps deliveries and caesarian section.

In the course of the pilot study it became apparent that one of the main obstacles to the poorer women travelling to these facilities to seek care was their inability to pay for transportation. In response to this a transport fund was set up at each union, funded by the project and to be drawn upon at the discretion of the research base supervisor.

During the planning phase of the study we discussed in some depth the advantages and disadvantages of our field workers having access to drugs such as antibiotics and had decided against it. BRAC's view was that this was an unsustainable activity which could create demands and we would be unable to meet and which had the potential to interfere with their programmes, current and future. During the pilot study we reviewed the study activities and those of BRAC's WHDP and found that, as regards pregnant women, they were similar in content but with the difference that the WHDP were supplying iron tablets, as do government ANC centres. As a result of this review it was decided to supply iron tablets to all study women in the last trimester of pregnancy after the antenatal interview. The accurate measurement of haemoglobin was not part of the investigation and it was felt that we could not justify withholding an intervention which was part of both government and BRAC's policy. Many women in the study expressed appreciation of the distribution of iron tablets and it was felt that the right decision had been made.

4.10 Quality Control and Logistical Issues

4.10.1 Follow up

In a large prospective study one of the main problems is ensuring that as many subjects as possible are followed up at the correct intervals. For this study a number of mechanisms were developed in order to achieve this.

In each union a basic register was kept from which each woman was allocated a unique identity number and which recorded her initial address and date of registration.

A separate main register was kept in which the dates of planned visits was recorded and the dates of actual interviews once they had taken place. The date of delivery and the date it was reported was also recorded in this register. The information in this register was transformed into an action plan wall chart so that the work load of the entire team could be planned. For the 48 hour and two week interview where timing was crucial and visits might be planned at short notice, the planned activities were displayed on a large blackboard.

In addition to these records which were retained at the research base, the information contained in the main register was also recorded on a card which was returned to the BRAC Office in Dhaka once follow up was completed.

As noted above, a record of visits was also kept by the mother primarily to avoid accidental re-interview.

The BRAC demographic surveillance system continued to keep independent records of births to women normally resident in the surveillance area, and this was used to give an estimate of the completeness of birth notifications to the study team.

4.10.2 Supervision

Overall supervision of the study by Dhaka based staff was undertaken by frequent field visits of one to three days duration. Apart from general discussion of problems and checking that follow up visits were taking place as planned, these visits were used to accompany the field workers when doing interviews. Immediate day to day supervision of the field workers was undertaken by male supervisors resident at the research base.

4.10.3 Field worker continuity

In a study of maternal morbidity, many of the questions and elements of examination are of a sensitive or private nature. For this reason, wherever possible given the constraints of workload, sick leave and holidays, all the interviews for one woman were conducted by the same field worker. In doing this, it was hoped that a rapport and trust would be built up between the woman and the field worker thus making it easier to deal with difficult topics and to obtain more accurate information.

4.10.4 Data management

Completed questionnaires were checked by the male supervisors for omissions or incorrectly recorded information. Checked interview forms were collected from the field on a monthly basis and batched at the BRAC Office in Dhaka. If, during the data handling, mistakes were uncovered which could not be resolved in Dhaka, these forms were returned to the field.

Most questions on the interview forms were precoded but coders were employed to fill in the data entry boxes and to code answers that were not precoded. The coders worked closely with the investigator and research assistant in solving any coding problems. Every tenth form was checked by the investigator or assistant.

Data was double entered by a data entry clerk using dBase III. Range checks and internal validity checks were carried out following entry and corrections made.

4.10.5 Quality checks

The following checks were made:

Reinterviews. The quality of the information obtained in studies using self reported symptoms may be difficult to determine as discussed above. Towards the end of the pilot study an exercise was undertaken in which 25 women in each union (Total 75) were re-interviewed within 48 hours by a senior field worker from another union. The questions asked in the re-interview comprised questions from the registration interview, morbidity questions and measurement of MUAC. As a result of this exercise revision training in MUAC measurement was undertaken.

Physical Measurements. The accuracy of scales were checked once a week against a known weight and any inaccuracies noted. Inaccurate scales were taken for repair.

An exercise was undertaken in which the inter observer error in using adult and baby weighing scales, and MUAC and height on the same subject was observed.

4.11 Data analysis

Preliminary analysis using data from the pilot phase of the study took place at the BRAC Office in Dhaka using EPI Info.

Analysis of the full data set took place at LSHTM using SPSS.

The system used to construct the socio-economic score is given in Annex .

4.12 In-depth study

The in-depth study took place over a six month period from May 1992. A Bangladeshi anthropologist working at BRAC was identified to help plan the field work for this phase of the study, and to supervise the field workers responsible for collecting the data. The data was collected by two of the most experienced field workers in each union team.

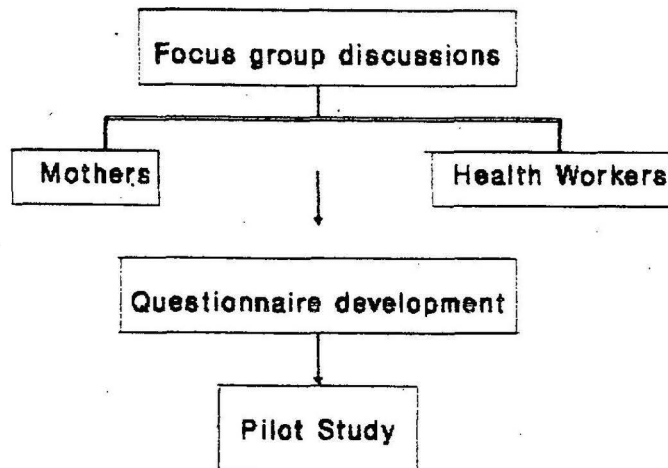
A total of 30 women (10 from each union) were selected for study. These women were not selected at random, but chosen at the time of the 48 hour interview. The intention was to include women who had experienced different difficulties at the time of delivery or who had had problems in this or a previous pregnancy and also to include some women who had had no apparent problems. The women were followed up twice weekly at home for six weeks. An in-

depth interview was undertaken on each visit and observations made of household activities. There was no formal proforma for the interviews, but the field workers collaborated in developing guidelines so that similar basic data was collected on all the women studied. No notes were taken at the time of the interview, but the field workers made a detailed diary of each visit immediately they returned to the base. These transcripts were later read by the BRAC anthropologist and translated verbatim into English.

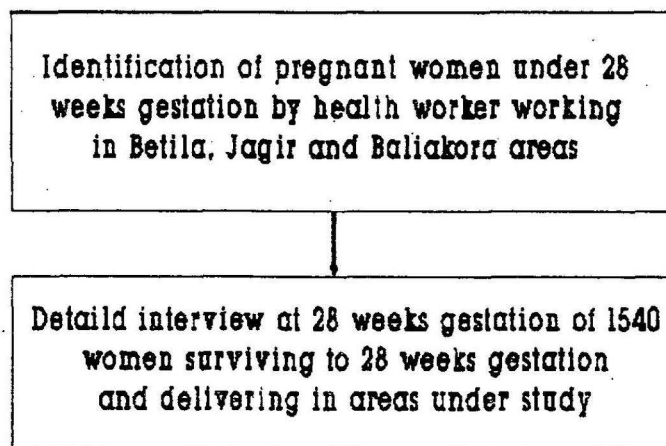
Figure 4.1: Stages of Study

August 1991 - July 1993

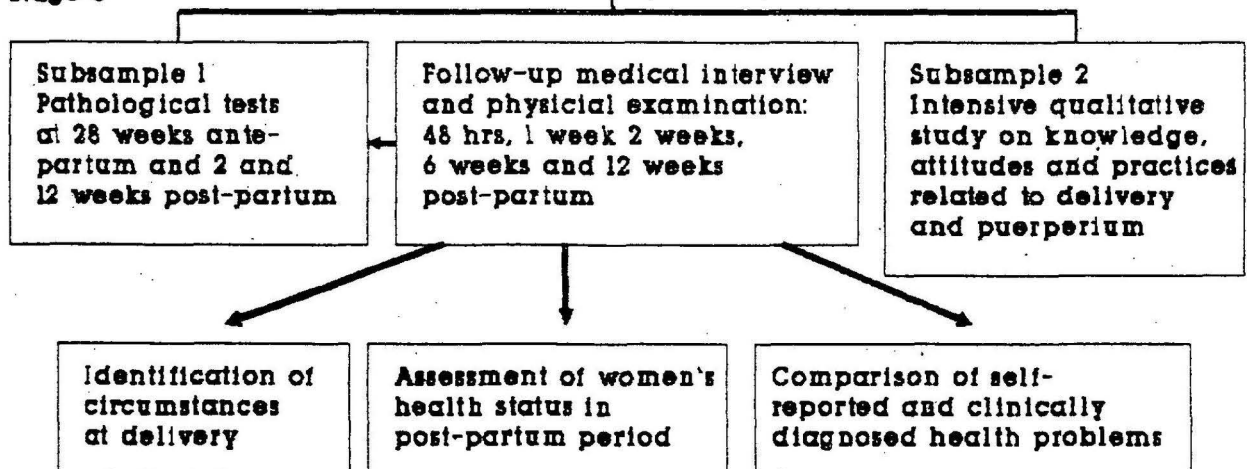
Stage 1



Stage 2



Stage 3



5. RESULTS

5.1. How good was the follow up?

A total of 2,099 pregnant women were registered into the study. The number of each interview type completed is shown in Table 5.1.

Table 5.1 Follow up of registered women

Interview type	Proportion of target sample size	Proportion of women registered	Number of women
Registration	142.5%	100%	2099
Antenatal	106.2%	74.5%	1564
48 hour	127.4%	89.4%	1876
Two weeks	89.9%	63.0%	1323
Six weeks	92.0%	64.7%	1357
12 weeks	95.3%	66.9%	1403

The number of women who completed all six interviews was 701. Another 553 women had completed all but one interview. A further 415 women had completed all but two interviews.

A total of 989 women completed their 48 hour interview within five days of delivery (67.2% of target sample size). (As well as information on the delivery, these women gave information on their health in the month before delivery and were physically examined. Women who were seen more than five days after delivery were asked only for information about the delivery.) 173 women were seen between 5 and 14 days of delivery and a further 233 women provided delivery information at the same time as their two week interview.

Of the 2,099 women registered, 33 reported a miscarriage, while 60 dropped out completely after registration and were lost to follow up. All others were seen again at some point during the follow up period..

(NB In some of the following tables the total number of observations reported may be slightly less than the number of women interviewed as expressed in Table 5.1. The discrepancy is due to missing values, unless otherwise stated.

5.2 What were the results of the repeatability check carried out during the pilot study?

Table 5.2 Percentage of agreement between responses obtained at re-interview within 2 days (N = 75)

Question	% Agreement	Kappa (see footnote *)
No. live children	98.7%	98.2%
Diarrhoea	86.7%	63.5%
Swelling	92.0%	76.1%
Pain	61.3%	20.2%
Fever	84.0%	67.0%
Vomiting	92.0%	77.1%
Vaginal discharge	84.0%	44.2%

* Kappa is an expression of agreement between two responses with a correction for the amount of agreement expected by chance

These results show that for questions referring to a well defined entity that is very unlikely to have changed in the time since the initial interview, for instance, the number of living children, repeatability is excellent. For most morbidity questions repeatability is also good. For very subjective symptoms such as pain, repeatability is not as good. Apart from variable reporting by the interviewee, discrepancy may arise if a symptom starts between the interviews, or if the initial questioning process makes the subject more aware of previously existing symptoms.

5.3 How well did the field workers do the physical examination?

It can be quite difficult to determine how well this kind of information is collected overall other than by observing individual field workers at work. However, collation of expected information can also indicate the quality of these data. Thus in Fig 5.1, the frequency of fundal heights reported for each interview type is presented graphically. This graph shows that the observed changes in fundal height are as would be expected and suggests that the field workers observed and recorded this physical sign consistently and not randomly or carelessly.

5.4 What were the characteristics of the women in the study?

Table 5.3 shows that the women enrolled in the study were mainly young and had started their reproductive life at a young age, the majority during adolescence. Nearly 70% had never attended school and nearly 50% were part of a landless household. This pattern is fairly typical of rural Bangladesh.

Nearly 13% of the women had had a stillbirth, and over one third had experienced the death of one or more of their liveborn children.

The women had signs of current and past undernutrition in that they were on average, short, underweight and had a low mid upper arm circumference.

Table 5.3 Characteristics of study population

Age:	11-50 yrs (Mean: 23.81)	
Age at marriage:	8-34 yrs (Mean 16.48)	(19.6% < 15 yrs)
Age at first pregnancy:	11-35 yrs (Mean 18.59)	(68.8% < 19 yrs)
Never attended school:	64.3%	
Landless:	46.1%	
First pregnancy:	32.4%	
One or more stillbirths:	12.8%	
One or more of liveborn children died:	34.7%	
Height:	112-177 cm (Mean: 148.9)	
Weight (28 wks):	30.0 - 70.0 kg (Mean: 44.4)	
MUAC (28 wks):	106 - 292 mm (Mean: 219)	

5.5. How many maternal deaths were there and what were the circumstances of these deaths?

There were six maternal deaths during the course of the study. All of these occurred following delivery of the child.

Table 5.4 gives a short summary of each of the deaths. Several avoidable factors can be identified even from these short histories. For instance, in case 4, the woman may have had a reasonable chance of survival if she had been referred to hospital for removal of her retained placenta during the ten days between delivery and her death.

Table 5.4 Brief case histories of maternal deaths

1.	Age 20 yrs; First birth; Education grade 4; Landless; Married at 16 yrs; First pregnancy at 20 yrs; Died of eclampsia in hospital 2 days after delivery. Infant stillborn.
2.	Age 37 yrs; Ninth birth; No education; Landless; Married at 13 yrs; First pregnancy at 16 yrs; Died of PPH at home 3 hours after delivery. Infant died 1 week later.
3.	Age 27 yrs; Second birth; No education; Landless; Married at 12 yrs; First pregnancy at 21 yrs; Died of eclampsia at home 6 days after delivery. Treated at hospital before death. Twins, 1 stillborn, 1 died shortly after birth.
4.	Age 15yrs; First birth; Education grade 2; Landless; Married at 14 yrs; First pregnancy at 15yrs; Died of retained placenta at home, 10 days after delivery. Infant alive.
5.	Age 23 yrs; Second birth; Education grade 5; Landless; Married at 17 yrs; First pregnancy at 18 yrs; Died of PPH in hospital 24 hours after delivery. Twins, both alive.
6.	Age 26 yrs; Second birth; Education grade 6; Landless; Married at 16 yrs; First pregnancy at 21 yrs; Died of ruptured uterus 15 mins after delivery at home following ?oxytocin injection. Twins, 1 stillborn, 1 alive.

5.6 What were the findings about the circumstances of all deliveries and delivery practices?

The vast majority of deliveries, 97.4%, were at home. Most deliveries (92.2%) were conducted by traditional birth attendants or relatives (Table 5.5).

