Title
Training Traditional Birth Attendants in Bangladesh: A New Model for Integration

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Training Traditional Birth Attendants in Bangladesh: A New Model for Integration

By

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Part I: Traditional Birth Attendants and Maternal Health

I. Introduction

A. Significance

It has been estimated that, worldwide, nearly 600,000 women die each year during pregnancy or childbirth[1]. That amounts to more than 1 woman every minute of every day[2]. These numbers are most significant in Sub-Saharan Africa, where in some countries 1 in 16 women risks death from pregnancy as compared to 1 in 4000 in the United States[3]. South Asia has the second highest maternal mortality rates despite great advances in health technology as compared to Africa[1].

The disparity in maternal deaths is striking: 99% of these deaths occur in developing countries, demonstrating the huge inequality in healthcare, more specifically in maternal healthcare. The vital part of all these findings is that while both developed and developing countries have improved maternal and neonatal health outcomes, the disparity in poor outcomes between the two has not decreased. It has, in fact, widened enormously[4].

The major causes of maternal mortality are: hemorrhage (~25%), infection (~15%), unsafe abortion (~13%), eclampsia (~12%), obstructed labor (~8%) and other direct and indirect causes accounting for over 25%of deaths[1]. The distribution of cause-specific mortality vary by region and have very different treatment options, as will be discussed at length. In addition to the risk of death, more than 50 million women develop maternal health problems annually, and 15 % of all pregnancies require "medical care"[i] [5] As many as 300 million women – more than one-quarter of all adult women living in the

developing world – currently suffer from short- or long-term illnesses and injuries related to pregnancy and childbirth [5]. The leading causes of maternal morbidity are the same as maternal mortality. The contributing factors to poor maternal health outcomes include but are not limited to poverty, malnutrition, lack of education and access to healthcare, among many others.

B. Attendance at Birth

Approximately 53 million births take place each year without the help of a "skilled birth attendant" (SBA). Instead, women are assisted either by "traditional birth attendants" (TBAs), relatives or local women, accounting for 47% of total births worldwide[6]. The terms "skilled birth attendant" and "traditional birth attendant" have been defined by WHO and other international organizations. An SBA has had some form of formal obstetric training, usually a minimum of six months. A TBA has had no such training but practices as a birth attendant in her community. An analysis of these terms is on the following pages.

In Bangladesh the number of births without "skilled" attendance is close to 90 %[7]. This includes both the urban and rural communities, where there is a significant difference in education, resources and access. Eighty percent of the population lives in rural areas, where close to 95% of the deliveries take place at home without skilled attendance. In the urban areas this number is close to 70%, lower but still significant.

Given the high number of births that take place at home without the help of an SBA, it has been assumed that the high maternal mortality, morbidity and infant death statistics in the developing world are a result of unskilled care. This has led to many

programs to combat poor maternal health outcomes. Many of these previously focused on training traditional birth attendants(TBA) to recognize, refer and sometimes treat pregnancy complications[8, 9]. There has been great variation in the interpretations of these studies, leading to intense debate within the international community as to the most beneficial and cost-effective way to improve maternal and infant health in the developing world. The most prominent international aid organizations such as the World Health Organization (WHO), UNICEF, UNFPA, Planned Parenthood and many others now promote the exclusive use of "skilled" care at every birth, effectively dismissing any use of traditional birth attendants, and, consequently, reducing funding for training to provide maternal health services[10]. Now, nearly ten years later, there is still no consensus, with many authorities continuing to reject the use of TBAs. [6, 11-14] However, there continue to be studies promoting the training of TBAs in life saving skills as well as in the use of oral and rectal misoprostol to control hemorrhage[8, 15, 16]. These studies have reintroduced the use of TBAs in reducing maternal mortality and morbidity, acknowledging the large role TBAs continue to play in their communities while testing new and innovative measures to improve reproductive health in the developing world.

In this paper I will argue that the current focus of the international community of the exclusive use of "skilled care" ignores the reality of birth in the developing world by disregarding the key role TBAs play in maternal healthcare. Furthermore, most of the research that has been conducted on TBA training often fails to critically analyze the training itself, focusing on long term outcomes without measuring content and knowledge gained in the training. Failure of TBA training does not necessarily mean a failure of TBAs but could result from improper instruction.

In order to address the issue of training content, I will first introduce the main causes of maternal mortality and the current methods employed to treat them, demonstrating the need for effective training and referral to prevent mortality and morbidity. I will then use Gonoshasthaya Kendra (GK), a Bangladeshi non-profit organization, as a positive example of prioritizing TBA training and use in a responsible and effective manner, taking into account many of the contributions and limitations of traditional birth attendants in preventing negative birth outcomes. I will provide the results of an evaluation of two GK TBA trainings conducted in winter 2005-2006 in two different regions of Bangladesh. Both surveys of TBAs and extensive field notes were obtained from both trainings, providing information on both the content and TBA knowledge gained from the training. The results of this study can be used both to provide suggestions for future trainings, as a model of evaluation, and as an example of the importance of monitoring content in any TBA training study.

II. "Trained" vs. "Skilled" Attendance at Birth

A. What is "Skilled"?

WHO replaced the word "trained" with "skilled" in 1996 to distinguish between having had training and actually being "skilled"[10]. TBAs are not considered skilled because they are considered lacking in the ability to manage obstetric complications[17].

A recent report on Dais, the common name for TBAs in South Asia, goes further to explain the difference between skilled birth attendants and TBA, distinguishing them based on 3 categories[18].

1. Literacy: TBAs have historically been local women working within their community. As mentioned above, their skills were not acquired through formal training and like most women in the developing world, TBAs are generally illiterate[17].

2. Pharmaceuticals: One of the key items in training SBAs is the proficient use of drugs such as oxytocin or misoprostol to stimulate labor and prevent hemorrhage, respectively. Older TBAs do not advocate the use of oxytocin[18] and most authorities do not promote their use at home due to risk of complications requiring immediate emergency care. The use of misoprostol, however, has been suggested as an at-home pharmaceutical treatment of hemorrhage and is currently being tested.[19, 20] Further, there is also a resistance to training TBAs in the use of antibiotics, while SBAs are often trained in their use. This is important in light of the high number of maternal and especially neonatal deaths resulting from infection.[21]

3. Accountability: SBAs are most often employees of a particular organization while TBAs are local village members. They often do not receive compensation for their services but will have repeated contact with the mother and baby during and after pregnancy. While SBAs are thought to be accountable to the organization in which they are employed, the TBA is only accountable to the women she serves as well as to their families. If she does not perform her services accordingly, she may become ostracized from her village and thus threatening her

livelihood. SBAs, however, are often part of a larger community and could be relocated to a different site and continue practicing as long as their superiors see fit.

Thus the difference between traditional birth attendants and skilled birth attendants lies in the inherent understanding that skilled birth attendants are to have formal training, are often from outside the community and will have adequate ties to a referral system. TBAs, on the other hand, come from the community, do not have formal training and can often be the only source of maternal and neonatal health care in a community lacking any hospitals[17].

There have been attempts to formally define what training is necessary to term an attendant "skilled". Most literature highlights the importance of SBA use without defining SBAs. One recent attempt to create an adequate definition of "skilled" based on an example of a 15-week training with a 6-week refresher course and follow-up assessment of knowledge. [22]. This training program prioritized knowledge assessment after the refresher course but there was no mention of continued assessment of the "skills" acquired in this training that would then qualify someone to be an SBA.

There is often no defining characteristic of from where the SBA comes, whether she is a village member or an outsider. The "insider vs outsider" question blurs the lines between SBA and TBA, though TBAs are nearly always defined as local women and community members, the focus of most community-based interventions.[23] SBAs are not illiterate, are trained in a formal setting and are employed from community to high levels

of healthcare. Their use can be as village healthworkers or as medical assistants. Their use has been based on the assumption that TBAs cannot be trained.

There are further problems inherent in the definitions and distinctions. As mentioned above, TBAs are often illiterate and this fact has been used to suggest that they are untrainable[24]. Being illiterate does not, however, mean that TBAs are unable to know and/or be trained to recognize potential risks and complications in pregnant patients. A recent meta analysis confirmed the improved referral rate, attitudes, beliefs and common hygiene practices employed by TBAs following training[25]. Furthermore, to comply with the guidelines set by the WHO, many doctors, nurses and midwives would have to undergo "retraining" in many skills. The definitions of "skilled" do not even apply to many of the people who have undergone formal training.

TBAs' trade has been passed down for thousands of years of apprenticeship. Illiteracy does not mean inability to read the human body, to detect pregnancy and become trained in the birthing process.[18] In Bangladesh, as mentioned earlier, even in the capital city of Dhaka where there is no shortage of EOC facilities, the vast majority of women (70%) are still delivering at home with the assistance of a TBA. The cost of delivery care is often very low as NGOs and the government subsidize many health services. Given the numerous hospital choices for women in Dhaka, it can be inferred that delivering at home is a choice preferred to hospital deliveries. It is not hard to imagine that, given her role in the community and history of maternal healthcare, a TBA may be more likely to develop a therapeutic alliance with a pregnant woman.

B. More on Skilled Attendance

The term" skilled attendant" encompasses a variety of people and duties. For the purposes of this paper, this term will refer to the definition provided by the Safe Motherhood Inter-Agency Group[1] (IAG).

> " A skilled attendant refers exclusively to people with midwifery skills (for example doctors, midwives, nurses) trained to proficiency in the skills necessary to manage normal deliveries and diagnose, manage and refer complications."[10]

Furthermore, there are a series of skills that an SBA should have according to the WHO, including: history taking, self-care, vaginal examination, active management of the third stage of labor using oxytoxic drugs, recording of maternal and fetal well-being on a partograph, and conducting "first-line" management of conditions detrimental to the health of the mother or the infant[17]. There appears to be no such requirement for TBAs as their training has not been standardized and can often take place within the context of the community.[26]

The call for skilled attendance does not, however, mean that all births should take place at hospitals. While some of the literature points to the importance of hospital deliveries and care in the reduction of maternal mortality in the West,[4, 27] the very large numbers of births that take place at home make this notion nearly impossible and many policymakers recognize this[1]. Recent programs aimed at monitoring and improving maternal mortality and morbidity have focused on ensuring the proper number of

[1] The Safe Motherhood interagency group first began as a coalition of the WHO, UNFPA, UNICEF, The World Bank, the International Planned Parenthood Federation and the Population Council at a conference of Safe Motherhood in 1987. It has since been joined by the International Confederation of Midwives(ICM), the International Federation of Gynecology and Obstetrics(FIGO), and the Regional Prevention of Maternal Mortality Network(Africa).

functioning facilities for Emergency Obstetric Care (EmOC), not on guaranteeing that all deliveries will take place in such facilities[28]. Here the distinction should be made between basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC). The chart at right defines these categories based on recent monitoring recommendations[29]. It has been noted that many countries actually have such facilities; but many are not maintained or utilized properly.[28] Bangladesh is a clear example of this, where one study found that 30% of district hospitals that were supposed to provide CEmOC only provided BEmOC and even in those hospitals that do provide CEmOC often pose access challenges for local women[30]. Thus monitoring these services should go one step further to not only count facilities but assess their usage and functionality.

Figure 1: BEmOC vs CEmOC

Emergency obstetric care (EmOC) functions
Basic EmOC (BEmOC)
Injectable antibiotics
Injectable oxytocics
Injectable anticonvulsants
Manual removal of placenta
Removal of retained products
Assisted vaginal delivery
Comprehensive EmOC (CEmOC)
All basic functions 1–6 plus
Cesarean section
Blood transfusion

C. More on Traditional Birth Attendants

It is always difficult to provide a definition for any group of people, let alone a group as heterogeneous as traditional birth attendants. They practice in vastly different ways and hold very different community status throughout the entire world[24]. For the purposes of this paper, the standard World Health Organization (WHO) definition will be employed, which is the one employed in most of the literature written on TBAs[31]:

> "A person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or through apprenticeship to other TBAs."

A TBA often assists women in her community during pregnancy, labor, delivery and puerperium (40 days post-delivery) and provides care of the newborn. Again, there is a great deal of variation regarding how TBAs practice and operate within the community. Some only provide social support or care after the delivery. Others provide the full spectrum of delivery care, including antenatal visits, labor, delivery and early infant care[32].

The term TBA is not indigenous to any culture. It essentially was created to provide a distinction between birth attendants who have completed some form of a professional program and those who have not [33]. As alluded to earlier, this definition includes women who may perform drastically different duties in their community in addition to starkly contrasting roles in society. In Tibet, for example, birth is considered unclean and TBAs are considered "dirty" (Miller, 2004, personal communication), while in many parts of Africa and Latin America, they are highly respected[32]. In Syria, Lebanon and Turkey, TBAs are outlawed even though they continue to practice[34]. It should also be noted that there is likely to be strong variation in how TBAs are viewed within a country. Even in a relatively small country such as Bangladesh, for example, TBAs are seen as "second-mothers" in some regions while they are called, loosely translated, "executioners"[2], in the regions of the far north[35].

The unclear definitions and varied roles of TBAs contributes to the inherent difficulty in studying this population and in making broad declarations of their effectiveness, or lack thereof. This fact has not prevented the international community from attempting to define the role that these women should play in maternal health.

[2] The term used is "charal", which is a Bengali word that stems from a Hindu term "chandal" for the person who performs the executions. TBAs are called as such due to the fact they are often seen as causing maternal death.

III. History of Traditional Birth Attendants

In order to understand the current controversy surrounding the training of TBAs, it is necessary to understand that they played a significant role in birthing in the industrialized west. Their replacement with skilled care has been seen as the course in which developing countries should go[27]. This vision does not account for the fact that TBAs will not be replaced by SBAs in the developing world any time in the near future.

A. The West

Traditional Birth Attendants have a long and rich history throughout most of the world, including the now industrialized west. In England, for example, TBAs were used until the end of the 19th century, when the Midwives Act of 1902 aimed to replace "traditional" midwives with professional care[4]. In much of the industrialized west, there was a shift to skilled care in the early 20th century. This has often been linked with the rapid decline in maternal mortality observed in these countries, which began around the 1930s. This decline, however, was more temporally associated with the control of puerperal infections due to aseptic techniques[27].

The dramatic reduction in maternal mortality in the west[3] has been described as the result of two key factors: recognition of the magnitude of the problem and also the manageability of the problem. In these countries, there was an existing medical infrastructure that provided for the training and delivery of skilled care. In the United States, for example, it is well known that while women did die during home deliveries,

[3] In the United States, for example, the MMR was as high as 885/100,000 in 1918, whereas today it is about 27/100,000

there was a very high maternal mortality rate due to sepsis acquired during hospital deliveries[27]. However, following the successful identification of the source of the peurperial epidemic in the hospitals, nearly all deliveries in the US now take place in hospitals. Home deliveries were routine from the country's inception, though there was always government resistance to promoting the use of midwives. Thus there was not much institutional resistance to obstetrician replacing midwives. There is little evidence supporting the resistance to skilled care in the West, as opposed to findings in many developing countries today where those utilizing skilled care are likely to be wealthier and better educated.[4, 36]

B. Developing Countries

As mentioned earlier, traditional birth attendants have been used to assist in deliveries throughout history. Training and utilization of traditional birth attendants, however, did not begin until recently. Some sources mention isolated instance of training throughout the 1800s, though most current literature refers to the first trainings beginning in the 1920s[4, 24]. Training was documented in 1921 in the Sudan. More training took place in the 1950s in Thailand, India and the Philippines.

Training TBAs did not get widespread attention until the 1970s when leading policy makers, most notably the WHO, called on the international community to develop maternal health programs in the developing world that utilized TBAs for their important role in the community[4]. Between 1972 and 1982, the number of countries with documented training programs rose from 24 to 52[34]. Trained TBAs were considered "health workers" and the WHO was convinced that trained attendants could be present at

[4] Here there was some discrepancy in the dates of the declaration. Kruske(2004) states that the declaration was make in 1978 at the Alma Ata convention, while DeBrouwere claims the declaration was made in 1970 and that by the end of the 1970s there was a very large effort to train as many TBAs as possible.

the majority of births worldwide, actually declaring in 1990 that they would promote the provision of trained attendants for all women[31].

C. Controversy

By the 1980s, however, there was growing concern that training TBAs was not actually effective in lowering rates of maternal mortality and morbidity. An increasing body of research supported this position[4]. In 1987, the first Safe Motherhood Conference was sponsored in Kenya. There the founding members sponsored a declaration calling for a 50% reduction in maternal mortality by the year 2000[10]. This goal was never reached, nor was there any real significant reduction in maternal mortality in the following 13 years. New estimates in 1990 actually showed an increase of 80,000 maternal deaths from previous estimates[37]. It should be noted, however, that estimating maternal mortality is very difficult and accurate numbers are difficult to find as every country has different methods of collecting their data and many countries will underestimate the true values[24, 38]. The new estimates of maternal mortality demonstrated the failure of existing programs, leading to many efforts to both implement new programs and to evaluate existing services [5, 10, 39].

The effectiveness of TBA training and use in the community came into question. By 1992 there was a joint statement by the WHO/UNFPA/MCH that called on the use of TBA training as an interim measure only to be used while women still did not have access to "modern health services".[31] In 1996 WHO replaced "trained" with "skilled" in its language. By 1997 the Safe Motherhood IAG set forth 10 "Action Messages"[10]. The most important of these messages was number 6, which simply states "ensure skilled

attendance at birth". Since TBAs were not considered "skilled", this message effectively reversed the 20 year policy of training TBAs to improve maternal health outcomes.

Since the Safe Motherhood Initiative, policymakers have redirected funds to support training skilled birth attendants and the notion of promoting "skilled" training at birth has been argued for extensively in most literature [3, 4, 11-13, 15-17, 22, 24, 38, 40-47] In the two years following the Action Messages, it was said that even mentioning TBAs would cause controversy[17].

In recent years, however, there has been growing number of academics reevaluating this policy and acknowledging the possible problems inherent in ignoring TBAs given their central role in deliveries.[15, 17, 18, 48-51] Many of these researchers point to some of the flaws and difficulties inherent in studying both TBAs and maternal health outcomes. As mentioned earlier, the vast majority of births in the developing world take place at home. Most studies of maternal mortality, morbidity and TBAs are of a quasi-experimental survey design which is based on recall data and subjective markers of morbidity[25]. Simply measuring maternal mortality, a relatively rare event, provides a host of complications in finding statistically reliable results[38]. Thus the following discussion of the major causes of maternal mortality will include a description of some of the difficulties inherent in their study.

IV. The Confusion over Training

A. Maternal Health Outcomes

In order to understand the confusion over TBA training, it is necessary to have a good understanding of the various outcomes measured in training studies. Given the

international attention focused on maternal mortality, this discussion will focus on the major causes of maternal mortality and the common interventions used to save a woman's life. These are important as the major source of controversy in training stems from whether or not a TBA can actually prevent or treat these conditions.

The majority of maternal deaths occur in the postpartum period and cannot be predicted[28, 52]. One meta-analysis found that 90% of hemorrhage and all deaths from eclampsia occurred within the first week postpartum[52]. Infection, based on different incubation periods, caused death after the first week. There are of course, a number of complications that can arise during the first and second stages of labor, many of which require advanced hospital care, though there are numerous recommendations for home care[53]. A major problem with many of these remedies, however, is that they require advanced medications. They would thus be expensive and likely very complicated for TBAs to learn and apply at home, where they are attending the majority of deliveries. This provides yet another criticism of TBA use.

In light of the timing of maternal deaths, it makes sense that managing the postpartum period has been viewed as central to reducing maternal mortality[52]. This argument, however, has several flaws. The complications that arise in the postpartum period are quite often exacerbated by poor antenatal care and difficult socio-economic conditions. The most important factor in a healthy delivery is a healthy mother[39]. This can be expanded further to discuss the role of poverty, as the number one reason for ill health is poverty[5]. Thus the complications discussed here need to be read in perspective. For the purposes of this paper, it is important to become familiar with the major causes of

maternal mortality as TBAs failure to control these complications has often been cited as their major flaw[24].

1. Hemorrhage

Hemorrhage can occur during any of the three stages of labor, cervical dilation, delivery of the fetus and delivery of the placenta. It is usually most prevalent and fatal after delivery, in the postpartum period [39]. During labor it is considered dangerous if more than 500 ml of blood are lost. The cause of hemorrhage is most often unknown and the vast majority of cases are in low-risk women, based mainly on the shear number of women in this population[28]. In the postpartum period, hemorrhage is most often caused by impaired uterine contraction and retraction[54]. This can be due to a variety of factors, most often a full bladder, retained placenta or placental products, trauma to the uterus or a tear[53].

