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Traditional Birth Attendants (TBA) training has been an important component of public health policy interventions to improve maternal and child health in developing countries since the 1970s. More recently, since the 1990s, the TBA training strategy has been increasingly seen as irrelevant, ineffective or, on the whole, a failure due to evidence that the maternal mortality rate (MMR) in developing countries had not reduced. Although, worldwide data show that, by choice or out of necessity, 47 percent of births in the developing world are assisted by TBAs and/or family members, funding for TBA training has been reduced and moved to providing skilled birth attendants for all births. Any shift in policy needs to be supported by appropriate evidence on TBA roles in providing maternal and infant health care service and effectiveness of the training programmes.

This article reviews literature on the characteristics and role of TBAs in South Asia with an emphasis on India. The aim was to assess the contribution of TBAs in providing maternal and infant health care service at different stages of pregnancy and after-delivery and birthing practices adopted in home births. The review of role revealed that apart from TBAs, there are various other people in the community also involved in making decisions about the welfare and health of the birthing mother and new born baby. However, TBAs have changing, localised but nonetheless significant roles in delivery, postnatal and infant care in India. Certain traditional birthing practices such as bathing babies immediately after birth, not weighing babies after birth and not feeding with colostrum are adopted in home births as well as health institutions in India. There is therefore a thin precarious balance between

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the application of biomedical and traditional knowledge. Customary rituals and perceptions essentially affect practices in home and institutional births and hence training of TBAs need to be implemented in conjunction with community awareness programmes.

Keywords: *Birthing position and community support in home births, traditional birthing practices, role and characteristics of traditional birth attendants, sepsis, hypothermia and birthing practices*

Traditional Birth Attendants (TBAs) provide maternal and infant health care services for women and families as they assist during deliveries. TBAs adopt practices which are beneficial for the health and well-being of the mother and the child and that are culturally accepted, such as the upright birthing position during delivery, particularly in India. However, there are other practices such as delays in the referral of excessive postpartum bleeding and engaging in unhygienic practices during their conduct of deliveries that can cause serious harm to mothers and babies (Guha 1998; OHCHR 2006; WHO 1999). As these latter practices need to be improved, multilateral funding agencies such as the World Bank, the World Health Organisation (WHO) and the United Nations Population Fund (UNFPA) have implemented TBA training programmes in developing countries to improve the maternal and child health situation.

With biomedical influence on traditional practices introduced through training, the role and birthing practices of TBAs have been constantly changing over time. South Asia, in particular, is an example of the complex and unique ways in which modernity is shaping local birthing practices and contexts. In turn, there are certain traditional beliefs and childbirth behaviours unique to this region that shape the characteristics and health and social roles of TBAs. This article reviews literature on the characteristics and role of TBAs in South Asia with an emphasis on India. A better understanding of their roles and birthing practices will enable policies to be developed that may work to further improve their services.

Characteristics of Traditional Birth Attendants

There are predominantly two kinds of TBAs: 'community TBAs' are women who practice midwifery (full-time or part-time) by assisting anyone who calls upon their services; and the 'family TBAs' who deliver only the babies of her close relatives or friends in the community (Kamal 1998). TBAs who have

received formal training through the modern health sector to upgrade their skills are 'trained TBAs', whereas those who have not received any training are 'untrained TBAs'.

Studies in developing countries reveal that TBAs are generally older, non-literate women who have learnt their midwifery skills through working with other TBAs (Carvalho et al. 1998; Fatmi et al. 2005; Hussein and Mpembeni 2005; Singh 1994; UNFPA 1996). Wyatt (2001) defines this type of learning through apprenticeship as a process used to acquire 'tacit knowledge'. This is in contrast to the didactic process of learning adopted by western biomedical ways of learning (Kruske and Barclay 2004). TBAs receive some compensation for their services, mostly in kind, and some accept whatever amount is given to them by the families (Carvalho et al. 1998; Fatmi et al. 2005; Hussein and Mpembeni 2005; UNFPA 1996). TBAs are readily available as they live in the community, their practices are acceptable because they share the cultural beliefs of the community and they are affordable because they cost less than other health care services (Bulterys et al. 2002; Singh 1994; Syamala 2004; UNFPA 1996). They speak the local dialects and their practices are consistent with those of the community and provide cultural consistency in the child-bearing process (Lang and Elkin 1997; Lefeber and Voorhoever 1997). Several studies have shown that TBAs generally have the trust and respect of the community (Bulterys et al. 2002; Chipfakacha 1997; Isenalumbe 1990; Quiroga et al. 1998; Ram 1991; UNFPA 1996). TBAs therefore have an exceptional local capacity to inform and assist women and their families in preparing for birth (Paul 1999; Ram 1991).

In India, 65 per cent of the births take place at home and TBAs assist more than one third (35 per cent) of home births (IIPS 2007). According to recent National Family Health Survey (NFHS) data published by the International Institute for Population Sciences (IIPS), only 47 per cent of the births in India were assisted by biomedical personnel such as Auxilliary Nurse Midwives (ANMs) (11 per cent) and doctors (30 per cent) (IIPS 2007). However, the data reveal a wide difference between the health care seeking patterns in rural areas of India when compared to those in urban areas. The extent of dependence on TBAs for assistance during delivery is higher in rural areas (40 per cent) of India when compared to urban areas (20 per cent) and higher among the poor (44 per cent) than rich (18 per cent) people (IIPS 2007). The percentage of home births is also considerably higher in rural areas (75 per cent) as compared to urban areas (35 per cent) in India (IIPS 2007). In addition, the problem of unavailability of health care personnel

and infrastructure is worse in rural and remote areas of India (Banerjee et al. 2004a; Chaudhury et al. 2003; Misra et al. 2003).