The duration of labour appeared to have been of concern in this community because 52% of women reported some action being taken to speed up labour. In 83.1% of these cases the activity could be considered to be harmless such as massage or homeopathic remedies, but in 4.3% of cases an injection (probably of oxytocic drugs) had been given.

It was interesting to note that the most commonly reported delivery position was 'on all fours' (76.9%) rather than squatting or sitting (1.9%) as we had expected.

Another significant finding was that in 97.5% of cases the cord was cut *after* the placenta had been delivered. Although there might be physiological advantages in this, there is also an increased risk of hypothermia in the child as the majority of babies (79.6%) were not wrapped up until after the cord had been cut.

Table 5.5 Type of birth attendant

(Data from all delivery records)

Birth Attendant	Number of deliveries	% deliveries
None	34	1.8
Family	140	7.5
Untrained TBA	601	32.3
Trained TBA	975	52.4
FWV	9	0.5
Nurse	46	2.5
Doctor	28	1.5
Other	29	1.5
Total	1862	100

5.7 How common were complications at the time of delivery?

Almost all women reported some kind of problem with delivery, and this is probably a subjective response to a more or less threatening event. However, when potentially serious problems were considered, nearly one third of women had experienced one or more serious complications (Table 5.6).

Table 5.6 Incidence of serious delivery problems

Complication of delivery	% of women (N=989)
Duration Labour > 24 hrs	8.4%
Duration pushing > 1 hr	7.8%
Premature rupture membranes (> 24 hrs before labour)	5.5%
Malposition	4.5%
Instrumental delivery	0.3%
Large perineal tear (to anal margin)	1.4%
Delayed placental delivery (> 30 mins)	8.6%
Excessive blood loss (like waterfall)	2.7%
Prolapse	2.4%
Serious Delivery Problem	33.1%

5.8. What proportion of women experienced ill health during the pregnancy and puerperium?

The proportion of women reporting ill health during pregnancy or the puerperium is extremely high (Table 5.7). During the two weeks after delivery 92% of women seen reported some episode of ill health. This was even higher than the proportion of women who had experienced symptoms during the last month of pregnancy (as recorded at the 48 hour interview), even though the recall time was shorter. The proportion of women reporting symptoms of ill health declines as the puerperium progresses, but still, at the final interview 12 weeks after delivery, 48% of women had suffered one or more symptoms of ill health in the previous six weeks.

Table 5.7 Period prevalence of morbidity symptoms during pregnancy and puerperium

Type of interview	No of women seen	% women reporting one or more symptoms
Registration	1386	36%
Antenatal	1564	63%
48 hours	989	81%
2 weeks	1324	92%
6 weeks	1357	70.5%
12 weeks	231	48%

(see Table 4.1 for details of recall periods)

5.9 What were the main morbidities reported?

The main morbidities reported are shown in Figures 5.2 & 5.3.

The types of morbidity reported change with time. Thus as might be expected, swollen ankles are common in pregnancy, particularly in the last month but are rarely reported after delivery. Fever is reported at a steady level during pregnancy but becomes much more common after delivery possibly in association with infection. Many women experience fatigue during both pregnancy and the puerperium though levels are diminishing by 6 weeks postpartum. Cough was included as a non-pregnancy related symptom and is reported at a steady level through out the study, thus supporting the reliability of symptom reporting.

Symptoms such as dysuria and perineal problems which, as might be expected, are at a high level during the two weeks after delivery, were still being reported by over 7% of women even 12 weeks after delivery.

Over 10% of women were still reporting breast problems at the end of the follow up period. Some of these breast problems were perceptual such as 'insufficient milk', while others were clearly defined pathological conditions such as breast abscess (Table 5.8).

Table 5.8 Proportion of types of reported breast problems

	2 Weeks (N=202)	6 Weeks (N=157)	12 Weeks (N=163)
No milk	1.0%	5.9%	4.9%
Poor milk supply	36.6%	62.1%	68.7%
Engorgement	42.1%	19.6%	21.5%
Breast Abscess	2.0%	3.9%	2.5%
Sore Nipples	8.4%	5.2%	2.5%

5.10 How common was secondary postpartum haemorrhage?

Excess bleeding other than immediate postpartum haemorrhage (ie secondary postpartum haemorrhage) was common, being experienced by 16% of women in the two weeks immediately after delivery and 5.6% of women between 2 and 6 weeks after delivery (Table 5.9).

Table 5.9 Prevalence of secondary haemorrhage

Week 2 (N=1320)	Week 6 (N=1356)	Week 12 (N=1388)
16%	5.6%	3.1%
(Main study only)		

5.11 What proportion of women were anaemic?

Anaemia was assessed by conjunctival colorimetry. Although this method cannot distinguish minor differences in haemoglobin level, it has been found to be as good as most other field methods in detecting severe anaemia. The results suggest that anaemia was common, with over 50% of women appearing to be anaemic to some degree at the 48 hour and two week examination and with over 10% of women being severely anaemic (Fig 5.4). As conjunctival colorimetry is poor at detecting mild degrees of anaemia, the true situation could be expected to be much worse than this.

5.12 How common was postpartum infection?

Postpartum infection was defined as having occurred if the woman had suffered concurrently from two or more of three symptoms; fever, foul discharge and lower abdominal pain. Using these criteria, 26.4% of women had evidence of infection during the first two weeks after delivery, and 14.7% during the period 2 to 6 weeks after delivery (Table 5.10).

Table 5.10 Prevalence of symptoms of infection

	Week 2 (N=1323)	Week 6 (N=1357)
Fever	32.4%	28.7%
Lower abdominal pain	32.0%	27.0%
Foul discharge	32.3%	13.7%
Genital tract infection	26.4%	14.7%

5.13 What other important morbidities were reported?

29.5% of women reported having had what they considered to be an abnormal vaginal discharge during the first six months of their pregnancy and 25.2% during the last trimester. (This level seems very high and it is possible that within the cultural context of Bangladesh, many women perceive the physiological increase in vaginal secretions associated with pregnancy as being abnormal).

2.7% of the women had experienced vaginal bleeding during the first and second trimester falling to 1.8% during the last trimester (when bleeding is a more dangerous prognostic sign).

1.8% women reported having been jaundiced during the current pregnancy.

3.4% reported urinary incontinence. This had fallen to 0.2% by 12 weeks after delivery probably reflecting the increase in reversible stress incontinence during pregnancy.

5.14 What were the levels of morbidities that can be detected by physical examination alone?

Many areas of Bangladesh are iodine deficient, and goitre is endemic. In our study area the prevalence of goitre during pregnancy was 2.0%.

Urine testing showed that 4.9% of women had glycosuria (more than a trace). It should be noted however that glycosuria is often detected in pregnancy and does not necessarily indicate gestational diabetes.

Pre-eclamptic toxemia (PET) was detected by a combination of high blood pressure, proteinuria, and oedema. For analytical purposes PET was defined as being the presence of any two of these signs (Table 5.11). (NB High BP was diagnosed if either the diastolic was ≥ 90 or the systolic BP was ≥ 140 , proteinuria was diagnosed if there was more than a trace of protein in the urine, and oedema was diagnosed if there was pre-tibial pitting oedema). Using these criteria, 2.4% of the women examined were found to be suffering from PET.

Table 5.11 Prevalence of PET at antenatal interview

	% prevalence	(N)
High BP	4.2%	1416
Proteinuria	9%	1441
Oedema	11.1%	1564
PET	2.4%	1416

5.15. How good was the correlation between reported symptoms and signs of ill health detected by physical examination?

Part of the rationale for including physical examination as well as interviews in the study design was to compare the results obtained by the two methods and obtain a measure of validity for the questions. Two examples of this process are presented here.

5.15.1 Infection

It is difficult to get a single reliable physical sign of postpartum infection. However we found a good correlation between the diagnosis of infection based on responses to questions and uterine tenderness as determined by examination. The correlation was better at six weeks than at two weeks (Tables 5.12 and 5.13), probably because there are a number of other reasons for uterine pain and tenderness early in the postpartum period (eg physiological uterine contractions).

Table 5.12 Comparing diagnosis of infection using symptom complex with physical sign (uterine tenderness): Two weeks

	Uterus tender	Uterus not tender	(N)
Infection	73.3% (55)	26.7% (20)	(75)
No infection	38.7% (109)	61.3% (173)	(282)
Agreement = 63.9%			

Table 5.13 Comparing diagnosis of infection using symptom complex with physical sign (uterine tenderness): Six weeks

	Uterus tender	Uterus not tender	(N)
Infection	65.2% (15)	34.8% (8)	(23)
No infection	12.2% (43)	87.8% (311)	(354)
Agreement = 86.5%			

5.15.2 Ankle Oedema

Ankle oedema is a reliably detectable physical sign. The proportional agreement of the observers examination with the women's reporting of oedema is high (Table 5.14), but the low sensitivity and low positive predictive value (PPV) shows that there is underreporting of the presence of ankle oedema. One of the reasons for this may be that the observers can detect a lesser degree of oedema than is obvious to a subject who does not wear shoes, another reason may be that women regard a small degree of ankle oedema as normal and therefore do not report it.

Table 5.14 Comparison of observed and self reported ankle oedema at antenatal interview

		Observed oedema		N
		Present	Absent	
Self-reported oedema	Present	86	40	126
	Absent	87	1351	1438
		173	1391	1564

Proportion agreeing: 91.87%

Sensitivity:	49.7%	PPV:	68.3%
Specificity:	97.1%	NPV:	94.0%

5.16 What factors were found to be associated with postpartum infection?

One of the objectives of the study was to identify possible determinants of postpartum morbidity. One area of particular interest was the factors associated with postpartum infection. Table 5.15 shows that a significant association was found between the duration of the second stage of labour and the development of infection and also between the birth attendant having put her hands in the vagina and the development of infection. Table 5.16 shows that women who had a lower MUAC during pregnancy were also more likely to develop infection in the postpartum period. Results are given for infection at six weeks. Results for infection at two weeks were similar. Other factors such as age, parity and socio-economic status showed no consistent effect.

Table 5.15 Association between duration of labour, insertion of birth attendants hands and infection at six weeks postpartum.

	% infected	(N)	p
Labour > 24 hrs	21.5%	(79)	p 0.139
Labour < 24 hrs	14.5%	(676)	
Pushing > 1 hour	24.6%	(57)	p=0.041 *
Pushing < 1 hour	14.5%	(761)	
BA hands in vagina	18.7%	(310)	p=0.024 *
BA hands not in vagina	12.5%	(441)	

Table 5.16 Association between MUAC and infection at six weeks postpartum

	Mean MUAC (Antenatal)	N	
Infected	216.01	177	p=0.02
Not infected	219.4	890	

5.17 What relationships were found between postpartum haemorrhage and other morbidities?

Another area of interest was the relationships between postpartum haemorrhage both primary and secondary, and other morbidities. Table 5.17 shows that there was no significant relationship between blood loss actually at the time of delivery (ie primary PPH) and anaemia detectable at the two week interview, but from Table 5.18 it can be seen that a significant relationship was found between continued blood loss (ie secondary PPH) during the two weeks after delivery, and anaemia detectable at the two week examination. (NB PPH here is defined as a blood loss sufficient to soak the woman's clothes).

Table 5.17 Blood loss at delivery & anaemia at 2 weeks

	Anaemic	Not anaemic	(N)	
1' PPH	47.4%	52.6%	264	p = 0.837
No 1' PPH	48.4%	51.6%	643	

Table 5.18 Blood loss in 2 weeks after delivery & anaemia at 2 weeks

	Anaemic	Not anaemic	(N)	
2' PPH	64%	36%	147	
No 2' PPH	41.4%	58.6%	551	$p < 0.001$

Tables 5.19 and 5.20 show that there was however a significant relationship between the occurrence of primary PPH and symptoms of fatigue and shortness of breath during the two weeks after delivery.

Table 5.19 Blood loss at delivery and fatigue during 2 weeks after delivery

	Fatigue	Not fatigued	(N)	
1' PPH	75.8%	24.2%	(264)	
No 1' PPH	54.2%	45.8%	(646)	$p < 0.001$

Table 5.20 Blood loss at delivery and shortness of breath during 2 weeks after delivery

	Short of Breath	Not Short of Breath	(N)	
1' PPH	17.9%	82.1%	(263)	
No 1' PPH	11.5%	88.5%	(645)	$p = 0.014$

5.18 How much did the women's nutritional status change during the course of the study?

MUAC was measured on every contact with the women in the study. Complete longitudinal records for this measurement were obtained on 406 women. Fig 5.5 shows that for all women nutritional status as measured by MUAC declined towards the time of delivery and stayed low for several weeks after. Towards the end of the follow up period an improvement had begun to occur. Women in the lowest socio-economic group had poorer nutritional status throughout the study. Their decline in nutritional status was greater than for those in the better off groups, and their recovery was slower. Fig 5.6 shows that although primigravidae start off at a nutritional advantage, they suffer greater nutritional stress than multi gravidae and their recovery phase is slower.

5.19. What was the effect of TBA training on maternal infection?

Of the deliveries where the mother was seen within 5 days of the birth, 58.5% were conducted by trained TBAs (Fig 5.7). This high utilisation level probably reflects the community awareness element of the BRAC training program that had taken place in this area. (For the purpose of analysis, birth attendants were grouped into 3 categories: Untrained birth attendants, comprising untrained TBAs, relatives and neighbours; Trained TBAs, comprising only traditional birth attendants who had undertaken an official training with either Government, BRAC or other NGO); and others, comprising doctors, nurses, FWVs.)

TBA training usually emphasises hygienic delivery in an attempt to prevent infection in both mother and infant. Three components are recognised, clean hands, clean surface, clean cord, often together known as "*The Three Cleans*".

Just over one third of the deliveries were conducted with all three components of the three cleans present. About one half were conducted with the two clean practices that are particularly relevant to the health of the mother (Table 5.21).

Table 5.21 Frequency of 'The Three Cleans'

Hygienic practice	% deliveries (N=989)
Delivery not on bare floor (1)	88%
BA washed hands with soap (2)	54%
Clean cord (Cutting,tying, dressing) (3)	62%
'Clean delivery' (All three cleans)	37.4%
'Clean delivery' (Maternal cleans, 1+2)	50.3%

Trained TBAs were more likely than untrained birth attendants to undertake clean delivery practices that form part of their training program such as cleaning their hands with soap and boiling the instrument used to cut the cord (Fig 5.8). They were also less likely to deliver the woman on the bare floor. However, it should be noted that a large minority of trained TBAs did not practice these behaviours despite having been trained. In addition, trained TBAs were more likely to practice potentially harmful activities such as putting their hands or oil into the vagina and no less likely to perform active manipulation of the baby when assisting the delivery.

If a clean delivery is defined as consisting of the 'three cleans', ie clean hands, clean cord, clean surface, then TBAs with training were significantly more likely to perform a clean delivery than was an untrained BA (Tables 5.22 & 5.23). (NB P value does not include 'Other' category).

