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Traditional birth attendants in rural Nepal: Knowledge, attitudes, and practices about maternal and newborn health

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Abstract

Efforts to formalize the role of traditional birth attendants (TBAs) in maternal and neonatal health programs have had limited success. TBAs' continued attendance at home deliveries suggests potential to influence maternal and neonatal outcomes. The objective of this qualitative study was to identify and understand the knowledge, attitudes, and practices of TBAs in rural Nepal. Twenty one trained and untrained TBAs participated in focus groups and in-depth interviews about antenatal care, delivery practices, maternal complications, and newborn care. Antenatal care included advice about nutrition and tetanus toxic (TT) immunization but did not include planning ahead for transport in cases of complications. Clean delivery practices were observed by most TBAs though hand washing practices differed by training status. There was no standard practice to identify maternal complications such as excessive bleeding, prolonged labour, or retained placenta, and most referred outside in the event of such complications. Newborn care practices included breastfeeding with supplemental feeds, thermal care after bathing and mustard seed oil massage. TBAs reported high job satisfaction and desire to improve their skills. Despite uncertainty regarding the role of TBAs to manage maternal complications, TBAs may be strategically placed to make potential contributions to newborn survival.

Keywords

Traditional birth attendants; knowledge attitudes practices; newborn care practices

Introduction

Millennium Development Goals (MGD) 4 and 5 call for countries to 'reduce by two-thirds the mortality rate of children under five' and to 'reduce maternal mortality by 75% by the year 2015', respectively (United Nations 2000). Each year, four million neonatal deaths occur, accounting for 38% of under-5 mortality. Ninety-nine percent of these deaths occur in low and middle income countries, over half occur at home without skilled care (Lawn et al. 2005, Martines et al. 2005), and approximately 50% occur within the first 24 hours of life, highlighting the need to address immediate newborn care. Furthermore, up to two-thirds of these deaths are preventable with low-cost, low-technology community-based interventions (Darmstadt et al. 2005) that 'extend from pregnancy, through childbirth and the neonatal period,

and beyond' and may be delivered through 'non mid-wife community health workers' (Bhutta et al. 2005, Darmstadt et al. 2005, Martines et al. 2005, Mullany et al. 2006).

The majority of the estimated 529,000 annual maternal deaths also occur in low and middle income countries (Ronsmans and Graham 2006) and are concentrated around labour, delivery and the immediate post partum period. Most are due to severe bleeding, hypertensive disorders and infections (Khan et al. 2006), and are often a result of delays in recognizing danger signs, deciding to seek care, reaching an appropriate health facility, and receiving quality care (Barnes-Josiah et al. 1998). While interventions to prevent maternal deaths may be more complex, many are feasible for a wide range of community health workers (Campbell and Graham, 2006).

Why traditional birth attendants?

WHO has defined traditional birth attendants (TBAs) as "traditional, independent (of the health system), non-formally trained and community-based providers of care during pregnancy, childbirth and the postnatal period" (WHO 2004). TBAs continue to play an important role providing antenatal care, assistance during labour and delivery, and initial postpartum care in many developing countries. They are easy to access in community settings and cost less than other village or government health workers (Bang et al. 1994, Costello et al. 2004, Kruske and Barclay 2004, Borghi et al. 2006). In some settings, where skilled care is available, services are still under-utilized due to cultural barriers, poor access, perceptions of poor quality, higher cost, and a preference for care within the community (Mesko et al. 2003, Koblinsky et al. 2006, Ahmed et al. 2007).

The impact of TBA training on maternal outcomes remains inconclusive. A meta-analysis associated TBA training 'with significant increases in attributes such as TBA knowledge (90%), attitudes (74%), behaviour (63%), and advice (90%)' though a *causal* relationship between TBA training and improved outcomes, was undetermined (Sibley and Sipe 2004). In other settings, TBA training has reduced incidence of postpartum complications (Bailey et al. 2002), reduced maternal mortality (Brennan 1988, Greenwood et al. 1990), and increased referral to health facilities (Eades et al. 1993, Akpala 1994, Ahmed et al. 2007). However, research has also reported no improvements in maternal outcomes such as postpartum infections (Goodburn et al. 2000), postpartum haemorrhage management (Dehne et al. 1995), or maternal mortality (Fleming 1994, Carlough and McCall 2005). The current WHO recommendation for skilled attendance at delivery (including midwife, doctor or nurse) explicitly excludes TBAs (WHO 2004).