Apart from inadequacy in infrastructure and health personnel, the factors that affect the choice of TBAs over the biomedical health care services provided by the Government of India (GOI) are socio-cultural traditions, community support, familiarity, inadequate trust of the medical system and the perception that birth is a normal phenomenon that does not need an institutional setting (Bajpai 1996a; Mathews et al. 2005; Smith 2004). Even in the urban areas of India where emergency obstetric care is accessible, some women (19 per cent) seek the assistance of TBAs to deliver their babies (IIPS 2007). The biomedical health care provided by GOI is generally used only during emergencies (Kausar et al. 1999; Mathews et al. 2001). TBAs are therefore an important component in providing maternal and child health service in India, especially to people from the low socio-economic background and those living in remote areas with less access to medical facilities.

Recruitment

TBAs are mostly recruited from within their own communities (Bulterys et al. 2002). Some women become TBAs in the community by working with and beside their mothers, other female relatives or other TBAs (Singh 1994; Syamala 2004). Jordan (1989) explains the natural process by which young girls within the community are recruited as TBAs after working alongside their mother/relative for several years. Singh (1994) observes that some women are selected as TBAs by the community because of the characteristics that members of the local community perceive that are required for assisting women with deliveries. These characteristics are good delivery outcomes, a strong personality along with the warmth and patience that will enable the birthing woman to move through the event with courage, power and ease (Bajpai 1996b; Ram 1991; Smith 2006).

Source of Learning Skills

Syamala's (2004) study in India revealed that TBAs learn their skills from various sources: senior family members such as their mothers, other relatives, formal health care personnel, and/or through their own experience. Their learning pattern involves both observation and imitation, in contrast to the instructive style of education of professional midwives, which is utilised more in the western biomedical systems (Kruske and Barclay 2004; Syamala 2004).

Through experiential learning TBAs also acquire the knowledge of traditional herbs and local materials that ease the pains of birth and help the mother towards quick recovery (Smith 2006; Singh 1994). Jordan (1989) explains the process of acquiring midwifery knowledge by the young girls in their daily lives by listening to stories and helping their mothers and grandmothers in assisting births. These young girls then go on to become accepted as TBAs in the community. Some studies have found that TBAs learn their skills for several years before they practice alone (Rogers and Solomon 1975; Singh 1994), although the study by Jeffrey et al. (1984) observed that TBAs did not have any skills or previous experience before assisting in their first delivery.

Occupation

Generally, TBAs assist births as a secondary occupation as it is difficult to earn a living by working only as a TBA because it is a lowly paid job (Singh 1994; Unnithan 1999). TBAs consider themselves to be private practitioners who respond to requests for service and receive some compensation in return (Singh 1994; UNFPA 1996). As they receive compensation in cash or in kind from their client's family, they do not cost much and generally accept whatever is offered to them (Jeffrey et al. 1984; Singh 1994). Given the cost involved in accessing the formal health care service in India, TBAs are much more affordable for impoverished people (Banerjee et al. 2004b; Chirmulay and Gupte 1997; Hitesh 1996). As described earlier, TBAs provide a variety of services to birthing mothers and their families; the following section reviews their social roles in providing delivery, postnatal and infant care.

The Social Roles of Traditional Birth Attendants in providing Health Service

TBAs are sought out for advice before delivery and play important health and social roles in the delivery process and in taking care of the woman and the infant for at least one week after birth. Recent studies note that these services include psychological as well as physiological healing and care to birthing mothers and babies (Bajpai 1996a; Bang et al. 2005), and a study in north India observed that TBAs and mothers-in-law have an equal role to play in the birthing process (Sethi et al. 2005). Studies suggest that 'the social role of a TBA, like that of a traditional healer, is profoundly rooted in

the local culture. It is not confined to the care to be provided for a particular pathology: it is all-embracing, and reinterprets the patient's suffering in its cultural context' (WHO 2005: 70).

Antenatal Care

Several studies in India have noted that during the antenatal period TBAs provide advice to pregnant women in relation to food intake, to take Tetanus Toxoid injections and iron and folic acid tablets from the health centre, and the need for rest (Bajpai 1996b; Kumar et al. 2000). Other studies in India and Bangladesh have found that TBAs have limited social roles in terms of antenatal care (Mathews et al. 2001; Rozario 1998). Yet another study in India has observed that TBAs have little to offer in the way of treatment for antenatal problems and have no medicines so they refer women to health centres (Shariff and Singh 2002), while the Indian National Family Health Survey (NFHS[1]) data reveals that only 0.2 per cent of the women receive antenatal advise from TBAs (IIPS 2007).