There are some risk factors for postpartum hemorrhage(PPH) that can be treated prior to deliver, most notably anemia[39]. During the birthing stage, however, there has historically been little that can be done in the absence of a well-equipped health facility to save the woman. PPH accounts for one quarter of maternal deaths[1] and is overall the most difficult complication to treat. This is in no small part related to the fact that without comprehensive EOC it takes an average of two hours before a woman will die of PPH.[38]

To manage excessive PPH (more than 1500ml), the attendant needs to find the source of the bleeding, stop the bleeding and replace the loss of the bleeding[55]. The treatments recommended for village-based care include massaging the fundus of the uterus, performing external compression of uterus and nipple stimulation to promote uterine contraction. It is also possible for the attendant to actually clear out the contents

of the uterus by hand, but this is very risky and only recommended in the case of a severe emergency[53]. TBAs can be trained to perform all of these, though if the bleeding is very severe there needs to be more care.

There are three uterotonic drugs that have been promoted to manage PPH including oxytocin, ergometrine and misoprostol. Oxytocin, the drug of choice, causes the uterus to contract, is released naturally from the pituitary during the first stage of labor and continues during lactation. Numerous sources recommend training TBAs in the use of oxytocic drugs to prevent PPH and point to its use as an example of a way that TBAs can manage third stage labor complications[17, 24, 53]. Though oxytocin has been cited as the method of choice to prevent and treat PPH, oxytoxic drugs carry with them the risk of severe hemorrhage and should not be given without access to immediate EOC services[56]. In addition oxytocin must be kept at a cool temperature, often an impossible task in poor rural areas. Thus its use by TBAs in home deliveries is understandably viewed with caution.

Ergometrine is an alkaloid that can be administered intravenously, intramuscularly, or orally to provide strong myometrial contractions. It has been considered the "standard" for treating PPH in many TBA trainings[20]. It is effective for the prevention and control of postpartum hemorrhage, but it is very dangerous for the fetus and the mother prior to delivery. The parenteral administration, especially by the intravenous route, sometimes initiates transient, but severe hypertension, especially in women who are predisposed to pre-eclampsia [54]. Thus it should be used with caution. This danger provides an obstacle to training TBAs in its use as, just as with oxytocin,

improper use without adequate immediate emergency care, could prove fatal to the mother and child.

Another new development in the treatment and prevention of PPH is the use of misoprostol, a Prostaglandin E analog. It was historically used to treat peptic ulcer disease and is currently used along with mifeprestone for medical abortions to contract the uterus. It is much easier to distribute and deliver than oxytocin, which must be given by injection and needs to be carefully measured. Misoprostol can be given in pill form, sublingually or rectally. Many clinical trials are now taking place in developing countries to study it's effectiveness in treating PPH [57] [20, 58].

The studies of misoprostol highlight the difficulties inherent in studying postpartum hemorrhage. Most sources define PPH as a blood loss of greater than 500ml. This number can be difficult to measure in a hospital delivery, let alone a home birth. Other references measure a variety of systemic effects and the often subjective need for transfusion[59]. Many studies are currently measuring rates of blood loss, some with innovative and culturally appropriate techniques. One current study of the use of misoprostol and TBAs is measuring blood loss on a cloth. The TBAs are advised to monitor how many cloths are bled through [19]. A recent study in Tanzania used the kanga, a traditional cloth garment, to measure blood loss in a misoprostol intervention study[60]. This is useful as there may be no sudden massive hemorrhage but rather steady bleeding that at any given instant appears to be moderate, but persists until serious hypovolemia develops [54]. Especially with hemorrhage after placental delivery, the constant seepage may lead to enormous blood loss. This highlights that while it is known how dangerous PPH is for the life of the mother, it is quite difficult to study in relation to TBAs and their

training. Measuring blood loss in the context of a home delivery, where there is often no light and no consistent measuring tool provides a serious obstacle for researchers seeking to test an intervention.

In light of these difficulties in diagnosing and managing PPH, it is important for any person attending a delivery to be able to recognize the signs and symptoms of PPH and to provide any appropriate treatment if possible. PPH can further be classified according to severity. Often only surgery, requiring comprehensive emergency CEmOC, is the only treatment for intractable PPH[56]. TBAs can be trained in uterine massage and bimanual uterine compression which can control most hemorrhage [54]. Many have been trained in the use of oxytoxics and ergometrines [18]. As mentioned earlier misoprostol is a relatively new yet promising treatment for PPH. While there is only recent evidence suggesting TBAs can effectively treat PPH, they can be trained in the tools to prevent and identify it and are central to timely referral and treatment[57].

2. Sepsis

Sepsis, or postpartum infection (PPI), accounts for 15% of all maternal deaths in the developing world [1], though it should be noted that these numbers vary by region. In Bangladesh, for example, this number has been estimated to be only 8%[7]. Regardless of its frequency, sepsis remains an important research topic in maternal health for its preventability.

Younger age at delivery, premature membrane rupture, STIs, oral infections, multiple gestations and prolonged labor increase the risk of infection and are associated with poorer outcomes with PPI [61]. PPI is strongly associated with the introduction of

improperly cleaned instruments into the vagina [55]. Other sources of infection include dirty towels, surroundings and people with unclean hands [53]. Clearly, PPI is a complication very much related to the environment in which is woman delivers. For this reason it has been cited as a complication that proper training can prevent [9].

A woman with PPI can be given fluid and local remedies, but if the infection is severe, no remedy other than pharmaceuticals has been proven. It is important for a birth attendant to be able to recognize the signs of an infection, such as fever, foul smelling discharge and abdominal pain, and refer accordingly if they are not trained in the use of antibiotics. As described in some guidelines [42, 53, 62] it may be difficult to train TBAs in the use of antibiotics as the dosage and administration can be quite confusing.

Herein lays another problem in studying infection and treatment. In the absence of a laboratory, it is in fact quite difficult to diagnose an infection. A specific temperature of >101.4 for more than two days is a common definition, but to measure this TBAs would have to be able to read thermometers, let alone have access to them. The common symptoms of fever, pain and foul discharge definitely imply infection and are often used to define infection diagnosis in relation to TBA training. One recent study based infection rates on the presence on two of the three aforementioned symptoms[9], though it should be noted that many women's temperatures rise after birth, they may have unusual discharge and some pain[39, 53]. Obviously if any of these are severe, it would be right to suspect infection, but a definitive diagnosis could only be made in a laboratory.

In a recent study, Goodburn et al[9] found that training TBAs in a specific region of Bangladesh[5] did not lead to a reduction in postpartum infection, though there was a significant increase in hygienic delivery. Their conclusion was that training does not lead to a decrease in postpartum infection. However, they mention that training led to increased hygienic practices but that this was offset by an increased incidence of TBAs inserting their hands into the vagina. This is a very significant finding but it was buried in the article, thus ignoring the very real contribution training made to other hygienic practices. Furthermore, as with most analysis of TBA training, there was very little description of the training. It is possible that there was something taught in the training that promoted the insertion of hands into the vagina, which, as mentioned earlier, is a major cause of infection. The conclusions of the study did not address the need to reevaluate training practices but rather to evaluate the use of TBAs and the cost effectives of TBA training.

3. Complications from Unsafe Abortions

Complications from unsafe abortions are said to account for 13% of all maternal deaths.[6] The number of induced abortions is clearly hard to measure, as underreporting in this category is surely to be higher than for other complications. In the absence of reliable statistics, researchers have estimated that nearly ¼ of all pregnancies end in abortion[38]. Abortion is illegal in many countries, leading women to seek the help of "medical"

[5] It should be noted here that there was no mention of the region in which this study took place. In Bangladesh, as in most countries, there is a great deal of regional variation in services, health and training. To follow up on this study it would be necessary to know exactly where this study took place.

[6] As mentioned earlier, maternal death does not only include the period immediately before and after labor, but the death of any pregnant woman from the complication arising from the pregnancy. Thus abortion in the early stages of pregnancy is also considered a maternal death.

persons capable of performing them, often with dangerous methods. Even in countries where abortion is legal, women may not have access to clean and safe facilities. In Bangladesh, as will be discussed later, abortion and many family planning methods are available. However, women require the consent of their husband to obtain an abortion. A pregnant woman whose husband does not consent would have to seek illegal methods. When women cannot reach a medical facility, and even in some "medical" facilities, women will inset dangerous chemicals and substances into their vagina and uterus as abortafacients. This can lead to infections and death.

It is obvious that studying complications from unsafe abortions is very difficult. The rates are hard to measure and are usually based on life-threatening complications that result in hospitalization. Thus those abortions that do not result in hospitalization either from lack of serious complications or absence of hospital access and availability will go unreported or misclassified. This is especially true in countries where the procedure is illegal. Women are not likely to be admitted to the hospital under this diagnosis and rarely is "abortion" noted in the cause of death.

There has not been much written on how TBAs can treat complications from unsafe abortions. The most common complications are infection or hemorrhage caused by incomplete evacuation of the uterus[17]. The treatments for this would be the same as the ones reviewed earlier for PPI and PPH. Antibiotics could be administered for prevention or treatment of infections. Misoprostol could be used for incomplete abortions. Manual vacuum aspiration (MVA) and dilation and cutterage (D&C) are commonly used in post-abortion care. For TBAs to be able to treat complications from abortions, they would require thorough training in these methods.

Perhaps most importantly, TBAs could play a significant role in diagnosis and referral in these cases. TBAs often play a valuable role in reproductive health related issues in their community. They may be potential confidants of the women and could prove valuable assets in the diagnosis and referral of women with complications from abortions. Such a role could be crucial in saving the lives of women who may be too frightened to go to a health facility post-abortion. Thus while TBAs may not be able to medically treat complications from unsafe abortions they may never the less prove invaluable in ensuring treatment can be provided for women who need it. This fact cannot be overlooked when analyzing the role of TBAs in relation to abortion care.

4. Eclampsia

Eclampsia is characterized by markedly high blood pressure, proteinuria and convulsions. Eclampsia can occur before, during or after labor. High blood pressure with proteinuria during pregnancy is known as "pre-eclampsia" and should be monitored closely. There are many symptoms of both pre-eclampsia and eclampsia, including dizziness, edema, headaches and blurred vision, though a woman will often be asymptomatic [37, 39]. Thus it often can only be diagnosed with a blood pressure cuff and a stethoscope. These can be quite difficult to obtain in a resource-poor setting.
The main cause of death during eclampsia is a cerebral hemorrhage during a convulsion, placing the mother and baby at risk of death.

There is very little that can be done to manage eclampsia in the absence of a hospital. In "A Book for Midwives", Susan Klein recommends positional changes, drinking plenty of water in a dark room and provides information on how to manage a

convulsion[53]. The only treatments, however, are strong medications, including Phenobarbital and diazepam. These can be provided intramuscularly or rectally in some cases. The diazepam carries the risk of maternal death if too much is given.

Clearly the need for medical intervention in the case of eclampsia leaves TBAs with few treatment options in the absence of a good referral center or training in the use of injectable medications. Some sources recommend training TBAs in these treatments[17], though this needs to be placed in the context in which the TBA works. She would have to have access to sterile needles and know proper dosage. This can be quite confusing and should be treated with caution[35].

5. Prolonged obstructed labor

Prolonged or obstructed labor accounts for 8% of maternal deaths (WHO 1996) and is a very common cause of morbidity in women. It is most likely to cause fistulas, a very common condition which can lead to shame, embarrassment and ostracization throughout s woman's life[63, 64]. Surgery is the only available treatment for this condition. This may be possible for wealthy people, but in the developing world, women are often not able to afford corrective surgery.

WHO defines obstructed labor as the presence of strong contractions but impaired fetal descent. Prolonged labor occurs when active labor persists for more than twelve hours. This can lead to exhaustion, uterine rupture and higher risk for infection. This can often be caused by abnormal lie, placental attachment, large fetus or simply tension. The cause plays a major role in treatment. Little can be done is the absence of a skilled health facility if the baby is too large or in abnormal lie. In these cases a cesarean must be

performed and it is imperative that the mother have access to a CEmOC facility. If there is no access, attendants are encouraged to have the woman change position and drink plenty of fluids. However, the most effective recommendation is to bring the woman to a hospital[53].

The problems posed by obstructive labor emphasize the importance of the availablilty of CEmOC for TBAs to be able to practice effectively. While a great deal of recent research suggests the universal use of skilled attendants, a skilled attendant would not be able to handle this complication without an adequate referral system.

6. Anemia and Malaria

Many women in the developing world have anemia, which is among the leading contributors of maternal mortality [65]. One study, although mainly hospital-based, found that the relative risk of mortality associated with moderate anemia was 1.35 and for severe anemia was 3.51 [66]. There is a further distinction that needs to be made between anemia from iron deficiency or malaria. Iron deficiency malaria is associated with higher maternal mortality rates than anemia from malaria. This is a key fact for healthcare providers. Nutritional anemia can occur in any region and is preventable. TBAs can educate women about the necessary nutritional requirements, though this does not solve the problem of poverty leading to malnutrition and the inequality that women face whereby they have to sacrifice there food intake when there is not enough for their husbands or children.

Anemia can be diagnosed with the WHO "hemoglobin color scale" which test blood on a strip to detect anemia by comparing the color of the strip to colors on a scale. TBAs could be trained to use these strips and to provide iron and folic acid pills.

TBAs can also be trained to provide malarial chemoprophylaxis which proved successful in one study in the Gambia [67]. This is an important as malaria can cause not only anemia (which increases mortality rates), but also can lead to stillbirth, premature birth and impaired fetal growth.

D. Concluding Remarks on Maternal Mortality and Morbidity

There is a wide variety of causes and treatments related to maternal mortality and morbidity. TBAs can play a role in prevention of all of the causes and in the treatment of a few, especially PPH. The question of whether or not TBAs can and should be used to prevent these complications has already been addressed. Regardless of what the international health experts declare, TBAs will be called upon by the majority of pregnant women in the developing world for the foreseeable future. Providing a productive and useful role for them is imperative. Many of the studies that have focused on TBA training have not included details of their training method, had inadequate sample size and poor data analysis [25]. Concluding that they do not have a role in safe motherhood is not only premature but discourages organizations from including them in their maternal health programs.

Given the many causes of maternal mortality, it is obvious that there is no easy solution to reducing the risk of dying in childbirth. It should be noted that the high number of maternal deaths each year is spread over large geographical regions and often

is difficult to study given the low prevalence in restricted locations. Maternal death is a critical issue to study and prevent as it not only affects the women throughout the world but also leaves children motherless and families without domestic and financial support, further perpetuating the poverty that itself leads to the high risk of maternal mortality. Maternal morbidity can leave a woman barren or permanently disabled. This can lead to divorce and ostracization. Thus it is imperative that women have the opportunity for a safe and healthy delivery. Safe reproduction is a right that every woman should have, regardless of her socioeconomic and geographical status.

To ensure that women have access to treatment and facilities that will treat obstetric complications, TBAs should be integrated into hospital-based systems of care. There are many emerging programs that monitor obstetric care based on the prevalence of EmOC facilities. Some of the more recent programs are designed to improve home based care and even integrate home care and hospital care [28, 47, 53]. TBAs can play a role in these programs if trained in recognizing complications and in providing appropriate and timely treatment or referral. The question for the international health community then should focus on how to effectively train TBAs to succeed in preventing mortality and morbidity.

V. Training Theory

A. Background

In order to evaluate training models for TBAs, it is necessary to gain an understanding of current education theory regarding how people learn. Our discussion will summarize and narrow down the key concepts that should be considered when

designing or evaluating an education program. First, three important educational principles that have been related to TBA training will be introduced. Second, effective learning environments will be described. Finally, a brief analysis of the specific problems inherent in designing a TBA successful TBA training program will be presented.

B. Educational Principles

Three educational principles have been addressed in relation to TBA training: the constructivist theory, metacognition and teaching to what students find interesting [17]. The constructivist theory states that information is learned and contributes to an already formed foundation of knowledge that must be addressed when designing any new educational tool [68]. This is important in TBA training as much training is led by "experts" in obstetric and gynecological health. Experts are an integral part of education [69] and should be used in any health related training, but they should be encouraged to respect the role that TBAs play in their communities. TBAs may have assisted in deliveries for longer than the "expert" and should be encouraged to share their knowledge throughout the training. Their experience and knowledge should be valued. They have often witnessed many deliveries and come from a community of attendants.

The constructivist theory ties into the notion that people learn best when taught about what they already know [69]. TBA trainings that do not address the needs and concerns of the attendants thus may not be as effective as those that do. A lecture based curriculum may not be the best method for training TBAs. A group participatory model would allow the TBAs to share their knowledge and it can reduce the power differential created between the trainers and the TBAs.

The notion of a group participatory model also relates to the learning theory of metacognition, which deals with assessing ones own level of understanding[68]. In a lecture-based course TBAs may not be able to discuss their understanding or provide feedback in a manner that could prove helpful in learning new skills and that could allow for interactions that might discourage TBAs from using harmful practices [17]. This practice would also help promote the transfer of learning in a successful manner, focusing on the conditions of application. That is, *when* what has been learned can be used [69]. A simple lecture based course may demonstrate some key practices, but if the TBAs can't interact (such as in role-playing activities), they may not be able to use helpful practices during obstetric emergencies.

C. Learning Environments

We have already looked at the importance of theory in developing a training program. Clearly simple lecture-based courses are not sufficient to promote the kind of learning that will be most effective for TBAs to learn new and important skills. Group participatory/ facilitation models demonstrate an approach that allows TBAs to have some role in directing their learning towards what they are most interested in learning. Recent research on designs for learning environments reinforces the notion of different learning environments for different learning goals[69]. The goals of the education program need to be addressed by focusing not only on the content covered but on how it is to be delivered to maximize utilization. Four concepts that affect this end are learning-centered environments, knowledge-centered environments, proper assessment and community-centered environments. Each will be discussed briefly here with a note on how they relate to TBA training.

Successful learning environments are most useful in a setting where the participants are familiar with the material, are able to contribute appropriately, and are subject to thorough assessment. Thus they are relevant to the three principles addressed above. No part of education theory is divorced from the influence of other parts and all components of knowledge impartation and acquisition need to be in sync, especially in the context of TBA training.

1. Learner-centered environments

"Learner-centered" environments[69] are those that focus on the degree to which learners contribute their current knowledge to construct new knowledge. They are the practical application of the constructivist theory. This is important in training TBAs as often their knowledge base is ignored in lecture formats. This is countered with the fact that there are times at which TBAs knowledge and practices are incorrect [18] and the goal should be to keep these practices from hampering the development of new skills and knowledge.

Another goal of the "learner-centered environment" is to train learners to make the connection between knowledge and practice. This is key to TBA training as they need to recognize life threatening complications in their villages. Tools like role plays and skill sharing can be incorporated into training to make these connections. A "learner-centered" approach reinforces the notion that trainers need to become familiar with the experiences of their students [69]. This is especially true in the case of TBA training as there is not only a difference in formal training but also a risk of mistrust.

2. Knowledge-Centered Environments

The goal of knowledge-centered environments is to ensure that knowledge is accessible and applied appropriately[69]. As for learner-centered environments, making knowledge that is gained relevant and applicable is emphasized. The difference is the focus on curricular designs and the degree to which they encourage learning and understanding rather than a disconnected set of skills and facts. Learning knowledge is different from learning skills, but these two can inform each other.

The importance of proper curricula to impart knowledge is central to the debate over TBAs. As mentioned earlier this does not necessarily reflect the "untrainability" of TBAs, but could be due to faulty training. Indeed, much of the literature on TBA training does not describe the methods of trainers or who is doing the training. Investing money in well thought-out and planned curricula is key to ensuring any measure of effectiveness in training TBAs. Programs could also incorporate many of the ideas mentioned earlier on group participation, role playing and skill sharing but also an effort to promote trust between the trainer and the TBAs. Any learning experience in strongly influenced by the ability of the teacher to communicate effectively with the students, and the disconnect between traditional and more formally trained birth attendants makes this difficult in the context of TBA trainings. This relates strongly to the role of culturally sensitive and appropriate learning environments [70], which have drawn more attention in education theory in recent years.

3. Community-centered environments

The last approach to learning environments focuses on the importance of fostering a sense of community in the learning process. Creating a hierarchy of student to teachers,

especially when all participants may be adults, can lead to isolation and mistrust. Assessment is especially important for TBA training as the goal of training should really be to incorporate TBAs into the medical or midwifery community. TBA integration is crucial to supporting a referral system whereby the TBAs trust the hospital enough to refer women having delivery complications. As discussed earlier, such referrals are often the only way to prevent morbidity and mortality.

D. Assessment to support learning

Almost all literature on learning stresses the importance of appropriate assessment. Historically assessments have been in the form of exams that measure specific content learned at the end of training [70]. Recently, however, there has been an increased interest in formative assessments, those that measure learning during the training process and allow students to revise and improve the quality of their thinking[69]. They stress not facts but process. Thus the goal is to enhance understanding and applicability which is the goal of both learning and knowledge-centered environments. It should still be noted that there are important facts that should be learned in any educational setting. This is especially true in TBA training as the successful transfer of knowledge and practice is imperative to save a woman's life.

