

## REVIEW

# Childbirth practices in rural Rajasthan, India: implications for neonatal health and survival

SD Iyengar<sup>1</sup>, K Iyengar<sup>1</sup>, JC Martines<sup>2</sup>, K Dashora<sup>1</sup> and KK Deora<sup>1</sup>

<sup>1</sup>Action Research and Training for Health (ARTH), Udaipur, Rajasthan, India and <sup>2</sup>Department of Child and Adolescent Health & Development, World Health Organization, Geneva, Switzerland

In a rural community of Rajasthan in north India, we explored family, community and provider practices during labor and childbirth, which are likely to influence newborn health outcomes. A range of qualitative data-gathering methods was applied in two rural clusters of Udaipur district. This paper reports on the key findings from eight direct observations of labor and childbirth at home and in primary health facilities, as well as 10 focus group discussions, 18 case interviews with recently delivered women and 39 key informant interviews carried out within the community. Although most families preferred home delivery, health-facility deliveries were preferred for first births, especially among adolescents. A team of birth attendants led by a traditional birth attendant or an elder female relative took decisions and performed key functions during home childbirth. Modern providers were commonly invited to administer intramuscular oxytocin injections to hasten home delivery, whereas health staff tended to do the same during facility deliveries. The practice of applying forceful fundal pressure, stemming from overriding concern about the woman's inability to deliver spontaneously, was near universal in both situations. In both facilities and homes, monitoring of labor was largely restricted to repeated unhygienic vaginal examinations with little or no monitoring of fetal or maternal well-being. Babies born at home remained lying on the wet floor till the placenta was delivered. The cord was usually tied using available twine or ceremonial thread and cut using a new blade. In facility settings, drying and wrapping of the baby after birth was delayed and preparedness for resuscitation was minimal. Families believed in delaying breast-feeding till 3 days after birth, when they believed breast milk became available. Even hospital staff discharged the mother and newborn without efforts to initiate breast-feeding. A combination of traditional and modern practices, rooted in the concept of inducing heat to facilitate labor, occurred in both home and facility delivery settings. Programs to improve neonatal survival in such rural settings will need to invest both in strengthening primary health services provided during labor and delivery through training and monitoring, and in community promotion of improved newborn care practices.

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## Introduction

India suffers the largest share of the world's burden of maternal and neonatal deaths.<sup>1</sup> Achieving the Millennium Development Goals relating to maternal and child mortality requires that substantial progress be made in providing primary and referral care to women and children, especially at the time of childbirth and during the newborn period, and in improving home-care practices. Public health approaches to maternal health over the last decade have emphasized the need for access to services, chiefly skilled attendance and emergency obstetric care, but have paid comparatively less attention to improving family and community practices.<sup>2</sup> This has had significant implications for neonatal health and survival. As the largest proportion of neonatal deaths occur within the first 2 to 3 days of birth mainly due to problems surrounding childbirth and the immediate newborn period, a study of family, community and the provider practices during this period should help inform the design of large-scale interventions.

Most assessments of family and community practices related to neonatal health have focused on events well after birth, such as the use of pre-lacteal feeds, exclusivity of breast-feeding, bathing and clothing, and care seeking for illness.<sup>3</sup> Studies of newborn care practices at the time of delivery have largely focused on the tying and cutting of the umbilical cord because of concerns about neonatal tetanus, but have not described the monitoring of progress of labor and immediate newborn care, including resuscitation, drying, wrapping and initiation of breast-feeding.

As part of a formative study to guide newborn care interventions in rural areas of the state of Rajasthan in north India, we explored family, community and provider practices during labor and delivery, focusing especially on practices likely to influence neonatal outcomes. We present here a description of the key practices, the extent of team work among birth attendants, discuss the underlying socioeconomic context and visualize the public health implications of these practices.