Delivery Care

Most of the studies in South Asia and in India observe that delivery care is an important time when TBAs are involved in providing their services (Bajpai 1996b; Bang et al. 2005; Kumar et al. 2000). TBAs are generally called for at the onset of strong labour pains and remain a part of the birthing process by receiving the baby, cutting the cord, disposing of the placenta, bathing the baby and mother, and cleaning the birth place (Bajpai 1996b; Bang et al. 2005). Some other studies have observed that although TBAs are called for when the head of the baby is crowning, the TBA has an important role to play in soothing, massaging and holding the birthing mother to ease her pain during delivery (Bajpai 1996b), an aspect of community support that women do not receive if they give birth in hospitals (Bajpai 1996b). In India, anthropologist Sarah Pinto suggests that with the multiplicity of women who provide advice, assistance or comfort in numbers at the time of delivery, it is difficult to differentiate between the role of TBAs and other persons involved and to speak of the TBA as a prominent figure in the process (Pinto 2006).

The notion of 'pollution' attached to birth is a strong characteristic of South Asian cultures and some studies have noted that women of lower socio-economic status are consequently called merely to cut the cord and clean

the birth place after delivery (Bajpai 1996c; Jeffrey et al. 1984; Mesko et al. 2003; Rozario 1998). In addition, while some studies have shown that TBAs are involved in decision making during delivery, recognising complications and making referrals (Bajpai 1996a; Bang et al. 2005; Rogers and Solomon 1975), others have observed that TBAs do not have any decision making power and it is family members who identify complications and make decisions regarding potential referrals (Jeffrey et al. 1984; Rozario 1998). Recognising the important role played by TBAs in maternal and child health care in developing countries, attempts were made by international public health agencies to include TBAs in the primary health care system and to train them to provide better services to women who depend on them for childbirth.

Postpartum and Infant Care

In India in general there is inadequate coverage and provision of the postnatal care that is sought by women. The NFHS data shows only 20 per cent of the women received any postnatal check-up for two months following birth (IIPS 2007). Studies have shown that apart from recognising complications in infants, the TBAs' social role in caring for the mother and baby can include giving a massage, bathing and taking care of all their needs for a certain period of time, which varies according to the family's requirements (Bajpai 1996c; Singh 1994). Some researchers such as Rozario (1998) mention that postpartum care is a part of the concept of exclusion and pollution but anthropological research suggests that the postpartum healing of the body parallels the social reintegration of the person and has a symbolic, physical and social value in the community (Pinto 2006).

Evidence published in 2007 has emerged in relation to the potential role of TBAs in reducing perinatal mortality.[2] A systematic review concluded that 'the potential of TBA training to reduce peri-neonatal mortality is promising when combined with improved health services' (Sibley et al. 2004: 1,017). An earlier study in Bangladesh noted that although trained TBAs may have more knowledge and willingness to disseminate information about breastfeeding and immunisation than untrained TBAs, the mother's health practices were independent of the suggestions provided by the TBAs (Mahbubur et al. 1999). Smith (2002), a Canadian midwife who has worked in rural areas of India for several years, observes that TBAs have a complex status in Indian society; on the one hand a TBA may be perceived as someone with a low status and

as associated with pollution but on the other hand she is very much needed and required by the community.

Conclusion

A review of the literature, evidence presented, and a range of studies over time reveal that TBAs have changing, localised but nonetheless significant roles in antenatal, delivery, postnatal and infant care in India. The literature review and studies also reveals that apart from TBAs, there are various other people involved in caring for and making decisions about the welfare and health of the birthing mother and newborn baby such as mothers-in-law, close friends and relatives. The studies describe TBAs generally as women, and often as older women, who are non-literate, are easily and locally accessible, are affordable, who live within the community, have learnt their skills through experience by working with their mothers/relatives, and are recruited by the community because they have certain qualities that the community recognises as necessary for performing the task of midwifery.

In general, TBAs are more sought after by people of lower socio-economic status in India but the strength of the TBAs is that they are part of the cultural and social life of the community in which they live and hence are well accepted as having a key role in the birthing process, even among some urban, wealthier and better-educated communities. TBAs have knowledge of the birthing process learnt through their lived experience, which they bring into their practice and which they can use to explain events in their local context. The roles and characteristics of TBAs are therefore rooted in their socio-cultural context.

Traditional Birth Attendants' Birthing Practices in Relation to Training

The main recognised benefits of traditional home births are community support and the effective birthing positions adopted during birth. Although traditional childbirth is based on a natural and holistic approach, its disadvantages lie in certain beliefs and practices that can be potentially harmful and unhygienic to mothers and babies. There are two main criticisms about

practices adopted by TBAs: 1) that unhygienic practices during home births cause sepsis among mothers and babies, and 2) that harmful traditional practices cause maternal and infant morbidity and mortality. The next section discusses the significance of safe and clean delivery practices, the criticisms raised about traditional practices, TBA training interventions and a review of evidence of these practices in developing countries.

Birthing Position

TBAs encourage women to walk and move about during labour to finally deliver in a squatting and seated position (Bajpai 1996a; Mathews et al. 2005). WHO suggests that mothers can adopt any position they like, while preferably avoiding long periods of lying supine (WHO 1996). However, formal health institutions in India continue to largely adopt the lithotomy position[3] during delivery (Van Hollen 2003). The negative effects of delivering in the lithotomy position have been well documented (Bhardwaj et al. 1995; Gupta and Nikoderm 2000; DiFranco et al. 2007). The lithotomy position is advised against for childbirth for a number of reasons such as that it defies gravity, it places pressure on the *venae cava* and thus prevents adequate blood flow to the foetus and it delays the second stage of labour (Roberts and Hanson 2007). One of the concerns expressed about adopting the lithotomy position in the context of developing countries is the embarrassment felt by women. They feel exposed in every way, feel humiliated, and the position violates their desire for privacy. These are key reasons why they would rather be delivered by TBAs who allow them to squat or kneel while delivering (Bajpai 1996a; Mathews et al. 2005).