The role of TBAs in newborn health has recently been considered and studies have shown the potential for TBAs to improve outcomes. In India, a 44% reduction in neonatal pneumonia deaths was attributed to training TBAs in the management of pneumonia (Bang et al. 1994). In Pakistan, a cluster randomized controlled trial of a TBA training intervention was conducted with 565 TBAs in seven rural districts. Results indicated a statistically significant 30% (95% CI: 18% – 41%) reduction in perinatal mortality and a 29% (95% CI: 17% – 43%) reduction in neonatal mortality in the TBA training group compared with the control group (Jokhio et al. 2005). Finally, in contrast to maternal health outcomes, the meta-analysis by Sibley (2004: 51) found that TBA training was associated with 8% and 11% reductions in overall peri-neonatal and birth asphyxia mortality respectively (Sibley and Sipe 2004).

Why Nepal?

Maternal, infant and neonatal mortality rates in Nepal remain high at 740 per 100,000 live births, 51 per 1000 live births, and 34 per 1000 live births, respectively (New ERA 2006). Improved education and health systems have expanded access to care, but 89% of deliveries

in Nepal still occur at home (New ERA 2001). TBAs attend 23% of deliveries in Nepal, and 43% of deliveries in the Central Terai, where this study was conducted. Comparatively, only 13% of deliveries in Nepal and 12% in the Central Terai are attended by skilled providers respectively (New ERA 2001). In Sarlahi District of the Central Terai, 29% of deliveries are attended by a TBA (Mullany 2006); an estimate lower than the regional estimates but higher than the national average.

TBAs attendance at home deliveries coupled with their social and cultural importance, suggest their potential role to influence maternal and neonatal health outcomes in rural Nepal. The objectives of this qualitative study were to identify and understand the knowledge, attitudes, and practices of local TBAs surrounding antenatal care, delivery, maternal complications, and newborn care. This information may then contribute to the design of TBA-based implementation strategies for low-cost, effective interventions.

Methods

Study area

The study was conducted in an agricultural area of southern Nepal by the Nepal Nutrition Intervention Project, Sarlahi (NNIPS) under the umbrella of a large trial examining the impact of chlorhexidine skin and cord cleansing (Mullany et al. 2006). *Madeshis*, from the plains regions of southern Nepal and northern India and *Pahadis*, from the hill regions of central and northern Nepal, form the primary ethnic groups in the area. We purposively selected an equal number of trained and untrained TBAs from both ethnic groups to collect a range of responses from these broadly defined sub-populations.

Study participants

TBAs were identified by local community members. TBAs who had attended at least one delivery in the previous three months and who had been involved in antenatal, intrapartum, and postnatal care were eligible for participation in the study. This excluded delivery assistants who were only responsible for cutting the cord or giving oil massage during or after delivery. Trained TBAs were those who had received any type of delivery training outside the home through a local health centre and/or hospital.

Data collection

Twenty-one TBAs participated in seven in-depth interviews (IDIs) and four focus group discussions (FGDs). An open-ended field guide helped interviewers guide the sessions. IDIs lasted approximately one hour and were conducted in the homes of TBAs. FGDs (3–4 TBAs per group) lasted approximately two hours and were conducted at a central location in the village. Interviewers were local female residents, fluent in both local languages (Nepali and Maithili¹), and trained in qualitative research methods. TBAs gave verbal informed consent with a witness, and sessions were tape-recorded. The study was approved by the Nepal Health Research Council and the Committee on Human Research of the Johns Hopkins Bloomberg School of Public Health.

Data analysis

IDIs and FGDs were transcribed and translated. Content analyses of key themes, phrases and practices, were used to organize data into behavioural matrices. Knowledge and practices were then categorised based on their potential impact on maternal and neonatal morbidity or mortality (Table I).

