WORKING WITH MIDWIVES TO IMPROVE MATERNAL HEALTH IN RURAL GHANA

TRAVAILLER AVEC LES SAGES-FEMMES POUR L'AMÉLIORATION DE LA SANTÉ MATERNELLE EN MILIEU RURAL AU GHANA

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ABSTRACT
This paper describes the implementation and evaluation of a safe motherhood project in rural Ghana. This project included a partograph and emergency skills program for rural midwives, training and monitoring traditional birth attendants (TBAs), a blood bank and an emergency obstetric transport service. The midwives' roles in caring for women in rural health centres, training and monitoring traditional birth attendants (TBAs) and in emergency obstetric transport are described. In this rural area of Ghana TBAs are responsible for approximately 65% of women in the district during birth. It is important to include them in projects to improve maternal health.

The results of process evaluation showed that the rural maternal health system was improved by the project activities through a good communication system, better support for rural midwives, better integration of traditional birth attendants into the health care system and more community involvement. Outcomes included an increase in the number of referrals of women with risk factors and complications to the district hospital, no cases of prolonged obstructed labour in the group of mothers cared for by rural midwives and trained TBAs, a comprehensive recording and reporting system for women cared for by TBAs, and a well established emergency obstetric transport service.

Integration of the TBAs into the health care system has had positive effects on TBA practice and morale. However, some TBAs had problems receiving remuneration for their work due to cultural beliefs and practices. The authors conclude that community education and participation are key components of safe motherhood projects.

KEY WORDS
safe motherhood, maternal mortality/morbidity, rural midwives, partograph training, referral of women at risk, traditional birth attendants, emergency obstetric transport

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RÉSUMÉ
Ce travail décrit la mise en oeuvre ainsi que l'évaluation d'un projet de maternité sans risques, en milieu rural, au Ghana. Ce projet comprenait un programme portant sur le partogramme ainsi que sur les urgences obstétriques pour les sages-femmes en milieu rural, la formation et le monitorage des accoucheuses traditionnelles (TBA), une banque de sang, ainsi qu'un service de transport pour les urgences obstétriques. Ce travail comprend également la description des différentes fonctions des sages-femmes en ce qui a trait aux soins prodigués aux femmes dans les centres de santé en milieu rural, à la formation et au monitorage des accoucheuses traditionnelles ainsi qu'au transfert en cas d'urgences obstétriques. Lors des accouchements, les accoucheuses traditionnelles sont responsables d'environ 65% des femmes dans cette région rurale du Ghana. Il est donc important de les inclure dans des projets visant l'amélioration la santé

maternelle.

Les résultats des évaluations des procédures ont démontré que le système de santé maternelle rural fut amélioré par les activités de ce projet, et ce, par le biais d'un bon système de communication, d'un meilleur soutien pour les sages-femmes en milieu rural, d'une meilleure intégration des accoucheuses traditionnelles au sein du système de soins de santé ainsi que par une participation plus importante de la part de la communauté. Parmis les résultats, on a pu remarquer une hausse dans le nombre d'aiguillages vers le centre hospitalier de la région pour les femmes qui avaient des facteurs de risques et des complications. Il n'y a eu aucun cas de travail prolongé ou d'arrêt de travail dans le groupe de femmes suivies par les sages-femmes rurales et les accoucheuses traditionnelles formées. D'autres résultats furent, la mise en oeuvre d'un système d'enregistrement et de reportage détaillé des femmes suivies par les accoucheuses traditionnelles ainsi qu'un service de transport bien établi pour les cas d'urgences obstétriques.

L'intégration des accoucheuses traditionnelles au sein du système de soins de santé a eu des impacts positifs en ce qui a trait aux pratiques et au moral des accoucheuses traditionnelles. Toutefois, certaines accoucheuses traditionnelles étaient réticentes à l'idée de se faire rémunérer pour leur travail, et ce, à cause de leurs croyances et pratiques culturelles. Les auteurs concluent que l'éducation et la participation des membres de la communauté sont les éléments clés des projets de maternité sans risques.