Studies in India have observed that delivering in the traditional upright positions was associated with less foetal stress, less labour pain, shorter delivery time, less perineal trauma, less discomfort and difficulty when bearing down and overall women were more satisfied with the birthing experience (Bhardwaj et al. 1995; Mathews et al. 2005; WHO 1996). Clinical studies have found that the squatting position is the most effective position for pushing in the second stage of labour as it enables the woman to bear down force in the direction of the birth canal (Gupta and Nikoderm 2000).

Davis-Floyd et al. (2001) describe the lithotomy position as the most graphic demonstration of the power of 'doctors choice', not because this position is sound, but because it is comfortable for them to manoeuvre. In recent

times the lithotomy position has penetrated into traditional approaches. There is evidence that TBAs learn to assist births in the lithotomy position during the training programme and some then give up the traditional upright birthing positions and encourage the lithotomy position during delivery (Bajpai 1996b; Mathews et al. 2005). In a study conducted in seven states of India, it was found that almost all TBAs mentioned the lying-on-back position for childbirth, probably reflecting a change due to TBA training efforts (Bajpai 1996a).

Community Support

Research in the disciplines of anthropology, midwifery, sociology and feminist theory describe the birthing experience as not only a biological or medical event but a rich personal event where the quality of relationships between a woman giving birth and those assisting her can define the outcome of the experience (Armstrong and Feldman 1990; Baer and Davis-Floyd 2006; Begay 2004; Dalmiya and Alcoff 1993; Kitzinger 2000; Smith 2006). The authors of the book *A Wise Birth* illustrate with examples from Latin America that home based deliveries within women's comfort zone can be more graceful and comfortable with better outcomes for both mothers and babies (Armstrong and Feldman 1990). And studies in India have found that mothers prefer to birth at home because of the community support received (Mathews et al. 2005).

WHO observes that in developing countries some large hospitals are generally overcrowded with low-risk deliveries and therefore personal support and privacy is inadequate (WHO 1996). Similar to the inclusion of the traditional upright birthing position in medical institutions, there have also been attempts to include 'community support' in health institutions in developing countries. However, a randomised pilot study in South Africa studying the effect of companionship on maternal outcomes found that although many women were treated very badly in government hospitals, childbirth companionship was difficult to be implemented in under-resourced health care systems with frequent staff changes, and the researchers were unable to determine if the presence of a traditional carer impacted on the humanity of care provided by health professionals (Brown et al. 2007). The variability in the studies suggests that local analyses should be made with good baseline studies of women's needs in their communities, and where possible, training should be adapted to their needs.

Birthing Practices and Sepsis among Mothers and Babies

A key example of one of the problems facing TBAs is birthing practices that cause sepsis. A recent large study in India conducted by the Sample Registration System (SRS[4]) assessing the causes of maternal mortality rate shows sepsis as the second main cause accounting for 11 per cent of maternal deaths (Hota and Sikri 2006). Other smaller studies have shown that sepsis is one of the main causes of mortality and morbidity among mothers and neonates in India (Chhabra and Sirohi 2004; Costello et al. 2006; Khan et al. 2006; UNICEF 2007). The modes of transmission of puerperal sepsis are categorised into nosocomial, exogenous, and endogenous factors. Nosocomial infections are acquired from health institutions or from the patient's own flora. Exogenous infections come from external contamination, especially when deliveries take place under unhygienic conditions. Endogenous organisms consist of mixed flora colonising the woman's own genital tract (Hussein and Fortney 2004). There are claims that deliveries assisted by relatives and TBAs take place in unhygienic conditions and often lead to infection in mothers and newborn babies (the World Bank 1996). TBAs have been accused of creating or even compounding problems of infections at home deliveries (Adamson 1996; Barns 1991; Boerma 1987; Feyi-Waboso 1989). However. the claims are not based on scientific studies analysing the cause-effect relationship between unhygienic traditional practices and mortality or morbidity among mothers and babies. To improve hygiene in home deliveries, since the 1970s WHO has advocated for beneficial biomedical practices such as safe and clean delivery through the 'three cleans' programme (hand washing with soap, clean cord care, and clean surface) and promoted the distribution of delivery kits to TBAs (WHO 1993). The delivery kits distributed to TBAs contain materials that are designed to help make deliveries cleaner and safer (Lettenmaier et al. 1988).

However, an intervention study in Bangladesh established that following the three clean methods alone does not control sepsis among mothers (Goodburn et al. 2002). The study observed that TBAs are only one of the sources of infection among mothers and the other main sources include the health and hygiene of mothers themselves (Goodburn et al. 2002). The next section reviews the evidence of clean delivery practices adopted by TBAs including hand washing, clean cord management and use of the delivery kit to obtain a general sense of their potential helpfulness to TBAs.

Hand Washing Hand hygiene is known to be the most important component of infection control and can be achieved by standard hand washing with soap and water (Hussein and Fortney 2004). Hand hygiene is not a new concept; the success story of reducing sepsis by hand washing was established in 1846, when Ignaz Semmelweis observed that maternal mortality was mainly caused by physicians due to their unclean hands (Bencko and Schejbalová 2006). In the context of TBAs however, they deal with only one delivery at a time and therefore this kind of cross-contamination is unlikely to happen.