Results

TBAs were 35 to 60 (mean 42) years old and had been practicing for 5 to 45 years (mean 15 years). Eighteen of the 21 TBAs in our sample were illiterate. Among the three literate TBAs, two had completed nine years of schooling and one had completed five years. With the exception of some breastfeeding practices, it was unclear if differences in practice were due to training status or ethnic group.

Antenatal care

TBAs routinely provided antenatal care, including advice about diet, workload, and tetanus toxoid (TT) vaccination. TBAs recommended TT injections *'to protect from tetanus'*. The recommended diet included *'green leafy vegetable... to make the baby healthy'* as well as other foods such as *roti* (local unleavened bread), rice, fruits, and lentils.

TBAs who recommended continuing heavy work explained it as a means to *'make the body light and the birth of the baby easier'*. TBAs who suggested less physical work explained it as a means to conserve strength and *'prevent miscarriage'*.

Delivery practices

TBAs were aware of the importance of a clean delivery and tried to deliver inside a clean room or a separate room if available. TBAs from both ethnic groups commonly reported coating the floor and walls of the room with mud to clean and warm the room in preparation for delivery. The practice seemed to replace an older traditional practice of using cow dung, but it was unclear if the practice was done by the TBA herself or by family members.

'When there is only one room in the house, one corner is used for the delivery and other is for kitchen. In the houses where there are two or four rooms, a separate room is used for delivery. Mud is used to smear the room while preparing for delivery. If the cow dung is used, the baby may get sick.' (Madeshi, trained).

During the period in which these qualitative data were collected, clean delivery kits (containing a plastic sheet, new blade, string, coin, and soap) were provided to delivering mothers and trained TBAs as part of the large community-based trial of chlorhexidine cleansing. Use of the materials provided in the kit varied among TBAs.

'There is a plastic sheet on the floor and the child is kept there' (Pahadi, untrained)
'Bathe the baby in warm water with the soap' (Pahadi, untrained)

Hand-washing knowledge was high, but the practice and timing in relation to delivery varied by training status. Untrained TBAs reported being *'engaged in different tasks'* or having insufficient time to wash hands with soap before delivery. Due to beliefs about the *'polluting'* nature of delivery, some TBAs reported hand-washing with soap only *after* delivery.

'After finishing all these jobs, I wash my hands with soap and go home' (Madeshi, untrained)

Some TBAs used mustard seed oil on their hands before delivery, in addition to, or instead of soap.

'First I ask for soap to wash my hands. I raise my hands upward to dry them. Then I ask for some oil (mustard seed) and start to massage the woman for delivery' (Madeshi, trained)

Maternal complications

TBAs practices for maternal complications were not standardised. The concept of 'prolonged labour' was familiar, but the time after which labour was considered 'extended' or 'prolonged' varied.

'When labour is more than 24 hours we say that the labour is long'. (Pahadi, untrained)

'Some call it (prolonged labour) as two and half hours and some take it as four hours' (Madeshi, trained)

Sitting over steam to reduce swelling, massaging the abdomen and pulling on the umbilical cord were methods used to facilitate removal of a retained placenta. Some TBAs also mentioned inserting the hand (often coated with mustard seed oil) into the vagina to remove the retained placenta.

'In some cases the placenta is retained. At that time I hold the cord by one hand and massage lightly on the lower abdomen of the woman by the other hand' (Madeshi, trained)

There was no standard measurement of postpartum haemorrhage and all TBAs used visual observation to identify excessive bleeding.

Women with unmanageable complications were first referred to a local health worker. If complications persisted, they were referred to an outside health facility. TBAs in our sample did not advise about planning ahead for transport in cases of emergency.

Newborn care practices

Newborn care practices were similar among all TBAs. The standard practice was to place the newborn on a plastic sheet or cloth on the floor immediately after delivery, deliver the placenta, and cut the cord. The child was then washed with warm water, dried, massaged with mustard seed oil, wrapped, and given to the mother or other relative.

All TBAs recommended bathing the newborn after the placenta was delivered and the cord was cut.