Formative assessment provides an opportunity for people to feel connected to their learning experience. This is relevant to TBA training as flexibility of training in response to the formative assessment would allow the TBAs to engage more in the education process. Formative assessment can be in the form of feedback and frequent quizzes that are used solely for formative purposes.

Proper evaluation and monitoring is important in any health education program, including TBA training, and has historically been lacking in most programs. [71] Most training programs (see table 3) are short-term. The trainers are often not local. Generally no evaluation program is implemented[25]. To implement a training program one would need resources and personnel on the ground to monitor the outcomes. This not only requires funding, manpower and organization, but also can be quite difficult in light of the context in which the TBAs are practicing. It is very difficult and perhaps inappropriate to have researchers or trainers attending deliveries with the TBAs to monitor their practices. Collecting data on birth outcomes can be biased as they are usually based on interviews with mothers or with TBAs conducted long after delivery[25, 72-74]. This may be the only way to measure outcomes given the resources in an area, though alternatives should be explored and closer monitoring prioritized

Formative assessment is also quite useful in program evaluations. It can be used to evaluate the progress of the education program and to track changes in the participants experiences.

VI. Goals for TBA Training

Given the history of TBA training in the last thirty years, it is not surprising that there have been recommended goals and guidelines for training TBAs set forth by both researchers and policy makers. The most prominent international health organization, the World Health Organization, published a *Guide for TBA trainers*[73], which identified thirteen specific objectives for TBA training:

1. Develop an overview of the importance of the concept of good health

and help the TBA understand her role in the health care set up;

2. Help the TBA communicate to the community in her area the ways in which her wide knowledge and understanding, in addition to her traditional role, can help them lead a healthier life;
3. Improve the TBA's knowledge and skills to conduct deliveries safely;
4. Identify harmful midwifery practices and correct them;
5. Train the TBA to recognize abnormalities during pregnancy, labor and puerperium and refer sick mothers or those "at-risk" to the appropriate health facility;
6. Train the TBA to advise mothers regarding proper nutrition during pregnancy and lactation;
7. Train the TBA to advise mothers about prevention of diarrhea in children and use of the oral rehydration solution;
8. Train the TBA to motivate mothers to have their infants immunized;
9. Train the TBA to encourage correct breast feeding practices;
10. Train the TBA to motivate pregnant mothers for immunization against tetanus;
11. Help the TBA assist women in the fertile age group to understand the need for spacing pregnancies and limiting their family size by use of available contraceptive methods;
12. Help the TBA act as a link between health workers and the community;
13. Help the TBA provide health care awareness in her area

Among the more notable aspects of these guidelines is the focus on training in broad categories of health behavior. Only #5 directly addresses delivery complications. Most TBA trainings have focused only on this aspect of maternal health [25], which directly corresponds to maternal mortality. Prevention of complications is quite important and thus the focus on proper nutrition, health behavior and family planning is also important in preventing maternal mortality.

These guidelines also address the many roles of TBAs in maternal healthcare. As discussed earlier, there are some countries where TBAs cannot see the mother until after delivery or only assist in delivery and cannot provide preventative and postpartum care. Thus these guidelines need to be tailored not only to the country but also to the regions and even villages in which they are to be applied. The 13 points are thorough and practical but need to be applied in the context of the role of TBAs in their community.

The last important point about the guidelines is the absence of training method recommendations. All of the topics mentioned above can be covered in a training session, but there may be no advanced methods of training to ensure the knowledge is both retained and applied. To that end, some suggestions for training have been made that directly address issues confronted by TBA trainers. One issue that has not been stressed thus far in our discussion is that many TBAs are in fact illiterate. Thus training them poses special challenges in technique. The authors of the WHO guide recognize this and provided several recommendations. These include:

- Trainers should use models, pictures and role-plays rather than written materials.

- The sessions should include as much time as possible on practical work such as examining pregnant women and talking to women about their health during and after pregnancy so that the TBA can incorporate what they are learning in the training. The learning situation should be as close to real life as possible.
- Trainers should encourage the TBAs to do most of the talking. They should encourage them to share their own experiences and to evaluate each other's knowledge.

These recommendations focus on concrete examples and concepts that will be easy for the TBAs to understand. In light of the earlier discussion of learner, knowledge and community-centered learning environments with proper level of assessment, these recommendations are very relevant and practical. It may be difficult to incorporate these recommendations into training in every category mentioned in the guidelines above, but every attempt can and should be made to tailor TBA training to the context in which TBA training occurs.

VII. Concluding Remarks

From the above discussion it should now be clear that TBAs are a vital part of maternal health in many developing countries. Their role is historical, cultural and practical. The international community's focus on "skilled care" cannot erase the reliance that many communities have on TBAs. Ideally every birth should be safe and healthy and

many would argue that only skilled care can provide this end. The conditions in these communities paint a different reality that cannot be ignored.

The goal now should be a focus on how to integrate TBAs into maternal healthcare programs and provide them with the skills necessary to both prevent and treat obstetric complications to the best of their ability. A strong focus should be placed on an effective referral system. There have been inconsistencies in studies of TBA training regarding referral rates[50, 75] and this issue should be addressed thoroughly in any TBA training. TBAs may feel that with training they have the skills necessary to manage complications or they may not trust the referral hospital. Any successful health program and training program should take this into account.

In those regions that do have hospital and clinic based obstetrical care, TBAs are still a central part of the community. Here they are still providing basic services and have the opportunity to use the hospital resources to treat emergencies. In this case it can be beneficial for all parties to integrate the TBAs into the healthcare plan of the clinic or hospital. TBAs will have more options for treating women, skilled healthworkers will have the opportunity to treat patients who wouldn't otherwise go to a hospital and the village women can be attended by a person they trust and have access to emergency care if needed. A recent study in Pakistan found that using TBAs alongside community healthworkers is an effective strategy in reducing hemorrhage and is seen as an innovative approach to maternal healthcare in resource poor settings [76].

It should also be noted that in many regions TBAs are the only source of maternal healthcare, thus adequate referral is not an option. In these cases it is imperative to train

TBAs in life-saving skills and not focus on the impossible task of training enough SBAs to replace them immediately. Some have claimed that it is a failure of the training that has led to poor outcomes in studies of TBA training [17]. This may be a simplification of a complex problem The current policy of abandoning TBA training has not proven effective and alternatives to only having skilled care need to be explored. Even if TBAs cannot refer to a hospital there are techniques that can be employed (such as misoprostol for postpartum hemorrhage) and practices that can be encouraged, such as the clean and hygienic delivery and the importance of detecting possible complications early. In hospital-poor regions TBAs are even more vital in their role as healthcare providers and should not be ignored.

The central element in the debate over TBA use is the role of training. As mentioned earlier, trainers need innovative approaches to learning. The goals need to be determined from the outset. Incorporating TBAs into existing healthcare programs would necessitate the fostering of trust and support within the sessions and a focus on practical and applicable techniques. TBAs should be encouraged to share their knowledge and harmful practices need to be discouraged. The discussion of teaching theory above addresses most of these issues and provides suggestions for how to educate in an effective way.

While women are still dying at high rates in the developing world as a result of pregnancy, every measure can and should be taken to give women the opportunity for a safe and healthy delivery. TBAs have been delivering babies throughout history and provide emotional as well as obstetrical care to women. They hold a unique role in many

societies and their continued use and training can be effective. New and innovative approaches are the key to successful application of their unique skills.

Table 1: Leading Causes of Maternal Mortality and Treatment Options			
Outcome	*Intervention*	*Impact*	*Comments*
Hemorrhage	➢ Uterine massage and bimanual compression	Reduced bleeding	▪ Does not stop all sources of hemorrhage ▪ Increases risk of infection by insertion of hand into vagina
	➢ Oxytocin	Uterine contraction, cessation of bleeding	▪ Difficult storage and administration ▪ Potential to exacerbate bleeding ▪ Multiple ways to administer
	➢ Ergometrine	Myometrial contraction, cessation of bleeding	▪ Serious complications with eclampsia and excessive bleeding ▪ Easy to store, administer
	➢ Misoprostol	Uterotonic, cessation of bleeding	▪ Safe use
Infection	➢ 3 cleans (hands, cut, cord)	Reduce risk for infection	▪ Easy to teach ▪ Does not treat infection
	➢ Antibiotics	Treat infection	▪ Very difficult to train in proper use ▪ Risk of side effects, not recommended for TBAs
Complications from unsafe abortion	➢ Recognition and referral	Provide treatment in a timely manner	▪ TBAs can easily be trained in referral ▪ Does not provide any immediate treatment
	➢ Family planning training	Prevent the need for unsafe abortion	▪ Training linked to cultural context ▪ Does not provide method to treat complications
Eclampsia	➢ Positional changes, fluid intake and referral	Decrease impact of hypertension and get immediate treatment	▪ Uncomplicated training ▪ Does not provide life-saving treatment
	➢ IV benzodiazapene/ barbiturate treatment	Rapidly lower BP	▪ very serious side effects, complicated training. High risk for overdose
Obstructed labor	➢ referral	Will provide skilled EOC	▪ uncomplicated training but does not provide any life-saving treatment

Table 2: Examples of TBA training and intervention evaluation				
Cause	*Evaluation Type*	*Place and Date*	*Author*	*Comments*
PPH	Field intervention trial using misoprostol	Tanzania, 2005	Prata N, Mbaruku G, Campbell M, Potts M, Vahidnia F	Significant decrease in referral for women in intervention group
	RCT of misoprostol vs ergometrine	The Gambia 2005	Gijs Walraven, Jennifer Blum, Yusupha Dampha, Maimuna Sowe, Linda Morison, Beverly Winikoff, Nancy Sloan	Non significant decrease in blood loss for women in misoprstol group
Sepsis	Field intervention comparing infection rates for deliveries attended by TBAs trained in clean birth	Bangladesh 2000	Goodburn EA, Chowdhury M, Gazi R, Marshall T, Graham W	No significant difference in PPI based one who attended the deliver. Trained TBAs did perform more hygienic deliveries Trained TBAs more likely to insert hands into vagina
Eclampsia	Field intervention with trained TBAs and birth kits	Pakistan 2005	Jokhio AH, Winter HR, Cheng KK	No significant difference in rates for intervention group
Obstructed labor	Field intervention with trained TBAs and birth kits	Pakistan 2005	Jokhio AH, Winter HR, Cheng KK	Significantly higher rates of obstructed labor in intervention group

Table 3: Examples of Training Evaluation				
Authors	*Location, Date*	*Training Details*	*Outcome*	*Notes*
Bailey, Szaszdi, Glover	Guatemala 2002	▪ 3 day courses over 3 months ▪ Emphasis on detection management and timely referral. ▪ Also discouraged harmful practices like alcohol and oxytocic abuse	▪ Postpartum complications decreased in group attended by TBAs ▪ TBAs less likely to refer after training. ▪ No increase in healthcare utilization by women with trained TBAs	▪ Outcomes based on interview results. Woman is unit of analysis, not complications
Smith, Coleman, Fortney et al	Ghana 2000	▪ 2 week course in manage-ment of normal pregnancy, complications, newborn care, family planning, immunization ▪ TBAs received "primary health items" kit on graduation	▪ Training proved protective against postpartum fever and retained placenta ▪ Positive association between training and prolonged labor ▪ No increase in referral after training ▪ 5/8 outcomes showed no effect from training	▪ Survey design precludes maternal mortality and abortion rates from being measured ▪ Surveys of mothers from same region controlled for geographical variation
Schaider,Ngonyani, Tomlin, Rydman, Roberts	Angola 1999	▪ 38 hour course focusing on prenatal, delivery and postnatal care ▪ Goal of training is to reduce maternal mortality	▪ Maternal mortality significantly reduced in deliveries attended by TBAs when compared to Angolan historical data ▪ Large number of deliveries to analyze (~20,000)	▪ Survey data collected from trained TBAs at risk for bias ▪ Historical data for maternal mortality may not be reliable ▪ No significant detail of training materials
Sibley, Sipe 2002	Meta-analysis	▪ NA	▪ Significant improvement in knowledge, attitude, behavior in trained TBAs ▪ Small but significant decrease in perinatal mortality, but not maternal mortality	▪ Study severely limited by incomplete data in most TBA studies ▪ Recommendation for future training/ studies included in discussion

Part II: Traditional Birth Attendants in Bangladesh

I. Introduction to Bangladesh and Gonoshasthaya Kendra

Traditional birth attendants have a long and important history in Bangladesh and throughout the Indian subcontinent. They are called "Dais", local women who assist in deliveries. They are not generally educated and often do not charge money for their services[18]. Bangladesh's history and current state of maternal health make it a very interesting and useful country in which to study TBAs and their training.

This paper will initially provide a current perspective on the state of maternal health in Bangladesh, introducing the major themes that must be covered in providing adequate maternal health care to Bangladeshi women. Gonoshasthaya Kendra (GK) will be used an example of a local organization seeking to improve the health care of Bangladeshis at a community level. GK has prioritized TBA training in an attempt to integrate them into their basic and comprehensive obstetric care programs. Their training focuses on recognition and referral of complications with an emphasis on prevention. Two 5-day trainings are evaluated in this paper, based on participant surveys and participant observation notes. The result is an overall evaluation of the training in addition to a comparative analysis of the two training sites.

A. Bangladesh: History and Maternal Health

The role of TBAs in Bangladeshi society needs to be viewed in a historical context. As mentioned earlier, TBAs hold very different roles throughout the world and the different regions of the Indian subcontinent.

Bangladesh's history of colonialism and civil war and their suspicion of foreign intervention play an important role in their defense of home delivery and thus the importance of TBAs in their maternal health systems. Here I will first introduce Bangladesh's political history and follow with a more detailed discussion of its maternal health status.

1. The 149th Country

Bangladesh was born into existence from thousands of years of conflict, and her struggles continue to this day. Bangladesh sits in the north-east portion of the Indian subcontinent, forming the northern border of the Bay of Bengal, 75% surrounded by India, the remaining 25% by Myanmar on the south east. Historically the region of Bengal, which includes the current Indian state of West Bengal and Bangladesh, was the wealthiest region of the subcontinent until European traders took control of the region in the 16th century[77]. The English were able to control the rebellious region by exacerbating tensions between the Hindus who predominantly lived in the west and the Muslims to the east. The tension between Muslims and Hindus throughout the subcontinent led to the eventual partition of the region into East and West Bengal, with East Bengal forming East Pakistan in 1949. The country of Pakistan was divided by nearly 3,000 miles of India and the majority of wealth and power was concentrated in the West[78]. The two parts shared only a religion.

After 2 decades of domination and conflict, West Pakistan sought to impose an "Urdu only" policy on the east, initiating a Bangla language driven revolt and the declaration of an independent Bangladeshi state. After 11 days of intense violence, Bangladesh was born, its independence celebrated on December 16, 1971. The language

and culture are a strong source of pride for the people of Bangladesh. They are now both very nationalistic, interested in foreign affairs and foreigners yet skeptical of foreign imposition and control in their society[35].

2. The Land and People

Bangladesh is 144,000 sq. miles, approximately the size of Iowa. The population is approximately 150,000,000 making it one of the most densely populated countries on Earth[79]. Furthermore, the current rate of global warming has led to expert predictions that up to a third of Bangladesh will be under water in the next twenty years[80], leading to even scarcer resource access for the rising population.

Bangladesh is 90% Muslim, 9% Hindu, and 1% other religions. Its religious history plays a large role in the lives of the people with continuing conflict over its role as a secular society with a growing fundamentalist component. The role of religion is important not only in the political sphere but also plays a large role in the healthcare practices of Bangladeshis, especially women. Islam took hold in Bangladesh in the 12th century, when the majority of the population was Hindu. The caste system is still embedded in the culture, creating a strong class and social hierarchy. In addition, Bangladeshis subscribe to the notion of son-preference, where a male child is more desirable than a female child. This leads to decreased emphasis on women's health, especially in the lower classes, exacerbating the role of poverty on health status. Thus women face many barriers to care which have very real consequences for their health[81].

B. The State of Women's Health in Bangladesh

1. Importance of Healthy Mothers

As mentioned above, there are many factors that influence the negative state of women's health in Bangladesh. Among these are the low status of women in society, the poor quality of maternal health services, lack of adequate providers and low utilization due to a variety of structural and institutional barriers[82]. There are many ways in which poor maternal health can have devastating effects on the family. A mother's death or injury leads to higher rates of poverty and ill health for the entire family she left behind. In a patriarchal society such Bangladesh, the woman's role is both reproductive and productive. Women both raise the children and often work in the field, not receiving any compensation for the hard reproductive and productive work in which they engage. Loss of a mother leaves a man to take on these roles or find another woman to fulfill the duties of the deceased wife, such as his mother or a second wife. However, clearly these women cannot possibly fulfill the role of the children's natural mother.

Furthermore, children born to a mother who dies also face serious health risks, an estimated 75% dying within the first week of their lives[83]. Nearly half the women in Bangladesh are considered malnourished which puts them at increased risk of obstetric complications and delivering a low birth weight (LBW) baby[84]. Clearly ensuring proper maternal health is very important for all members of a given family and community. In a country as family and community oriented as Bangladesh, this reality is even more crucial.

2. State of Maternal Health in Bangladesh:

a. Mortality Rates

Bangladesh has one of the highest maternal mortality rates in the world[81], estimated to be 380/100000. The most common causes are hemorrhage, eclampsia,

abortion complications, obstructed labor, infection and postpartum injuries[83]. These causes are also the most common seen in other parts of the developing world. A woman's lifetime risk of dying in childbirth in Bangladesh is 100 times higher than in most industrialized countries[81], demonstrating the poor state of maternal and reproductive health in the country.

Two very striking aspects of maternal mortality in Bangladesh are the estimated 25% of deaths due to abortion complications and 14% of deaths that are associated with some form of violence or injury[81]. This is a crucial piece of information for providers in this region.

The role of domestic violence in women's health is certainly not relegated to Bangladesh alone, but it still needs to be acknowledged as an important risk especially in reproductive health. Injuries from beatings with hands or foreign objects affect both the mother and the fetus's health. The very high rate of injuries in the region demonstrate that it is quite prevalent in Bangladesh and is seen in every level of society[78]. Providers have long been advised to monitor patients for signs of violence, but given the low rate of service utilization, violence has devastating effects on maternal health. TBAs in Bangladesh are much more integrated into the community than are most healthcare providers. They are more likely to know about the violence and can be given information about resources for women subjected to domestic violence. These resources range from emotional support to social and financial support services that have been proven to decrease the amount of domestic violence suffered by their female members[85].

b. Unintended Pregnancy and Family Planning

A great deal of resources have been devoted to family planning in Bangladesh, bringing the overall fertility rate from 6.3 in 1975 to the current rate of 3.3[83], with persisting disparities in the urban and rural fertility rates[86]. This fact should be considered carefully when using Bangladesh as a model for population control. The same surveys estimate that if all unwanted pregnancies were avoided this number would drop to 2.2, indicating a problem in the current access to family planning. It is estimated that 45% of pregnancies are unplanned, of which two thirds result in births and the remaining ending in manual vacuum aspiration abortion, known as menstrual regulation (MR) in Bangladesh[87].

Though abortion is technically illegal, it is estimated that 2.8% of all women undergo MR, which is a legal form of abortion that can be provided to women early in their pregnancy[88]. The providers are often poorly trained, putting them at increased risk of obstetric complications. This practice has also been found to be more available to higher class women, leaving poor women to attempt abortion often through illegal and very dangerous means. It is estimated that 50% of all obstetric hospital admissions are due to abortion complications, most caused by illegal and often very dangerous procedures[89]. These have a strong impact on the maternal mortality rates. TBAs and other traditional practitioners are the main providers of illegal abortions[90].

Improving the outcomes of unintended pregnancies is a function of ensuring proper access to family planning and safe abortion services with comprehensive post abortion care.

Bangladesh has a high rate of ever-use of contraception, estimated to be nearly 80% and near 100% knowledge of methods[91]. These data were mainly gathered in urban

centers in Bangladesh. Like the fertility rate, they need to be interpreted in the context of the rural and urban disparities. It is less likely that rural Bangladeshis have the same access and knowledge of contraception.

There are many factors that affect access and successful use of contraception. Women often need permission from their husbands, must access a clinic and also may have difficulty using the contraception. An example of this is the use of contraceptive pills, which need to be taken daily at the same time. This is reported to be the most commonly used contraceptive method in Bangladesh[91] and is quite effective when used correctly, but may not be used properly at all times.