TBAs have been criticised for not undertaking measures of cleanliness while providing care for mothers and newborns such as washing their hands (Fatmi et al. 2005): the practice is perceived as a possible means of reducing the risk of infection (Saeed Ali et al. 2007). However, a study in nine states in India showed that TBAs generally washed their hands and feet before entering the house of labour (Bajpai 1996a). In contrast, a study in Uttar Pradesh and another in Bangladesh found that TBAs generally washed their hands only after finishing the task of delivery, due to local beliefs that the act of giving birth was polluting (Jeffrey et al. 1989; Rozario 1998). Indeed, studies in India have noted that babies were generally received with unwashed and ungloved hands by TBAs (Syamala 2004), in some cases alcohol was used to wash hands in Gujarat and Maharashtra (Bajpai 1996a).

TBAs are taught, as part of their training, to clean their hands with soap and use gloves during delivery and one of the expected beneficial effects is that the improved hygienic practices of TBAs will reduce postpartum infections among mothers and babies (Goodburn et al. 2002). An intervention study in Tanzania, examining the cause-effect relationship between hand washing, use of gloves and maternal infections found that washing hands by birth attendants before the delivery and the use of new gloves were not important factors affecting rates of infection in mothers (Winani et al. 2007). Apart from this latter study there is little other evidence about the relationship between washing hands and infection among mothers and babies, suggesting that there is a debate about the efficacy of hand washing and that local practices may differ for reasons of belief rather than associations with cleanliness in relation to infection.

Cord Management Research worldwide shows that sometimes blades of grass, bark fibers, reeds, fine roots, scissors, knives, broken glass, stones, sickles or used razor blades are employed to cut the cord, which is potentially harmful because such materials often harbour tetanus spores from the soil

and thus increase the risk of neonatal tetanus (WHO 1998). The items used to cut the cord are generally easily available in the house, or related to the father's trade. They are rarely cleaned or boiled before use and can be a potential source of infection. Studies in India have shown that non-sterilised materials for cutting the cord are used both by TBAs and formal health personnel assisting non-institutional births (Khandekar et al. 1993; Mathews et al. 2005; Nandan and Mishra 1996). WHO notes in a report on umbilical cord care that the current recommendations for cord care are chiefly based on research in hospital nurseries in developed countries, which may not apply in developing countries where resources are scarce, most deliveries take place at home and different sources of bacteria can cause cord infections (WHO 1998).

WHO observes that ash, oil, butter, spice pastes, herbs and mud are substances that are often used to apply to the cord in home deliveries, and they may be contaminated with bacteria and thus increase the risk of infection (WHO 1998). A newborn baby can become infected with tetanus if the umbilical cord is cut with unclean instruments and treated with unhygienic applications (Bhutta et al. 2003). WHO suggests that these practices are dangerous and should be discouraged or replaced with safer alternatives (WHO 1998). However, there are no studies examining the effects of these materials on infection in mothers and infants (WHO 1998). Studies in India have shown that some materials that may cause contamination, such as *ghee* (clarified butter), mustard oil, cow dung and betel nut, are applied on umbilical cords (Nandan and Mishra 1996). A study in Nepal found that infection risk was 29 per cent higher in infants receiving cord applications of mustard oil and 62 per cent higher for other potentially unclean substances (Mullany et al. 2006). Other materials used for dressing the cord also include talcum powder, ash and turmeric (Khandekar et al. 1993; Mathews et al. 2005). Turmeric, however, is known to have analgesic, antibacterial, antiseptic and many other qualities according to Ayurvedic literature (Mashelkar 2001). Use of turmeric in wound healing is well known and is patented in the United States (Lak 1999; Mashelkar 2001). The most common reasons given for applying these substances to the cord is to prevent bleeding from the stump, to promote separation of the stump, and to keep spirits away. However the effect of these practices on bleeding and separation has not been studied (WHO 1998). Literature suggests that, once again, there is debate about the efficacy of application of unguents to the umbilical cord and that

local practices may differ for reasons of belief (for example, to deter spirits) rather than associations with cleanliness in relation to infection.

Delivery Kit Since the 1970s, TBAs have been provided with a delivery kit at the end of the training programme to help them maintain safe and clean deliveries. The purpose of supplying the kit is to ensure that TBAs observe the clean methods taught during training. In India, the material usually provided in the kit includes a piece of string, half a razor blade, a piece of cotton, a plastic sheet and gauze (Chaturvedi 1978; PATH 2002). However, some studies show that the midwives and TBAs rarely used sterile cord care kits (Kamal 1998; Mathews et al. 2005). Studies indicate that use of the clean delivery kit has had a positive effect on reducing both cord infection and puerperal sepsis (PATH 2002). A study in Tanzania found that newborn babies were 13 times less likely to develop cord infection and mothers were 3 times less likely to develop puerperal sepsis when a delivery kit was used in comparison to those who did not use the kit (Winani et al. 2007). However, a review of medical literature to identify new and underutilised technologies to reduce maternal mortality related to puerperal sepsis in developing countries states that the safe delivery kit primarily prevents cord infections in the newborn rather than puerperal infections in the mother (Hussein and Fortney 2004).