## Methods

### Study area

We studied two rural communities of Udaipur district (population 2.6 million, divided across 11 blocks), of which Udaipur city

Correspondence: Dr SD Iyengar, Action Research and Training for Health (ARTH), 772, Fatehpura, Udaipur, Rajasthan, India.  
E-mail: arth@softhome.net

(population about 500 000) is the district headquarters. We purposively selected two rural clusters (one 'intermediate' or well connected and the other 'remote' or poorly connected to urban areas and facilities) with key sociodemographic indicators (literacy rates and proportion of population belonging to socially marginalized groups) similar to those for the district as a whole. The intermediate cluster comprised of five villages (population 4567) and was connected to the block headquarters (6 km), a subdistrict town (12 km) and the district headquarters (48 km) by refurbished state highways. The remote cluster (seven villages, population 4234) was connected by poorly maintained district roads to the block headquarters (85 km), a subdistrict town (35 km) and the district headquarters (65 km).

#### *Data collection and analysis*

The formative research of newborn care practices utilized a range of qualitative methods for data collection. These included social mapping of community groups, providers and facilities, free listing, pile sorting and rating of illnesses and providers, longitudinal case interviews that commenced in pregnancy and spanned the neonatal period, key informant interviews and focus group discussions (FGDs) with mothers, grandmothers and traditional birth attendants (TBAs) or *dais*. In addition, we conducted a few direct observations of labor and childbirth to complement and clarify information obtained from the other methods.

In this paper, we report key findings related to labor and delivery. We have considered labor as spanning four stages, with the fourth stage being the vulnerable first hour after the delivery of the placenta, which also represents the immediate newborn period.<sup>4</sup> We draw on 10 FGDs with mothers, grandmothers and TBAs, 18 case interviews with recently delivered women, eight direct observations of labor and childbirth and 39 key informant interviews.

To enroll participants for each FGD, we purposively selected one to two hamlets, listed all women therein and then invited 10 to 12 of those eligible to a secure indoor venue in the vicinity. Once eight or more participants had assembled, a moderator (social scientist) commenced the discussion. Latecomers and curious onlookers were engaged outside the room in a parallel educational session to prevent them from disturbing the FGD. The moderator used a pre-tested topic guide and tape recorder (the latter after consent) and a recorder took notes. Raw notes and tape recordings were used to generate transcripts in the local dialect. These were subsequently translated into English in a close consultation with investigators. Codes were assigned using Atlas-ti software package and the data were analyzed in an iterative manner.

To carry out case studies of delivery and newborn care, we enumerated pregnant women in the third trimester and took consent from the woman and family. We interviewed these 18

women and key informants in the family about 1 to 2 months and 3 to 4 months after delivery.

We attempted to make direct observations of labor and childbirth in all the 18 pregnant women identified. We identified informants in the vicinity who would telephone with news of onset of labor, and arranged for a trained female investigator to rush to the venue at any time of day or night. Information about the women in labor was received for only eight women, in whom the observations were carried out. With the help of an observation guide, the investigator recorded her observations from the time she reached the venue, till at least 1 h after delivery of the placenta or discharge of the woman from the health facility, whichever was earlier.

#### *Ethical issues*

Verbal consent for case and key informant interviews and for FGDs was taken from participants, and for observing home-level newborn care, from women and their families. We took consent from women for interviews and from women and elder family members for observation of the delivery process. In the case of government facilities, a general letter of organizational consent had been obtained from the district chief medical and health officer. In addition, consent was sought from the medical officer in charge, for a female observer to be present during labor and delivery. Finally, investigators introduced themselves to TBAs and local unqualified practitioners who had been invited by the family to attend home delivery. There were a few ethical dilemmas—on one occasion, just before giving a woman in labor an intramuscular oxytocin injection, an unqualified 'doctor' suggested that the investigator should leave the room, but the family members insisted that she should remain. On another occasion, family members sought advice from the investigator about taking the woman to the hospital, and on yet another occasion she was asked to help with applying fundal pressure—on both the occasions, the investigator who had no clinical training, politely declined, pleading either ignorance or inability.