MOTS CLÉS
maternité sans risques, mortalité/morbidité maternelle, sages-femmes en milieu rural, formation pour l'utilisation du partogramme, aiguillage des femmes à risques, accoucheuses traditionnelles, transport en cas d'urgences obstétriques

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INTRODUCTION

Problems in maternal health in developing countries are well-known. The numbers of women who die in childbirth vary across the world, but the reported statistics suggest that for every 100,000 live births in Africa, as many as 979 women die in childbirth.[1] Death and disability rates are further affected by war, famine and other natural disasters, the responses to which are usually beyond the developing country's resources. The major causes of death in childbirth are hemorrhage, pregnancy-induced hypertension and infections. An even higher number of women suffer injury related to childbirth, such as obstetric fistula. The physical consequences of obstetric fistula for the woman include bowel and bladder incontinence, skin excoriation and infertility. The social consequences of these problems to the woman and her family are devastating.

There are three major factors associated with maternal mortality and morbidity. These are known as "the three delays":

- delay in identifying the problem
- delay in transportation
- delay in intervention in a timely manner at the referral hospital[2]

Strategies to address the delays are a crucial component of any safe motherhood project. The World Health Organization (WHO) and other national and international agencies have called on governments to support initiatives to address maternal health problems. Midwives are central to the care of mothers and babies during childbirth. Therefore, involvement of midwives in any strategies to address maternal health problems is critical to the improvement in maternal and infant health outcomes.

The purpose of this paper is to describe a collaborative Canada-Ghana safe motherhood project between MaterCare International, a Canadian non-government organization, and the Diocesan Health Committee, Catholic Diocese of Sunyani, Brong Ahafo Region, Ghana. The project implementation and evaluation for the period 1999 to 2003 will be described and some of the challenges and issues that arise in international

projects will be discussed.

PROJECT DESCRIPTION

In 1998, a safe motherhood project was established in a rural district in the Brong Ahafo region in central-west Ghana. The project covered six rural maternity centres of 11 in the district. We had hoped to include all health centres, but five of the centres were not staffed by midwives and did not offer maternity care.

The project was carried out in two phases. Phase one was from mid-1998 to July 2001 and phase two was from August 2001 to July 2003. The project team in Ghana consisted of a midwife who was also a public health nurse, a project assistant who collected the evaluation data, the local medical director and, on intermittent visits, the Canadian nursing and midwifery consultant and the Ghana and Canada medical directors who were consultant obstetricians.

The overall project goals were to:

- improve maternal health by lowering maternal mortality and morbidity rates in the district of Nkoranza, Brong Ahafo Region, Ghana
- develop an integrated maternal health service linking the rural areas with the district hospital

The major objectives were to:

- establish use of the partograph to monitor and record the progress of labour for all labouring women in six rural health centres
- identify and train all traditional birth attendants in the project area to conduct a clean, safe birth and recognize and refer women with risk conditions or complications in childbirth to the local health centre or the district hospital
- establish an emergency obstetric transport service (EOTS) linking the rural areas with the referral hospital
- establish a maternity blood bank at the district hospital

Nkoranza district is one of 13 administrative districts in the Brong Ahafo Region. It is situated in the mid-west part of Ghana and covers an area of 1200 square kilometres. The people of the district are mainly farmers producing maize, yam, cassava, beans, groundnut, and rice. There are about 191 communities in the district totaling a population of about 139,690. There are no telephones in the villages and transportation from the villages to the town is a problem due to bad roads, especially in the rainy season. Few villagers have cars.

As in most developing countries, maternal death is not uncommon and perinatal death is even more common. In Ghana, the maternal mortality to live birth ratios in 1993 were estimated to be 214:100,000, but there were wide regional variations. A recent survey in Brong Ahafo region showed maternal mortality rates of 212-328 per 100,000 live births.[3] In the year prior to the start of the project (1997) there were four recorded maternal deaths in 790 in-hospital births at one hospital, a ratio of 506:100,000 live births. There were anecdotal reports from the midwives and doctors of women who died having arrived in critical condition at the hospital. The maternal and perinatal mortality rates in the villages for out-of-hospital births at this time were not known as there were no systematic comprehensive data collected in the 191, mostly rural, communities in the district. Many births took place in the village with some trained, but most untrained, traditional birth attendants.