Cord care was similar among TBAs. It was believed that cutting the cord before the delivery of the placenta would cause the cord to get stuck inside the mother and '*hurt or kill her*'. Few TBAs applied mustard seed oil to the umbilicus immediately after cutting; most applied oil to the umbilicus during full-body oil massage after bathing. Madeshi TBAs described another woman of a lower sub-caste (*Chamain*) who sometimes cut the cord and washed the newborn after delivery.

'The cord is cut by the Chamain. The baby is dried out only after the cord is cut off and placenta comes out. The baby is then wrapped in a piece of cloth by the Chamain' (Madeshi, trained)

Several practices were noted for managing non-breathing infants at birth. Observing the chest and limbs for movement and noting the presence or strength of a cry identified if a baby was breathing. Resuscitation methods included inserting fingers into the mouth and nose to clear the passageway, turning the baby upside down and striking the feet, striking the baby's back, and mouth to mouth resuscitation. 'Massaging the placenta'ⁱⁱ and 'milking the umbilical cord'ⁱⁱⁱ were also mentioned. TBAs believed that manually 'pushing' the blood within the cord towards the baby would maximize the transfer of blood to the baby from the umbilical cord and 'send breath towards the baby'. TBAs did not use other materials such as bag or tube and mask for resuscitation.

Breastfeeding was initiated after the infant was washed. In the Madeshi community, it was believed that the mother did not produce breast milk until two to three days after delivery and may not produce enough milk, so TBAs often recommended animal milk.

‘It takes two days to produce breast milk. A small piece of cloth is immersed in the goat milk and then squeezed into the mouth of the baby’ (Madeshi, untrained)

Madeshi TBAs did not recommend feeding colostrum. They believed ‘*it is too thick and the baby gets diarrhoea*’. All but one Pahadi TBA recommended feeding colostrum.

Mustard seed oil massage of the newborn was unanimously practiced. It was believed to help keep the baby warm, build strength, and prevent sickness.

‘Oil is very important because it helps the baby to gain weight. It keeps the baby out from the cold and cough. If the baby is not massaged with oil he may become sick’ (Madeshi, untrained).

Knowledge and attitudes

TBAs were aware of family planning however, provision of advice to mothers and families was mixed. TBAs who provided family planning and birth spacing advice, recommended it as a means to ease financial burden on the family. TBAs did not mention health of the mother or newborn infant as reasons for birth spacing.

‘We tell them it is quite difficult to rear the children and educate them if there are many children’ (Pahadi, untrained)

TBA knowledge of HIV/AIDS and modes of transmission was low and inaccurate and no TBAs reported advising about HIV/AIDS to mothers.

‘It [HIV/AIDS] is spread by means of syringe and by mosquitoes. No we haven’t advised anyone on this’ (Pahadi, untrained)

Madeshi TBAs reported religious duty, family status, or caste as motivations to practice. Pahadi TBAs reported community service as the primary reason for practice.

TBAs did not charge a fee for service, however, were often compensated by the family in the form of rice or clothes after a successful delivery. In the Madeshi community, TBAs received higher compensation when they delivered a male child.

‘They give us more if the baby boy is born and less if the baby girl is born’ (Madeshi, trained)

TBAs reported positive community attitudes towards them however many felt ‘*mental pressure*’ to deliver the baby safely and reported criticism from families in the event of complications.

‘They treat us well with respect. They come and consult us in their times of trouble. On the other hand, if something goes wrong, we have to listen to their scolding.’ (Pahadi untrained)

Discussion

This study provides insights about TBA practices that may impact maternal and newborn health outcomes. Delivery practices to improve maternal outcomes remains a challenge given the lack of standardisation among TBAs. Newborn care practices, however, were similar among TBAs and may have the potential to impact neonatal health outcomes. Using recommendations from the Lancet Neonatal Survival Series, behaviour change, educational, and service delivery

interventions to address neonatal care practices were identified (Darmstadt et al. 2005). (See Table II)