## **Results**

### *Choice of venue for delivery: home or hospital?*

Focus group discussions revealed that the community norm is to opt for home delivery because of a perception that the TBA or *dai* is competent, and because fewer problems occur at home than at hospital.

They (*dais*) are good (at their work) ... better than going to the hospital (four women nodded in agreement). At the hospital, 'dakh padey' (problems befall the woman). At home, 'kam (dakh) padey' (fewer problems occur). (FGD with grandmothers)

We gathered that an important reason for women preferring home deliveries was that the TBA 'touches' the woman or 'uses her

hands'. This meant that she uses a massage like action to apply compressive pressure on the woman's abdomen, to help her deliver. By contrast, hospital staff—nurses and doctors—were seen as having a 'hands-off' approach—they merely exhorted women to 'apply strength' (bear down) while administering 'heat injections' or 'bottles' (intravenous drips).

At the hospital (they) don't use their hands—they don't touch anything and tell the woman (imitating a provider) 'Apply strength! Apply! (Lagao taakat, lagao!)' (laughing, two women nodded their heads). ... (they) give injections, then (they) hoist our legs up ... (demonstrating) this way... We use all our strength and they don't even touch.... Oh yes, they just don't touch! Now here (at home) if I get pains, the dai touches... the more the pains, the more she touches... slowly, she uses her hands and then births the baby. Here (gesturing toward the abdomen), she uses her hands, and by that, the baby falls (comes out)... Yes...being at home is good. But if it doesn't happen... nowadays that is frequent, then (we) take and go (to hospital). (FGD with grandmothers)

The end of the above quote suggests that families are not dogmatic about opting for home delivery. Women reported at least two circumstances in which a hospital delivery is preferred—delivery in a married adolescent daughter and when the TBA opines that hospital would be better.

If (she) is in ochchi avastha (under-age) then... problems... if she is a 12 or 13 year old, her parents don't keep her at home... (they) take (her) and go (to hospital)...  
If the naavi (dai) comes then (she) might say, keep (her) at home, or (she) might say, take her (to the hospital) ... if (delivery) doesn't happen after an hour, (she) says take (her) and go, so they (family members) take (her) and go. (FGD with mothers)

Traditional birth attendants are additionally valued for the range of ancillary tasks they perform as part of comprehensive birthing care.

(After delivery, the TBA ) waits (for) an hour or two...bathes and washes (the mother); (she) puts kaadi-haadi (a saree cloth) on her, cleans her... if clothes have to be washed then (she) washes them. Then later she comes to apply gaar (mud and cow-dung plaster) on the floor. Then she (the TBA) herself bathes and returns. She cares (for) everything and comes again on the following day. (She) mops the floor, removes rubbish (brooms), bathes the baby... for 2–3 days milk doesn't come down so she gives (the baby) 'gadhlo' (a herbal concoction). (FGD with mothers)

Case interviews with 18 women who had delivered in the previous 6 months, 10 of them at home, showed that the decision regarding the place of birth was usually made by the father or brother of the woman.

I delivered at the Udaipur government hospital...here (in the village) there are no facilities—no doctor, no vehicle, so a vehicle has to be brought from the town. The doctor conducted my delivery. My sister, mother, mother-in-law and brother and many

others had accompanied me ...the decision to get the delivery done at Udaipur was made by brother and father. (Case interview with an 18-year-old mother educated up to grade 5)

Out of the eight instances in which we observed the process of labor and childbirth, in six, the families had opted for home delivery, whereas the remaining two families had planned for facility delivery. Of the two families that had elected to deliver in a facility, one was related to a hospital employee, whereas in the other instance, the parents of a married 17-year-old preferred a private nursing home for their daughter's first delivery. Three of the six women who intended to deliver at home actually had a delivery in a health facility. One 20-year-old primigravida insisted on going to the hospital soon after labor pains started, whereas two others had to be taken to a health facility when they failed to deliver at home. Eventually, five of the eight women observed gave birth in a health facility—four at facilities at the block or subdistrict level and one at a referral hospital at the district headquarters. The observation team followed the women who were taken to the hospital.