Giving women control of their reproduction is perhaps the first step in improving maternal health and, given the young age structure and very high population density of Bangladesh, should be a central component of any maternal health program.

c. Antenatal Care

Recent health survey data for Bangladesh indicates that anywhere from half to two-thirds of women receive no antenatal care (ANC) with the average number of visits being less than two and only 12% having four or more visits[7, 81, 83]. ANC is important in reproductive care as it allows providers to detect complications before they arise. Risk factors for hemorrhage, eclampsia and obstructed labor can all be assessed in ANC visits and can contribute to reduction in maternal mortality from preventable conditions.

These surveys also revealed sharp differences in rates of ANC coverage in different subgroups in Bangladesh with the highest rates of ANC in more educated women. Urban women are also much more likely to obtain ANC from a "trained"

professional (63% urban to 41% rural by one survey) as are younger women and those of a lower birth order[82]. Much focus has been given to who is providing the ANC for Bangladeshi women. The higher numbers of "trained" professionals in the urban centers makes this a more feasible option for many women. More rural women employ the use of TBAs and "village doctors".

ANC is crucial to assess a mother's risk during pregnancy. Though the majority of births are uncomplicated, nearly twenty percent do carry risk[39]. The goal of ANC is to monitor and treat these risks, including anemia, pre-eclampsia, and infections. ANC also allows the mother to ask questions and be advised on healthy pregnancy behaviors and delivery practices. It has been promoted throughout the world as a tool to promote safe deliveries and healthy mothers and infants[39]. Increasing utilization of existing facilities is very relevant to the poor maternal health in the region and one relatively cost-effective way to prevent complications.

d. Delivery Care

As in many developing countries, the overwhelming majority of births take place at home. The various surveys conducted in the last ten years estimate that country-wide ninety percent of deliveries are conducted in the home. Seventy percent in urban areas and ninety-four percent in rural areas combine to make this average[83]. Table 1 displays the result of one such survey and reveals the striking differences in delivery location and assistance according to residence, wealth and education levels.

Table 1: 2002 Bangladesh Demographic Health Survey

Percent distribution of births in the three years preceding the survey by place of delivery assistance providers according to background characteristics, Bangladesh 2001 (Majority cases).

	Place of Delivery			Assistance during delivery					
Background Characteristic	At home	Any public health Facility	NGO/private hospital/ clinic	Doctor	Nurse/ midwife/ FWA/ SACMO/ MA	Trained Birth attendant	Untrained Birth attendant	Relative/ other	Number of births
Mother's age at birth									
<20	91.9	5.6	2.3	5.5	5.4	12.9	64.4	10.6	12,562
20-34	90.5	5.7	3.6	7.3	5.2	11.7	62.7	11.0	24,312
5+	97.8	3.6	1.4	3.7	3.2	9.4	69.1	10.8	2,650
Birth order									
1	85.0	9.3	3.0	11.4	7.7	13.2	58.4	8.2	11,663
2-3	91.9	4.9	3.0	5.8	5.0	12.4	63.4	11.5	16,405
4-5	96.2	2.7	0.9	2.7	2.8	11.1	68.0	12.9	7,102
6+	97.3	2.1	0.5	1.9	2.1	8.2	71.6	12.4	4,355
Residence									
Urban	78.6	11.9	9.2	16.6	10.2	11.9	53.6	6.4	6,826
Rural	93.9	4.2	1.8	4.4	4.0	11.9	65.8	11.8	32,699
Division									
Barisal	95.2	3.6	1.1	3.8	4.3	10.5	70.0	9.7	2,615
Chittagong	92.3	5.5	2.2	6.2	5.2	12.0	69.0	6.4	8,247
Dhaka	89.8	5.6	4.2	8.0	4.7	13.2	62.8	9.7	13,531
Khulna	87.9	6.6	5.1	8.4	7.6	13.0	59.0	8.9	3,792
Rajshahi	91.7	6.1	2.1	4.7	5.5	11.1	56.7	18.7	8,359
Sylhet	94.5	3.5	1.9	5.2	3.1	7.9	72.8	9.8	2,980
Mother's education									
No education	97.1	2.3	0.5	1.7	2.3	10.0	70.6	12.9	17,668
Primary complete	93.1	5.2	1.4	4.9	5.1	13.0	64.9	10.7	4,220
Secondary+	77.9	12.4	9.3	17.5	10.8	14.8	49.1	6.6	10,340
House wealth index									
1	97.7	1.8	0.3	1.2	2.2	9.6	70.4	14.1	9,893
2	96.5	2.7	0.6	2.0	3.0	10.5	68.7	13.2	8,670
3	95.0	3.8	1.1	3.2	4.0	12.7	67.4	11.0	7,504
4	91.4	6.4	2.1	6.2	6.0	14.7	63.0	8.6	6,648
5	69.9	15.9	13.7	24.6	12.7	13.5	43.2	5.0	6,509
Antenatal care visits									
None	97.9	1.6	0.4	1.2	1.9	9.0	72.2	13.4	20,714
1-3	90.8	6.7	2.4	6.4	6.6	15.4	60.8	9.0	14,165
4+	62.7	19.5	17.0	30.4	14.8	14.5	34.5	4.7	4,696
Total	91.2	5.5	3.1	6.5	5.1	11.9	63.7	10.8	39,525

Note: Total includes 49 births for which the number of antenatal care visits was not stated. UHC = Upazilla health complex, MCWC = Maternal and child welfare centre, UHFWC = Union health and family welfare center.

Source: NIPORT, Mitra and Associates, and ORC Macro, 2002

The high rate of TBA attendance (labeled as "untrained birth attendant" in Table 1) at delivery clearly demonstrates their importance in this region. The urban centers have a large number of EmOC facilities. Though more deliveries take place within them as compared to rural areas, the vast majority of deliveries are still taking place at home. While many reports emphasize lack of awareness and knowledge of facilities, the role of economic security is critical in determining who accesses skilled care[36]. Here it should

also be noted that Bulato and Ross determined that SES had more of an effect on maternal mortality than does "skilled" care[40]. Clearly lower SES puts women a greater risk of many complications that can affect them throughout their pregnancy, thus any discussion of maternal mortality and morbidity needs to take this into account.

e. EmOC Facilities and Feasibility

There has been a lot of pressure from the government and international donors to increase the use and access to EmOC facilities and hospitals in Bangladesh. While this has been cited as the source of improved maternal health in much of the developed world[4], the reality of "skilled care" in Bangladesh is quite different. Deliveries have been taking place a home for as long as these communities existed and there is often an inherent mistrust of hospitals. Furthermore, even though many resources have been given to developing these facilities, they are often built in locations where people do not access them.[92]

As addressed above, there is a difference between basic (bEmOC) and comprehensive emergency obstetric care (cEMOC) and the difference in services can determine whether or not a woman survives her pregnancy. In Bangladesh, this becomes particularly relevant when addressing the disparities between urban and rural hospital care. There are numerous bEmOC faciltites located throughout rural areas, but they are underutilized and, more importantly, often refer women to hospitals to which they continue to face difficulty in accessing needed care[30, 92].

f. Necessity of EmOC

For the majority of Bangladeshi women, home deliveries do not necessarily pose a threat.[36] The concern for those to whom it does is ensuring their access to an EmOC

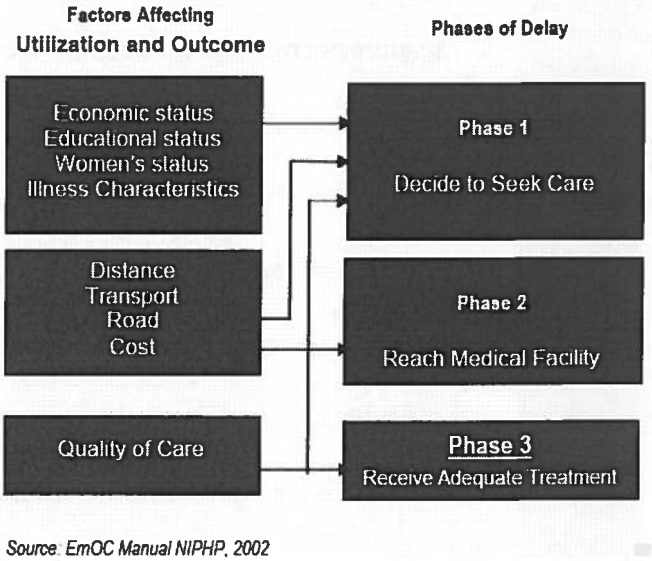
facility to reduce their risk of a complication or death. Much has been written on the role of skilled care in improving maternal health, though this does not necessarily mean all deliveries need to take place in a hospital[23, 29, 38]. Even if there were enough facilities in Bangladesh, there are many other factors that would inhibit their proper and successful use, including cost , transportation, accessibility and acceptance[36]. Many reports highlight the importance of village midwives in Bangladeshi society[93, 94]. Considering how many deliveries they are conducting, any successful EmOC facility should acknowledge and tap into TBAs' unique role in the community,

C. How to Improve Health for Women

It is common when discussing poor maternal health outcomes to address what is known as the "three delays" leading to poor utilization of care and negative outcomes[95]. These delays are separated into phases are:

1. delay in deciding to seek medical care
2. delay in reaching a medical facility where adequate care is available
3. delay in receiving care at that facility

Figure 1: phases of delay



Source: EmOC Manual NIPHP, 2002

The National Integrated Population and Health Program developed a model integrating the major factors that influence these phases, seen at right. The importance of women's economic, education and societal status has already been established. The other

factors influencing utilization and outcomes such as distance, transport, road conditions, cost and quality of care are also very important.

Further, the cost of accessing care can be prohibitively expensive for many poor rural families. Most health facilities are subsidized in Bangladesh and can even provide free care to many women in the case of deliveries. The sustainability of free healthcare in Bangladesh is a problem too large for the scope of this paper, but one that is relevant to many NGOs in Bangladesh. Even if a woman can receive free healthcare, she may not have the means to transport herself to that facility. With more than 80% of Bangladeshis living in rural areas, many women cannot afford the cost of traveling so far to reach many of the EmOC facilities in the region[96].

1. Current Healthcare Strategies

There have been numerous programs instituted throughout the history of Bangladesh to tackle the problem of maternal mortality and morbidity. The most current plan is a collaboration of the government, UNFPA and the WHO to increase the number of SBAs in the community[81]. This is not surprising given the position of the major international health institutions and their influence in funding Bangladesh. Time and resources continue to focus on increasing the number of SBAs in Bangladesh, though there is not much conclusive data on the actual numbers of new SBAs[7]. Only time will determine whether this has an impact on maternal health outcomes. However, as mentioned earlier, given the strong participation of TBAs in deliveries in Bangladesh, ignoring their important role in favor of SBAs may not in fact be the best policy. SBAs must be accessed by the women, are not available around the clock, often charge a fee and receive a commission from the hospital[97].

2. What can TBAs contribute?

Given maternal health in Bangladesh, there are a variety of roles TBAs can and should serve in Bangladesh. Though there has been controversy surrounding TBA training in recent years, there have been many recent reports promoting their use in developing nations[48, 98-100]. Recent reports from Nepal and Pakistan demonstrate the effectiveness of community based health models. The most significant results of training TBAs have been shown in improvements of neonatal mortality and morbidity[15, 48]. This does not mean that they may not have an impact on maternal mortality and morbidity as well. Indeed, there have been recent calls to acknowledge their contribution[101]. The renewed focus on TBAs follows studies that have demonstrated declining rates of maternal mortality and morbidity after training and implementation within multisectoral interventions[100] that utilize TBAs in the community. Many of these reports have been recently published, demonstrating that many organizations are not yet willing to accept the Safe Motherhood Initiative's denial of the usefulness of TBAs.

In Bangladesh, the high utilization of TBAs in the community highlights this reality even more. Addressing each of the major categories involved in maternal health outlined above, it should become clear that TBAs can and should be employed in a variety of sectors in Bangladesh.

a. Mortality Rates

As discussed in Paper 1, there are many ways in which TBAs can help to improve maternal health outcomes. There are ongoing studies in Bangladesh employing misoprostol in the field as a method to reduce hemorrhage (Prata, personal communication, 2005). TBAs can be trained in hygienic practices to reduce infection.

This may be controversial given Goodburn's recent article that suggests TBA training does not reduce infection rates[9]. Nevertheless TBAs still will be conducting deliveries at home in Bangladesh and training them in hygienic practices is an inexpensive way to promote hygiene not only for TBAs but in the community as well.

Perhaps the most important way in which TBAs can reduce mortality rates is by linking them with an EmOC and teaching them to recognize and refer complications. Most complications do indeed require a provider with some form of advanced training. TBAs can form the link between these providers and women in labor. TBAs are often the only witness to the delivery and may even have access during pregnancy. Pregnant mothers trust them, possibly more than they trust the skilled attendants. The TBAs themselves may not be trusting of skilled care and thus unlikely to refer women. This is where training with the goal of linkage to skilled care facilities can be useful.

There have been several studies measuring the impact of TBA training on referral, most providing mixed results[50, 72]. Again a problem in the current research is a lack of adequate description of training content. If the training focused only on recognizing and treating complications, it is possible that the importance of referral was not emphasized. Subsequently there wouldn't be a change in referral rates.

Furthermore, there is some concern that training may in fact empower TBAs to believe they are more equipped to handle complications than their skill set allows. In this case there may actually be a decrease in referral rates due to training[50]. In this case an argument could be against training TBAs. However, a training program could address this issue by emphasizing when a hospital is necessary to save a woman's life. The TBAs can be empowered to recognize serious complications and know their limitations. Their

awareness of when to refer is in itself a skill that they can use for the benefit of a pregnant woman.

It should also be stressed that measuring referral rates in relation to TBA training is problematic as it is very difficult to isolate the TBA training as a variable, especially given the variety of components in any intervention[50]

Even if referral was a key component of the training, it is still possible that the TBAs would not necessarily trust the local providers enough to send women to their facilities. More will be discussed below, but here it should be noted that more than most other training components, adequate referral relies entirely on a TBAs trust of the care the mother would receive at the EmOC facility. Even if the TBA uses the tools taught at the training, referral is absolutely essential in the case of a life-threatening complication and should be the goal of any training. This is the first step to reducing mortality and morbidity rates.

b. Unwanted Pregnancy and Family Planning

As mentioned above, untrained providers (including TBAs) are thought to provide close to 3% of all abortions in Bangladesh. The potential complications from these procedures are life threatening to many women. Thus it is crucial for any training program to educate on the risks inherent in this practice. Again, encouraging a proper learning environment without judgment or condemnation is an essential part of a training program. TBAs may be the first to learn of an unwanted pregnancy in a woman who does not have regular access to proper abortion services. And though abortion is in fact illegal in Bangladesh, as mentioned earlier, it can be performed as a "menstrual regulation". When done properly, this procedure provides a safe and effective means to terminate a

pregnancy. TBAs can be employed to refer women to facilities where such services are provided. The government and health organizations in Bangladesh are currently investing only in skilled care but how will these providers gain the kind of access to women during this vulnerable time? Ignoring the role TBAs can play in this particular area denies the valuable role they could have in this critical area.

c. ANC

As mentioned above, ANC is used to recognize potential complications and also to provide education to expectant mothers[102]. This is an area where TBAs can and should play an important role. In Bangladesh, TBAs are an integral part of the community and, while the government is dedicated to training SBAs to provide ANC, the reality in rural villages is that this may not be possible. ANC rates are lower in poorer villages, where it is more important to recognize the potential for complication. The women in these villages may be less likely to trust an SBA from outside the community. In addition the poor state of transportation in most of rural Bangladesh makes it less likely for SBAs from outside the community to reach many of the villagers from primary ANC visits.

A TBA can be trained to recognize symptoms and signs of anemia, malnutrition and to recognize women at risk for hemorrhage. She can also advise the mother about proper nutrition and personal care during her pregnancy. She can ask about signs of pre-eclampsia such as blurry vision or edema. It should be noted that adequate blood pressure monitoring would be ideal, but again, the reality in the village may not allow for this. Proper training and linkage could also encourage TBAs to bring women to clinics for blood pressure monitoring by a healthworker.

TBAs may be able to learn exam techniques that could measure the fetus' size and allow her to monitor growth and assess position. Given a TBA's history and experience, it is possible that she may have enough exposure to detect abnormalities during pregnancy. A proper linkage program, as mentioned earlier, would enable her to refer the woman to a skilled care facility if necessary. Again, in Bangladesh, there is an infrastructure of skilled care with increasing attention paid to increasing utilization and access.[103] Currently they are underutilized and TBAs can serve as the link between the mother and the center.

d. Delivery and Emergency Care

A variety of organizations have trained TBAs in delivery care over the last twenty years, recognizing their contribution and potential in this area. TBAs can be trained in preventative measures during delivery, such as hygiene and ensuring access to care in case of a complication. TBAs can be trained to provide uterine compression if needed and to administer misoprostol in case of hemorrhage, which is the most common postpartum complication.

The transportation infrastructure in Bangladesh is exceedingly poor, leaving women in very dangerous situations if they do decide to seek care but cannot access proper transportation. TBAs here can serve as a link between the mother and the EmOC, seeking transportation for the mother. There are programs in Bangladesh whereby NGOs are seeking to create a mobile phone network that would allow TBAs to call the EmOC in case of an emergency and the EmOC could then arrange for proper transport[104]. TBAs here are the link in case of emergency.

3. Important issues involved in training

There are a variety of reasons that a TBA may participate in a given training, not the least of which is the economic incentive many of them provide. Trainings may or may not provide compensation, but most certainly will provide meals and sometimes housing and transportation. For those TBAs who are motivated by purely financial reasons, it is more likely that they will not pay attention to the training. Thus there is little reason to assume that training will make a difference in not only their delivery practices but their referral rates as well. In order to ensure that training leads to referral, one component of any training should be an emphasis on forming a relationship of trust between the EmOC and the TBA. There are often very significant social and class differences between TBAs and trainers, especially in a country such as Bangladesh. Doctors are paid the highest respect. In addition, as mentioned earlier, there is still an element of the caste system that exists throughout the country. TBAs are usually poor and illiterate, part of the lowest classes in a community. Trainers are often doctors and healthworkers, who are educated and most often come from among the highest classes in the country.

There are a variety of ways in which the problem of trust can be overcome, many of which were mentioned in the preceding paper's section on learning and teaching methods. Creating an atmosphere of respect for the TBAs important place in the community is critical. The TBA has more access to pregnant women than any healthworker and thus can be a major asset in a community health program. It has already been demonstrated that training TBAs can improve a mother's knowledge about the risks of pregnancy[99]. Given the reality of poor ANC in Bangladesh, training TBAs may also serve as a link to educating mothers. Encouraging this role can provide an

opening to improved relations with the trainers. First and foremost, the trainers must understand the importance of trust in the training room if they are to affect any form of change in maternal health in Bangladesh

C. Gonoshasthaya Kendra

This paper has thus far focused on broad themes in the area of maternal mortality in the developing world and in Bangladesh, with little focus on specific institutions that are in the field, providing healthcare to the billions of people living in these countries. In Bangladesh there are over 15,000 NGOs serving in fields from microcredit to relief, rehabilitation and gender empowerment[105]. There are several that provide a variety of services, with healthcare being a major component. One such organization is Gonoshasthaya Kendra (GK), "The People's Health Center", whose headquarters are in Savar, Bangladesh.

GK was founded by Dr. Zafrullah Chowdhury, a Bangladeshi doctor who returned to Bangladesh during the liberation war in 1971 after studying medicine in England. GK began as a 480-bed field hospital on the Indian border and moved to its current location in Savar, 40 km from Dhaka, the capital of Bangladesh. From its humble beginnings, it has now grown into the largest health centered NGO in Bangladesh, with additional programs in advocacy and education, agriculture, disaster management, credit cooperatives and women's empowerment programs[106]. GK also has a university and medical school on the Savar campus and is arguably most well-known for its generic pharmaceutical company, which is used to support is mission of sustainable healthcare to even the poorest Bangladeshis. Dr. Chowdhury was a central figure in Bangladesh's

national drug policy which was very controversial in its stand against multinational drug coorporations[107].

About half of GK's estimated 1.1 million dollar budget is self generated through the pharmaceuticals, sliding scale insurance programs, small scale micro-credit and production programs (see Appendix 1). A central goal of GK is self-reliance. Bangladesh's entire economy is very dependent on international donations. Donors not only influence the system but also have led to a great deal of corruption in the country. Most of the funding stays in the hands of a very few, leading to continued poverty, especially in the rural areas, as well as a to great deal of cynicism in the general population[78].

No organization is ideal, and GK is no exception, but its focus on a people-centered health system has allowed it to reach poor Bangladeshis more than many other organizations [108]. GK has subcenters in twelve different locations in Bangladesh, nearly all of which were set up after GK provide emergency disaster relief. In a country with the worst monsoons and cyclones on earth[78], GK is known for reaching and provider relief faster and more efficiently than the government, which is often overwhelmed during the monsoon season.