Nonetheless, despite the efficacy of delivery kits, an evaluation study of seven developing countries shows that most programmes had difficulty maintaining adequate supplies for TBAs to conduct clean deliveries as replenishment of supplies was often planned in conjunction with supervision visits which were generally irregular (UNFPA 1996). The same study also observed that some TBAs depended on the programme to restock supplies, whereas others tried to replenish them themselves. It was observed that locally produced kits seemed to be more cost effective and sustainable (UNFPA 1996). Therefore in Nepal and Bolivia, simple, locally made home delivery kits had been developed with the aim of making them more appropriate, functional and inexpensive (UNFPA 1996). The studies and evaluations suggest that while delivery kits can be effective in reducing infection, they must be replenished frequently, or be filled with items that can be replenished and/or repaired locally. Again, an understanding of the local context in which TBAs are operating is vital to enhance their capacities and to optimise their training.

In sum, existing literature about unhygienic practices shows mixed results. Some studies show that TBAs continue to engage in potentially unhygienic practices (Bang et al. 2005; Rama Rao et al. 2001), whereas others show that TBAs have a lesser role to play in causing infection in mothers and babies (Goodburn et al. 2002; Winani et al. 2007). An important finding that emerges from the literature is that TBA practices and personal and community health and hygiene are equally important in preventing sepsis among mothers and babies. This shows that generation of awareness about cleanliness and hygiene is very important not only for TBAs and women but also for the community as a whole in order to reduce the known potentially harmful infant care practices that are adopted in home deliveries. The next section reviews some of these practices.

Infant Care Practices

The main criticisms about the potentially harmful infant care practices for home births include bathing the baby soon after delivery, discarding colostrum and not weighing babies on birth. These practices are criticised for causing morbidity and mortality among babies (OHCHR 2006; the World Bank 1996). This section reviews these infant care practices in developing countries, specifically in South Asia and India.

Bathing Babies soon after Birth and Hypothermia One viewpoint is that bathing babies soon after delivery, even if the water is warm, increases the risk of hypothermia (Mathews et al. 2005). The subsequent evaporation of moisture on the skin is said to cause hypothermia, especially in small babies, which can set in any time during the first week of life, usually during the night (John and Bodhankar 2001). Another point of view is that bathing has physiological benefits as it is an excellent and agreeable way to stimulate the baby's skin and that babies can and are being bathed with lukewarm water in institutional births in France even before the placenta is expelled (Odent 1984). In recent times babies are being born in bathing tubs emerging from the womb directly into the water and this practice is known to have positive effects (Odent 1984). Other than these inferences, there are no research studies that draw any cause-effect relationship between bathing babies and incidence of hypothermia. Traditional attendants and family members in India tend to bathe the infant soon after birth (John and Bodhankar 2001; Mathews et al. 2005; Sreeramareddy et al. 2006). Even in health institutions

in India, babies are bathed soon after delivery with lukewarm water (Mathews et al. 2005). For home deliveries this practice may take a dangerous course when premature or underweight babies not receiving special care are bathed immediately on birth thus exposing them to potential health risks such as hypothermia.

WHO suggests the 'warm chain' procedure to maintain warmth in newborn babies which includes immediate drying and wrapping, skin-to-skin contact, immediate breastfeeding and postponed bathing (WHO 1997). WHO asserts that bathing should not be carried out before six hours after birth, and preferably on the second or third day of life, as long as the baby is healthy and its temperature normal (WHO 1997). WHO recommends that after birth the baby should be immediately dried with a dry towel, including its head, while the cord is still attached. One intervention study developed a simple method by which TBAs can detect hypothermia by touching (Ellis et al. 2006). Another study in north India examined the diagnostic accuracy of the human touch (HT) method in assessing hypothermia against axillary digital thermometry (ADT) by a trained non-medical field investigator and hypothermia assessed by HT showed a high diagnostic accuracy when compared against ADT (Agarwal et al. 2007). However, the study noted a need to assess whether with training and supervision even to the less literate mothers, traditional birth attendants and community health volunteers can accurately assess mild and moderate hypothermia. This intervention needs to be researched further to assess the possibility of its wider use, especially among TBAs and other community workers.

Weighing Newborn Babies Newborn babies need immediate medical attention if prematurely born or underweight. However, most of the babies in India are not weighed immediately after birth thus potentially exposing the babies that need immediate care to complications. According to NFHS-2 data, most (79 per cent) of the babies in rural India were not weighed after birth (IIPS 2007). Among children for whom birth weights were reported in rural areas of India, 24 per cent were of low birth weight (less than 2.5 kilograms). Evidence shows that institutional births do not necessarily assure weighing of babies on birth. A study conducted in India shows that even in the primary health centres and government hospitals, only 11 per cent of the babies were weighed on birth (Mathews et al. 2005). There are criticisms that TBAs cannot record information because of their inadequate literacy levels. However, an intervention programme in India demonstrated

that even illiterate health workers can help in identifying 'at risk' newborns by using simplified methods and low cost improvised technology in recording birth weight (Kumar and Walia 1981). These interventions that have proven effectiveness need to be identified and tested further with TBAs and included in TBA training programmes. This signifies the importance of TBAs having access to weighing instruments and knowledge about special care for babies of low birth weight. This section highlights the importance of community awareness for the significance of weighing newborn babies immediately after birth and subsequently at specific intervals.