Table 5.22 Training of birth attendant and clean delivery practices (The Three Cleans)

	% deliveries with 3 Cleans	Total deliveries in each category	
Untrained BA	23.3%	369	
Trained TBA	47.1%	577	p < 0.0001
Other	27%	41	

Table 5.23 Training of birth attendant and clean delivery practices (maternal cleans).

	% deliveries with maternal cleans	Total deliveries in each category	
Untrained BA	37.1%	369	
Trained TBA	58.8%	577	p < 0.0001
Other	51.2%	41	

When the prevalence of infection was determined at the two week interview and the six week interview, no significant difference was found between women who had been delivered by a trained TBA as opposed to those who had been delivered by an untrained birth attendant (Table 5.24).

Table 5.24 Postpartum infection by type of birth attendant

	Week 2 (N=911)	Week 6 (N=763)
	% women infected	% women infected
Untrained BA	26.9% (N=338)	13.6% (N=295)
Trained TBA	26% (N=533)	16.7% (N=437)
Other	30% (N=40)	9.7% (N=31)

Not only did the training of the birth attendant have no significant association with the development of postpartum infection, but the practice of clean delivery factors relevant to maternal infection (washing hands with soap and using a clean surface) had no significant association with infection diagnosed at either 2 weeks or six weeks after delivery either (Table 5.25).

Table 5.25 Postpartum infection by presence of maternal clean delivery factors

	Week 2 (N=912)	Week 6 (N=764)
	% women infected	% women infected
Clean delivery	25.8% (N=466)	14.7% (N=368)
Less than clean	27.6% (N=446)	15.7% (N=396)

5.20 How did age, gravidity and socio-economic status affect choice of birth attendant?

Tables 5.26 and 5.27 show that primigravidae were more likely than multigravidae to choose a trained TBA but that there was no strong relationship between age and choice of birth attendant. Better off women were more likely to choose a trained TBA than were poorer women (Table 5.28).

Table 5.26 Age and choice of birth attendant

	Trained TBA	Untrained Birth attendant	Other
Mean Age (yrs)	24.3	25.0	23.7
SD	6.74	6.97	5.0
(N)	(571)	(368)	(41)

Table 5.27 Gravidity and choice of birth attendant

	Trained TBA	Untrained BA	Other	(N) 986
Primigravidae	63.3%	31.1%	5.6%	267
Multigravidae	56.6%	39.8%	3.6%	718

Table 5.28 Socio-economic status and choice of birth attendant

SE Group	Untrained BA	Trained TBA	Other	(N) (979)
1 (Poorest)	43.4%	54.0%	2.6%	(263)
2	40.7%	56.0%	3.4%	(209)
3	30.8%	64.3%	5.0%	(182)
4	37.1%	60.0%	2.9%	(170)
5 (Richest)	31.0%	60.7%	8.4%	(155)

5.21. Did women receive antenatal care during pregnancy?

At the 48 hour interview women seen within 5 days of delivery were asked about use of antenatal care during the last three months of their pregnancy. Of the 989 respondents, only 12.6% had had an antenatal check. The most common reason for non-attendance was the perception that they had no health problem with the pregnancy (Table 5.29).

Table 5.29 Reason for non-attendance at antenatal care

	% women (N=737)
Did not know about it	15.4%
Shame	17.6%
Not permitted to go	2.5%
No transport	3.8%
No money	4.0%
No health problem	54.7%
Unpleasant attitude of staff	0.6%

55.1% of the women interviewed had had Tetanus Toxoid during their pregnancy (this immunisation is given at EPI centres as well as at antenatal clinics).

5.22 How did age, gravidity and educational status affect attendance for antenatal care?

Younger women were more likely than older women to attend for antenatal care as were primigravidae (Tables 5.30 & 5.31). Women who had received education were more likely to attend than those who had not been to school (Table 5.32).

Table 5.30 Age and attendance for antenatal care

Age (Years)	% attendance at ANC	N (983)
10-14	25.0%	16
15-19	12.0%	209
20-24	16.0%	313
25-29	10.0%	231
30-34	10.0%	152
35-39	10.0%	44
40-44	11.4%	15
45+	13.3%	3

Table 5.31 Gravidity and attendance fro antenatal care

Gravidity	% attendance at ANC	N (990)
Primigravidae	17.0%	266
Gravida 2-4	11.0%	543
Gravida 5+	10.0%	181

Table 5.32 Education and attendance for antenatal care

Education	% attendance at ANC	N (990)
None	8.0%	675
Attended primary	14.0%	121
Completed primary	17.0%	98
Attended secondary	35.0%	96

5.23. Where did women receive antenatal care?

The most frequent sources of antenatal care were at the government satellite clinics and at the government Maternal and Child Health and Family Planning Centre (MCH-FPC) in Manikganj. Both these facilities have predominantly female staff (Table 5.33).

Table 5.33 Sources of antenatal care

Source of ANC	% women receiving (N=112)
Satellite Clinics	23%
FWC	13%
MCH-FPC	30%
Hospital	18%
Home	11%
Other	4%

It was noted that 17% (19) of the 112 women who attended for ANC were advised to deliver in hospital. In the end, only one of them actually did so.

5.24 Where did women obtain care during the postpartum period?

Women's use of health care providers during the postpartum period differed according to the type of problem for which they were seeking care. If the problem was of a reproductive nature they were nearly twice as likely to visit the MBBS doctor at the MCH-FPC (a female) than they were if the problem was non-reproductive (Table 5.34). This was despite the distance and the likelihood of having to pay for medicine and possibly for the consultation. For non-reproductive problems they were nearly three times as likely to visit a Kobiraj (traditional healer using spiritual as well as herbal methods) or other traditional practitioner than they were if the problem was non-reproductive.

5.25 How vulnerable were the women in the study to becoming pregnant again by the end of the follow up period?

By the end of follow up at twelve weeks after delivery, (N=1403):

- * 46% of living babies were receiving supplementary feeds (80% by bottle!)
- * 25.5% of women interviewed had started menstruating again

- * 91% of women interviewed had started to have sexual intercourse again
- * 5.6% of these sexually active women were using contraception

These data show that many women were at risk of becoming pregnant again and suggests that there is a large unmet need for contraception in the later part of the postpartum period.

Table 5.34 Type of health provider by nature of problem according to the woman's perception during the two weeks after delivery

Health provider consulted	Type of problem for which consultation made	
	Reproductive	Non-reproductive
FWV/FWA/MA	5.9% (6)	6.1% (14)
Village Doctor	60.8% (62)	54.1% (125)
MBBS Doctor	24.5% (25)	14.3% (33)
Other (Kobiraj, Hakim, TBA etc)	8.8% (9)	25.5% (59)
Total number of consultations	102	231

(By consultation, 333 responses, multiple responses for single problem included)

5.26 What methodological lessons were learnt from analysis of the data?

One of the objectives of the study was to test methods for measuring maternal health. Two examples of how some measurement issues can be explored are presented here.

Table 5.35 compares the responses to questions about the first two weeks after delivery from the two week interview and the six week interview. If it is assumed that the information obtained at two weeks is the more accurate, then it can be seen that information obtained at six weeks is reliable for well defined and definitely abnormal symptoms such as prolapse and diarrhoea whereas for vaguer diagnoses such as fever, and symptoms which are part of a normal spectrum, reliability is lower.

Table 5.35 Reliability and recall: Two week interview compared with six week interview

	Question	% Agreement	Kappa
Good Correlation:	Diarrhoea:	90%	0.46
	Prolapse:	96%	0.44
Poor Correlation:	2' PPH:	78%	0.23
	Fever:	71%	0.33

Table 5.36 shows that when responses to questions about the delivery obtained at 12 weeks postpartum is compared to that obtained very soon after the delivery, the answers tend towards a 'normal' response. This means that questions administered some time after a birth may underestimate the problems experienced.

Table 5.36 Reliability of information about delivery: comparison of data collected at 12 weeks postpartum with 48 hour delivery record. Proportion of women reporting prolonged labour

	Labour > 24 hrs	N
48 Hour Interview	13.6% (131)	967
12 Week Interview	9.4 % (91)	967

This trend is also found with reporting of other complications such as excess blood loss.

5.27 What was the mean birth weight of the infants weighed in the study and what proportion were low birth weight (LBW) (<2.5 kg) and very low birth weight (VLBW) (<2.0 kg)?

Table 5.37 gives the proportion of babies with birth weight below 2kg and 2.5kg and the mean birthweight. Babies were weighed within 5 days of birth, the majority (64%) within 72 hours.

Table 5.37 Birth weight of babies

Day	N	% < 2kg	% < 2.5kg	Mean	Std Dev
0-5	813	9.3	46.7	2.47	0.42

5.28 What maternal factors influenced the birthweight of the baby?

The tables presented in Annex 6A show that there was a strong association between both young age and primiparity, and the birth of a low birth weight (LBW) baby. Socio-economic group and maternal education were not strong predictors of LBW. Short maternal stature and low MUAC (antenatal and postpartum) were both significantly associated with LBW.

5.29 What were the perinatal and neonatal mortality rates in the study?

The perinatal mortality rate was 68.4/1000 still and lives births.

The neonatal mortality rate was 61.2/1000 live births.

The proportion of infants dying at different times in relation to delivery is shown in Fig 5.9. Perinatal deaths comprise still births plus deaths in the first week of life and make up nearly three fourths of the deaths. Similarly, neonatal deaths comprising infants which were born alive but died in the first 28 days after birth comprise about two thirds of the deaths (NB There is overlap between perinatal and neonatal categories).

5.30 What factors contributed to the high perinatal loss?

The tables presented in Annex 6B show that low birth weight, primiparity and high parity, and problems with the delivery were all associated with perinatal death.

5.31 What was learnt from the qualitative part of the study?

The results of the focus group discussions have been reported in full elsewhere (BIRPHERT, 1992) but in summary the key points are as follows:

- * There are strong beliefs in the influence of the supernatural on events in pregnancy, childbirth and the puerperium.
- * Food taboos to be followed in pregnancy and the puerperium were frequently described.
- * Harmful delivery practices were described even among trained TBAs. These include the introduction of oils and hands into the vagina.*

- * Many beneficial traditional practices were also described, for instance, the use of upright positions during labour and delivery.
- * Ill health during the puerperium was reported as being common. Infections, breast problems, perineal problems and prolapse were described. More serious problems such as fistulae were known about.
- * Traditional healers and traditional remedies are used extensively for postpartum health problems.
- * The period of seclusion after childbirth can make formal health care difficult to obtain.

The in-depth study is providing a rich source of background data and an insight into the every day lives and problems of women delivering in this community. It is planned to present these data separately as a series of case studies.

Figure 5.1 Distribution of measured fundal height by type of interview: according to field workers' examination