GK's centers are located all over the country and provide a variety of unique services that allow Bangladeshis from the entire country to receive training in vocations such as commercial driving for women, agricultural education, and elementary education for the poorest children in Bangladesh. There are health services at all of these centers, ranging from health education and pharmaceutical distribution to basic emergency care. GK trained "healthworkers" and "paramedics" training programs focus on educating poor

women with secondary education to provide basic health services and some advanced procedures. The female healthworkers can conduct natural deliveries, perform tubal ligations and minor surgeries. GK's entire health policy is set up around these women, demystifying the current medical model in Bangladesh where male doctors are responsible for the majority of care. This allows the health services to be more cost-effective in terms of training and recruitment, especially in light of the shortage of rural doctors and the ratio of 1 doctor for every 30,000 people in Bangladesh[106].

1. Maternal Health and TBAs

GK's focus on improving conditions for women in Bangladesh is evident by both their emphasis on training and utilization of women in their health programs and their prioritization on improvement of maternal health. For this reason the healthworkers in the various GK centers monitor pregnancies in each region. Extensive documentation using standard birth cards are given to all expectant mothers and filled out by GK healthworkers as they conduct ANC visits. The cards contain information on demographic indicators as well as on who attended the delivery, the location, method and any complications. The goal of the prenatal program is to provide physical ANC (average number of visits=5) and link the expectant mother with a TBA. The healthworker and TBA collaborate on participatory planning for a safe delivery and sufficient follow-up[97].

a. TBA Training

GK is known for its dedication to providing care to the poor and becoming part of the community. TBAs are a central part of their maternal health programs. Extensive focus is given to their training. The training director of Sreepur developed a new TBA training program four years ago. He compiled various resources to develop a manual that

is used throughout GK subcenters in training programs that are designed to be conducted over five days. The manual covers ANC visits, hygiene, safe delivery and neonatal care. The training were designed to follow this order.

The overall goal of the training, however, is to form a linkage with the TBAs that will ensure referral to an EmOC facility if necessary. The focus is not on treatment of emergency complications as much as activities to promote trust and recognition of complications[109] .

GK trains TBAs in each of its ten subcenters. There are varying levels of experience and knowledge in all regions of Bangladesh. In addition, the facilities are all very different. Healthworkers from the subcenters participate, but the sessions are usually led by a trainer from GK's main training center at Sreepur.

There is no formal evaluation of GK's TBA training. The TBAs are brought back to the centers for refresher courses every 6 months, but there is no standardized way to measure the knowledge they have gained or whether this knowledge is used in the field. Furthermore, there is only anecdotal knowledge about the differences between TBAs in the various regions served by GK subcenters. There has been no standardized investigation in the form of surveys or questionnaires that could provide background information relevant to the trainers. Information relating to training history, delivery experience, opinion on hospital delivery and relationship to SBAs can play important roles in how the TBAs respond to training and the topics that may be more relevant to a particular training.

Further, there has never been a thorough evaluation of a given training by an observer who was present for an entire training. There is no knowledge assessment for

the TBAs as well. This study thus provides a tool by which GK can both assess the background of the TBAs and their knowledge gained from the training in addition to providing a comparative analysis of the various GK subcenters and the TBAs practicing in the region.

. D. Summary

Bangladesh provides an excellent opportunity to study TBA training. TBAs participate in the majority of deliveries in Bangladesh. They are the primary birth attendants despite many established EmOC facilities. Bangladeshi culture has supported their use and resisted hospital deliveries. However, the demographic statistics for the country reveal that this approach has not been successful in improving maternal health. Thus a new approach must be taken. This is the goal of the Bangladeshi government in promoting skilled attendants. The emphasis on SBAs, however, should not be at the expense of accepting the role TBAs can play in healthcare. Indeed, TBAs are still conducting the majority of deliveries and will continue to do so into the near future. Thus an effort to incorporate them into skilled and emergency care programs is a realistic and attainable goal.

Ghonoshasthaya Kendra has been training TBAs for over twenty years. Their new training module emphasizes the importance of referral and linkage with local EMOC facilities. They have never done any assessment of their training and have little background information on the TBAs who participate. GK's training program provides an opportunity to study the content of a training and develop a tool for knowledge assessment that can be useful to their program and serve as an example for other organizations interested in TBA training.

II. Training Evaluation

Two training sessions were attended and evaluated during winter 2005-2006. The goal of the evaluation was to measure differences in TBA knowledge before and after the trainings, thus providing information about knowledge gained from the training. This assessment could later be used to improve GK's training program. Another goal of this evaluation was to provide information about the TBAs that GK trains. This information is useful not only for training design but also for its possible influence in training outcomes.

It would be impossible to determine whether gaps in knowledge before and after GK's training were due to problems with the training, both in terms of content and methods, without observing the actual training. Participant observation is a useful method that allows for reliance on first-hand information, high face validity of data, and reliance on relatively simple and inexpensive methods. Thus both trainings were attended and careful notes taken throughout. The training notes were used to provide a description of the content and methods of the trainings that could produce a qualitative description to supplement the results of the surveys.

A. Materials and Methods

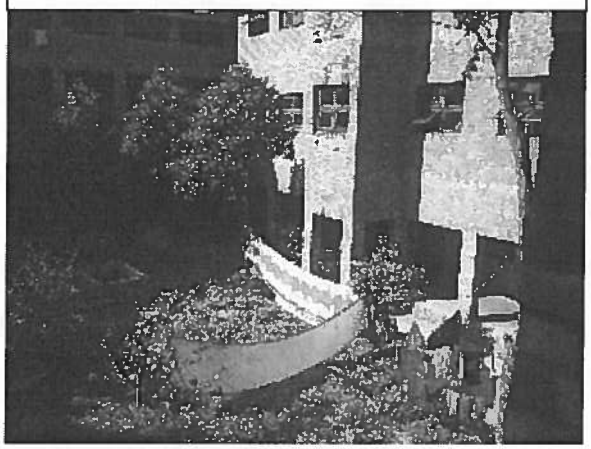
Two training sessions were attended during winter 2005-2006. Initially the two trainings were attended to provide a large enough sample size to detect any differences in knowledge based questions before and after the training. The background questions revealed important information about the TBAs that could be used in future trainings and also to detect possible influences in knowledge. The overall results, however, provided more information about the differences between both the TBAs' background and their

knowledge retention in the training. The differences also provide an example of the diversity of TBA experience and training within a given country and an organization. As mentioned earlier, Bangladesh is a small and somewhat homogenous country. However, the results of this study show that there can be much diversity in TBA background and experience based on location in Bangladesh. These differences illuminate some very important concepts in TBA training, to be discussed in further sections. Thus this study is both a descriptive analysis of GK's training as well as a comparative study between two locations within the same country.

1. Location

The first training was conducted at GK's Sreepur training center, in the Dhaka division near Gazipur, from December 21-26, 2005. Sreepur is located 75 km from the capital city of Dhaka. It is considered rural Bangladesh, but many of the villagers frequently travel to and from the capital and are familiar with urban Bangladesh.

Image 1:Sreepur dormitory and courtyard

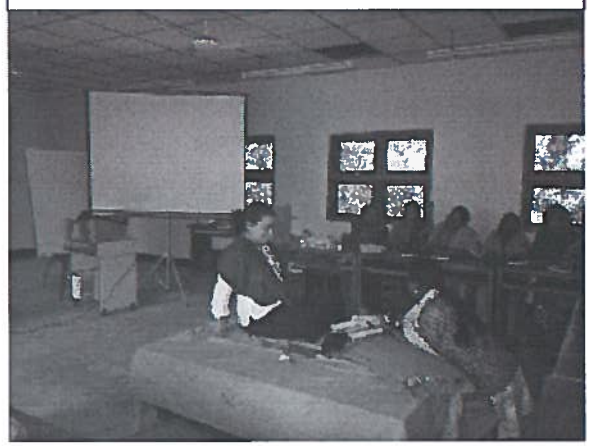


The Sreepur center is GK's second largest location and includes a 50-room dormitory, 20-bed hospital, and large land space for gardens and livestock.

Numerous NGOs regularly rent the facilities for training sessions and the hospital serves as a referral center for the region. There are two doctors who reside at the center. GK medical students and interns are required to complete a three-month rotation at the center to gain experience in rural medicine. There are also nearly fifty male and female paramedics-in-training and a staff of security guards, accountants and cooks.

The TBAs were housed in the female dormitories at the center and did not leave the grounds from the day they arrived until they were provided transportation on the final day of training. They were provided all meals while at the GK center, eating with the male and female paramedics in training. The training sessions were generally conducted during the morning from 9-11, the afternoon from 2-5 and evening from 7-9.

Image 2: Sreepur classroom and overhead



The training were conducted in one of two training rooms with tables and chairs, boks and anatomical models. There was a TV and an overhead projector. The TBAs were not allowed to eat or chew pan (betel-leaf) while in the sessions.

The TBAs were provided a traditional Bengali snack during the morning session and ate first at meal times, before the other training residents. The training director, Dr. Karim, was present at the center during the entire training, with the majority of sessions conducted by three senior healthworkers who reside at the Sreepur center.

The second training took place from January 3-8, 2006 in Vatshala, in the Sylhet division of Bangladesh on the northern Bangladesh-India border. Vatshala is over 300 km

from Dhaka. Many of the villagers have never seen urban Bangladesh. There are fewer modern facilities, including hospitals and NGOs , but there are various offices associated with the major Bangladeshi NGOs in this region.

Image 3: Vatshala training facility

The Vatshala location is a typical GK subcenter. There is a small medical facility where there is usually a delivery at least once daily. There are usually close to ten GK healthworkers who live on the site, supervised by other GK-trained health providers. There is no running water on site and no wall separating the center from the village in which it is situated.

There was no lodging for the training and as a result the TBAs attending training sessions daily and returned home in the evening. They were provided breakfast at 7:30 am, attended training sessions from 8:30-12:00 and 1:30-4:30, with lunch served in between. There was a half hour break daily at 10:30 for traditional Bengali snack. The TBAs were allowed to eat during the sessions and chew pan.

Image 4. Vatshala classroom

The sessions were held in a storage shed with a concrete floor covered by dried grass and carpet. There were no tables or chairs and much of the training was conducted on the floor. Models and overhead supplies were transported from Sreepur and there was electricity to provide for overhead projections and film training when necessary. The

training was primarily conducted by the senior Sreepur health worker, with a one day visit from the training director. The senior health official was assisted by two healthworkers who reside at the Vatshala center.

2. Recruitment

The TBAs were recruited from the community in the week prior to each training. Many of the TBAs were known to the health workers prior to recruitment and were visited in their homes and asked to participate in the training. For those unknown to GK, health workers used part of their daily visits to local villages to question community members about who the local TBAs were that were most trusted in the community. These TBAs were visited n their homes and asked to participate. For each training the goal was to have no more than twenty-five participants.

3. Informed Consent

Consent to participate in the evaluation was gathered from each TBA. All participants had the option not to participate in the survey and refuse photographs. Given the poor literacy of the participants, the training director provided all information verbally and consent was gathered orally, in accordance with UC Berkeley CPHS Protocol #2005-10-6.

4. Data Collection

Data collection for the training evaluation was both quantitative and qualitative. Quantitative data were gathered in the form of a survey with semi structured interviews with each TBA before and after each training. Qualitative data consisted of observation notes and photographs taken throughout each training.

a. Quantitative Collection

A preliminary questionnaire was drafted in English and translated into Bengali by the doctor in charge of training. Background questions asked only at baseline included TBA delivery experience, training history, and opinions about training and hospital delivery. Knowledge content questions focusing on antenatal care, hygiene, hemorrhage, neonatal care and family planning were asked at baseline and after the training[•]. The survey questions were semi-structured, with the majority of the questions providing four prewritten selections and an option for free response. All participants had the freedom to select as many of the prewritten options as they felt were applicable and any verbal responses they gave were written down by the healthworker-interviewer.

Before the surveys were to be distributed all the healthworkers met with the training director, for an explanation of the questions and how to provide the surveys. An emphasis was placed on privacy in order to ensure the responses were not influenced by other TBAs or healthworkers who were not part of the initial interview.

In both trainings the TBAs were gathered in the training room while the healthworkers met with the training director. The healthworkers then entered the training room and randomly asked a TBA who had not completed the survey if she would go outside to answer some questions about the training. There was no time limit placed on the interviews and all the questions were asked orally and the responses written by the individual healthworkers. When the survey was completed, the TBAs were taken back into the training room and a new TBA was taken to complete the survey. All surveys

[•] See Appendix 2 for copies of all questions asked and options given

were collected at the end of the session, photocopied and translated into English. The Gonoshasthaya Kendra training director conducted all translation.

b. Qualitative collection:

Each training was photographed and observed with key sessions translated by GK healthworkers. There was minimal participation in the training by the observer and all sessions were watched from the back of the room. The training was conducted in Bengali. The observer had modest knowledge of the language and was able to ask for translation during specific sessions. All notes were written in English and typed at the end of every training day.

A phenomenological approach was used to record the events of the training. The goals of note taking were to document both the temporal, physical, contrasting experiences and opening of social relations that took place within the training, in accordance with an intersubjective understanding in the phenomenological approach[110]. This approach takes into account the observer's understanding of their role in the observation process. Descriptions of participants, trainers, methods, materials and activities were documented extensively with personal comments supplementing objective observations.

5. Data Analysis

Data analysis was performed with statistical software package Stata version 9.The goal of the analysis was to measure the responses for the questions relating most directly to the major causes of maternal mortality and to document the largest gaps in knowledge prior to training and improvements in knowledge following training. In order to

accomplish this goal, each response was labeled as either a 0 or 1. The responses and labels are summarized in Table 2.

a. Knowledge Based Question coding (summary in Table 2)

i. Treatment of Apnic Newborn

The TBAs were asked what they would do when a newborn does not breathe. They were given the option of doing nothing, shaking the infant, hanging it upside down and slapping it, stimulating the back and providing mouth to mouth. GK's training focused on the better practices of stimulating the back and providing mouth-to-mouth. Therefore these responses were coded as "1" and the others were coded as "0".

ii. PPH Management

The TBAs were asked what they do when they suspect a woman is bleeding too much. The options given included nothing, insertion of objects into the vagina, traditional medicine and bringing the woman to the hospital. Given the importance of hospital care in the case of PPH, only this response was coded as a "1". The rest were coded as a "0".

iii. Tools to Measure Blood Loss

The TBAs were asked how they would measure blood loss during a delivery. They were given the option of selecting observation alone, using clothing or cloths or a plastic sheet. Observation alone was coded as a "0" and the use of materials was coded as a "1". This was based on GK's emphasis on using materials in an attempt to gauge the possibility of hemorrhage.

iv. Treatment for Convulsion

The TBAs were asked what they do in the case a woman starts to convulse. They were given the options of waiting, providing traditional medicine or taking her to the

hospital. Given the importance of accessing emergency medical treatment in the case of convulsions, especially in the case of eclampsia, only the hospital option was coded as a "1". The other options were coded as "0"

v. PPH Prevention

The TBAs were asked what measures they take to prevent hemorrhage. They were given the options of selecting nothing, early breastfeeding, fundal massage or injection medicine. GK's training emphasis was on early breastfeeding to induce uterine contraction and fundal massage to prevent bleeding. Thus these two responses were coded as "1" and the other two were coded as "0". GK's policy is strictly against TBAs providing injectable medication in the community, thus this response and "nothing", were coded as "0".

vi. Clean Delivery Practices

The TBAs were asked what they do to ensure clean deliveries. They were given the option of choosing nothing, washing hands, washing instruments or sterilizing their instruments. Given the fact that some TBAs do not use instruments and hand washing is key to ensuring clean deliveries, all responses except "nothing' were coded as "1".

vii. ANC Opinion

The TBAs were asked whether or not they recommend antenatal care. Given their diverse background, no questions were asked about the kind of ANC they know of or support. They were given the options of selecting that they don't recommended ANC, recommend it or have no opinion. The only response that was coded as a "1" was recommending ANC at it is crucial to ensuring a healthy pregnancy.

viii. Maternal Nutrition Opinion

The TBAs were asked what they recommend to pregnant women regarding their diet. They were given the option of recommending less food, no change in diet, more food and nutritional supplements of iron and folic acid. GK's training emphasized the importance of increased food intake and supplement use. Therefore the last two responses were coded as "1" and the option of les food or no change in food were coded as a "0".

a. Significance testing

Student-T test was used to measure differences in responses between the two training sites and differences between pre and post training knowledge overall and according to selected background variables. Mean responses for eight questions asked before and after each training are summarized in Table 5, which also includes the before and after training responses for each site. Significance was established at $p<0.05$.

All significant responses were further evaluated according to the TBAs' training history, delivery number and opinion of hospital delivery with the results summarized in Table 6. The measured before and after values in these tables indicate the percentage of TBAs who selected a response corresponding to a value of 1, as indicated in Table 2. It should also be noted that one TBA did not return to the Vatshala training after the first day and was not included in the final survey and therefore not in the knowledge-based question results.

For details of questions and specific answers, see appendix 1.

b. *Qualitative Analysis*

The qualitative notes were collected and entered into an electronic journal. Given the goal of linking the knowledge based survey results with the specifics of the trainings, special attention was paid to the topics in the surveys. Following the survey analysis, the qualitative notes were reviewed to assess correlations between the quantitative knowledge-based results and how these topics were covered. Attention was also given to the differences in training materials, methods and topics taught at the two training sites. Details of the videos, role-play and lectures were reviewed to determine the time devoted to and the methods by which the specific training topics were addressed. The detailed subjects taught in the various topics were also analyzed. The goal was to provide specific examples of methods by which to introduce new material and specific practices in a community-based learning environment.

Table 2: Variables measured and coded for GK TBA Trainings

Variable	***Response=0***	***Response=1***
Background		
Training history	None	any
# deliveries	<1/month	>1/month
How she chose vocation	Family choice	Personal choice
Income	None	Money/barter
Opinion of hospital deliveries	Worse/no different than home	Better than home
Community opinion of training	Unsupportive	Supportive
SBA respect for TBA work	Do not feel respected	Feel respected
Closest SBA	< 4km	>4km
Closest EOC	Government/ private clinic	GK
family planning	Do not recommend	Recommend 42 after delivery
Knowledge-Based Questions		
Clean delivery practices	None	Wash hands/clean instruments
Tools to measure blood	None	Plastic sheets/ clothes
Manage PPH	No hospital	Hospital
Birth asphyxia treatment	Shaking and slapping	Stimulation and mouth-to-mouth
Treatment for eclampsia	No hospital	Hospital
Opinion of ANC	Not necessary	Necessary
Maternal nutrition	Normal or less 76	Excess food

B. Results

A total of forty-five participants were surveyed at two different locations. Nineteen TBAs participated in the Sreepur training. Twenty-six initially attended the Vatshala training, one of whom did not return for the second day of training.

The qualitative data will be presented first with the goal of introducing the most important aspects of the trainings and including the differences between the trainings at the two sites.

The quantitative data will then be presented, beginning with the background questions, followed by the results of the knowledge-based questions. Careful consideration will be given to areas where the largest difference in survey responses were detected and how the training addressed major concepts in health delivery.

1. Training Description

The order of topics for the training was addressed at the end of section one. This order was not followed in either training, however, and there was no continuity between the topics in each training session. There was no schedule that was clearly followed and many topics were repeatedly addressed in the training. Here only the key topics, material and methods of training will be presented. Also noted will be the topics that were covered in only one of the two trainings.

a. Training Materials

There were numerous models of female reproductive anatomy used in both trainings, most donated to GK in the 1970s. They included non-pregnant female reproductive anatomy and models of pregnancy at one month, three months, six months

and nine months. These models were used initially to demonstrate and reinforce the lecture topics that covered anatomy and physiology.

Image 5: newborn model during role-play

There were also small dolls with umbilical cords that were used most often in the training. There were several role-plays conducted each day, mostly concerning antenatal exams, proper delivery technique and neonatal cord cutting and care. These stuffed dolls were used in all of these role plays. The role plays included the TBAs with the trainers at first but by the end of the training included only the TBAs. Participation was voluntary for all of the role-plays though most of the TBAs were eager to participate, especially at the end of the training.

Other materials included 3 different videos ranging from thirty minutes to two hours, produced by local Bangladeshi or Indian NGOs. The topics of the videos included antenatal care, normal delivery practices, management of complications and neonatal care. One video shows importance of cleanliness and boiling instruments. Two of the videos showed antenatal care and deliveries in a home birth setting, while one showed care by a skilled attendant in a clinic-based setting. Two of the three videos were in Bengali and the other was in Hindi, produced mainly for Indian TBAs. In Sreepur the Hindi video was shown in its entirety without pause. In Vatshala the video was paused every ten minutes to allow the GK trainer to translate the information into Bengali.