Delivery practices

Conclusions about the use of the clean delivery kit in this community cannot be generalised as they were provided free to all expecting mothers and TBAs. However, as previously reported, proper use of the kit, was not always practiced (Beun and Wood 2003). Hand washing was common, but appropriate timing (before delivery) and the use of soap was inconsistent. This can be a difficult behaviour to change as it involves cultural perceptions about the 'polluting' nature of child birth (Thapa 1996). In this community, hand washing with soap by birth attendants has been associated with lower neonatal omphalitis (Mullany et al. 2007) and mortality risk (Rhee 2007). Educational interventions about hygiene, and providing liquid soaps (hand sanitizer) that feel like oil, which many TBAs use before delivery, are potential intervention. Coating the room with mud to warm the room before delivery is common and has replaced an older practice of using cow dung (Costello 2000). Given the potential for infection, further research is needed to understand when before delivery this is conducted, and by whom.

Maternal complications

Improving recognition of danger signs such as excessive bleeding or a retained placenta, and clarifying the optimal response, may help improve survival of both mother and newborn (Sibley et al. 2004, Sibley et al. 2004a). Additional information about how TBAs identify and quantify excessive blood loss is recommended. Counting the number of pieces of cloth soaked with blood (bij de Vaate et al. 2002) or using a blood collection drape to measure excessive blood loss are better than visual estimates (Patel et al. 2006), and may be possible interventions. An anti-shock garment to reverse shock and reduce bleeding from obstetric haemorrhage has been explored in resource poor settings (Miller et al. 2004) however use for home deliveries needs further study. Finally, oral misoprostol, which can significantly decrease the incidence of postpartum haemorrhage has been successfully administered by community based auxiliary nurse midwives (Derman et al. 2006) and by TBAs (Walraven et al. 2005, Derman et al. 2006) and should be further explored.

Newborn care practices

TBAs reported cutting the cord *after* the delivery of the placenta, sometimes up to several hours later and bathing the newborn after delivery. Delayed cord cutting may be associated with neglect of immediate drying and wrapping, thus increasing the risk of hypothermia. A study in Uganda reported increased risk of hypothermia in newborns bathed one hour after birth compared with non-bathed newborns (Bergstrom et al. 2005). Thermal care interventions to delay bathing and ensure the baby is dried and wrapped immediately after delivery, even if the cord is left uncut, should be encouraged.

Birth asphyxia causes an estimated 23% of newborn deaths and neonatal resuscitation has been identified as a high impact strategy to improve survival (Lawn et al. 2005, Marsh et al. 2002). Common practices such as milking the umbilicus and striking the newborn have no reported benefit and may even be harmful for the newborn infant (Kumar 1994). TBAs in our sample did not use the tube/mask or bag/mask for resuscitation, however studies have shown that with training, TBAs were willing to use modern methods of resuscitation (Kumar 1994)

Exclusive breastfeeding was rare. Madhesi TBAs held strong beliefs about the ill effects of colostrum and it was rarely fed to infants. They also believed in a two to three day delay in milk production and that breast milk was not enough for the baby, resulting in the use of supplemental feeds. Early initiation of *exclusive* breastfeeding has the potential to substantially

improve neonatal survival. In Ghana, researchers estimated that 22% of neonatal deaths could be prevented if breastfeeding was initiated during the first hour of life (Edmond et al. 2006). Education and training programs should stress *immediate* and *exclusive* breastfeeding including colostrum. Where vaccines and nutritional supplements are well accepted, this may be facilitated by introducing colostrum as the infants “*first vaccine*” or “*supplement*” to prevent mothers from discarding it. In communities where milk production is perceived to start late, suggesting regular water intake after delivery to support milk production may benefit, though additional prospective research is required.

Mustard seed oil massage was universal as it is believed to provide energy, strength, and warmth for the baby. The oil is usually heated with other substances (garlic, fenugreek, caraway seed, nutmeg, and cloves) before application. This is consistent with other reports of oil massage in Nepal (Mullany et al. 2005) and Bangladesh (Darmstadt and Saha 2002, Winch et al. 2005). A recent study has indicated increased risk of omphalitis from mustard seed oil application to the umbilicus (Mullany et al. 2007) and previous reports have demonstrated toxic effects of mustard seed oil on newborn skin barrier functions (Darmstadt et al. 2002). Formative research in Sarlahi indicated community willingness to substitute sunflower-seed oil, but further research is needed to evaluate the impact of massage with alternative oils before culturally and financially acceptable behaviour change interventions can be promoted (Mullany et al. 2005, Ahmed et al. 2007).