Midwives in the health clinic and hospital setting

In Ghana, most midwives are educated as nurses first and then attend midwifery school. Ghana's colonial past is linked to Britain and the midwifery education and practice models are similar to the British system. Most programs are hospital diploma based and midwives' practice takes place either in the hospital setting, or in the community as government employees. Community midwifery practice is based in rural health centres. Each health centre is staffed by a nurse, a midwife and, sometimes, a physician assistant. Some midwives and nurses have specialized community health qualifications. The government provides motorbikes to enable the public health nurse or midwife to visit her large district, but a shortage of gasoline or vehicle breakdown makes outreach difficult. As well, only the bravest midwife will venture alone by motorbike to visit the outlying villages in her district because of the bad roads, isolation and distance. In talking to midwives, I have heard that salaries and morale are low.

The hospital midwife works shifts in the small combined pre-, intra- and postpartum unit. The

hospital, run by the local diocesan health committee, is better equipped with basic supplies compared with some of the government hospitals.

PROJECT ACTIVITIES

The first step in the project was to provide a course to upgrade the partograph and emergency obstetric skills of the rural midwives. The World Health Organization (WHO) recommends the use of a partograph (a graph for monitoring and assessment of cervical dilatation and fetal head descent over time), which alerts the midwife to the need for maternal transfer to hospital for prolonged labour. For some of the midwives it was a refresher course; for some it was new material. A midwifery lecturer from the regional school of midwifery taught the partograph course and the Ghanaian consultant obstetrician to the project taught emergency obstetric skills. The health centres were supplied with partographs. A system of data collection for evaluation of partograph use was established. Data included the number of births at each maternity centre, the number of partographs used, the number of referrals to the hospital (particularly those referred for prolonged labour), the number of mothers who were in partograph categories 2 and 3 (those who had reached the alert or action lines) who were not referred, and maternal and perinatal outcomes.

Training of traditional birth attendants (TBAs)

The second step was to identify and train the TBAs. The local project team visited the villages in the project area and asked the TBAs to come forward. If there was no TBA, the village committees were asked to recommend someone from each of their communities for training. One hundred and thirty-one TBAs were identified and trained in the first phase. A few TBAs declined training. In the second phase, another 35 were trained. Each training session took place over a two-week period and was conducted by the project team and a TBA trainer from the Ministry of Health.

Topics included clean, hygienic delivery, care of the newborn, recognition of childbirth risk factors, and signs and symptoms of complications. For the risk factors and complications, we used a pictograph (a set of drawings of the major complications of pregnancy, labour and postpartum) that we had used for a similar project in Nigeria. The pictograph drawings included pregnancy-induced hypertension, very short stature, the schoolgirl, antepartum hemorrhage, previous Caesarean birth (uterine scar), prolonged labour, breech presentation, twin pregnancy, postpartum hemorrhage, retained placenta, and grand multipara. If the TBA checked one of these pictures for any of her clients she was instructed to refer the woman to the health centre, or if more appropriate, directly to the hospital.

After the TBAs were trained they were supplied with delivery kits and pictographs. Initially, the project team monitored TBA practice, but it gradually evolved to the health centre midwives to monitor the TBAs in their own district. A system for data collection was established throughout the TBA project to evaluate process and outcomes.

There were no reliable statistics of maternal deaths in the villages prior to the project. This made a pre- and post-test evaluation of project outcomes not feasible. However, useful descriptive statistics and qualitative data for process and outcome evaluation were obtained. Data collection for this component included the number of TBAs trained and still practicing, the number of mothers who gave birth with the TBAs, the use and accuracy of the pictographs, the number of referrals to the hospital or health centre, and maternal and perinatal outcomes.

The blood bank

The laboratory at the district hospital was provided with the essential equipment for safe collection and transfusion of blood for obstetric emergencies.

Emergency obstetric transport service

In January 2000 the emergency obstetric transport service (EOTS) was established. A land rover ambulance was equipped with emergency supplies. A midwife from the hospital was assigned to the emergency transport system. An instruction manual was developed for all personnel and the community and TBAs were informed about the service. Most important, a radio communication system was set up, linking each of the health centres with the maternity unit. The radio system was solar-powered and generally worked well, although problems occurred due to atmospheric conditions at one health centre during the rainy season.