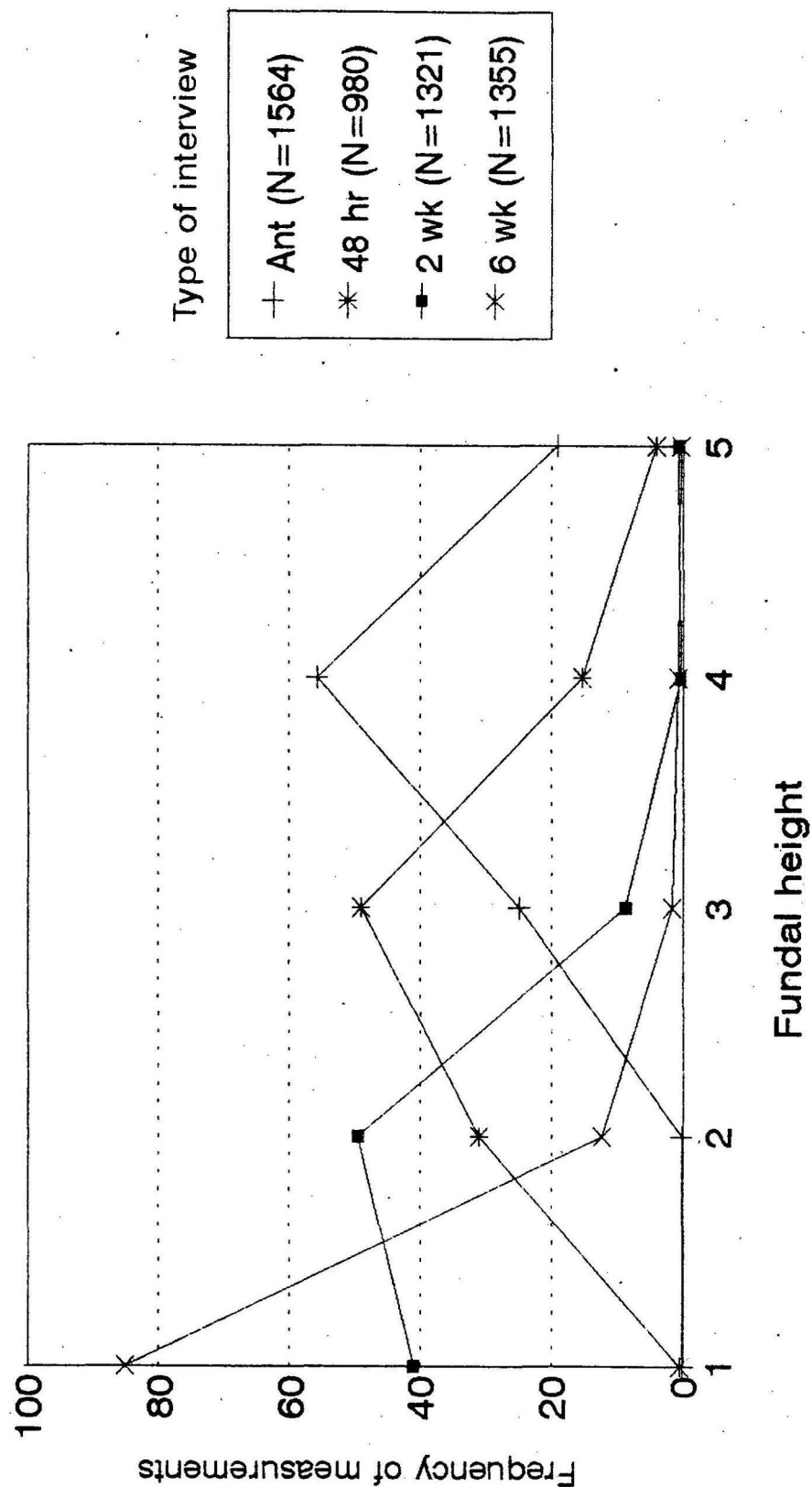


Figure 5.2 Frequency of commonly reported symptoms by type of interview

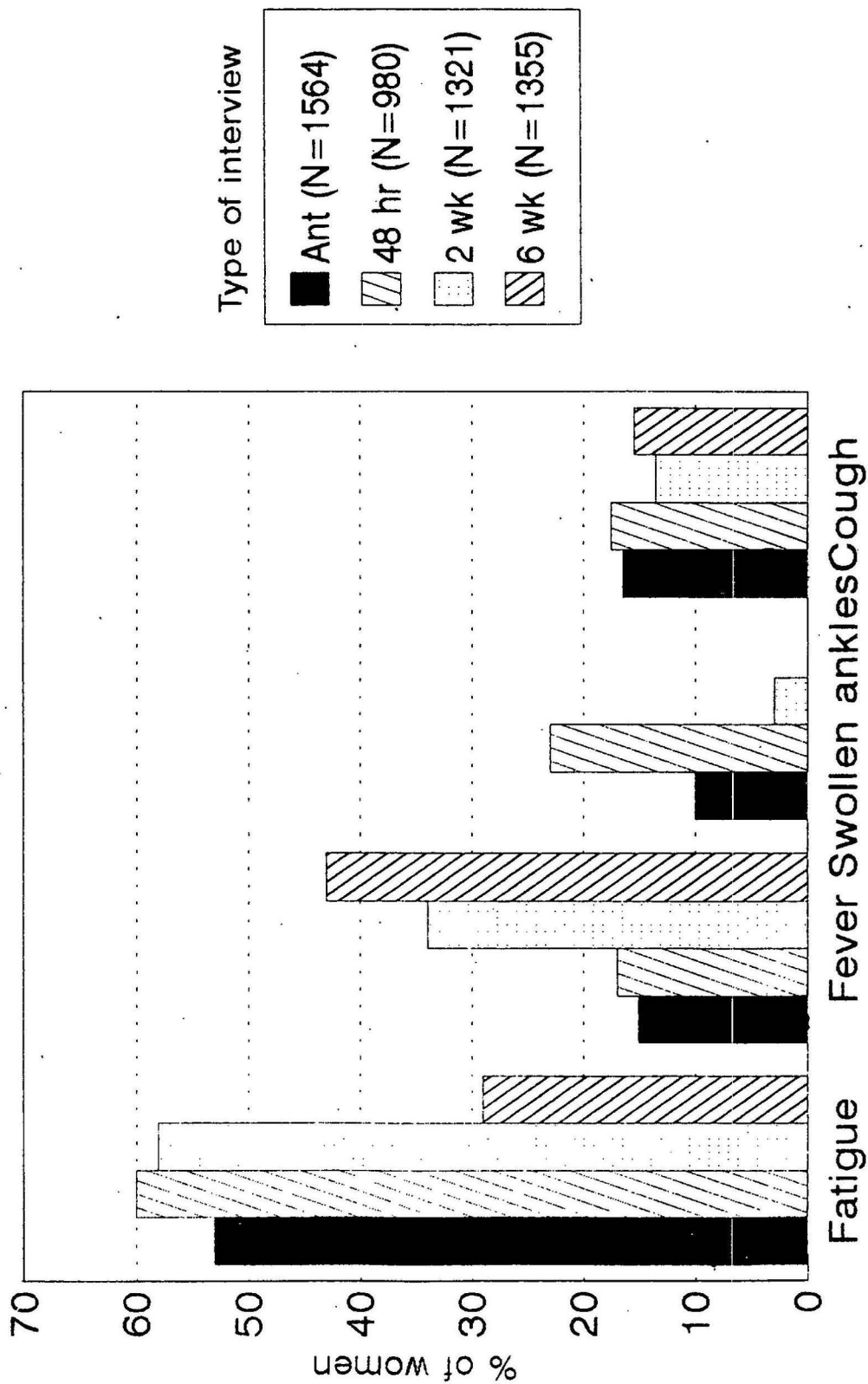


Figure 5.3 Frequency of postpartum symptoms by type of interview

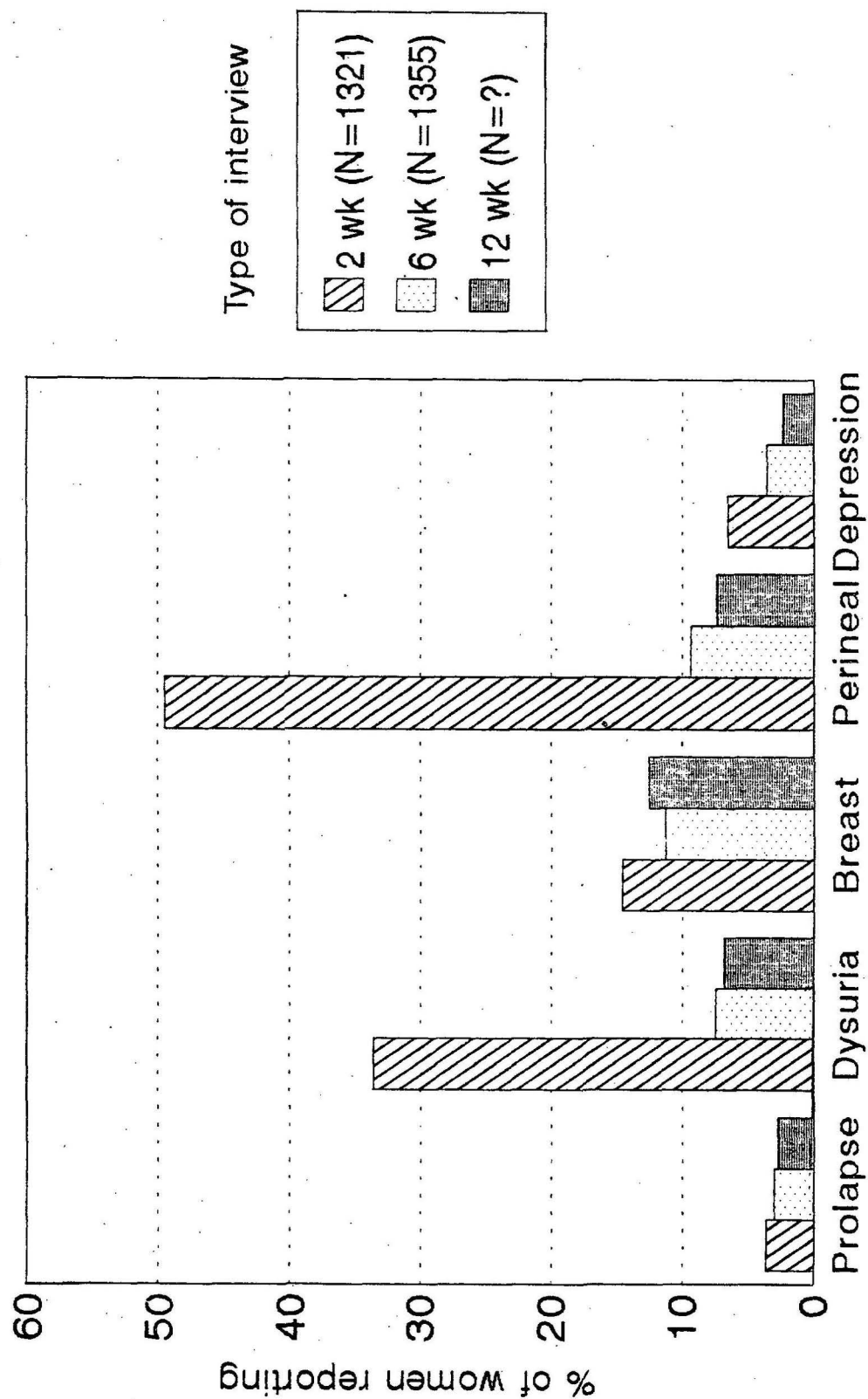


Figure 5.4 Proportion of women with "severe" and "moderate" anaemia, using conjunctival colorimetry

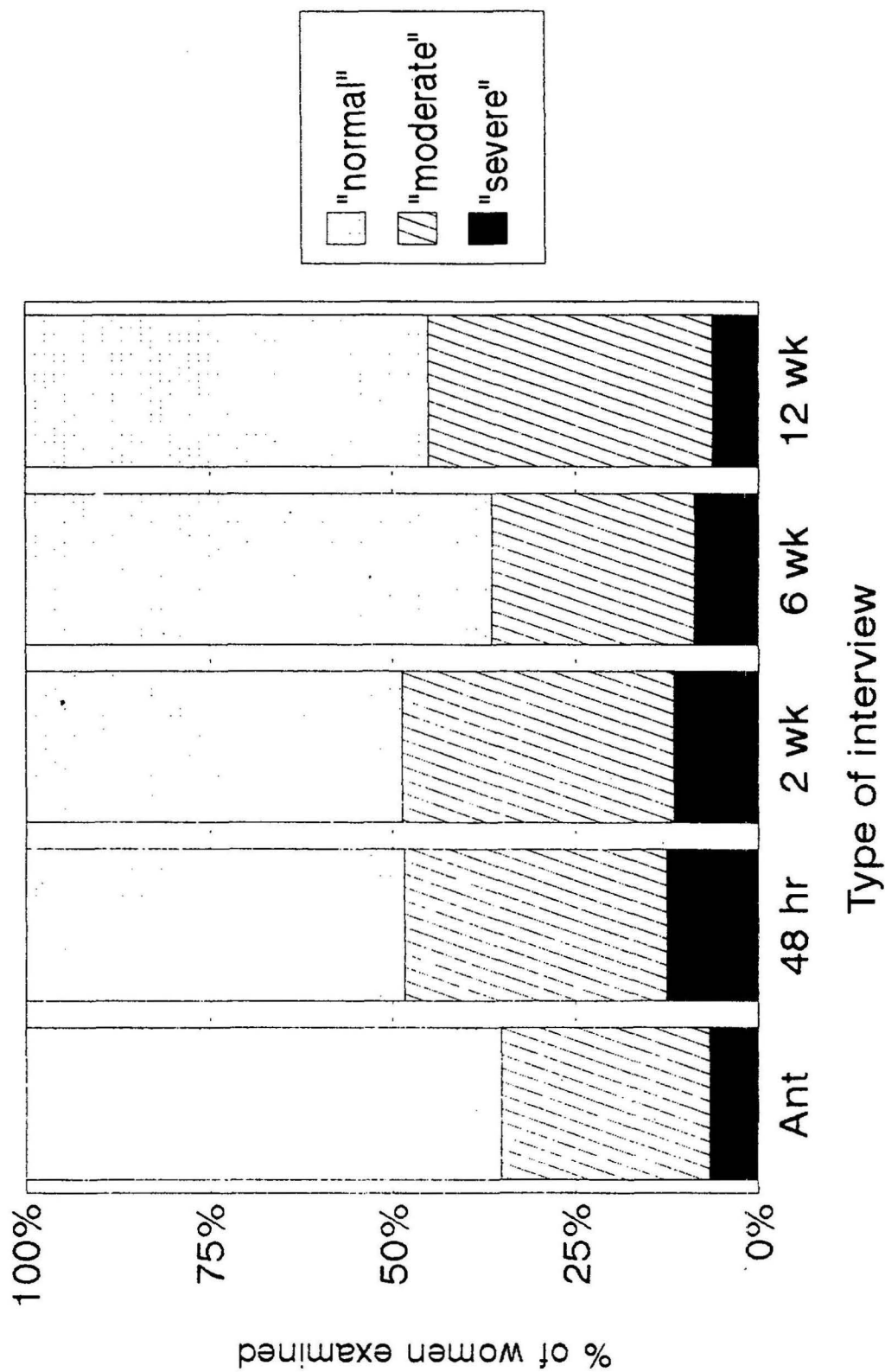


Figure 5.5. Changes in mean MUAC over time by socio-economic status (N = 403)

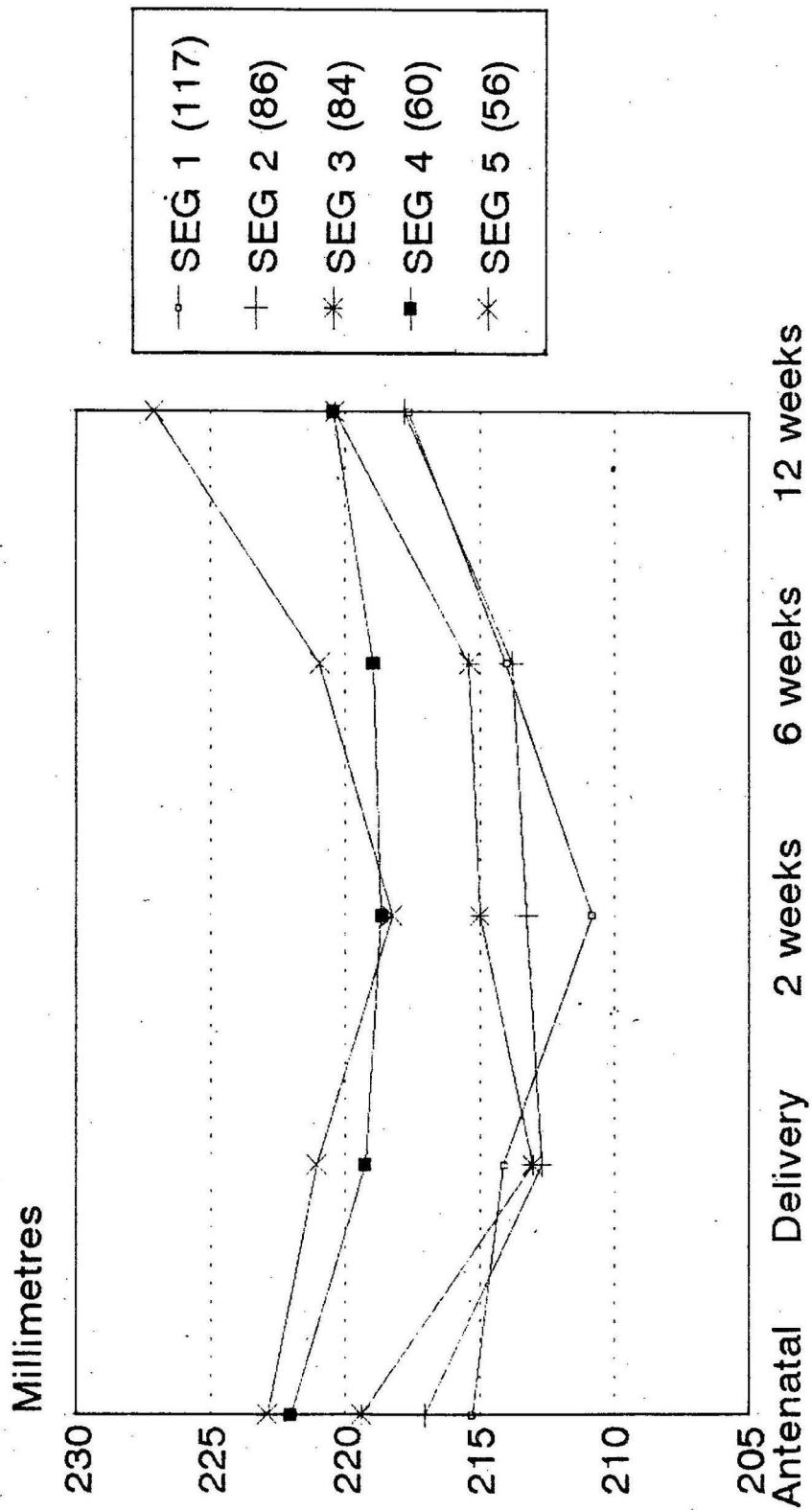


Figure 5.6. Changes in MUAC over time by parity
(N = 405)