There was an overhead projector at each training site and numerous photos were shown throughout the course of the training. Most of the photos were from a training manual compiled by GK's training director. They were taken from a variety of obstetric and midwifery text and training modules created by other NGOs. The pictures included female development, reproductive anatomy, stages of pregnancy and labor. There were also diagrams of the anatomy and approach to normal and breach deliveries. The trainers would demonstrate many of the normal procedures for delivery while the overheads were shown.

Other materials included buckets for all the TBAs to practice effective handwashing. Overheads of 8-step handwashing practice were shown and the TBAs were divided into pairs and given soap and jugs. An entire morning was devoted to practicing this technique, with each TBA watched and corrected by the trainers.

Image 6: bucket-washing exercise

The Sreepur training also provided small mercury thermometers to the TBAs and tried to teach them numbers on a white-board. Several hours were spent reviewing numbers in Bengali then attempting to translate those numbers into English, as all the thermometers had English numbers. More time was spent practicing reading the thermometers with the TBAs because the numbers were very hard to visualize. The trainers realized after several hours of practice that the TBAs were not likely to understand the numbers or read the thermometers. They did not repeat this exercise in Vatshala.

The training director also briefly introduced forceps to demonstrate obstructed labor practices. This demonstration lasted only a half hour and was not repeated at the Vatshala training.

b. Training methodology

The training employed a variety of training methods, many of which have already been mentioned. Every day of the training included numerous role-plays both with the trainers and the participants as models, using many props and tools. For example, role plays of deliveries included TBAs lying on a covered table with a doll placed under her sari. Either the trainer or another TBA would play the role of the birth attendant, enact a prenatal exam visit and then role play a delivery. The "attendant" would practice removing the "baby" from the Sari, tying a know around the cord with role and then cutting the cord with a blade. The "attendant" would then practice wrapping the baby in several cloths and cleaning the delivery space. There were repeated role plays demonstrating what to do when a baby doesn't breathe.

The TBAs also were partnered to practice finding physical information such as vital signs. The TBAs were shown where to locate the pulse on the wrist and feel the forehead for temperature. Because teaching temperature from thermometers was not effective, emphasis was placed on comparing the mother's forehead to the TBA's for any significant difference in warmth. The same method was used for the pulse, with the TBAs instructed to note if the pulse is much faster and stronger or slower and weaker than their own. Any significant difference should warrant concern. The TBAs were also partnered to feel each others' ankles for edema and look at the eyelids for signs of anemia.

The training included lecture-style lessons, with the trainers showing numerous overheads and explaining many aspects of maternal health. These ranged from normal anatomy to antenatal care (ANC) to delivery complications. For example, the TBAs were shown pictures of women convulsing and told that this represented eclampsia, whose symptoms included high blood pressure and albumin in urine. The other lecture topics included nutrition, normal pregnancy related changes and delivery complications. See Table 3 for details of topics and methods.

There were a variety of lecture styles employed during the training, mainly based on who was conducting the particular lecture. The training director encouraged questions and would make everyone in the room clap when a TBA answered a question correctly. He would often stop speaking for extended periods of time to allow the TBAs to continue a discussion on a particular topic, even if it was a side conversation in the room. They were encouraged to share their ideas and stories as well.

There was not as much discussion allowed when the other trainers were leading the lectures. Several times the GK health director and other healthworkers told the TBAs to be quiet if they were having a side conversation. The main health worker did encourage everyone to clap when a TBA answered a question correctly at the Vatshala training. In this way she modeled the behavior of the GK training director. As mentioned above videos were also used for training purposes to show further examples of the major topics covered in the training. There was no new information presented in the videos that was not covered by overheads and role-playing.

Table 3: Training Topics and Methods		
Topic	*Method*	*Specific Example*
Female physiology	• Lecture • Models	• *Overheads of reproductive organs in adult women and changes during puberty* • Nonpregnant uterus , ovaries and fallopian tube model passed around training room
Physiology of Reproduction	• Lecture	• Overheads of drawings depicting sexual intercourse and fertilization
Normal pregnancy	• Lecture • Mode • Video	• Overheads of pregnancy changes in reproductive organs and pictures of abnormal vs. normal lie • TBAs all examined models of pregnant uterus at 4, 12, 18, 30 and 36 weeks • Pictures and diagrams on normal changes during pregnancy explained in Bengali and Hindi
ANC	• *Lecture* • Video • Role-Play • activity	• Overhead pictures of measuring fundal height, assessing lie, proper nutrition, dangers of drug and cigarette use • Depictions of a routine ANC visit at home or at local community clinic • Healthworkers demonstrate proper abdominal exam using a doll under the TBAs Sari, followed by the TBAs practicing on each other • Paired TBA assessment for tibial edema and ocular signs of anemia and jaundice
Safe Delivery	• Lecture • Video • Role-play • activity	• overhead pictures of instruments and tools • depictions of TBAs boiling instruments, cleaning delivery surface and creating proper lighting • TBAs have to set out clean cloth and practice setting out tools • Bucket hand-washing exercise for pairs of TBAs
3 Stages of Labor	• Lecture • Video • Role-play	• Overhead diagrams of stages, drawings of fetal and placental presentation • Depictions of actual woman in labor with recreation of delivery using models and fake blood • TBA pairs using doll to simulate delivery and normal presentation
Post-delivery Care	• Lecture • Video • Role-play	• Overhead pictures of cord-cutting and breastfeeding • Depictions of proper cord-cutting, wrappiing the breastfeeding • TBA pairs practice cord cutting, wrapping and breastfeeding on models. Also practice proper treatment for newborn apnea
Complications	• Lecture • Video • Activities	• Overhead drawings representing, fever, convulsions, pain and bleeding. Stress importance of hot vaginal pack for bleeding and hospital referral • Depictions of PPH using models and excess fake blood • TBA pairing to feel for pulse and temperature on body parts. Stress placed on referral in case of major difference between TBA and delivering woman. Thermometer practice in Sreepur training
Treatment of neonates and immunization	• Lecture	• Overhead pictures of necessary immunizations, nutrition and treatment for diarrhea

c. Relationship between trainers and trainees

As mentioned earlier, Bangladesh's history on the Indian subcontinent and strong Muslim values have emphasized the hierarchical caste system and lower status of women. TBAs are woman and are usually from lower castes. This is true of GK TBAs and, though GK emphasized forming a professional relationship with their TBAs, there was a clear hierarchy in the classroom.

However, the relationship of the trainers and the TBAs was very dependent on the trainers. Each had different styles of communications and different levels of respect for the TBAs and when and how they should contribute to the training. It was not dependent on the professional status of the trainers. One doctor would not tolerate interruption while another doctor always made the classroom wait while a TBA finished whatever interjection she had. The female healthworkers also had varying styles, with the lead healthworker being much less tolerant of interruptions than the other health-workers.

There was some site specificity here as the Vatshala training was a less formal environment and atmosphere. There was more dialogue between the trainers and TBAs as everyone was seated in a circle in the training room. Most of the training was conducted by female health workers, one of whom was from the same village as many of the TBAs. In Sreepur the tables and chairs separated the trainers from the trainees and created a power difference that could have contributed to the hierarchy within the training room. In Sreepur the TBAs were also more exposed to more training from men and doctors, both of whom are held to a much higher value than female villagers.

d. Key difference between the trainings

Many of the important differences between the two trainings have been mentioned already, including facility and logistical differences and some content differences. In general the same topics were covered in both sites, with the exception of numbers and thermometers being taught only at Sreepur. Less time was spent on the various topics in Vatshala, with nearly half the amount of time devoted to lecture as was spent in Sreepur. A greater percentage of time in Vatshala was spent in role plays and participatory activities. All videos were also translated into Bengali in Vatshala, which was not done in Sreepur.

The other major difference between the two trainings was in the instructors. Mainly the GK training director, a male doctor who designed GK's TBA training manual, conducted the Sreepur training. The lead senior GK health worker, a woman who also trains GK healthworkers, assisted him. Two other female healthworkers assisted in the training. Neither gave any lectures but assisted with the activities throughout the training. In Vatshala, the training director was present for only two days. The majority of the training was conducted by the senior healthworker. She was also assisted by Vatshala healthworkers. As in Sreepur, neither healthworkers conducted any lectures, but mainly assisted with the training activities.

Given the different facilities of the trainings, there was a difference in the social time the TBAs spent with one another and the GK community. In Sreepur, the TBAs became part of the center for five days, eating meals with the other workers and trainees and taking leisure time in the evenings. In Vatshala, the TBAs ate separately and returned

home every night. They did, however, have leisure time during the day and were very friendly with each other and the staff.

2. Survey Data

a. Background Characteristics

The summary results of the background questions asked at both trainings are shown in Table 3. All numbers are percentages of TBAs who responded positively to the options shown. Presented here will be more detailed results from the specific options given to the TBAs.

Table 4: TBA Background

Question	*options*	*% Overall n=45*	*% Sreepur n=19*	*% Vatshala N=26*	*Measured Difference*
Decision to become TBA	Personal Choice	44	58	38.5	**p<.001**
Training History	any	29	26	31	p=.094
Closest EmOC	> 4km	26.7	32	23	**p=.033**
Number of deliveries	>1/month	65.9	50	77	**p<.001**
Payment	Money/ barter	84.4	95	77	**p<.001**
Opinion of Hospital Deliveries	better	54.5	89.5	31	**p<.001**
Feel Respected by SBAs	yes	86.7	89.5	85	**p=.0335**
Recommend Family Planning	any	91	79	96	**p<.001**
GK Recruitment	GK Healthworker		100	100	NA
Community Opinion	supportive	71	74	69	p=.096

i. History

Twenty (44%) of the TBAs personally chose to become a TBA. A higher percentage of women in Sreepur personally chose to become TBAs when compared to Vatshala, 58% vs. 38.5%. The rest had this vocation chosen by a family member or spouse. The difference was significant.

ii. Training History

Overall only thirteen (29%) of the TBAs had not received any training prior to attending GK training during winter 2005-2006. Of the thirteen who had received training, ten had received government training and the other three had received NGO training. There was no significant difference between the two training sites.

Five TBAs specified the duration of training, including one day, five days, ten days, twenty-one days and thirty days divided into three blocks of ten days. The thirty-day training was conducted by the government, the ten-day training by GK. There was no specification of the training leader or location for the other trainings.

iii. Closest EmOC

Twenty-sit percent of the TBAs live more than four kilometers (km), which was considered walking distance, from an EmOC facility. Thirty-two percent in Sreepur and 23% in Vatshala live more than four km of an EmOC facility, which was defined as a formally trained midwife, nurse or doctor. There was a significant difference between the two training groups in this category with more TBAs in Sreepur living out of walking distance from an EmOC.

In detailed questioning, seven TBAs indicated what type of skilled care was closest, midwife or doctor. Half indicated that GK was the closest location to receive emergency obstetric care. The majority indicated that government and private hospitals were the closest options for emergency care. There were a wide variety of responses indicating how one would reach skilled care in the event of an obstetric emergency. The majority indicated a rickshaw would have to be taken for prices ranging from 15-65 Taka

($.2-.9). For the longer distances, a vehicle would have to be employed to reach skilled care.

iv. Number of deliveries

Overall 65% of the TBAs conduct at least one delivery each month, though there was variation between the two training sites. Fifty percent of the TBAs in the Sreepur training conduct more than one delivery per month compared to 76% of the TBAs in the Vatshala training. This difference is significant.

v. Payment

Overall nearly 85% of the TBAs receive some form of compensation for their services. Again there was a significant difference between the two training sites as 94% of the TBAs at the Sreepur training receive payment compared to 77% at Vatshala training. This difference is significant.

For those who provided detail about their reimbursements, 6 received only money, ranging from 100->500 Taka (~$1-$10). Seven receive either money or barter. Items for barter most commonly mentioned were saris, oil and soap.

vi. Opinion of Hospital Deliveries

More than half of the TBAs (54%) indicated that they have a positive view of hospital deliveries. However, this question provided the biggest difference in responses between the two training site. However, there was striking variation between the two training sites. In Sreepur only 11% indicated a less than positive opinion compared to 69% in Vatshala. Here there was a significant difference between the two locations.

vii. GK Recruitment

Every TBA learned of the training from a GK health worker. As mentioned earlier, the GK health workers spend the majority of their time in the field, becoming familiar with their given community. The TBAs are recruited after the health worker asks questions in the community concerning who the most trusted TBAs are. Four of the TBAs had heard of the training from either other TBAs or village members, but GK health workers recruited all of them.

viii. Initial Thoughts About Training

The TBAs were asked what their initial thoughts about participating in the training were. All of the TBAs except for 3 indicated excitement about the training. The remaining 3 had no opinion.

ix. Perceived Community Opinion

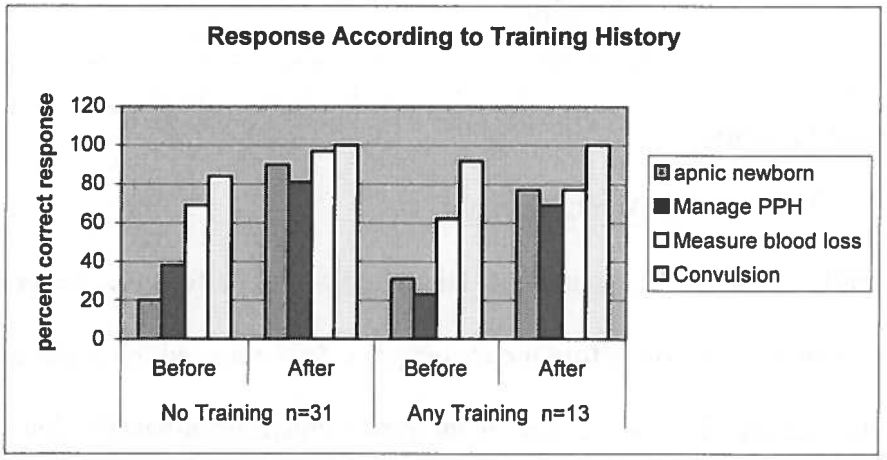
The TBAs were asked what they believed the members of their community thought of training. Seventy-one percent of the TBAs who responded that their community likely approved of the training. Twenty-two percent of the TBAs said that their community likely had no opinion of the training and the remaining responded that they were not sure how their community would feel. None responded that their communities disapproved and there was no significant difference between the two training sites.

Table 5: Measured Significance for Knowledge Based Questions									
Question	*Combined Mean Response n=44*			*Sreepur Mean Response n=19*			*Vatshala Mean Response n=25*		
	Before %	After %	Measured difference	Before %	After %	Measured difference	Before %	After %	Measured Difference
Treatment of apnic newborn	23	86	**p=<.001**	25	89.9	**p=<.001**	23	84	**p=<.001**
Manage PPH	33	78	**p=<.001**	26.3	73.7	**p=.0026**	38.5	80.0	**p=.014**
Measure blood loss	67	91	**p=.0042**	47.4	94.7	**p=.008**	80.0	88.5	p=.45
Convulsion treatment	86.7	1	**p=.011**	89.7	1	p=.14	84.6	1	**p=.02**
PPH prevention	76	75	p=.53	77.8	63.1	p=.771	75	84	p=.24
Clean delivery	93	98	p=.167	84.2	87.4	p=.1516	1	1	p=1
ANC opinion	93.3	97.8	p=.16	1	1	P=1	88.5	96	p=.163
Nutrition opinion	86	93	p=.1483	1	94.7	p=.83	76.9	92	p=.0722

b. Knowledge-Based Questions

Figures 2-4: Significance according to selected background variables[••]

Figure 2



[••] see appendix 4 for detailed chart of significant differences according to selected background variables

Figure 3

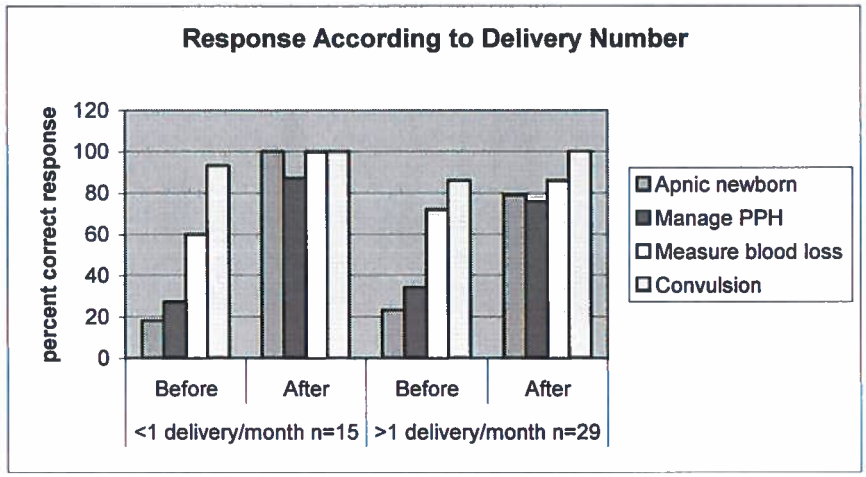
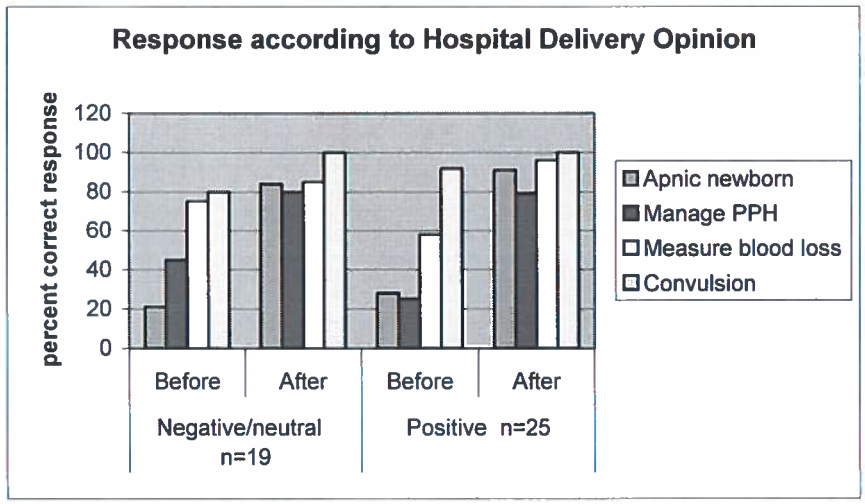


Figure 4



Significant Responses

x. Treatment of Apnic Newborn

Overall 23% of the TBAs indicated that they would perform the better procedures in the case of birth asphyxia before the training and 86% selected the better answer at the end of the training. This was a significant improvement from baseline knowledge and was seen at both training sites. There was not a difference in baseline knowledge or after training knowledge between the two sites.

Training history did not affect the overall improvement in response to the question (see Figure 2 and appendix 3). Those without a training history were significantly less likely to select the correct response at baseline but were significantly more likely to select the correct response after training. Those without previous training had significantly more improvement in response to this question than those who did have previous training.

Significant improvement was seen for this question regardless of the TBA's delivery history (see figure 3 and appendix 3). There was no difference in baseline knowledge according to delivery number, but those who participate in fewer deliveries each month were significantly more likely to select the correct response. There was also a larger improvement in responses for those who conduct fewer deliveries.

Significant improvement was seen for this question regardless of the TBA's opinion of hospital deliveries (see figure 4 and appendix 3). There were no differences in baseline knowledge between TBAs with a positive or negative opinion of hospitals. However, TBAs with a positive opinion of hospital deliveries were more likely to select the correct response after the training.

xi. Manage PPH

Overall there was a significant increase in correct responses before and after both trainings. This difference was measurable in both training sites, with a slightly greater increase in correct responses in Sreepur.

Previous training history did not affect the significant of the overall improvement in responses to this question. However, TBAs with no previous training were significantly more likely to select the correct response at baseline and after the GK's training

compared to those with previous training. There was a greater improvement in responses for the TBAs without previous training compared to TBAs with training history.

Difference in delivery experience did not affect the overall improvement seen in response to this question. However, TBAs with more delivery experience were more likely to select the correct response at baseline than those with less delivery experience but less likely to select the correct response after GK's training. There was a larger improvement in responses for those who conduct fewer deliveries.

Difference in opinion of hospital delivery did not affect the overall improvement seen in response to this question. However, TBAs with less favorable views of hospital deliveries were significantly more likely at baseline to indicate they would send a woman to a hospital in the case of PPH. Opinion of hospital delivery did not affect the final responses to this question.

xii. Measure Blood Loss

There was a significant increase overall in the number of TBAs who, after the training, indicated they would use materials to measure blood loss. However, the significant improvement was only seen at the Sreepur training. There was not a significant increase in the Vatshala training.

The overall improvement was affected by training history as only those without previous training had significant improvements in response to this question. TBAs without training were more likely to select the correct answer after GK's training than those who did have a history of training. Further, while there was a significant improvement for TBAs without training history, there was no significant improvement for TBAs with training history.