The Practice of Discarding Colostrum Colostrum, the yellowish, sticky breast milk produced at the end of pregnancy, is rich in vitamins and antibodies and provides natural immunity to the infant, is recommended by WHO as the perfect food for the newborn, and feeding should be initiated within the first hour after birth (WHO 2003). According to WHO, initiation of breastfeeding within the first hour of birth is a vital step towards reducing infant and under-5mortality. There are arguments that delay in initiation of breastfeeding may lead to hypoglycaemia, hypothermia and acidosis especially among low birth weight infants (Prasad and Costello 1995). However, there are counter-arguments that mention that although the practice of discarding colostrum raises alarm for development observers who are screening for 'harmful practices', it is not known if this practice actually causes harm (Pigg 1995; Reissland and Burghart 1988).

Breastfeeding in India is generally considered to be a positive experience from which mothers and babies gain both physically and emotionally (Smale 2003). However, research has identified that due to lack of awareness and misconceptions in India, the mother's first milk, the colostrum, is discarded without it being administered to babies (Basu and Stephenson 2005; Nagadeve 2002). According to NFHS data, only 16 per cent of the mothers in India initiate breastfeeding within the desired one-hour after birth and only 37 per cent do so by the end of the first day; as many as 63 per cent of the women do not feed the colostrum to their babies (IIPS 2007). TBAs have therefore been trained to convey the knowledge about the significance of colostrum and exclusive breastfeeding to people. There have been no recent studies in India identifying the influence of TBA training on breastfeeding practices.

Breastfeeding is strongly influenced by cultural and religious factors and the family plays an important role in the decision making regarding when

to initiate breastfeeding (Kumar et al. 2006; Laroia and Sharma 2006; Sharma and Kanani 2006). The colostrum is discarded because of the general understanding that it is 'heavy, stale or unhealthy for the child' (Khan 2000; Sharma and Kanani 2006). The need to discard colostrum is a widespread belief in India and is followed even in formal health institutions. For example, studies in Maharashtra and Bihar states in India have found that deliveries in formal health institutions do not necessarily ensure early initiation of breastfeeding (Nagadeve 2002; Srivastava et al. 1994). Hence, the practice is not the fault of TBAs; it forms part of a more strongly and widely held belief system in India. Yet TBAs are held accountable by international health agencies for their 'ignorance'. The next section discusses another criticism directed towards TBAs in relation to their inadequate knowledge to identify risk and make referrals during delivery.

Recognising and Managing Maternal Complications

According to recent estimates, the leading cause of maternal deaths in India is postpartum haemorrhage (38 per cent), followed by sepsis (11 per cent) and abortion (8 per cent) (SRS 2006). Studies in India have revealed that the postpartum period is the riskiest period and maternal deaths occur mainly at home because of delay in recognising complications due to inadequate awareness and availability of transport, medical facilities or personnel (Maitra 2001; Murthy and Barua 2004). The delay in recognising complications due to inadequate awareness signifies the importance of making TBAs and women in general aware of the main signs of complications and the simple means of managing these.

Postpartum hemorrhage is the leading cause of maternal deaths in India, accounting for 38 per cent of women who die in childbirth (SRS 2006). Most of these women enter pregnancy usually in already anaemic conditions (UNICEF 2004). Hemorrhage can happen when the placenta, a pouch the shape of a mushroom that holds the foetus, is detached from the uterus too early, or when parts of the placenta do not come off after the baby is delivered, or when the uterus ruptures (UNICEF 2004). Medical research instructs to pull very gently downward on the cord for 30 to 40 seconds with the strong uterine contraction to deliver the placenta (Lalonde et al. 2006; Pfitzer and Sanghvi 2004). It is also now known that feeding the baby breast milk helps in the placenta delivery. This information can be helpful when passed

on to TBAs and other people in the community assisting birthing women. TBAs have been criticised for pulling on the cord during the delivery of the placenta and causing hemorrhage in mothers. However, there are no recent studies showing any evidence of such practices existing in India. TBAs are instructed during training to refrain from forcefully pulling on the cord in order to deliver the placenta but there are no studies assessing the influence of this message passed through training on the practices of TBAs.

The importance of managing complications is in identifying risk and provision of effective emergency care and thereby preventing death. Thaddeus and Maine (1994) identified three delays that occur in complication management: 1) delay in recognising a complication and decision making to seek care; 2) delay in reaching the appropriate health centre; and 3) delay in the provision of care. TBAs are generally involved in the first two kinds of delays. The criticism is that TBAs are illiterate and therefore do not have skills or scientific knowledge to identify danger signs or respond skillfully to complications with drugs (Bulterys et al. 2002; GOI 2000; UNICEF 2004). The World Health Report 2005 states that TBAs delay and deliberately discourage women with complications from going to the hospital (WHO 2005). The third delay occurs when, after reaching a health facility, there is a lack of staff or equipment to attend to the emergency (UNICEF 2004).