In the Madeshi community, the *Chamain*, who, as one TBA explained, is part of a ‘*low caste people who make earning by making shoes and slippers*’, was sometimes summoned to cut the cord. Use of a *Chamain* has been previously reported in this setting (Mullany et al. 2005). The relationship between the *Chamain* and TBAs should be further explored to determine if certain interventions should be targeted towards the *Chamain* in addition to the TBA.

Knowledge and Attitudes

TBAs reported high job satisfaction and strong desire to improve their knowledge and skills.

HIV/AIDS is rare in this population. However, the burden of infections is rising and is likely to spread unless interventions are implemented. Education about modes of transmission through blood and sexual contact may be beneficial (Bertrand et al. 2006). TBAs can provide HIV transmission and condom use information via family planning counselling. However, discussing sexual practices remains a social taboo (Poudel-Tandukar et al. 2003) and other data from Nepal indicated that even when TBAs *were* educated and trained to distribute condoms, ‘community members were too shy to get them’ (UNPF 1996). Context-specific research on barriers to discussing HIV and sexual health issues is needed.

Madeshi TBAs reported higher compensation when they delivered a male child. Gender-based differences may have serious implications for the quality of care provided by TBAs after delivery and/or subsequent treatment of the child by the family, and should be explored.

Limitations

There were several limitations to the study. The study was conducted under the umbrella of a larger study focused on maternal and neonatal mortality outcomes. As a result, our sample of TBAs may have been more familiar about maternal and newborn health issues than TBAs found outside the study area.

In this region, there are often others involved in deliveries and newborn care such as family birth attendants (i.e. mother-in-law) or other women (i.e. *Chamain*) who are responsible for parts of the delivery, like cutting the cord, or postpartum oil massage. To the extent that

practices common to TBAs are similarly followed during home births where a TBA is not present, some intervention strategies suggested may be appropriately targeted to others in addition to TBAs. Further comparative work between family-member based behaviours and TBA practices is necessary.

Finally, given the variation in cultural, ethnic, religious, and social norms throughout Nepal, interventions suggested for TBAs in the southern Terai might not be applicable for TBAs across the country.

Conclusions

TBAs continue to play an important role in home deliveries in Nepal. While the role of TBAs in managing maternal complications remains uncertain, practices such as oral administration of misoprostol and planning ahead for maternal complications, may improve outcomes and may be feasible for TBAs

TBAs are also present during the immediate postpartum period when healthy neonatal practices are essential. Education, behaviour change, and service delivery interventions can address important causes of neonatal deaths. Immediate and exclusive breastfeeding, improved resuscitation methods, education about hand washing before delivery and thermal care are interventions that may be feasible for TBAs with proper training.

This qualitative research provides unique details about traditional practices of TBAs in rural Nepal. Information may be used to develop structured surveys about TBA practices in the community. Future programs and research should explore integrating TBA training and practices with that of existing community health workers while acknowledging their important cultural role.

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Table I
Behaviour Matrix of Common TBA Practices for Maternal and Neonatal Outcomes