The data collected on the EOTS included the person who initiated the ambulance call, reasons for referral, any treatments required en route, treatments on arrival at the hospital and maternal and perinatal outcomes. As well, we collected information on the emergency response time from the midwife's call for help to the woman's arrival at the hospital. Instances when the system failed for some reason were analysed and remedial action was taken, as necessary. Information was also collected on the cost of gasoline, vehicle maintenance etc. The midwife assigned to the service was responsible for keeping the ambulance stocked with emergency supplies.

PROJECT OUTCOMES

Evaluation was done on an ongoing basis by the Canadian nursing and midwifery consultant and, at the end of the fourth year of the project, by independent evaluators.[4] The system worked well to link the traditional birth attendants, the rural health centres and midwives to the district hospital. The radio communication system was considered a great benefit as the health centre midwives could contact the maternity unit for advice as well as summon the ambulance, as needed.

The primary aim of the project was to link the TBAs with the health care system through the health centres. However, TBAs were encouraged to refer either to the health centre or the hospital directly, depending on the circumstances. The TBAs complained that some of the hospital midwives did not welcome them when they brought their pregnant women to the hospital, but relationships improved over time as the hospital midwives became more oriented to the project. The trained TBAs were highly motivated and, if they had problems in the villages, they readily consulted with the health centre midwife and referred when necessary. Most women attended the antenatal clinics at the health centres even if they planned to give birth in the village with the TBA. Over the life of the project the number of referrals from the TBAs both to the hospital and the health centres increased.

The partograph project

Throughout the project, the consultant reviewed all partographs for use and accuracy. Ongoing support and advice was given as necessary. An independent evaluation of partograph use found that partographs were used for the majority of births and non-completion was usually due to the woman arriving at the health centre fully dilated (Table 1). A Midwife Competency Checklist was used to assess the accuracy of 50 randomly selected partographs. This found that 65% of partographs were completed correctly. The majority of items not completed or incompletely recorded related to whether drugs were given. However, other than ergometrine for the mother and vitamin K for the baby, drugs are rarely used in the health centres.

A review of partographs of mothers referred to the hospital for prolonged labour found that all the mothers in the sample had been referred from the health centre before they reached the "action" line on the partograph.[4] The evaluators suggested that this indicated the women were transferred too early. Given the difficulties in transportation (the average ambulance response time from reception of the call to arrival at the maternity unit was 72 minutes), it is

Table 1:
Partograph use and maternal and perinatal outcomes for rural midwives (1999-2002)

Indicator	1999	2000	2001	2002	Total
# deliveries by midwives	575	644	802	768	2789
# partographs used	404 (70.3%)	534 (83%)	642 (80%)	626 (81.5%)	2206 (79%)
# referrals for complications	103 (18%)	123 (19%)	82 (10%)	84 (11%)	392 (14%)
PPH	13	18	15	19	65
Perinatal deaths (SB and NND)	15 (26:1000)	10 (15:1000)	19 (24:1000)	14 (18:1000)	58 (21:1000)
Maternal death	1	0	1	0	2 (71:100,000)

difficult to criticize the midwife's judgement in these cases.

Local health authorities recommended referral of primiparas to the hospital for birth. However, some primiparas gave birth in the health centres, particularly those furthest from the hospital. Other primiparas gave birth in the village. This was usually due to the woman's choice, or arrival at the health centre or TBA too late for transfer. There were no cases of prolonged obstructed labour in women cared for by health centre midwives or the trained TBAs. Sixteen point five percent of mothers had a postpartum hemorrhage and one of these mothers died. The maternal and perinatal mortality rates calculated for the group for 1999-2002 were 71:100,000 and 21:1000 respectively.