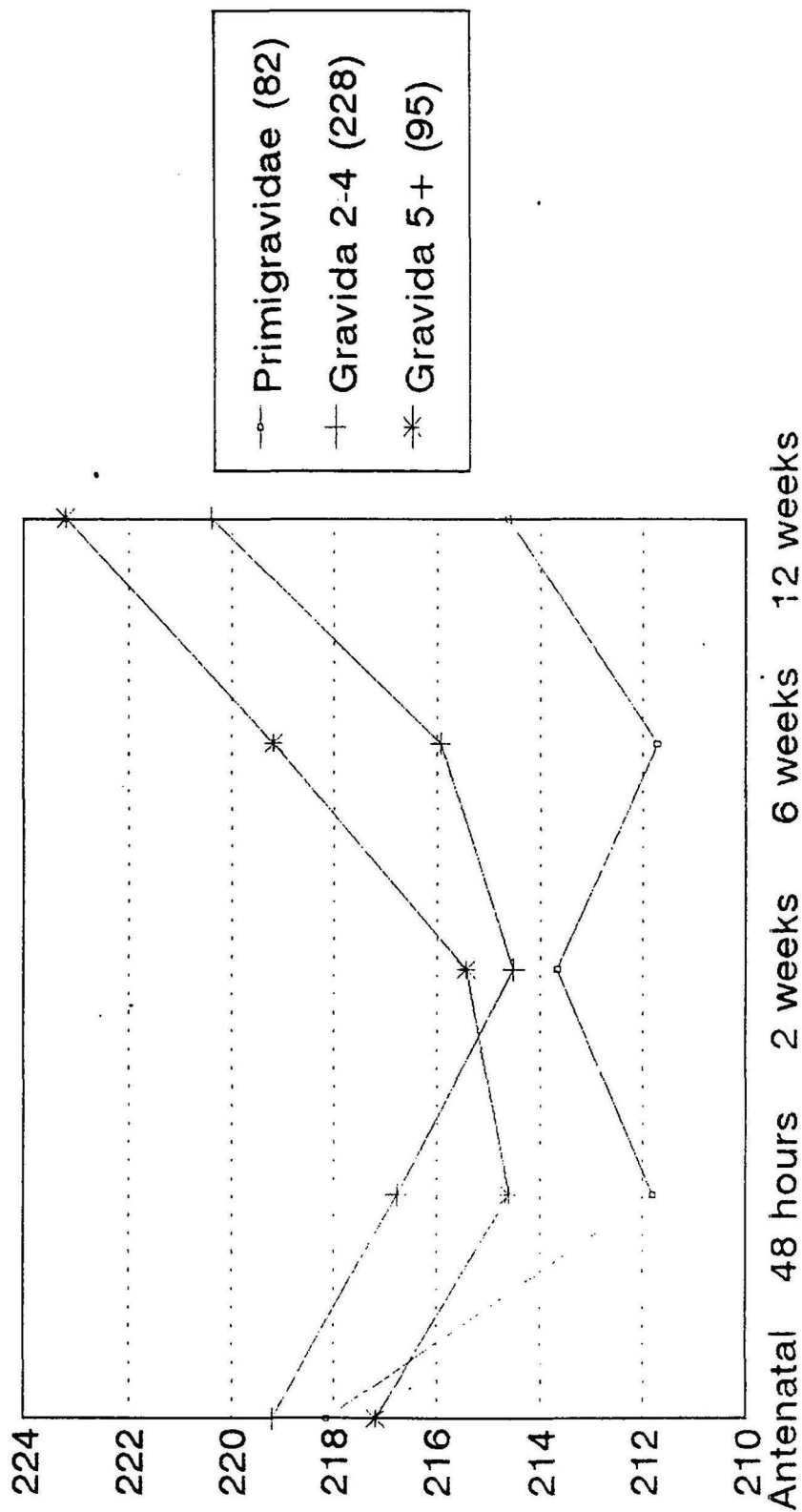
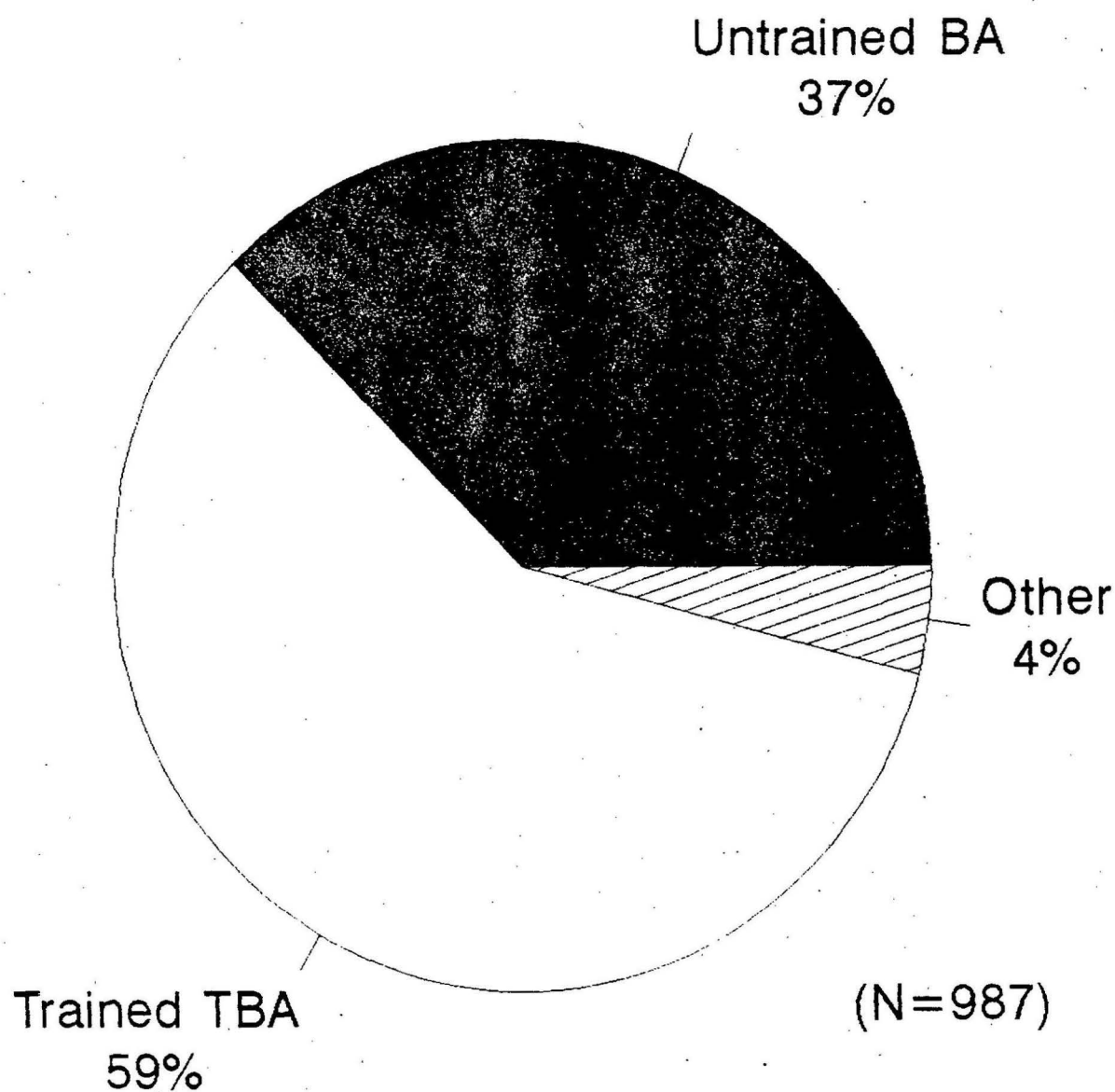


Figure 5.7. Category of Birth Attendant
(Recall 0 - 5 days after delivery)



(Percentages are in rounded figures)

Figure 5.8 Delivery practices by training of birth-attendant

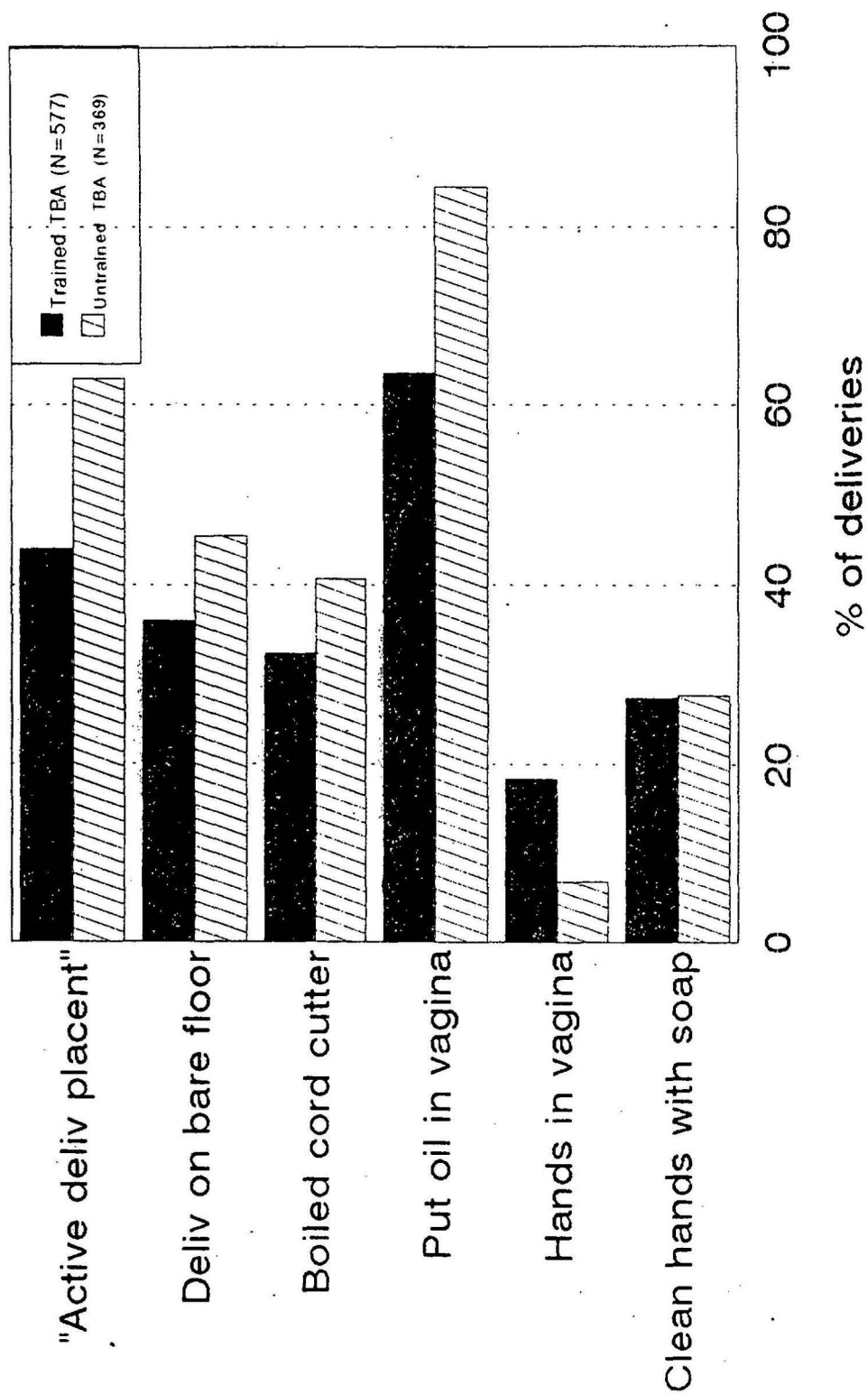
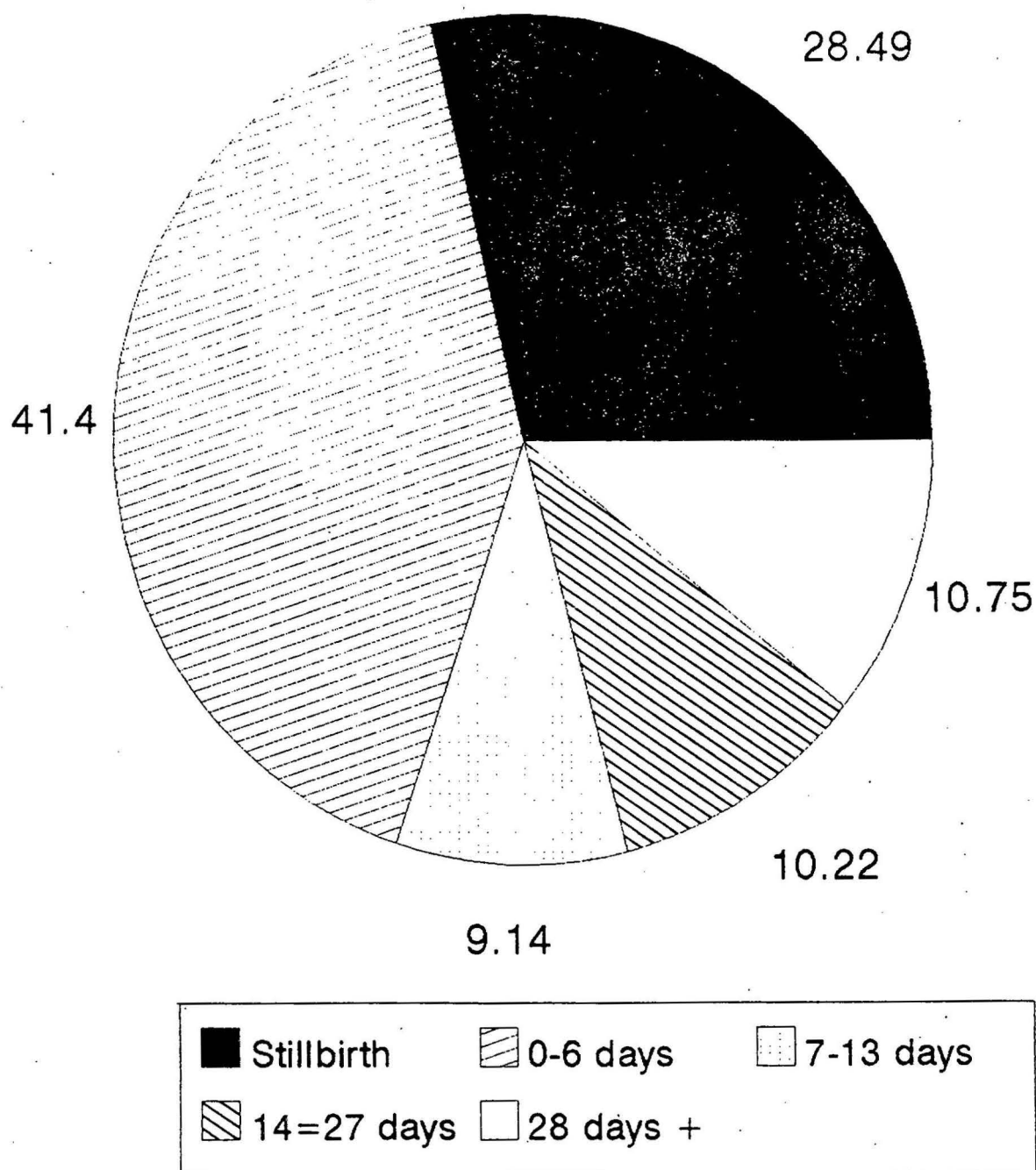


Figure 5.9 Timing of perinatal and infant deaths



6. DISCUSSION

6.1 Levels of postpartum morbidity in rural Bangladesh

This study has demonstrated that levels of morbidity associated with childbirth in this population of women in rural Bangladesh are very high. The observed levels were much higher than expected from the estimates available at the time the study was started though interestingly they correspond to the more recent estimates based on reviews of literature. The observation that 92% of women suffered symptoms of ill health during the first two weeks after delivery and that nearly 50% of women were still reporting symptoms more than six weeks after their delivery suggests that there is a considerable need for continuing maternal health care in the weeks after delivery. In the context of rural Bangladesh this need is unlikely to be met by the current recommended brief clinic visit at six weeks alone, even if attendance be dramatically increased from its present usually low levels, though the presence and use of appropriate clinic facilities at this time could certainly be a positive feature of a postpartum care program.