	Reported Practice	Number of TBAs who reported the practice (n=21)	Reasons (if given) for practice	Potential effect on health outcomes
Antenatal Care	Nutritional advice	Some	▪ healthy for the baby	Beneficial ^{iv}
	Recommendation to decrease workload	Some	▪ prevents miscarriage ▪ makes mother weak ▪ prevents breech birth ▪ tradition to continue work	Lack of evidence
	Recommendation to increase or maintain heavy workload	Few	▪ baby will grow stronger ▪ easier delivery	Lack of evidence
	TT immunization	Some	▪ to protect from tetanus	Beneficial ^{iv}
	Recommendation to plan ahead for transportation in case of complication	None		Lack of evidence
Delivery Practices	Coat the walls and floors with mud	Few	▪ tradition ▪ warms the room	Lack of evidence
	Spray the room with phenyl	Few		Lack of evidence
	Sweep and clean the floor	Few		Lack of evidence
	Hand wash with soap before delivery	Few		Beneficial ^{iv}
	Rub hands with mustard seed oil before delivery	Few		Lack of evidence
Maternal Complications	Visual observation of excessive blood loss	Most		Lack of evidence
	Prolonged Labour (<12 hours)	Few		
	Prolonged Labour (over 24 hours)	Few		
	Sitting over steam to remove retained placenta	Few	▪ steam will help the placenta come down	Lack of evidence
	Pulling cord and massaging abdomen to remove retained placenta	Few		Potentially harmful ^v
	Inserting hands to remove placenta	Few		Potentially harmful ^v
Placement of Newborn/ Thermal Care	Bare Floor	Few		Potentially harmful ^{iv}
	Plastic/cloth covering on floor (baby is not wrapped)	Some	▪ plastic from clean delivery kit ▪ baby is wrapped after bathing	Potentially harmful ^{iv}
	Cloth on the floor (baby is wrapped)	Few		Beneficial ^{iv}
	Straw mat	Few		Potentially harmful ^{iv}
	Given to a family member	Few		Lack of evidence
	Given to the <i>Chamain</i>	Few	▪ <i>Chamain</i> takes baby because it is dirty	Lack of evidence

	Reported Practice	Number of TBAs who reported the practice (n=21)	Reasons (if given) for practice	Potential effect on health outcomes
Neonatal Resuscitation	Bathing newborn after delivery	Most	<ul style="list-style-type: none"> ▪ birth is polluting ▪ clean baby 	Potentially harmful ^{vi}
	Clearing out mouth and nose with finger to resuscitate	Few	<ul style="list-style-type: none"> ▪ mouth and nose is full of dirt making breathing difficult 	Lack of evidence
	Mouth to mouth resuscitation	Few		Lack of evidence
	Turn baby down and strike/slap the back to resuscitate	Few		Potentially harmful ^{vii}
	Turn baby down and strike/slap the back of feet to resuscitate	Few		Lack of evidence
	“Milk” (massage) the umbilical cord	Few	<ul style="list-style-type: none"> ▪ sends the breath towards the baby from the placenta 	Potentially harmful ^{vii}
Newborn Feeding	Massage the Placenta	Some		Lack of evidence
	Exclusive breastfeeding	Few	<ul style="list-style-type: none"> ▪ no tradition of using animal milk 	Beneficial ^{iv}
	Delayed breastfeeding	Most	<ul style="list-style-type: none"> ▪ takes 2–3 days for mother to produce breast milk 	Harmful ^{viii}
	Use of supplemental feeds (includes goat milk, cow milk, honey, water, ghee)	Most	<ul style="list-style-type: none"> ▪ mothers milk is not enough ▪ mother is not producing milk 	Potentially harmful ^{ix}
Newborn Oil Massage	Discarding colostrum	Few	<ul style="list-style-type: none"> ▪ too thick for baby ▪ causes diarrhoea 	Harmful ^{ix}
	Mustard Seed Oil Massage	Most	<ul style="list-style-type: none"> ▪ helps baby gain weight ▪ good for baby ▪ gives heat to the baby ▪ prevents cold and cough ▪ helps clean baby ▪ prevents rash 	Potentially harmful ^x
	Linseed Oil Massage	Few	<ul style="list-style-type: none"> ▪ more affordable than mustard seed oil 	Lack of evidence

Note: IDIs and FGDs were coded. Practices were recorded once for each mention by a TBA. If a TBA mentioned a practice more than once, it was only recorded one time. Number of TBAs was categorized as: None= 0 TBAs; Few = 1–4/21 TBAs; Some = 5–11/21 TBAs; Most = 12 or more TBAs