Training and monitoring TBAs

TBA referrals of women with risk factors or complications in labour to the health centre or hospital increased over the life of the project. For example, 116 mothers were referred to the health centre from 1999-2001. The midwives were able to care for 65 (56%) of the women at the health centre and transferred 51 (44%) to the district hospital. During the second phase, 381 referrals were made, of which 160 were referred to the health centre and treated there. Of the mothers transferred to the district hospital, 35% received potentially life-saving interventions. Most of the mothers who gave birth without complications were primiparas. Grand multiparas were referred because they were considered to have risk factors.

The role of the health centre midwives was crucial in the follow-up, support and monitoring of TBAs after they had been trained. In the first phase of the project (1999-2001), the project team conducted the monitoring and support of the trained TBAs. Monitoring sessions included visits to the villages to meet the TBAs, inspect the delivery kits, review the use of the pictograph, and correct and complete them as necessary. The TBAs were also asked about any other births that may have occurred in the village and whether there were any untoward circumstances or adverse outcomes. Continuing education was an important focus of the visits. For example, after a newborn died because the cord ligature slipped, sessions were held to reinforce the method and importance of cord ligature.

Sustainability after the project ended was an important consideration. For the second phase of the project (2001-2003), monitoring and support was handed over to the health centre midwives. This was already a role assigned to the rural health centre midwives by the Ministry of Health, but monitoring was sporadic and incomplete because of transportation problems. Motorbikes were provided for community outreach, but they were often inoperable due to lack of gasoline and lack of repairs. Only the most intrepid midwives would venture out on the roads after two of them sustained broken limbs. Following consultations, the midwives felt that market days were good days for centralized monitoring. Most women travel to the central village for market day and the midwife met the TBAs at a convenient location for monitoring on selected market days. Generally, this worked well, but some TBAs would forget to bring their kits and pictographs for inspection and others were absent. In these cases the midwife followed up in the villages.

The emergency obstetric transport service

The average response time for the ambulance was 100 minutes during the first phase of the project. Delays occurred due to problems contacting an ambulance driver until walkie-talkie radios were given to the driver on call. During the second phase of the project, the response time was reduced to 73 minutes. However, in some emergency situations, the midwife sent the woman to the hospital by taxi or private transport to save time.

MATERNAL AND PERINATAL OUTCOMES

We monitored and documented all cases of maternal death in the villages, health centres and mothers referred from the area covered by the project throughout both phases of the project. The total numbers of births and deaths that occurred in the hospital, in rural health centres and in the villages with TBAs through each phase of the project were tallied and are presented in Tables 2, 3 and 4. Although we focused on maternal health, we also documented perinatal outcomes.

Health centre outcomes

All cases of maternal death within the project area were reviewed. The deaths were investigated through interviews with family and community members, traditional birth attendants and midwives when a woman died out of hospital. In the first phase, there

Table 2:
Maternal and perinatal deaths in hospital, health centre and with TBAs
Phase one (July 1999-August 2001)

Site	# Births	Maternal Deaths	Perinatal Deaths
District Hospital	2164	8 +	N/A *
Health Centre	1219	1	13
TBA	1588	2	22

** Data not tabulated in the hospital statistics because deaths occurring in the neonatal period were not recorded accurately.*
+The hospital rate covered the whole district, including areas without community maternity services.

Table 3:
Maternal and perinatal deaths in hospital, health centre and with TBAs
Phase two (September 2001-April 2003)

Site	# Births	Maternal Deaths	Perinatal Deaths
District Hospital	1395	11	N/A
Health Centre	1970	1	13
TBA	2863	0	30

Table 4:
Total maternal deaths for hospital, health centre and TBAs (July 1999-April 2003)

Site	# Births	Maternal Deaths	Ratio (per 100,000)
District Hospital	3559	19	534:100,000
Health Centre	3189	2	62:100,000
TBA	4451	2	45:100,000

was one maternal death among the group who gave birth in the health centres. The woman, who had a history of postpartum hemorrhage, declined referral to hospital, arrived late in labour and died of postpartum hemorrhage before she could be transferred to the hospital. This death occurred before the EOTS was available.