Many of the morbidities demonstrated as being common, especially in the early part of the postpartum period, such as infection and secondary postpartum haemorrhage are well recognised complications of childbirth but are given little prominence in programmes of post-natal and delivery care though they are potentially relatively easily detected and treated. The prevalence of postpartum infection observed, 26.4% in the first two weeks and 14.7% in the subsequent 4 weeks is a particular cause for concern. Using the symptom complex of fever, lower abdominal pain and foul discharge, combined with simple examination such as abdominal palpation and possibly inspection of the discharge, infection could be diagnosed reasonably easily at home by community health workers and initial treatment with antibiotics begun if programs allowed for an early postpartum visit by a worker with paramedical training.

The study also demonstrates the importance of morbidities which are given little prominence in medical research and writing, in particular perineal problems and breast problems. These morbidities were reported by significant numbers of women in the study but are given very little more than cursory treatment in most training programmes for community level health workers. There is considerable scope for early postpartum care in the detection of these problems.

In the case of perineal problems, inspection of the perineal wound could be carried out at home and for many conditions, treatment could be carried out at home. These could include perineal cleansing with salt and water to promote better healing, and possibly the use of antibiotics if infection was present. Women with large tears could be referred to a health facility for repair. The findings on breast problems are of particular interest given the current drive to protect and promote breast feeding, particularly exclusive breast feeding, in Bangladesh and other developing countries. Most of the focus of breast feeding campaigns has been on the breast feeding activity itself rather than any actual physical problems that the mother might be experiencing. The perception of an inadequate milk supply is recognised as being a problem in Bangladesh and some attention has been paid as to whether this is a 'real' problem associated with poor nutrition in the mother, or whether it is a perceptual problem exacerbated by early and inappropriate

supplementation. However, actual pathological problems such as abscess and sore nipples receive less attention. The importance of this is that medical staff frequently give incorrect advice while treating these problems and often advise that breast feeding is discontinued. Local healers generally advise continuation of breast feeding while remedies are applied and there is scope for building on these traditional beliefs and reinforcing the ability of the mother to continue feeding while appropriate treatment is given. At the same time there is scope for the re-education of medical staff in the appropriate management of breast problems.

Non-specific symptoms such as fatigue were common and must imply a considerable burden on women's lives. Although these kind of complaints sound vague in isolation they are often indicators of physical or mental ill health particularly if taken in conjunction with other symptoms.

6.2 Delivery practices

The relationship between delivery practices, birth attendants and morbidity is discussed below, however, it is interesting to note that potentially harmful delivery practices were relatively common in this population as a whole. For instance active delivery of the placenta, including the use of force, was common, as was the practice of manipulating the baby during delivery. The focus group discussions revealed that desire to expedite delivery of the placenta is associated with the belief that, unless removed quickly, the placenta can move up inside the mothers body and choke her. Although TBAs are trained to allow the placenta to deliver naturally, the strength of this belief would suggest that they are unlikely to carry out this part of their training in practice.

Manipulation of the baby during the delivery is probably dictated partly by the desire and perceived need to assist if the delivery appears to be proceeding more slowly than expected or if there is a malposition, and partly by the expectation that this is what a TBA is expected to do and that in performing manipulation she demonstrates her skill in delivering the baby.

6.3 Determinants of postpartum morbidity

The analysis of the study data has demonstrated a number of associations which are of potential importance.

Women were more likely to have symptoms suggesting genital tract infection during the six weeks after delivery if the labour, particularly the second stage had been prolonged. They were also more likely to have symptoms of infection if the birth attendant had put her hand in the vagina. These two activities are likely to be linked in that the birth attendant might be more likely to put her hands in the vagina if the labour was prolonged or difficult.

This finding implies that a possible important determinant of postpartum infection in this study was the introduction of bacteria into the vagina by the birth attendant, made more likely by the length of labour.

Women who were less well nourished during pregnancy were also more likely to have suffered symptoms of infection during the six weeks after delivery but other factors such as socio-economic status (which is associated with nutritional status) in itself did not have any strong effect. This finding suggests that it is poor nutrition per se or some other factor associated with poor nutrition, that makes women vulnerable to postpartum infection, rather than other factors associated with socio-economic status such as quality of housing or ability to pay for medical care.

As has been noted above, the fact that the birth was conducted by a trained birth attendant made no substantial difference to the development of postpartum infection despite the observation that trained attendants were significantly more likely to practice 'clean delivery' (as defined by their training) than were the untrained birth attendants.

Indeed the results show that the performance of clean delivery by the birth attendant had no significant effect on the outcome in terms of postpartum infection.

Why should this be the case? Considerable sums of money have been invested in training of traditional birth attendants, and one of the main facets of their training has been that they should be able to prevent postpartum infection by practising hygienic delivery techniques particularly by hand washing and using a clean delivery surface.

One possibility is that the whole environment is so contaminated that single activities designed to reduce the introduction or transmission of infection cannot be effective. A precedent for this observation is the finding that the introduction of tubewells or handwashing alone is ineffective in preventing diarrhoea transmission.

Another possibility is that women already have subclinical infection and that the process of delivery causes these infections to become active. That this is possible is suggested by Wasserheit's finding that 15% of the reproductive age women in Matlab were found to have reproductive tract infections.

A third possibility is that the action of putting the hands in the vagina, whether or not the hands have been washed with soap is a very powerful mechanism for causing infection. As we have shown, the trained TBAs were actually more likely to do this than were the untrained. This may be because they are more confident and experienced birth attendants to start with, or because the training has made them more confident, or because they are called to more difficult deliveries, for instance those where labour has been prolonged. The action of putting hands in vagina by TBAs, although generally discouraged, is not specifically addressed in TBA training programmes and is in fact a topic that has conceptual difficulties as it is in many ways bound up with the TBAs own perceptions of their expertise. A more logical approach, and one that might give a more positive role to the TBAs is to emphasise the importance of referral to hospital if labour is prolonged for more than a specified period of time. This might be chosen as being, for example, 12 hours ie a whole day or a whole night as this is readily measured in an environment where there are no clocks, and makes allowance for time needed to reach hospital before the really critical duration of labour of 24 hours is reached. The duration of labour might also be

given a more prominent role as a risk factor, for example, as an indicator for the use of antibiotics, and as an indicator for the performance of TBA training programs ie duration of labour before delivery or before specific action such as referral to hospital.

The incidence of other serious delivery problems apart from prolonged labour was also high in this study, and the observation that over 33% of women had one or more serious problems implies that there is considerable need for increasing the rate of referral for hospital delivery in this community. Currently the facilities at the first referral level are not ideal, but considerable attention is being paid to this problem by BRAC, UNICEF and other agencies and it will be important that, along with investment in the resources available at first referral level, attention is paid to education of TBAs and perhaps more importantly, the community as a whole, in the signs arising during labour which indicate a need for transfer to hospital.

The another important finding from this study is the importance of secondary as well as primary postpartum haemorrhage. The results demonstrate the relationship between haemorrhage at delivery and symptoms of fatigue and shortness of breath during the two weeks after delivery. This observation demonstrates that PPH at delivery is not only a life threatening event, but is also an event from which survivors are likely to suffer continuing morbidity. The importance of this observation is that a visit early in the postpartum period where a history of PPH at delivery could be obtained would indicate a need for intervention such as extra iron supplementation or other forms of support.

The results of the study showed that not only is secondary PPH a common problem, but that it, in contrast to primary PPH is strongly associated with the presence of anaemia at two weeks after delivery. The importance of this finding is that, like infection, secondary PPH could be detected at an early postpartum visit and appropriate action taken. Initially this might only need to be extra oral iron supplements and, because of the known association between postpartum bleeding and infection, possibly a course of antibiotics. Continued observation would indicate any need for further action.

6.4 Maternal Nutrition

The finding that the nutritional status, as measured by MUAC, of all the women deteriorated towards the end of pregnancy and during the first few weeks of the postpartum period suggests that this may be a physiological effect. However, the observation that the women in the lowest socio-economic groups not only had a worse nutritional status to start with, but deteriorated more and recovered more slowly implies that poorer women as might be expected, are worse off nutritionally at this time and represent a potential target group if nutritional supplementation was being implemented. The second observation, that primigravida exhibit a more severe deterioration in nutritional status than other gravidae over the same period also suggests that they too represent a potential target group for nutritional intervention. Further analysis is expected to explore the interaction between gravidity and socio-economic status on changes in nutritional status as measured by MUAC and further explore the relationship between poor nutritional status

and morbidity. Data on weight change, which can be more difficult to interpret in pregnancy will also be analysed.

The observation that anaemia of pregnancy appears to be common in this population merits further research into its causes and into the effectiveness of interventions to prevent and treat it.

6.5 Care and factors affecting care

The proportion of women attending for antenatal care in this study was quite low. Nevertheless several observations can be made from the break down by age, gravidity and education. These results show that younger women and primigravidae were more likely to attend than older women and multi-gravidae. This is encouraging as these groups are amongst those antenatal care particularly targets. However, the older groups of women and grand multips are amongst the least likely to attend and as these groups also may be particularly at risk there is the potential to try interventions to encourage them to attend. The results show that well educated women were more likely to attend than women with no education and this finding coupled with the finding that the most common reason for non attendance was the perception that they had no problems with their health suggests that if it is desired that most women should attend for at least one antenatal check, then considerable motivational and educational work is required in the community to encourage the less educated groups to attend.

Factors which had a strong effect on antenatal care such as age and parity did not have such a strong effect on the choice of birth attendant for delivery. However, there was a trend for primigravidae to choose a trained TBA. Better-off women were also more likely to choose a trained TBA. This could either be a manifestation of their greater perception of the benefits of training, or more simply a reflection of their greater ability to pay.

The findings that by 12 weeks postpartum many women were at risk of pregnancy but were not using any form of contraception is a strong indication of the need for strengthening of provision for postpartum contraception in this community. From the in-depth interviews it is apparent that women were aware of their risk of pregnancy and that the prospect of another pregnancy so soon was unwelcome. However, they appeared unaware of the possibility of using contraception so soon after delivery and it would seem that there is considerable scope for community education to improve awareness of the choices available at this time as well as increased provision of services.

6.6 Birth outcomes

The study was able to examine two outcomes relating to the child. One was birth weight and the other was perinatal death which has been shown very high in this community. This is the largest community based study of birth weight to date in Bangladesh and the finding that the proportion of low birth weight and very low birth weight babies is so high and that the mean birth weight is so low, is very valuable.

The strong association with young age and with primigravidity suggests that any interventions aimed at the prevention of low birth weight needs to be targeted at these groups. The lack of strong association with maternal socio-economic status and education suggests that interventions directed at improving these parameters, while they may be beneficial in the long term, are unlikely to have an immediate effect on the problem of low-birth weight. The study demonstrated a strong association between mothers current nutritional status (as measured by MUAC) and past nutritional status (as measured by height). The implication of this is that if were possible to improve the nutrition of girls while they are still growing, and thus increase their final height, that this might improve the birth weight of their babies. This would be a fairly long term strategy, but the effects of it would be expected to be evident after about fifteen to twenty years. A shorter term strategy is to improve the nutritional status of young women before conception, or during pregnancy. Certainly in the most malnourished this is likely to increase the birth weight of their babies. However, there are concerns that this increase might have the potential to increase the incidence of obstructed labour a serious problem unless facilities for operative delivery are easily available. Certainly programs for nutritional supplementation of young pregnant women, although desirable in many ways need to be carefully monitored.

6.7 Methodological lessons

The methodological findings of the study are only touched upon in this report. However, certain of the findings are potentially very important for future studies of maternal health in the community. The first of these is that information obtained sometime after the event is likely to be more reliable for the more obvious and well defined morbidities such as prolapse than it is for more general symptoms such as fever.

More importantly, the study has shown that information obtained at a longer time after the event, in this case, delivery, is more likely to tend towards a 'normal response' than information obtained at the time. This finding is similar to that of a recent study in the Philippines and has implications for studies of the demographic and health survey type in that the information they acquire is likely to underestimate maternal health problems and complications of delivery.

Other methodological lessons relate to the design of the study. It was particularly useful to have undertaken focus group discussion prior to the questionnaire development as this was a relatively new field for research. In addition, the system developed for continuous recruitment of women into the study in a fairly small geographical area helped considerably in minimising the loss to follow up which is always a problem with longitudinal studies.

Before starting the study we were concerned that women might not want to answer questions on such sensitive issues, but the field work has shown that, given the right kind of interviewer, in this case female and locally based, women are usually quite willing to give this kind of information.

6.8 Limitations of the study

This study took place in a confined geographical area and was able to achieve good levels of follow up despite the problems of in and out migration. The data thus presents a unique opportunity to examine the risk factors and determinants for postpartum morbidity in this area of Bangladesh. The results may not necessarily be completely representative of the entire population of Bangladesh but such close follow up would not have been possible in a wider geographical area.

The repeatability checks and other quality control measures suggest that, within the constraints of the current level of knowledge about how best to measure maternal health, the information obtained is valid.

Logistic constraints and the community based design of the study precluded the use of laboratory based tests. Such tests could possibly have added a further dimension to the data, but would have required a service based design. As with the use of doctors diagnosis in morbidity studies, the use of lab tests often fuels a debate as to the nature of 'true diagnosis' and the relative importance of health 'needs' as opposed to health 'demands'.

The data set collected from this study is large and rich. The information presented in this report is the result of the initial round of analysis and as well as answering many questions has also raised many more. Analysis will continue and is expected to result in additional relevant findings.