The overall improvement was also affected by the TBAs delivery experience as only those TBAs who conduct fewer deliveries had significant improvements in response to this question. TBAs with more delivery experience were more likely to select the correct response at baseline than those with less delivery experience. TBAs who participate in less than one delivery each month were also more likely to select the correct response after the training.

The overall improvement was affected by the TBAs opinion of hospital deliveries. Only TBAs with positive opinion of hospital deliveries saw improvement in responses. TBAs with less favorable views of hospital deliveries were significantly more likely to indicate at baseline that they use materials to measure blood loss. However, those with a positive view of hospital deliveries were significantly more likely to select the correct response after the training than those with negative views of hospital deliveries.

xiii. Convulsion Treatment

There was a significant increase overall in the number of TBAs who, after the training, indicated they would send a woman to the hospital if she began convulsing. When looking at training site, however, only Vatshala TBAs saw significant improvement in response rate and had a significantly lower baseline response rate than Sreepur. It should be noted that the average pre-training response was higher than for the other questions, but that this was the only question where 100% of the TBAs selected the better answer after the training.

The improvement in response was influence by the TBA's past training history as only those with no previous training selected the correct response. TBAs with previous

training were significantly more likely to select the correct response at baseline. Previous training did not affect the final response rate.

Delivery number also influenced the significant improvement to this question as only the TBAs with more delivery experience saw improvement in response. TBAs with less delivery experience were more likely to select the correct response at baseline than those with more delivery experience. Delivery experience did not affect the final responses.

The overall improvement in response was seen only in TBAs with less than favorable delivery experience. TBAs with less favorable views of hospital deliveries were significantly less likely at baseline to indicate that they would send a woman to the hospital if she began convulsing. Again there was no difference in final response rates for the two groups.

Nonsignificant Variables

xiv. PPH Prevention

There was no significant improvement in responses for this question before and after training. This result was seen overall and in each location. There was no significant difference in baseline responses. However, Vatshala TBAs had a significant higher rate of correct responses compared to the Sreepur TBAs.

xv. Clean Delivery Practices

There was no significant improvement overall in responses to the question of clean delivery practices before and after each training. There was also no significant improvement according to location. All the Vatshala TBAs selected the better response before and after the training. The Vatshala TBAs were significantly more likely than the Sreepur TBAs to select the correct response at baseline.

xvi. ANC

There was no significant improvement in TBAs opinion of ANC overall and according to training. All the Sreepur TBAs supported ANC before and after the training. They were significantly more likely to support ANC before the GK training than Vatshala TBAs but there was no significant difference between the two groups following the training. Both had very high rates of ANC support following the training.

xvii. Nutrition Opinion

There was no significant difference in the TBAs opinion of maternal nutrition before and after the training overall and according to location. TBAs in Sreepur were significantly more likely to select the correct answer at baseline but there was no difference between the two groups after the training.

a. *Summary of Quantitative Results*

The results of the background questions and knowledge based questions indicated significant improvement in half of the knowledge-based questions from the training. These questions were treatment of an apnic newborn, manage and measure PPH and manage convulsion. The majority of these overall improvements were not directly influenced by the TBAs' training history, delivery experience or opinion of hospital deliveries. These factors did, however, affect the amount of improvement in responses. There was no improvement seen in TBAs knowledge of preventing PPH, ensuring clean delivery, recommending ANC and advising on maternal nutrition.

The results of the surveys also indicated significant differences in TBA background and knowledge improving between the two training sites. The biggest

difference in TBA background was seen in the opinion of hospital deliveries, where the Vatshala TBAs were significantly less likely to have a favorable view of hospital deliveries at baseline than Sreepur TBAs. Significant differences were also seen in the decision to become a TBA, location of the closet EmOC facility, delivery number, payment, feeling respected by SBAs, recommending family planning and feeling support from community member for participating in TBA training.

C. Discussion

The goal of this project was to provide an evaluation of a particular TBA training program. Most of the literature on TBA training does not address the specific content and methods employed in training. Further, the majority of training assessment is based on maternal mortality and morbidity numbers within the region following training. As argued in Paper One, it is not possible to determine whether the lack of improvement in maternal health indicators following training is due to the "untrainability" of TBAs or a failure of the training.

There is a wide variety of training methods, materials and topics that have been used throughout the world in attempt to effectively utilize the provider role TBAs have in their communities. GK's stated goal for training was to provide a linkage with the TBAs in the community[109]. However, most of their training was focused on information that would better allow the TBAs to provide primary care to local women, both pregnant and non-pregnant.

Given the mixed method nature of this study, this discussion will begin with an assessment of the training notes, comparing them to the three educational principles and

learning environments introduced in Paper One. The training notes will also be compared to the WHO recommendations for training content and methods, also specified in Paper One.

Next there will be a discussion of the important information gained from the quantitative section, highlighting the significant findings of both the background questions and the knowledge-based questions. Given the interrelationship of TBA background, knowledge and training content, more space will be focused on the significant findings before and after the training. The goal is to make connections where possible between the TBA knowledge assessment and training content.

A. Assessment of Training

1. Principles

The three educational principles addressed in Paper One in relation to TBA training are the constructivist theory, metacognition and teaching to what students find interesting.

The constructivist theory ties into the notion that people learn best when taught about what they already know, building on a foundation of knowledge. GK's training provided the TBAs with opportunities to share knowledge and the TBAs were generally listened to. However, many of the lecture-based materials were presented at a basic level. It was not clear whether this was most useful in this case. Knowing the TBAs basic knowledge could have provided assistance in determining which materials were the most useful to cover. In this case the assessment gathered in this study could be of great use to

GK and other training programs to provide information about base knowledge prior to the training.

The notion of an assessment prior to training directly relates to the principle of metacognition, which deals with assessing ones own level of understanding. TBAs should be able to discuss their understanding or provide feedback in a manner that could prove helpful in learning new skills. There are many ways to create a space where TBAs feel comfortable with self-assessment. In the GK training, there was a lot of time for TBAs to practice the skills introduced. This allowed the TBAs to assess their own knowledge and understanding and provided the trainers with the opportunity to correct procedures. The post training assessments used in this research project could also prove useful in this context for TBAs to assess their own level of understanding.

Teaching to what the TBAs find interesting would be helpful for GK's training program. There was space in the beginning of both trainings for the TBAs to ask questions and suggest topics about which they wanted to learn more information. The training, however, was set in its content from the beginning. There are many topics that TBAs may not be familiar with which are necessary for trainers to cover. In any training this would vary greatly given both the background of the TBAs and the services they are expected to provide. In the GK training, more time could be devoted to assessment during the training to determine what the TBAs were interested in. However, the importance of specific topics such as immediate management of delivery complications and proper neonatal care are just some examples of topics that are very important to cover and hopefully can be incorporated into TBA interests.

2. Learning Environments

The learning environments stressed in Paper one included "learner", "knowledge" and "community"- centered environments. The importance here is in teaching participants information that they are interested in and in a manner that maximizes their learning.

"Learner-centered" environments are those that focus on the degree to which learners contribute their current knowledge to construct new knowledge. They are the practical application of the constructivist theory which was already discussed above in relation to GK's TBA training. Another goal of the "learner-centered environment" is to train learners to make the connection between knowledge and practice. This is difficult to bring into a classroom, but tools like role plays and skill sharing were encouraged in the GK training. One area of concern, however, is the introduction of material that would not be as practical in a home birth setting without most tools. An example here is the introduction of concepts of blood pressure and albuminemia in relation to eclampsia. This was not necessary for the rural TBAs in Bangladesh as they have no access to sphygmomanometers and urinalysis kits. It may be better to focus on symptoms of blurred vision and headaches. Stress was placed on evaluating pregnant women for edema, though this is often a normal finding.

"Knowledge-centered" environments focus on ensuring that knowledge is accessible and applied appropriately. The focus here is on curricular designs and the degree to which they encourage learning and understanding rather than a disconnected set of skills and facts. Opinion on curricular design can often be a subjective measure but is important in relation to the GK training as they have clearly put a lot of time into their

training manual and have numerous materials, methods and topics that they cover. The numerous role-plays and partner practices were helpful in this regard. Indeed, almost all the topics covered in lectures had a practical component. There were several lecture-only components to the training that lasted up to two hours. Further some of the videos were not in the TBAs' native language and were watched in their entirety in the Sreepur training. However, as mentioned earlier, the trainers translated the videos for the Vatshala TBA training. Still, the majority of topics covered in these videos and lectures were later reviewed in role-plays and practices.

"Community-centered" environments focus on the importance of fostering a sense of community in the learning process. As mentioned in Paper One, an important part of this principle is the relationship between the students and instructors. Social power dynamics are even more evident in a country like Bangladesh, where the caste system is still part of the culture and there is a strong class culture [111]. This would contribute to a hierarchy in the classroom that could influence trust-building. The respect most people in Bangladesh have for doctors and health care providers could influence the TBAs to trust the trainers more. However, the trainers need to be careful about respecting the contributions and knowledge that the TBAs bring to the field of maternal health care, especially in the training. The GK trainer encouraging participation and making everyone clap when someone chose the correct response is one good example of creating a community centered environment. The occasions where the TBAs were cut-off or not asked to participate in exercises are examples of practices that do not foster a community-centered environment. The creation of a community-centered environment also contributes to the TBAs trusting the trainers and SBAs enough to refer women having

delivery complications. As discussed earlier, this is often the only way to prevent morbidity and mortality.

3. World Health Organization Recommendations

The thirteen WHO recommendations for TBA training and further recommendations for training methods were covered extensively in Paper I and can provide a comparison tool to help evaluate GK's training.

When comparing the subjects taught to the GK TBAs to the WHO recommendations, it is clear that GK's training was very thorough in the subject matter covered. The training covered the areas of advising mothers about nutrition, recognizing potential complications, conducting normal deliveries, breastfeeding, family planning, immunizations and treatment for diarrhea. Some of the recommendations to make the TBA a link for health care in her community are not trainable "skills" but rather depend on the TBAs relationship with her community and with the local emergency care facilities.

As mentioned earlier, the GK trainer's overall goal was to form a link with the TBAs in order to ensure referral in the case of a complication. However, this goal cannot be "taught" in the same way as cord-cutting, for example. In order to evaluate GK's success in this area, one would have to see an increase in referrals for complications over time. Further, the final goal of helping TBAs provide health care in their area is also a priority for GK. To this aim, they use TBAs in almost all of their health campaigns. However, this is not an area that can be evaluated in the confines of this project, whose goal was to evaluate GK's training.

GK's trainers did not as closely follow the other two WHO recommendations, practicing on pregnant women and skill sharing. While it would have been ideal to practice examining pregnant women, this was not feasible in the GK training. Finding a pregnant woman to be part of the training was logistically difficult and could risk the health of the fetus if a mistake was made during examinations. There was one night during the Sreepur training where a delivery did take place and some of the TBAs had the opportunity to examine the woman, but this was not part of the training. In Vatshala one of the administrators was eight months pregnant but the training director was concerned that her low bodyweight and primigravida status would make repeated exams a risk to her fetus. Thus the majority of practical application of examinations and delivery were modeled with role-plays.

The final recommendation of skill sharing and allowing the TBAs to do most of the talking is one that could be used by GK. As mentioned earlier, the TBAs were given time and space to share their ideas, but most of the trainings involved their listening and watching. This is important to introduce many new concepts, but there were times in the training where breaking variation in the schedule of video and lectures would have allowed for more practical discussion, skill sharing and learning.

Overall, however, it is clear that, while the GK training did not intend to train according to the WHO recommendations, their program included the majority of these recommendations. The training also incorporated many of the educational principles that are seen as most effective in teaching. However, it is impossible to promote a training without assessment. This is the one crucial component of the training that was not seen in either training.

Assessment could have been in the form of practicum for all the TBAs. They could have been partnered and watched individually in the areas of fetal exam, delivery, cord cutting and wrapping. They also could have been orally quizzed on the many other topics covered in the training, such as proper ANC, nutrition, signs of complications and infant health care. As mentioned in Paper One, this assessment does not have to be summative and would be designed as a way to reinforce the knowledge introduced in the training. However, given the overall goal of forming a linkage with the TBAs, the trainers have to be careful about maintaining a positive relationship with the TBAs. A formal assessment may not be welcomed and could be viewed with suspicion. This would counteract the goal of creating a community-centered learning environment.

B. Use of Quantitative Analysis

The surveys provided as part of this research project could be the first step in creating a tool of assessment for GK's training. They also provided important information about the TBAs background that can be useful in designing curricula that is learner, knowledge and community centered. The TBAs were all willing to answer the questions. Further, as seen in the results section, there were measurable improvements in knowledge and as well as topics without improvement. The areas and topics where improvement was either significant or non-significant can be further evaluated in terms of the content and methods used for the training. Thus the discussion here will use the observations of the training to analyze the survey results and make recommendations for future trainings.

1. Background Questions

There were several important reasons for asking the many background questions before GK's training. First it provides information about the particular TBAs in GK's regions. Given the broad roles TBAs play in their communities, asking specific questions can allow for a more detailed understanding of Bangladeshi TBAs, especially those specific to the areas in which GK is working. The questions about vocation choice, payment methods and delivery number vary greatly throughout the world and even in Bangladesh. Thus asking GK TBAs these questions allows for a more descriptive understanding of these TBAs.

These questions also provided information about access to skilled care in the community. Though not meant to provide definitive information on EmOC access, the questions concerning EmOC distance and access provide information not only about emergency care in the community but also the TBAs familiarity with it. Given the importance of referral in the case of an obstetric emergency, knowing where the closest EmOC facility is can determine whether a woman survives a complication.

An advantage of this project is the ability to survey TBAs from two distinct regions of Bangladesh. The background questions further elucidate the differences between these two groups, though it is first interesting to note the ways in which both groups are similar. Though the Vatshala TBAs live in a region that is more rural than Sreepur, there was very little difference in the distance of the closest EmOC. This question does not provide a factual basis for the location of EmOC but, as noted above, provides information about the TBAs' familiarity with local EmOC facilities. Further, the majority of both groups indicated that there is a facility within 4 km of their village. They

also did not indicate that the cost would be prohibitively expensive in case of an emergency, which is very important.

There also were very little differences in how the Vatshala and Sreepur TBAs feel about SBAs and their communities' opinion of their work. The majority in both locations answered affirmatively to both questions, suggesting that they have a positive relationship with SBAs and that their community supports their training. Clearly the nature in which this question was asked, by SBAs at a training, likely influenced the response. It is not surprising that the TBAs would feel obliged to answer affirmatively to the questions in this context. Thus it is difficult to draw any definitive conclusions from these results.

The nonsignificant differences in background are also important to note as much of the significance testing was influenced by the small sample size. Thus for questions about TBA history and recommendations there may in fact be significant differences that would be elucidated with a larger sample size. It is also possible that the relative homogeneity of most of rural Bangladesh would explain why all the TBAs were unlikely to be trained and had their vocation chosen for them. In terms of knowing the closest EmOC facility, it is not surprising that the TBAs would be familiar with GK given the effort put forth by GK health workers in recruitment and publicity.

The significant differences between the two groups were found in delivery number, payment method and opinion of hospital deliveries. Delivery number is key as more experience may influence delivery practices. The Vatshala TBAs indicated more delivery experience, possibly reflecting their more rural location. This could also be due to fewer TBAs in the region or their position in the community. It is not possible to

determine this without further qualitative and quantitative data gathering. A TBA who performs more deliveries provides more opportunities for incorporating the skills learned in the training though both groups of TBAs can practically apply what was covered in the training.

The question of payment is also important as 5% of the Sreepur TBAs indicated they receive no form of payment for their services while 23% of Vatshala TBAs volunteer. It would be good to explore the relationship of the TBA to her community in terms of obligation and reimbursement, though this clearly would entail more qualitative data collection beyond the scope of this project. What is important to note here is that the majority of the TBAs who participated in GK's trainings do receive some form of reimbursement, though usually in the form of gifts and barter. They are not practicing for a living wage. Indeed, most of the TBAs' time is spent performing duties of an ordinary villager and woman in the home, including harvesting grain, cooking and cleaning. Furthermore, the payment received by TBAs reflects the relationship of the TBA to the community and how much families are able to give. TBAs work in all levels of Bangldeshi society and may receive different compensation based on the class level of the woman they are assisting.

The most important finding of the background questions is the large difference in opinion of hospital deliveries in both training groups. The majority of Sreepur TBAs have a positive opinion of hospital deliveries while the majority of Vatshala TBAs have a less than favorable view of hospital deliveries. This question is critical for any TBA training program to evaluate. Given GK's stated goal of providing linkage with the TBAs to

ensure referral in the case of a complication, it is critical that the TBAs trust the hospital enough to send women in the case of an emergency.

It is possible that the Sreepur TBAs, living closer to the metropolitan capital of Dhaka, are more familiar with hospitals and have had more experiences with deliveries. There are hospitals in the Sherpur division in which the Vatshala TBAs live as well, however. This is also supported by lack of any measurable difference in distance of a known EmOC facility asked prior to the training. The hospitals could be of different quality or have different reputations that could influence the TBAs' opinion. Clearly, as with the other questions, no more information about the reasons for these results could be ascertained without detailed qualitative data collection. This data would most likely be in the form of interviews to further asses the TBAs' opinions and experiences with hospital deliveries. What is important for this study is the relationship of TBA opinion of hospital deliveries to how they responded to the assessment questions, and how they will likely respond in the case of a delivery complication.

2. Knowledge Based Questions

The knowledge-based questions were designed with the intention of both assessment of the TBAs baseline knowledge and the overall impact of the training. There were many more questions that were asked at the trainings, with the eight presented here being the ones where conclusive information was gathered both before and after each training. The questions provide valuable information about the TBAs and GK's training. This information is gleaned from both the significant and nonsignificant differences in pre and post-training responses.

a. Overall Improvement and Effect of Location

The most significant differences in pre and post-training responses was for the question concerning treatment of an apnic newborn, with the average improvement in both sites being from 23% to 86% of the TBAs selecting the better response. This improvement was not affected by the training location. It should be noted that there is no uniform agreement on the way to treat an apnic newborn in the home setting without a suction device. GK's recommendation of stimulating the back and providing mouth-to-mouth was chosen as the between response as it was heavily emphasized throughout the training and repeatedly practiced in role-plays. This concept was repeatedly addressed in both sites. Thus it is not surprising that the TBAs' responses to this question improved in accordance with the GK recommendations and suggests the training was effective in transmitting this piece of practical information.

The other significant finding was seen in the responses to treating PPH. Both trainings saw a majority of TBAs initially not select the hospital option, with the Sreepur TBAs being even less likely than Vatshala TBAs to indicate that they would send a woman to the hospital in case of PPH. This is an interesting finding given the Sreepur TBAs' proximity to an urban center with more hospitals and their positive opinion of hospital deliveries. It is possible that they have more confidence in their ability to manage PPH in the home, but this cannot be assessed without more qualitative investigation. There was a lot of time spent in the training on the importance of sending a woman to the hospital in case of PPH. There was no way to role-play care for PPH, though there was a lot on content devoted to it in the training videos. Emphasizing the importance of sending

a woman to the hospital in the case of PPH is a simple concept to transmit and one that obviously is effective in the case of GK's training.

There was also a significant improvement in the TBAs' response to measuring blood loss following the Sreepur training. The goal of this question and section in the training dealt with the importance of observing blood loss in a delivery. It would be quite difficult to measure the exact amount of blood loss in a home delivery but using materials like plastic, cloths and clothing makes it easier for the TBA to determine if bleeding has been excessive. There is no true consensus on how much blood constitutes a life-threatening condition, but if a woman's blood soaks through several pieces of clothing and pools on a plastic sheet, a TBA would be better able to visualize the risk. Thus the use of materials was emphasized in the training. Every delivery role-play began with a trainer laying down sheets or plastic on an improvised delivery table.

There was not a measured improvement in responses to measuring blood loss in the Vatshala training because the vast majority (80%) indicated before the training that they would use cloths and plastic sheets to measure blood. However, it is interesting to note that while less than half of the Sreepur TBAs initially selected the better answer for this question; they were more likely to select better answer after the training than the Vatshala TBAs. This difference is significant and could indicate that the Sreepur TBAs were more likely to learn the new information presented in the training. It could also be possible that there was a difference in training time devoted to measuring blood loss between the two trainings. As indicated above, there was more time overall in the Sreepur training and thus more repetition of concepts that are not as obvious as measuring blood

loss. Again it is not possible to know the reasons behind the difference in significance but there was clearly a positive impact of teaching this material in the Sreepur training.