During the second phase of the project, 1,970 mothers gave birth at the rural health centres. One maternal death occurred at one of the health centres. The woman, in her second pregnancy, had been in labour in the village for several days. In this village the trained TBA was away and the woman's husband, who had successfully helped his wife give birth to the first baby, believed he could handle this birth. Eventually, the woman was brought to the health centre and died while the ambulance was being summoned and the midwife was trying to start an intravenous transfusion. The cause of her obstructed labour was determined to be locked twins. Cause of death was related to uterine rupture.

It was not possible to determine the causes of perinatal death as autopsies were not done. Antepartum hemorrhage, pregnancy-induced hypertension and prematurity were leading factors in several deaths. However, most deaths were unexplained. One baby died in the village after the cord ligature slipped. Some of the perinatal deaths occurred in mothers who had been transferred to the health centre or hospital from the TBAs.

TBA outcomes

Over the course of the project, the TBAs were responsible for 58% of all births in the project area. In the first three years of the project, four maternal deaths occurred in the villages. Two were women cared for by project-trained TBAs. One of these deaths was not directly obstetric-related. Death was thought to be due to cerebral-spinal malaria following an uncomplicated birth in the village. Her baby was also very ill and both died following transfer to hospital. The other mother died from a postpartum hemorrhage, en route to hospital in a taxi. Both deaths occurred before the emergency obstetric transport service was in place. Two other deaths were reported in the villages. One was related to AIDS. The other was a woman who had been cared for by an untrained TBA. When labour became prolonged, she was brought to the house of the trained TBA where she died soon after arrival. Autopsies are not done, but conclusions as to cause of death can be made on a careful analysis of the history and signs and symptoms. In this case, ruptured uterus was thought to be the cause.

Maternal deaths in the hospital numbered eight during the first phase of the project, but these included

women from the area not covered by the project, and those who did not receive trained TBA or professional midwifery care.

There were 1,588 births supervised by trained TBAs during the first phase of the project and 2,863 births by trained TBAs in the villages during phase two, for a total of 4,451 births. The TBAs referred 251 (16%) mothers to the nearest health centre or hospital during phase one and 497 mothers of the group of 2863 (17.3%) for risk factors or complications of pregnancy or labour during phase two. There were five maternal deaths in the total group, two during phase one and three during phase two. The deaths occurred in hospital following transfer. Two deaths were related to malaria, a significant problem for African mothers, and one resulted from placenta accreta, in spite of surgery and blood transfusion. The TBA referred this mother to the hospital because of a previous postpartum hemorrhage. Two other deaths were reported from the villages. These occurred in mothers not cared for by trained TBAs. In the last two years of the project, no deaths of mothers cared for by trained TBAs were reported in the village. However, there was a rise in maternal deaths at the district hospital (Tables 2 and 3).

Hospital outcomes

The data suggest that although deaths were reduced in the villages covered by the project, mothers were still dying after transfer to hospital or health centre. There were eight maternal deaths in the hospital from 1999-2002 and 11 maternal deaths in the hospital from January 2001 to December 2002. Ten of these deaths were mothers from the area not covered by the project. These areas did not have community midwifery care. This made analysis of the predisposing factors in those deaths difficult due to lack of data. We could only assume that the rise in hospital deaths was related to the higher number of referrals and an increased in-hospital birth rate. From the hospital records we know that a significant factor in the maternal deaths was delay in accessing care for prolonged labour, pregnancy-induced hypertension, or for risk of hemorrhage and delay in transportation.

The comparative maternal mortality rates for hospital, health centre and TBAs are shown in Table 4. Based on our records, we calculated the district rates to be 205 per100,000 live births. This is slightly lower than the most favourable rates reported from the neighbouring district.[3] However, there may have been maternal deaths in the villages not covered by the project.

Referrals to hospital from TBAs or health centre

A major project objective was to develop an integrated maternal health service through training of midwives and TBAs for timely referral to hospital in appropriate circumstances. Over the life of the project, referrals to the hospital or the health centre increased. The TBAs referred 251 (16%) mothers to the hospital or health centre during phase one and 497 (17.3%) during phase two. Approximately 25% of the mothers referred to the health centre by the TBA gave birth at the centre. The health centre midwives referred 315 of their clients to the hospital (21%). Approximately 36% of the referrals needed some type of obstetric intervention following transfer to the hospital.