There are no studies that examine the relationship between the delays caused by TBAs and deaths of mothers and babies. An evaluation study covering seven countries in Asia, Africa and the Middle East found that the health centres visited had no assessment records of the condition of the patient upon arrival. Thus, it was not possible to conclude whether the trained TBAs had made a proper assessment of complications and timely referrals (UNFPA 1996). On the contrary, it is observed that in locations where referral is feasible, TBAs can potentially save lives through identifying risks and conducting required preventive measures even before arrival at the referral site (UNFPA 1996). TBAs are therefore taught in training programmes to recognise signs of complications among mothers and babies and make referrals (GOI 2000). Recent studies have revealed that excessive postpartum bleeding can be controlled with misoprostal medicine (Carpenter 2001; Chandhiok et al. 2006; Lalonde et al. 2006). Unlike oxytocin, misoprostol does not require refrigeration, costs as little as 14 cents a tablet and is easy to use for semi-skilled birth attendants. A recent study in rural India found that the administration of oral misoprostol to women resulted in significant decreases

in the rate of acute postpartum haemorrhage and mean blood loss (Derman et al. 2006). The study therefore highlights the significance of disseminating information to TBAs and the community about such low cost measures that can be easily administered, and have a positive safety profile, which makes them a good option in resource-poor settings (Derman et al. 2006).

There are criticisms that 'even trained traditional birth attendants cannot, in most cases, save women's lives effectively because they are unable to treat complications, and are often unable to refer' (Carlough and McCall 2005: 201). Several studies, however, demonstrate the capacity of TBAs to recognise complications and make referrals, putting the knowledge gained in training into their practice despite their lower literacy rate. A recent study by the Department of Pediatrics, Institute of Medical Sciences in Varanasi, India, for example, on testing the reliability of information obtained by illiterate health workers (IHWs) including TBAs on risk pregnancy, found that IHWs recorded the risk indicators with a fair degree of reliability and accuracy (Das et al. 2000). Another exploratory study in India found that TBAs were able to recognise the condition of birth asphyxia, an important cause of perinatal mortality, but mostly could not deal with it (Raina and Kumar 1989). The study suggests that this deficiency could be overcome if suitable training was provided to TBAs (Raina and Kumar 1989).

A programme evaluation study in south India noted that with training there was an improvement in risk identification; however TBAs tended to manage certain complications of retained placenta and prolonged labour by themselves (Lartson et al. 1987). The study emphasises the need for supervisory back-up along with training (Lartson et al. 1987). Studies in other developing countries such as Honduras and Tanzania have also shown that knowledge about risk factors and signs of danger in pregnancy and childbirth increased with TBA training (Jahn et al. 2001; Rodgers et al. 2004). UNFPA (1996) in an impact assessment study covering seven countries notes that trained TBAs identify signs of risk and make referrals. Studies have also provided evidence that referrals for immunisation and complications have increased with training (Rodgers et al. 2004; Smith et al. 2002; UNFPA 2004). A study in Guatemala found that the TBA training programmes appear to have had a substantial impact on the frequency of referrals, with trained TBAs being much more likely to refer their patients than their untrained counterparts (Goldman and Glei 2003). These studies demonstrate that TBAs not only have the capacity to absorb the knowledge imparted to them by training, despite their low levels of literacy, but also to apply acquired knowledge in

their practices by increased referrals, demonstrating that they are potentially a vital human resource in communities accessing their services.

Conclusion

In India women prefer to birth at home with community support and to deliver in comfortable upright positions. Materials known within biomedical knowledge frameworks to cause neonatal tetanus continue to be used to apply to and cut the cord and the few studies on materials used to apply on the cord and infant health show that application of oil increases infection risk among infants. Yet materials and unguents are used within local belief systems where they are considered to be beneficial and where beliefs in their efficacy may have a strong spiritual component. Certain traditional practices such as bathing babies immediately after birth, not weighing babies after birth, and not feeding with colostrum are adopted in home births as well as health institutions in India. There is therefore a thin precarious balance between biomedical and traditional knowledge. The literature therefore highlights the importance of community involvement in adopting beneficial practices. Research findings also show that the use of the delivery kit reduces infection risks among mothers. TBAs, however, are not the only source of infection caused among mothers and babies. Unhygienic practices and potentially detrimental beliefs within the community also need to be addressed along with the TBA training programme to improve maternal and child health outcomes.

With suitable training and supervision certain dangers during delivery can be minimised and the TBAs' potential can be drawn on to improve the health outcomes of mothers and babies. There are research interventions that have effectively implemented simple methods of identifying hypothermia and recording birth weight that can be used by TBAs. More research is needed on these interventions and the research should frame and where relevant be included in TBA training programmes. Maternal complications require immediate recognition and action to be taken. There is research evidence that TBAs can recognise risks and studies have shown an increase in referrals with training. This article highlighted the importance of TBA training to improve maternal and infant health, the need for evaluations of training on TBA practices, but also the need to recognise TBAs' skills, knowledge and practices as they are enacted within local communities and to work with their knowledge where possible.

Notes

1. The National Family Health Survey is a large-scale, multi-round survey conducted in a representative sample of households throughout India. Three rounds of the survey have been conducted since the first survey in 1992–93 and provide state and national information on fertility, infant and child mortality, family planning, maternal and child health, reproductive health, nutrition, anaemia and utilisation and quality of health.
2. Number of perinatal deaths per 1,000 total births. These deaths include those occurring during pregnancy (at 22 completed weeks of gestation and over), during childbirth and up to 7 completed days of life (WHO 2006).
3. Lithotomy position: Lithotomy was the position used by the majority of physicians in the 1960s to 1980s, in which the woman is positioned on a flat delivery bed.
4. SRS: Sample Registration System is the largest demographic sample survey in India and is being used to provide direct estimates of maternal mortality through a nationally representative sample. The study 'Maternal Mortality Rate in India: 1997–2003—Trends, Causes and Risk Factors', has investigated 4,484 maternal deaths among over 1.3 million births (SRS 2006).

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