7. CONCLUSIONS

The main conclusions of the study are:

1. Postpartum morbidity is common in this area of rural Bangladesh, with over 80% of women affected to some degree. It should be noted that this study only focused on one pregnancy per woman. If the results were to be extrapolated to a life time risk, then the burden of maternal morbidity in this community must be extremely high. Much of this morbidity, for instance infection, could potentially be either prevented or treated with simple methods.
2. Postpartum infection and secondary haemorrhage are common, as are breast and perineal problems. These problems could potentially be addressed within programmes of postpartum care which focus on the early part of the postpartum period.
3. Postpartum infection is linked to events at delivery such as length of labour but is not affected by the hygiene practices of the birth attendant as currently taught in the TBA training programme.
4. Although the use of trained TBAs in this area is high, their presence at delivery did not have a demonstrable effect on maternal outcomes such as infection.
5. Although women are aware of health problems associated with childbirth, their use of formal health services is extremely low.
6. Perinatal mortality is extremely high in this area of Bangladesh and is strongly associated with events at delivery.
7. Low birth weight is common in this area of rural Bangladesh and is particularly associated with low age and parity of the mother and poor maternal nutrition.

8. RECOMMENDATIONS

Bangladesh Rural Advancement Committee (BRAC) and the London School of Hygiene and Tropical Medicine (LSHTM) hosted a workshop in Dhaka Bangladesh on 10th May 1994 at which this study was presented. The participants of the workshop (see Annex 7) made a number of recommendations based on the results of the study and the ensuing discussion. The following is a summary of those recommendations.

8.1 Policy and programmes

Promotion of accessible postpartum care, including the currently recommended clinic visit at six weeks postpartum and integration with other programmes such as EPI and Family Planning.

Provision for post-natal visits at home in the first week or two after delivery. Could be done by FWA, FWV or possibly trained TBA who could inform FWV. The effectiveness of this new approach would need to be evaluated in a pilot or demonstration project.

Promotion of breastfeeding (including consideration of breast problems) and giving of contraceptive advice at both early and routine postpartum contacts.

Provision of antibiotics and iron to treat infections and anaemia during the postpartum period.

Promotion of psychological support from family and community during the postpartum period.

Celebrate the birth of female children!

Promote perineal hygiene in the postpartum period.

Improve community awareness of obstetric emergencies and the importance of referral. Educational efforts in the community need to address men and other relatives as well as women and health providers such as TBAs.

Develop better monitoring and evaluation systems for grass roots workers particularly TBAs. The role, training and potential of TBAs needs to be revisited.

Maternity care should be comprehensive, addressing the needs of all pregnant women, not just those detected at 'high risk' during pregnancy.

Services for adolescent girls are needed within existing programmes with a focus on young primigravidae as being a group with special risks and needs.

Programmes for nutrition and health care need to be integrated.

8.2 Research questions

What are the processes by which maternal morbidity particularly postpartum infection develops in the context of rural Bangladesh? How important are RTIs as a risk factor for postpartum infection in Bangladesh?

Which interventions will be most effective in preventing and treating maternal infection?

How well does the length of labour perform as firstly an indicator for obstetric management in the community, and secondly as a risk factor for postpartum complications particularly infection?

How do different patterns of postpartum care perform in terms of maternal morbidity, infant health and contraceptive uptake?

How does nutritional supplementation of pregnant women effect outcome in terms of LBW and obstructed labour in the context of Bangladesh? How feasible is supplementation?

How does nutritional supplementation affect the growth of adolescent girls in Bangladesh? What are the long term effects of such supplementation in terms of the birthweight of their offspring, and their obstetric complications?

Is the standard definition of LBW appropriate in Bangladesh? What is the survival and morbidity of LBW babies in Bangladesh?

Is nutrition education, for both boys and girls, effective?

What are the social, economic, practical and cultural constraints on the use of maternity services in Bangladesh?

Is there a role for official user charges in the maternity services in Bangladesh?

What are the patterns of treatment (home/traditional/formal) for maternal health problems in the postpartum period.

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ANNEX 1

DEFINITION OF MATERNAL DEATH

Maternal Death

A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Maternal deaths should be subdivided into two groups:

1. Direct obstetric deaths - those resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium), or from a chain of events resulting from any of the above.
2. Indirect obstetric deaths - those resulting from previous existing disease that developed during pregnancy and which was not due to direct obstetric causes but which was aggravated by the physiological effects of pregnancy.

(International Classification of Diseases, 10th Revision (ICD 10) (WHO, 1990).

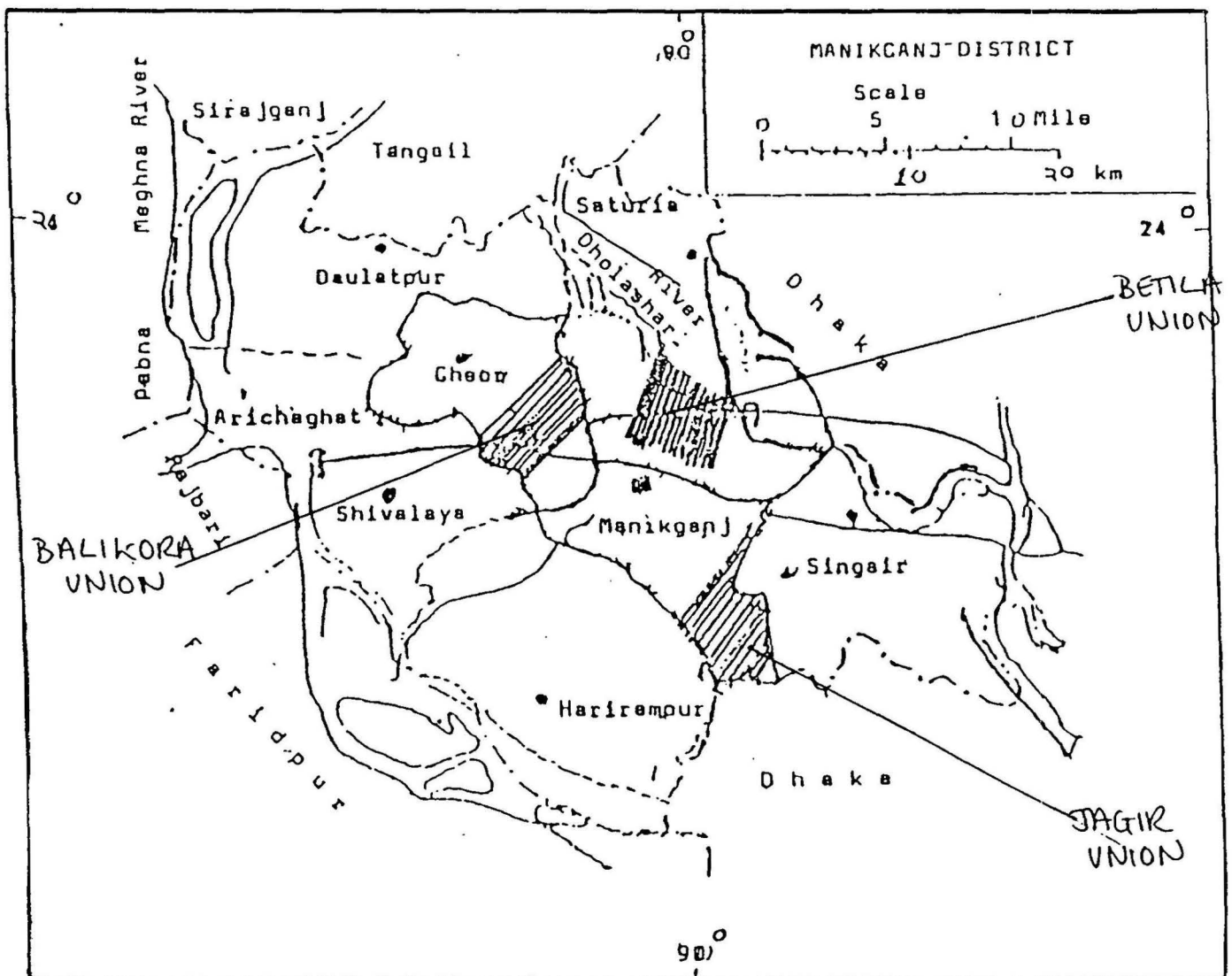
Maternal Mortality Ratio

The maternal mortality ratio is the number of maternal deaths per 100,000 live births.

ANNEX 2

MAPS

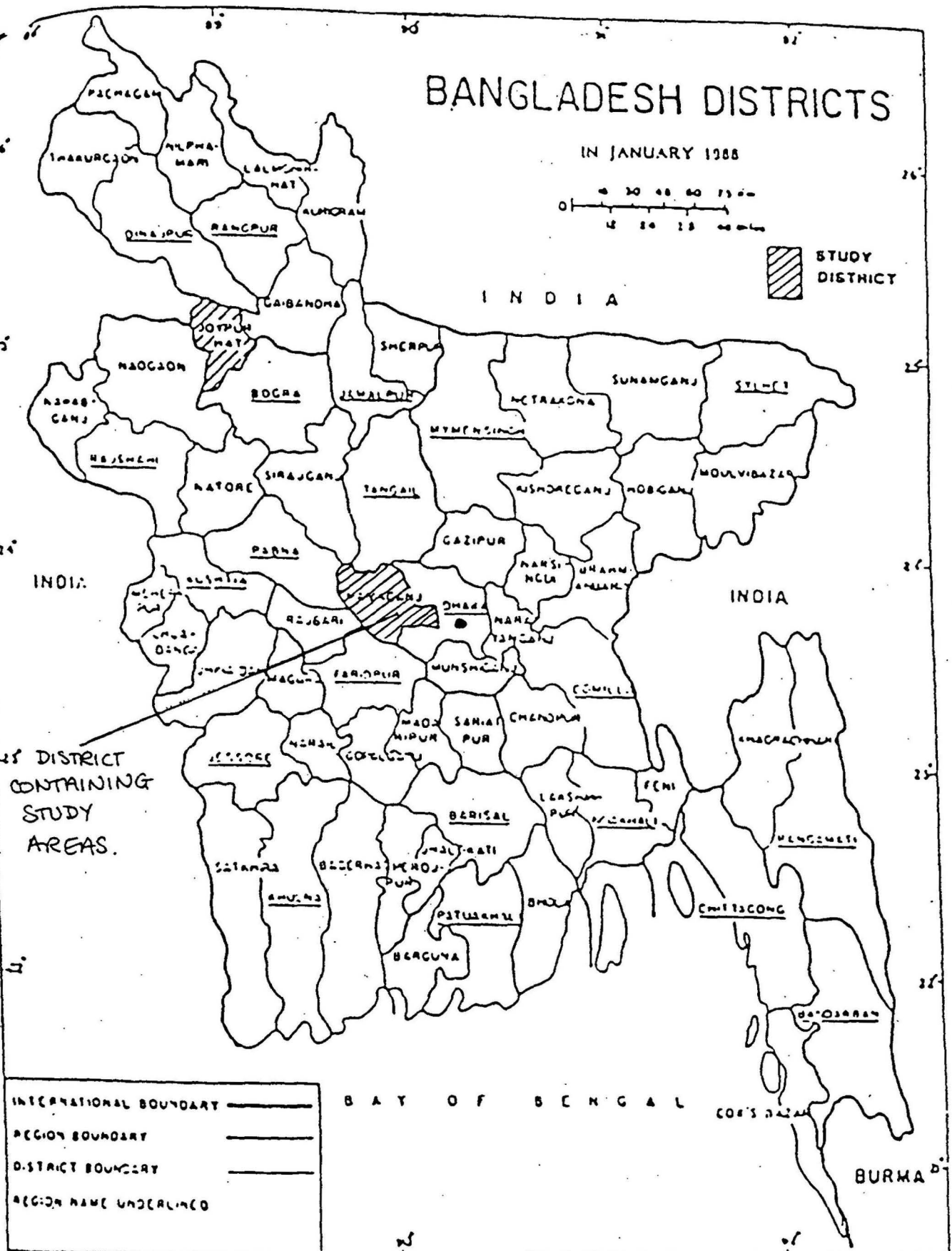
MAP OF MANIKGANJ DISTRICT



Source: Survey Corporation, Dhaka, Bangladesh

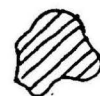
 Study Area

ANNEX 2



Source : Bangladesh Bureau of Statistics.

DISTRICTS CONTAINING BRAC DEMO GRAPHIC
SURVEILLANCE A3



ANNEX 3

VOCABULARY OF LOCAL TERMS

English Medical Term	Normal Bengale Term phonetic	Normal Bangla term	Local term phonetic	Local term Bangla
Vagina	Joni Path	যোনি পথ	Joni Path/Bosti kotor	যোনিপথ বস্তিকোটর
Birth Passage	Prosiber Path	প্রসবের পথ	Prosobet Rasta/Ghor	প্রসবের রাস্তা, ঘর
Lubricate passage	--	--	Ghor Maja	ঘর মাজ
Oedema	Oedema	ইডিয়া	Pani asa	পানি আসা
Convulsion fo fit	Khichuni	খিচুনী	Khichuni/Bak Dhora	খিচুনী/বাক ধরা
Nauja	Bomi Bomi Bhab	বমি বমি ভাব	Uki Bhab	কি ভাব
Vomiting	Bomi	বমি	Uki Utha	উকি ওঠা
Birth Place	Prosober Sthan	প্রসবের স্থান	Idha Ghor	আইধা ঘর
			Sotighor, Asoighor	ছটিঘর, আছইঘর
Labour Pain	Prosab Bedona	প্রসব বেদনা	Bis/Bedna/Batha	বিষ/বেদনা/ব্যাথা উঠা
Amniotic Fluid out	Baccha tholir phani	বাচ্চা থলির পানি বের	Tel (oil)/Pani	পানি বা তেল ভাল
	Ber howa	হওয়া	(water) Bhanga	
Hand Presentation	Hat (hand)asa	হাত আসা	Hat Dekha jai	হাত দেখা যায়
Melpresentation or malposition	Baccha ule	বাচ্চা উল্টা থাকা	Upte Bheb	উপত ভাব
	Thaka			
Cord	Nari	নারী	Nari	নাড়ী
Placenta	gonbo phul	গর্ভফুল	Phul (Flower)	ফুল
Haemorrhage	Rokto Khoron	রক্তক্ষরণ	Rokto Bhanga/	রক্ত ভাল বা যাওয়া
			Rokto Jawa	
Vtorus	Joraiu	জরায়ু	Podme Nari	পদ্ম নাড়ী
Dilatation of cervix	Joraiur muk Khola	জরায়ুর মুখ খোলা	Joraiurmuk Khola	জরায়ুর মুখ খোলা
			Podmeo (lotus Fota)	
Vagina	Joni Path	যোনি পথ	Joni Path/Bosti kotor	যোনিপথ বস্তিকোট
Birth passage	Prosober Path	প্রসবের পথ	Perosober Rasta/Ghor	প্রসবের রাস্তা, ঘর
Lubricate Passage	--	--	Ghor Maja	ঘরমাজ
Oedema	Oedema	ইদিমা	Pani asa	পানি আসা
Convulsion/or fit	Khichuni	খিচুনী	Khichuni/Bak Dhore	খিচুনী/বাক ধরা
Nauisa	Bomi Bomi Bhab	বমি বমি ভাব	Uki Bhab	উকি ভাব
Vomitinag	Bomi	বমি	Ukiutha	উকি ওঠা
Birth Place	Prosober sthan	প্রসবের স্থান	dha Ghor, Soti Ghor,	আইধা, ছটি ঘর
			Asoi Ghor	আছই ঘর