Community involvement

It is clear that community involvement is critical for the success of safe motherhood projects. From the beginning, the project team met with village leaders (usually men) to inform them about the project and seek support. For example, the Ghanaian team believed strongly that people had to pay for use of the ambulance service to ensure sustainability after the end of the project. The cost was negotiated with the village health committees. The fee established was based on the average taxi fare and was paid directly to the hospital.

Meetings, or durbars, were held throughout the district to promote the importance of good prenatal care and care by either a trained TBA, the local health centre or the hospital. In spite of our efforts, when the evaluators held focus groups in the community they found that more needed to be done to involve the community and more education was needed about the project.[4] The project team believes that the health insurance scheme should be extended to cover health centre clients, especially maternity clients and the ambulance service.

DISCUSSION

The external evaluators considered the fee for maternal transport by ambulance was too low and

should be increased in order for the service to be cost effective and ensure sustainability. Unfortunately, poverty is a major issue for the rural population. We are concerned that people will not use the service in emergency but rather seek less safe methods of transport if the fee is increased. The diocesan health committee has set up a health insurance scheme for hospital care at the diocesan hospitals. However, the scheme does not extend to community health centre care. A review of the fee structure and use of the ambulance service should be done in 2005 to determine whether cost or other factors affect utilization of the service. Maintenance of the ambulance and the radio communication system is crucial for the availability, accessibility and efficiency of the service. Therefore in the long-term the viability of the EOTS remains open to question.

Monitoring and supporting the TBAs was a challenge. For example, at the end of phase one, 97 TBAs of the original 131 (74%) trained were still practicing and, in spite of training another 35, only 102 (61%) were still practicing at the end of phase two. This is a drop out rate of about 35%. There are several possible explanations for this. The TBAs set a small fee for their services, half of which would go to the village health committee. The committee would then use the fee to supply the items to re-stock the TBA kits. However, some TBAs had trouble getting paid even the very low fee. In the village, traditionally the TBA has been paid with a chicken or some other gift and monetary compensation for such services is foreign to the people. Unfortunately, some money is needed to replace the items in the delivery kits to ensure cleanliness. We asked the village health committees to address the problem in those villages, if possible.

Another interesting issue was raised when the TBA referred a pregnant woman for hospital care due to a risk condition. For example, the TBAs were instructed to refer women with previous Caesarean birth to the hospital. However, if the woman subsequently had a normal birth, the TBA could lose face in the community as the family had a higher cost for a hospital birth that was then seen by the woman and family as unnecessary.

CONCLUSIONS

Implementing effective strategies to improve maternal mortality and morbidity has been challenging. As Lawson et al note, "There are no easy solutions and short cuts to the problems of reducing the prevailing high mortality rates in poor countries."[1] These authorities conclude that death rates are increasing because the underlying problems of extreme poverty and widening inequalities have not been addressed. As well as poverty, isolation, bad weather, and cultural beliefs and values -- factors difficult to control -- also affect outcomes.

In spite of many improvements in the accessibility and availability of services and integration of the traditional birth attendants into the system, the three delays -- delay in recognizing the problem, delay in transfer and delay in treatment at the hospital -- continue to affect the effectiveness of the health care system.

Maternal and perinatal mortality rates continue to be unacceptably high in spite of the training programs, emergency transport and the provision of a blood transfusion service. It is very disappointing to find that most maternal deaths in this sample of mothers were preventable. Nevertheless, safe motherhood projects such as this one have the potential to improve the quality and accessibility of maternal health services, especially in rural areas. As well, rural midwives in the project felt more supported as midwifery care providers in isolated areas. The traditional birth attendants appreciated their relationships with the rural midwives.

Safe motherhood projects must be grounded in the community and reflect community values, attitudes and beliefs. The process must include involvement of community leaders, TBAs, women's groups, and health professionals in determining what the community wants and how the objectives can be achieved. Ongoing mechanisms for community feedback need to be established from the outset if the community is to take ownership of the project and sustain it after overseas funding is withdrawn. Durbars (community mobilizations) and media campaigns have been recommended to engage the general public in safe motherhood activities. An informed community may be the most effective factor in improving maternal mortality rates.

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