The only other improvement seen before and after the training was for treatment of convulsions. This was a very important question to ask and concept to cover. As discussed earlier, there is almost nothing a TBA can do to treat the life-threatening effects of eclampsia without access to an EmOC facility. Thus it is crucial for trainers to emphasize the importance of referral in the case of convulsions. The majority of TBAs (86.7%) from both groups initially selected the correct answer for this question and 100% selected the correct answer at the end of the training, which is a very good result. Both training groups saw an improvement in responses to this question, but only Vatshala's was significant. This is likely because Vatshala TBAs had a lower percentage of correct responses prior to the training. However, the most important result of this question is the 100% correct response rate at the end.

Ensuring the proper referral of a woman having convulsions is an essential component of delivery care. GK's training was successful in transmitting this information. However, the positive results of this question do not mean that the TBAs will put this information into practice. The only way to measure success in this area would be to study the rate of referral for eclampsia in the community. Given its rarity as well as logistical difficulties in studying outcomes, it would be quite difficult to measure a significant improvement in referral rates in the field. What is more important here is to encourage trainers to continue to emphasize the necessity of referral.

b. Influence of Background Questions

All questions where significant improvement was found before and after the training were reanalyzed, controlling for variables that were most likely to affect knowledge. These were determined to be training history, delivery number and opinion of hospital delivery. The reasons for selecting these variables was described in the methods section.

Prior training had the most unexpected effect on the survey responses. As expected, those without training were significant less likely to initially select the correct answer for three of the four significant findings. Only measuring blood loss saw an equal baseline response for TBAs with and without training experience. However, with the exception of convulsion treatment, TBAs without training experience were significantly more likely to select the correct response at the end of the training. Thus not only did they have higher rates of measured correct responses, they also had a larger improvement overall.

There are many possible explanations for this phenomenon, though none can be proven here. The better initial response for TBAs with training history can be understood by the likely exposure to these concepts prior to GK's training. It may be possible that they also thought they had a baseline of knowledge that prevented them from paying more attention in the GK training. It may have been helpful to use the TBAs with training history to demonstrate the skills they had been shown previously. This would have allowed for a more community-centered environment.

Those without training history may have been more excited to learn the information and were able to retain it better at the end of the trainings. None of these

explanations can be proven, however. They should be looked at only as ideas that could help improve GK's training and as considerations for other organizations interested in both conducting and evaluating TBA trainings. The goal should be to have all participants improve their knowledge.

The effect of delivery experience also had paradoxical findings similar to those found for training history. Those with less delivery experience were less likely to chose the correct response at baseline for treating an apnic newborn, managing PPH and measuring blood loss but significantly more likely to choose the correct response for all three questions after the training. For measuring blood loss, the significant improvement was only seen in those with less delivery experience. From the background questions, we should remember that Sreepur TBAs had significantly less delivery experience than Vatshala TBAs. Thus it is understandable that the improvement in this question came only from the Sreepur cohort.

There are many explanations for why less delivery experience leads to more significant improvements in before and after training responses. As with training history, it is possible that those with more experience did not pay as close attention in the training. They may have thought their experience provided them more knowledge. They also may not have taken the surveys as seriously. There could also have been a difference in training content between the two training sites. As mentioned earlier, there was more time devoted to teaching at the Sreepur training, based on the continuous nature of the training. Thus those TBAs with less delivery experience, who were mainly from Sreepur, could have had more time to learn the information and thus performed better on the surveys.

As with the effect of training history, it is not possible to know the causes for the effect of delivery number on training experience. It is not clear whether the outcome is based on delivery number or training site difference. There was no difference in training history between the two sites yet there was still this paradoxical finding. It may be that experience was more a factor in influencing how the TBAs paid attention to and integrated the knowledge presented in the training. What is most important here are the implications for GK's training. The trainers could use the disparity to address those with more experience in the classroom and ensure that they are interested and engaged.

The TBAs initial opinion of hospital deliveries had more of a varied influence on their response to the survey questions. Those with less than positive opinions were less likely to choose the correct initial response to treating birth apnea and managing convulsions but more likely to choose the correct response to measuring blood loss and managing PPH. What is interesting here is that the only questions that dealt with the importance of hospital care where those asking about managing convulsions and PPH. Yet there was not consistency in the initially response. One would assume that a TBA would be less likely to send a woman to the hospital if she had a lesser opinion of hospital deliveries, but especially for the management of PPH, this was not the case. It is impossible to explain these findings without further qualitative data gathering, most likely in the form of interviews with the TBAs. It is possible that opinion of hospital deliveries and emergency care are different. Thus one would prefer to deliver at home but there is an understanding that hospitals do provide life saving care.

Those with positive opinions of hospital deliveries were also more likely to select the correct response to treating an apnic newborn and measuring blood after the training,

with there being no difference for managing PPH and convulsions. There was significant improvement for TBAs regardless of hospital delivery for managing an apnic newborn and PPH but only those with favorable views saw significant improvement in answering the question of blood loss. This is likely because those with negative views already had positive response rates. The significance seen in the treatment of convulsions was only confined to those with negative views of hospital deliveries, which is attributed to the fact that this group had a lower initially correct response rate.

There are few explanations for the varied responses to questions based on hospital opinions. Of note is the fact that the majority of those with lesser opinion of hospital deliveries were from the Vatshala training. Thus the two groups did have different trainings and differences in their improvements to the knowledge-based questions. Indeed, the difference in improvement for all questions based on opinion of hospital delivery follows the same pattern of significant seen for the two training sites (see table 5). A more likely explanation for these findings is not the effect of opinion of hospital deliveries on the knowledge gained and retained in the training, but a likely difference in training information transmitted. The lack of a trend for the significance based on hospital opinion points more towards the training rather than the influence of opinion.

Given the overall significance of the questions presented above, is it clear the GK did have success in transmitting important information about the management of PPH, convulsion, newborn apnea and measuring blood loss. There was a difference seen in the training sites and based on background experience and opinions. While the content of the training was similar in both training locations, there were differences in the amount of time and some of the materials used. Further, there was a difference in the background of

the TBAs in both locations. This leads to a limitation in the conclusions that can be drawn from the training data. It is more important to understand the possible sources of significance than to draw any definitive conclusions about the surveys. This is not possible without much further data collection, mostly in the form of qualitative interviews with TBAs and analysis of the specific training differences.

c. Nonsignificant Results

There were four questions that did not result in any significant improvement overall or within a single training site. These were PPH prevention, clean delivery practices, ANC and maternal nutrition opinion. All of these questions saw the vast majority of TBAs from both training sites initially select the correct response. All questions saw improvement overall except the question of PPH management. This was due to the decrease in correct responses in the Sreepur training group. This decrease, however, was not significant and thus no conclusions can be drawn from these findings. More likely the lack of significant improvement in these four questions was due to the initially high rate of correct responses for each questions asked. This is positive information for GK and Bangladesh in general. It indicates that TBAs are familiar with healthy practices involving prevention, which is where they can be most useful.

These topics were also important to cover in the training as reinforcement for already positive practices. Further, it is possible that a larger sample size would have resulted in significant improvement in these areas. For the purposes of this study, these results suggest that the TBAs have a positive baseline understanding of preventive practices that should be reinforced, as they were in the training. There were repeated discussions and lectures covering hygiene, role-plays with hand washing, videos of ANC

and overheads of proper foods and amounts. Given the high baseline, it may have been helpful to make the topic of prevention even more discussion based, allowing the TBAs to share their knowledge and correct each other. This supports the knowledge and community centered learning environments that would be most helpful in TBA training. Clearly, however, there was success in transmitting this information, given the near perfect responses for these questions after the training.

III. Conclusion

The goal of this study was to evaluate a TBA training program and to provide a model for evaluating training outcomes. The goals were both specific to GK in terms of suggestions for future training and also relevant to the international community in addressing many of the misconceptions regarding the importance of TBA training.

GK's goal for the training was to create a linkage with TBAs in the community that would lead to improved referral. They also sought to encourage TBAs to practice preventative care and recognize complications. Their goals were very much in line with the 1994 WHO recommendations for TBA training. The results of the qualitative portion of this study demonstrate their success in covering nearly all the topics recommended. Whether or not the topics were successfully transmitted, however, was the reason behind the knowledge assessment.

There are many ways in which the studied training was a positive example of a TBA training. There were obvious improvements in knowledge after the training, especially in important content areas. Questions related to delivery complications, hemorrhage and eclampsia, resulted in significant improvements in knowing the importance of referral. Given the repeated mention of the importance of referral here, this

finding is a very positive result of the study. The other two significant improvements were related to measuring blood loss, a crucial step in preventing severe PPH, and treating an apnic newborn. These are critical elements to providing proper maternal and reproductive healthcare at household level and can potentially save lives. Clearly the GK training was successful in transmitting this information.

The nonsignificant results can also be viewed as a positive outcome as they were clearly due to high baseline knowledge about hygienic delivery, ANC, maternal nutrition and PPH prevention. The high baseline knowledge supports GK's promotion of their use. They can effectively use their support of ANC, good maternal nutrition and hygienic delivery for the benefit of local pregnant women. The Bangladeshi government's stress on skilled care is important as skilled care should be the goal but may deny the important role TBAs can play in their society. As mentioned earlier, TBAs may be the first to recognize not only a delivery problem, but also an abortion complication or a domestic violence situation in a woman's household. GK made the determination to take advantage of their role and has a unique niche in the community because of its dedication to health at the community level.

The positive findings of this study do not negate the many areas in which GK's training can in fact be improved. The importance of more participation and skill sharing, fewer lectures and videos and a more community-centered approach should be emphasized to improve the training. These elements will hopefully ensure that all TBAs leave the training selecting the correct response.

The training alone, however, may not account for the lack of differences in knowledge retention. Results show that TBAs' background plays an important role in

how they respond to new knowledge. This is important for the GK trainers to understand but also to serve as an example to any organization that seeks to train TBAs. This study demonstrated that not only does a TBAs background affect her knowledge acquisition but that there can be a great amount of diversity within a small region. GK's trainers and all people seeking to design a training that encompasses more than one site should note this. Knowing who the participants are can significantly impact how knowledge is transmitted.

The global implications of this study are also very significant. TBA training and utilization continues to be controversial among international health organizations. This topic was addressed at length in Paper I. As noted earlier, there is a dearth of information on the specifics of any given training. Thus there can be no real conclusions drawn from the failure of maternal mortality rates to improve after a training as it may very well be the failure of the training and not the TBAs. This study is novel in its approach as it provides both a qualitative and a quantitative approach to studying TBA training. What remains to be seen, however, is whether or not the improved knowledge seen in after GK's training correlates to improved care in the community and thus timely identification of complications and higher referrals rates. This would be a crucial component of any follow-up study. A follow-up should include assessment of the same knowledge-based questions as well as a comparison of referral rates before and after the training.

It is necessary to acknowledge the many ways in which a TBA cannot save a woman's life in the case of a delivery complication. For example, in the case of eclampsia, the need for emergency pharmacological treatment has already been discussed. Another example is the need for emergency surgery for a torn cervical artery and hemorrhage. New technology such as the use of misoprostol tablets offer promising

hope for managing PPH at home. In the case of eclampsia, severe infection and some cases of PPH, emergency intervention is required, and therefore access to EmOC should be supported. This same argument has been used to support the emphasis on skilled care in developing nations and to disregard TBAs. Skilled care can and should be promoted, but simply focusing time and resources into new hospitals or training programs ignores the fact that women in developing nations will continue to use TBAs at home. Without effective linkage to the women in need, there is no use for the skilled care facilities. In fact in many developing countries' rural maternity wards, when they exist, are underutilized.

This is perhaps the area in which GK's training can serve as the greatest example. GK's emphasis on providing a linkage with the TBAs is the most likely method by which to ensure improved delivery care in the region. GK's history and emphasis on providing care to those most in need has necessitated this approach, given the important role of TBAs in Bangladesh. Other organizations can learn from this focus to design their training programs to place maximal emphasis on referral. This is dependant on access to skilled care, however. In many parts of the world this is not a reality and thus TBAs are the only resource a woman has. It is important to fund EmOC facility development but not at the expense of ignoring TBAs and how they can contribute to maternal and newborn health.

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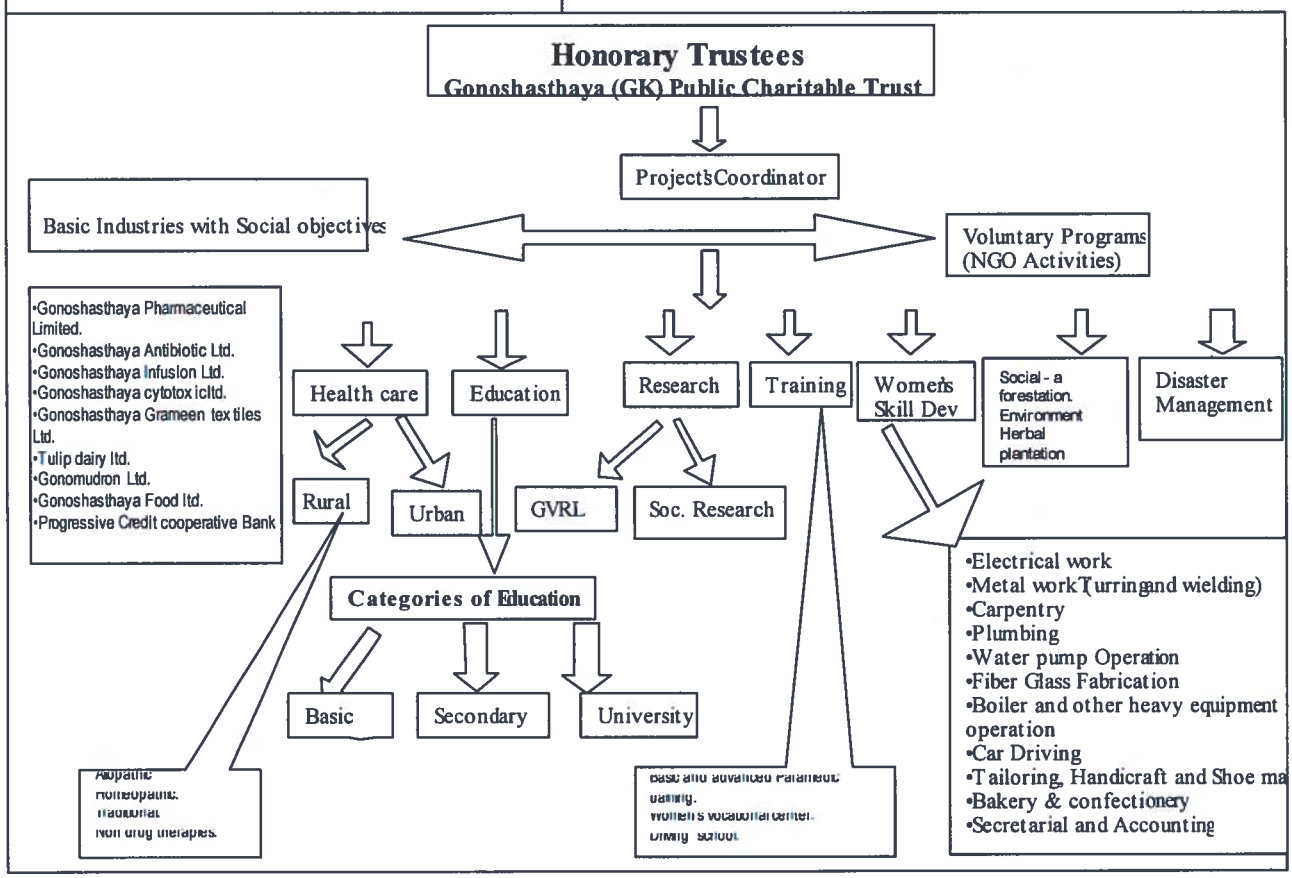
Appendix 1: GK Program Structure



Appendix 2: Training Surveys
Registration Questions

Date:
Location:

1. How did you become a TBA?
    a. mother was a TBA
    b. chose in childhood/adolescence
    c. chose in adulthood (>16)
    d. family chose vocation
    e. husband chose vocation
    f. other:

2. How many deliveries do you participate in each year?
    a. 1-2
    b. 3-5
    c. 6-9
    d. 10-15
    e. >15

3. What forms of training did you have prior to working with GK?
    a. no training
    b. government training (number, length, location)
    c. other NGO training (number, length, location)
    d. apprenticeship (number, length, location)
    e. other (specify):

4. How did you hear about GK's training?
    a. GK health worker
    b. Other TBAs
    c. Village members
    d. Other (specify):

5. What is your income from participation in deliveries?
    a. none
    b. 100 T
    c. 200-400 T
    d. >500 T
    e. Barter: sari, oil etc.

6. Where is the closest health center for emergency obstetric care (EOC)?
    a. government: name and location
    b. GK: name and location
    c. private clinic: name and location
    d. other: name and location

7. How far is the nearest SBA?
    a. very near: distance, form of transport and cost
    b. moderately far: distance, form of transport and cost
    c. distant: distance, form of transport and cost

8. How do you feel about hospital deliveries in your village?
    a. they are no different from home deliveries
    b. they are better than home deliveries
    c. they are worse than home deliveries
    d. other (specify):

9. I feel that "trained" health professionals value my profession?
    a. Strongly disagree
    b. Somewhat disagree
    c. Somewhat agree
    d. Strongly agree
    e. No opinion

10. Do you provide family planning information?
    a. no
    b. yes, specify: pills, condoms, IUD, injection, norplant

11. What were your initial thoughts about participating in the training?
    a. no opinion
    b. was not trusting
    c. was excited
    d. other (specify):

12. How do the woman and families you work with feel about your participation in the training?
    a. They do not know
    b. They do not trust GK
    c. They like that I do training
    d. They have no opinion of my participation
    e. Other:

Training Assessment (asked at beginning and end)

1 What measures do you now take to ensure clean deliveries?
   a. nothing
   b. wash hands
   c. boil instruments
   d. cleaned instruments with soap
   e. other (specify)

2. How would you measure excessive blood loss?
   a. Just watch the vulva for a time
   b. by observing soaks cloth under her
   c. by setting plastic sheets on delivery bed after membrane ruptures
   d. by observing symptoms

3. Do you take any measures to prevent excessive blood loss? If yes, then
   a. start early breastfeeding
   b. give fundal massage
   c. give oral medicine(specify)
   d. control cord traction
   e. give injections (specify)

4. How do you treat excessive blood loss?
   f. insert hand into vagina and press on uterus
   g. nothing
   h. go to hosp
   i. oral med (specify)
   j. injection (specify)
   k. other (specify):

5. What do you do if a woman starts convulsing?
   a. nothing
   b. call hospital
   c. village doctor
   d. traditional healer, iman(religious leader)
   e. other (specify):

6. What is your opinion on antenatal care?
   a. no need
   b. it causes no harm
   c. it is only a problem
   d. it should be done regularly

7. What is your opinion on nutrition during pregnancy?
   a. excess food, some examples:.....
   b. less food
   c. normal amount of food

d. iron and folic acid supplements
e. other

8. What do you do when a baby doesn't breathe?
   a. nothing
   b. upside down and slap back
   c. shake baby and don't cut cord, blow air in face
   d. rub baby and clean mouth and nose, wrap dry clothes stimulate back
   e. other (specify)

Appendix 3: Significant responses according to Selected Background variables

Table 6 Significance according to Background variables								
	By Training							
Question	Measured difference in correct responses		No Training n=31			Any Training n=13		
	before	after	Before	After	*Difference*	Before	After	*Difference*
Apnic newborn	**p=.0032**	**p=<.001**	20	90	**p=<.001**	31	77	**p=.016**
Manage PPH	**p<.001**	**p=.02**	38	81	**p=.0002**	23	69	**p=.016**
Measure blood loss	p=.98	**p<.001**	69	97	**p=.0024**	62	77	p=.42
Convulsion	**p=.0004**	N/A	84	**100**	**p=.02**	92	100	p=.32
	By Delivery Number							
Question	Measured difference in correct responses		<1 delivery/month n=15			>1 delivery/month n=29		
	Before	After	Before	After	*Difference*	Before	After	*Difference*
Apnic newborn	p=.14	**P< .001**	18	1	**p=<.001**	23	79	**p=<.001**
Manage PPH	**p=.02**	**p<.001**	27	87	**p=.0004**	34	76	**p=.0012**
Measure blood loss	**p=.0004**	**p<.001**	60	100	**p=.0048**	72	86	p=.2
Convulsion	**P=.014**	**NA**	93.3	100	p=.32	86	100	**p=.04**
	By Hospital Opinion							
Question	Measured difference in correct responses		Negative/neutral n=19			Positive n=25		
	Before	After	Before	After	*Difference*	Before	After	*Difference*
Apnic newborn	**p=.044**	**p=.0036**	21	84	**p=<.001**	28	91	**p<.001**
Manage PPH	**p<.001**	p=.72	45	80	**p=.02**	25	79	**p<.001**
Measure blood loss	**P<.001**	**p<.001**	75	85	p=.44	58	96	**p=.001**
Convulsion	**p<.001**	NA	80	100	**p=.04**	92	100	p=.15