Table II
Framework of Interventions for TBAs to Improve Neonatal Health

	Educational/Behaviour Change Intervention	Service Delivery Intervention	Cause of Neonatal Death that may be prevented
Antenatal Care			
Nutrition	▪ Education about folate rich foods and vitamin A	▪ Provide micronutrient supplementation	▪ Congenital malformation ▪ Low birth weight ▪ Preterm delivery
TT Vaccination	▪ Education about TT and appropriate number of TT doses		▪ Tetanus
Planning transport for obstetric emergency	▪ Education about early signs of complications and planning transport	▪ Provide subsidized vouchers for taxi or other transportation service	▪ Maternal Complications ▪ Birth asphyxia
Delivery			
Hand washing with soap before delivery	▪ Education about hygiene/sterilization prior to delivery	▪ Provide hand sanitizers that feel like oil	▪ Sepsis/Omphalitis
Preparation of delivery area	▪ Importance of sterile setting for delivery		▪ Sepsis
Placement of newborn immediately after delivery	▪ Handing the newborn to family member or mother after birth		▪ Sepsis ▪ Pneumonia
Thermal Care	▪ Education about keeping the baby dry and warm after birth ▪ Education about delayed bathing	▪ Providing a blanket as part of the Clean delivery kit to wrap the newborn	▪ Sepsis
Cord Care	▪ Delayed cord cutting ▪ Clean cord cutting and cord care ▪ Antiseptic (chlorhexidine to umbilicus)	▪ Provide antiseptic for umbilicus as part of the Clean delivery kit	▪ Sepsis/Omphalitis
Post Delivery and Newborn Care			
Neonatal resuscitation	▪ Education about recognition of non-breathing infant ▪ Stimulation of a non-breathing infant	▪ Training and providing bag/mask resuscitation materials	▪ Birth asphyxia
Exclusive breastfeeding	▪ Benefits of colostrums ▪ Immediate and exclusive breastfeeding ▪ Educate about potential risk of supplemental feeds ▪ Increase water intake of mother after delivery to induce milk production		▪ Diarrhoea ▪ Sepsis/Pneumonia
Oil Massage	▪ Education about protecting the skin barrier ▪ Substitute other oil (sunflower seed oil)		▪ Sepsis/Other
Family planning/Birth spacing	▪ Health benefits of birth spacing ▪ Family planning methods ▪ Contraception		▪ Low birth weight ▪ Preterm birth
HIV/AIDS	▪ Modes of transmission		

Educational/Behaviour Change Intervention	Service Delivery Intervention	Cause of Neonatal Death that may be prevented
▪ Prevention measures(condoms, etc...)		

ⁱ Maithili is the dialect spoken by the Madeshi ethnic group residing in southern Nepal and northern India

ⁱⁱ 'massaging the placenta' refers to pressing gently on the placenta

ⁱⁱⁱ 'milking the umbilical cord' refers to gently pushing/pulling on the cord. The belief is that manually "pushing" the blood within the cord toward the baby will exaggerate or maximize the transfer of blood to the baby from the umbilical cord and 'send breath towards the baby'.

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^v Goodburn, E.A., Gazi, R., & Chowdhury, M. (1995). Beliefs and practices regarding delivery and postpartum maternal morbidity in rural Bangladesh. *Stud Fam Plann*, 26(1), 22–32.

^{vi} Bergstrom, A., Byaruhanga, R., & Okong, P. (2005). The impact of newborn bathing on the prevalence of neonatal hypothermia in Uganda: a randomized, controlled trial. *Acta Paediatr*, 94(10), 1462–1467.

^{vii} Kumar, R. (1994). Effect of training on the resuscitation practices of traditional birth attendants. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 88(2), 159–160.

^{viii} Edmond, K.M., Zandoh, C., Quigley, M.A., Amenga-Etego, S., Owusu-Agyei, S., & Kirkwood, B.R. (2006). Delayed breastfeeding initiation increases risk of neonatal mortality. *Pediatrics*, 117(3), e380–386.

^{ix} WHO Essential newborn care—Report of a technical working group WHO 1996

^x Darmstadt, G.L., Mao-Qiang, M., Chi, E., Saha, S.K., Ziboh, V.A., Black, R.E., Santosham, M., & Elias, P.M. (2002). Impact of topical oils on the skin barrier: possible implications for neonatal health in developing countries. *Acta Paediatrica*, 91(5), 546–554.