ANNEX 3 VOCABULARY OF LOCAL TERMS

English Medical Term	Normal Bengle Term phonetic	Normal Bangla term	Local term phonetic	Local term Bangla
Breast abous	ston paka	স্তন পাকা	Ston Pakh/Duer Dhar Bondho/Dud Hosto	স্তন পাকা/দ্রব্যের ধার বন্ধ
Lower abdomen	Tol pet	তল পেট	Tolpet	তল পেট
Continuous cormping pain in lower abdonden	Tol pate Sthai Bhatha	তলপেটে স্থায়ী ব্যাথা	Tolpete chp Dhere Thaka	তল পেটে চাপ ধরে থাকা
Abdomenal pain after child birth	Peta Prosab	পেটে প্রসব পরবর্তী ব্যাথা	Udlar Bis	আধতলার বিষ
Haodbal madicine	Poroborti bhatha	গাছন্ত ওষুধ	Gachonto osud	গাছন্ত ওষুধ
Head comming	Gchonto osudh Matha (head) Dekajowa	মাথা দেখা যাওয়া	Chandi Dekajawa	চাঁদি দেখা যাওয়া
Micarriage	Gorbo Sreb	গর্ভস্রাব	Baccha Nosto howe/Baccha Pore jowa	বাক্চানষ্ট হওয়া/বাক্চা পড়ে যাওয়া
Abortion	Gorba Pat	গর্ভপাত	Gorbopat/Baccha Nosto kora	গর্ভপাত/বাক্চা নষ্ট করা
Memborne	Panir tholi porda	পানির থালি/পর্দা	Panir thosa	পানির ঠোসা
Uterus	Jorwui	জরায়ু	Baccha thpli	বাক্চা থলি
Puetiberium (period of uchurin)	Soti	ছটি	Soti, Choci	ছটি/ছটি
TBA	Bai, Dhatri	দাই/ধাত্রী	Dai/chauoi	দাই/চাউনী
Tetanus	Dhonustonkar	ধনুষ্টংকার	Upribhab/Batas laga	উপরিভাব/বাতাস লাগা
Shutika (Chronic lost pertum diorriha)	Sutika	সুতিকা	Sutika	সুতিকা
Prolobes	Joraiu Neme asa	জরায়ু নেমে আসা	maja daki (horrible bourl sound)	নাড় নেমে আসা
Taam	prosob Dar chire	প্রসব দ্বারা ছিড়ে যাওয়া	Nar Neme asa	ছিড়ে যাওয়া
clot	chaka, rokto banga	চাকা, রক্ত ভাসা	Chire jawa	চাকা বা মরা রক্ত ভাসা
Fewer	Jor	জ্বর	Chaka/Mora roktoBanga	জ্বর
Briast engoragement	ston fula jawa	স্তন ফুলে যাওয়া	Jor	দুধবাড়ী/সাজুর আসা
Milkorid up	Dud Na asa/Dukia jawa	দুধ না আসা/শুকিয়ে যাওয়া	Dud Bara/Sajor	দুধের ধার বন্ধ
			Duder Dhar Bondho	

English Medical Term	Normal Bengle Term phonetic	Normal Bangla term	Local term phonetic	Local term Bangla
Cumin and chili mashed together which iueress Milk secretion Stillbirth Rowutenus Catter Child birth Peruneum/Anus Ghost/Spirit	Kalogira (Cumun) Moric (Chili)Borta) Gurjubi bhut/upribhab	কালোজিরা, মরিচ ভর্তা	— Mani Bacha Katiha nar	—

ANNEX 4

MEASUREMENT INSTRUMENTS

Mid upper arm circumference (MUAC): MUAC was measured on the left arm hanging loosely and straight at the woman's side. The tape used was based on the TALC tape for measuring MUAC in children. The TALC tape is however too short for adult MUAC so a longer version was designed and made for the study by BRAC printers.

Infant chest circumference and head circumference: These measurements were obtained using the same tape as for adult MUAC. The technique used was that recommend by WHO.

Gestational age of infant: This was measured using a simplified method described and validated in Goroka, Papua New Guinea, using only the presence or absence of foot creases and breast bud diameter.

Height: Height was measured in centimetres using height measuring sticks made for us at ICDDR,B. These sticks were similar in many respects to those used in ICDDR,B field studies, but modified to our requirements.

Blood pressure: BP was measured using aneroid sphygmomanometers and a stethoscope. Training in the use of these instruments was undertaken by the research assistant in the field.

Urine Tests: Sugar and protein in urine was measured using sticks.

ANNEX 5
SOCIO-ECONOMIC SCORE

COMPONENTS:

	Score	
Duration of rice stores: (months)	0	0
	1-5	1
	6-11	2
	12+	3
Land holding: (decimals)	0	0
	1-49	1
	50-99	2
	100-499	3
	500+	4
Mother's education: (grade)	0	0
	1-4	1
	5	2
	6+	3
Husband's education: (grade)	0	0
	1-4	1
	5	2
	6+	3
Size of house: (number of rooms)	0	0
	1	1
	2-3	2
	4+	3
Room occupancy: (persons per room)	4+	0
	3-3.9	1
	2-2.9	2
	1-1.9	3
	<1	4
Possessions:	none	0
	watch	1
	radio	2
	bicycle	3

Scored from 0 to 25 and divided into 5 groups with approximately 20% of population in each group.

ANNEX 6

TABLES ON BIRTHWEIGHT AND INFANT SURVIVAL

A. Determinants of low birthweight

Table 6A.1. Birthweight and parity

Parity	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
1	211	17.1%	43.6%	39.3%
2 to 4	458	7.0%	36.5%	56.6%
over 4	137	3.6%	32.1%	64.2%
Total	806	9.1%	37.6%	53.3%

Changes statistically significant - $p < 0.001$

Table 6A.2 Birthweight and mother's age

Mother's Age	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
< 15	14	28.6%	57.1%	14.3%
15-19	167	15.6%	40.7%	43.7%
20-24	258	7.0%	39.1%	53.7%
25-29	196	7.1%	34.2%	58.7%
30-34	120	8.3%	31.7%	60.0%
35-39	31	3.2%	38.7%	58.1%
40+	13	0.0%	30.8%	69.2%
Total	799	9.1%	37.3%	53.6%

Changes statistically significant - $p < 0.01$

Table 6A.3 Birthweight and socio-economic group

Socio-Economic group	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
1	212	9.0%	36.3%	54.7%
2	167	12.0%	38.3%	49.7%
3	147	10.9%	38.8%	50.3%
4	143	6.3%	40.6%	53.1%
5	134	6.7%	33.6%	59.7%
Total	803	9.1%	37.5%	53.4%

Changes not statistically significant $p > 0.5$

Table 6A.4 Birthweight and education

Mother's Education	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
none	545	9.7%	38.7%	51.6%
some primary	98	8.2%	40.8%	51.0%
complete primary	82	8.5%	36.6%	54.9%
secondary	81	6.2%	27.2%	66.7%
Total	806	9.1%	37.6%	53.3%

Changes not statistically significant - $p > 0.3$

Table 6A.5 Birthweight and mother's height

Mother's height (cm)	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
<140	31	9.7%	58.1%	32.3%
140-144	113	15.0%	42.5%	42.5%
145-149	248	7.3%	38.3%	54.4%
150-154	194	8.2%	32.0%	59.8%
155+	104	2.9%	29.8%	67.3%
Total	690	8.3%	36.8%	54.9%

Changes statistically significant $p < 0.01$

Table 6A.6 Birthweight and antenatal maternal MUAC

MUAC (mm)	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
<200	79	20.3%	36.7%	43.0%
200-224	389	9.3%	37.5%	53.2%
225-249	208	2.9%	37.0%	60.1%
250+	28	3.6%	28.6%	67.9%
Total	704	8.4%	36.9%	54.7%

Changes statistically significant $p < 0.001$

Table 6A.7 Birthweight and postpartum maternal MUAC

MUAC (mm)	Number	Birthweight (Kgs)		
		percent under 2	percent 2 to under 2.5	percent 2.5 and over
<200	128	14.3%	45.3%	39.8%
200-224	451	10.6%	37.5%	51.9%
225+	224	2.7%	32.6%	64.7%
Total	803	9.1%	36.9%	53.5%

Changes statistically significant $p < 0.001$

B. Determinants of early infant death

Table 6B.1 2-week child mortality and birthweight

Birthweight	Proportion 2-weeks died	
	Numbers	Percent
Not measured	75/548	13.7%
<2 kgs	5/69	7.2%
2 to <2.5 kgs	5/284	1.8%
2.5 kgs or over	1/399	0.3%
Total	86/1300	6.6%

Excluding "not measured", changes statistically significant, $p < 0.01$

Table 6B.2 2-week child mortality and parity

Parity	Proportion 2-weeks died	
	Numbers	Percent
1	33/341	9.7%
2 to 4	32/707	4.5%
over 4	20/249	8.0%
Total	86/1297	6.6%

changes statistically significant - $p < 0.01$

Table 6B.3 2-week child mortality and delivery problems

Problems	Proportion 2-weeks died	
	Numbers	Percent
Yes	26/303	8.6%
No	19/606	3.1%
Total	45/909	4.9%

changes statistically significant, $p < 0.001$

ANNEX 7
PARTICIPANTS AT NATIONAL WORKSHOP
MAY 10TH AND 11TH 1994,
DHAKA, BANGLADESH

Name of the Organisation and Participant	Designation
<u>BIRPERHT</u>	
- Dr. Yeasmin Hemayet Ahmed	Assistant Director
- Dr. Arindam Sen	Medical Officer
- Dr. Sahida Tarik	Medical Officer
<u>Bangladesh Population and Health Consortium (BPHC)</u>	
- Ms. Anne Garbutt	Programme Manager
- Ms. Shahnaz Ahmed	Programme Officer
<u>Bangladesh Women's Health Coalition (BWHC)</u>	
- Dr. Nazneen Akhter	Medical Officer
<u>Christian Commission for Development in Bangladesh</u>	
- Dr. Pearl V. Anthony	
<u>Dhaka Medical College and Hospital</u>	
- Prof. Latifa Shamsuddin	Professor, Dept. of Obs & Gynae
<u>Fertility Regulation Centre</u>	
- Dr. Nina H. Naznin	Medical Officer
<u>Gonoshasthaya Kendra</u>	
- Dr. Mahmuda	Medical Officer
<u>GTZ-NIPORT</u>	
- Dr. Nilufer Mustafa	Programme Officer
<u>Helen Kellar International</u>	
- Ms. Nasreen Huq	Senior Technical Advisor
<u>ICDDR,B</u>	
- Prof. Demisse Habte	Director
- Dr. Abbas Bhuiya	Scientist
- Dr. Anne M. Vanneste	MCH-FP Programme
- MS. Nancy Fravel	MCH-FP Programme
- Ms. Fazilatunnessa	MCH-FP Programme
- Dr. M. Bateman	Community Health Division
- Dr. Therese Juncker	MCH-FP Programme

Name of the Organisation and Participant	Designation
<u>IEDCR</u>	
- Dr. Enamul Karim	Senior Scientific Officer
<u>IPGMR</u>	
- Prof. T. A. Chowdhury	Professor, Dept. of Obs & Gynae
- Prof. Shaila Khatun	Professor, Dept. of Obs & Gynae
- Dr. Shamim Ahmen	Associate Professor, Dept. of Paediatrics
<u>LSHTM</u>	
- Dr. Liz A. Goodburn	Maternal & Child Epidemiology Unit
- Mr. Tom Marshall	Maternal & Child Epidemiology Unit
<u>National AIDS Committee</u>	
- Major General (Rtd) M. R. Chowdhury	Chairman, Technical Committee
<u>ODA-UK</u>	
- Dr. Mehtab Currey	Advisor, Health & Population
- Mr. C. H. W. Bullough	Project Manager, FIMC Health Project Office
<u>Pathfinder International</u>	
- Dr. M. Alauddin	Country Representative
- Dr. Shabnam Shahnaz	Programme Officer
<u>PIACT, Bangladesh</u>	
- Mr. Abu Yusuf Chowdhury	Director
<u>Save the Children Fund, USA</u>	
- Dr. Ruchira Tabassum	Research Coordinator
- Dr. Abdullah-al-Masud	Medical Officer
<u>The Asia Foundation</u>	
- Ms. Kirstan W. Lundeen	Population Programme Manager
<u>The Government of Bangladesh</u>	
- Dr. Aminul Islam	Director (MCH) Directorate of FP
- Mr. D. K. Nath	Project Director, MCH Co-ordination cell, MOHFW
- Dr. AKM Muazzem Hossain	Deputy Civil Surgeon, Bogra
<u>The Morning Sun</u>	
- Ms. Rahat Khan	Staff Reporter
<u>The Population Council</u>	
- Mr. Peter Miller	Operation Research Specialist
- Ms. Ismat Ara Bhuiya	Consultant

Name of the Organisation and Participant	Designation
<u>UNFPA, Dhaka</u>	
- Ms. Tahera Ahmed	Senior Programme Officer
<u>UNICEF, Dhaka</u>	
- Dr. G. Mustafa	Programme Officer, Health & Nutrition Section
- Dr. Yeasmin Ali Huq	Consultant
<u>USAID, Dhaka</u>	
- Mr. David Piet	Head, Health & Population
<u>Voluntary Health Service Society (VHSS)</u>	
- Dr. Rezaul Farid Khan	Research Officer
<u>BRAC</u>	
- Mr. F.H. Abed	Executive Director
- Dr. Salehuddin Ahmed	Director Programme
- Mr. Faruq Ahmed Chowdhury	Advisor
- Mr. Tajul Islam	Director Public Relations
- Dr. Sadia Chowdhury	Director Women's Health & Development Programme (WHDP)
- Dr. AMR Chowdhury	Director Research & Evaluation Division (RED)
- Mr. M. G. Sattar	Manager RED
- Mr. Jalaluddin Ahmed	Manager Field Operations WHDP
- Mr. Fazlul Karim	Senior Research Epidemiologist RED
- Dr. Abdullahel Hadi	Research Sociologist RED
- Ms. Gulrukh Selim	Senior Reseacher RED
- Dr. Syed Masud Ahmed	Medical Officer RED
- Dr. Ziya uddin	Medical Officer WHDP
- Mr. Shah Noor Mahmud	Senior Area Manager RED
- Dr. Ziauddin Hyder	Senior Nutritionist RED
- Dr. Zeba Mahmud	Senior Nutritionist WHDP
- Dr. Younus Ali	Medical Officer WHDP
- Dr. Md. Nazrul Islam	Medical Officer RED
- Dr. Kaosar Afsana	Medical Officer RED
- Dr. Malobika Sarker	Junior Consultant WHDP
- Dr. Manjur Hossain	Medical Officer ENHR
- Dr. Firoz Kamal	Medical Officer RED
- Dr. Hashima-e-Nasreen	Medical Officer RED