#### *Team of birth attendants, one or two in charge*

During case interviews, most women reported that more than one person was involved in childbirth, and that injections and drips were widely used to quicken delivery at home and in health facilities. However, as depicted below, we often found their account to be incomplete and incoherent, perhaps because women in labor were not in a position to recall clear details.

My delivery was done by mother, jethani (husband's elder brother's wife) and village doctor (an unqualified practitioner)... (To be) with a woman, a woman is needed so (I) had called (my) mother. At 4 o'clock the pain had begun. Mother-in-law sent (her) son (to) call and bring the village doctor...he came at 5 am and gave needles (intramuscular injections)—two on my hips and one on the arm, in 5–5 min each needle was given, and the baby was born at 6 o'clock... (At) 7 o'clock the village doctor went back. (Case interview with a woman who gave birth at home)  
For three days, (I) was admitted to the hospital .... At the time of delivery there were three doctors and four nurses. (I) was admitted at 1:30 at night on 29th and (the baby) was born on 31st at 3 o'clock in the afternoon. They gave bottles (intravenous drips) again and again... (Case interview with a woman who gave birth in a community health center)

In all the observations of delivery except one, we found that there was more than one birth attendant. During labor and until delivery of the placenta, a decision-making role would be assumed by one or two key providers. They monitored progress, facilitated delivery and looked after the placenta and newborn (in that order).

A second category was that of helpers—female relatives, neighbors or the husband. They carried out support tasks like heating water, serving tea or decoctions to the woman, cleaning the home or rushing after delivery to fetch essential items like razor blades for

cutting the cord or cloth for wiping and wrapping the newborn. Some other women acted as passive onlookers, with a few becoming active participants when key providers asked them to assist.

In the case of home deliveries, an elder female relative or TBA assumed charge, often in partnership with one to two other women. A modern provider was additionally invited to each delivery to give injections. In two instances, the modern providers were an unqualified village-based practitioner and a government auxiliary nurse midwife, and in one case the family called a homeopath. A TBA was present during all observed home deliveries and also accompanied the family to the health facility if delivery occurred there.

In the case of facility deliveries, the team of birth attendants was led by one or two staff nurses or doctor. However, within the labor room, a hospital attendant ('ward-boy'), the TBA brought by the family and even family members participated by applying fundal pressure. They also took part in wrapping the newborn or tying and cutting the cord.

#### *Monitoring during labor*

Labor was observed at home for five women, two of whom eventually gave birth in a health facility. Three remaining women had most of their labor in a health facility. During all the eight observations, we noted that the progress of labor was monitored by judging the intensity of contractions from the woman's reactions, by carrying out repeated pelvic examinations, or by looking at the introitus around the time the head was expected to emerge. The only two references to the fetus or its well-being were in the advice to one mother not to sit in a certain manner so as to prevent a 'crooked' fetal position and one experienced TBA's description of a fetus that had descended into the pelvis, as having 'left its home'. We did not find any mention of the possibility that events occurring during labor, including maneuvers undertaken by birth attendants like applying fundal pressure, might adversely affect the well-being of the fetus.

In all home and facility births, vaginal examinations, ranging from 1 to 28 in number, were carried out either to assess the progress of labor and/or to open up the birth passage, the latter by using fingers of one or two hands to 'iron out' the floor of the pelvis. It was sometimes difficult to differentiate the two purposes. The more frequent vaginal examinations clearly resulted from increasing anxiety and sense of urgency among birth attendants, especially when they perceived that labor contractions were weakening and chances of vaginal birth were receding. For five of the eight women, more than one person carried out vaginal examination—after the main attendant had carried out some, the other attendants would perform a few more examinations or attempt to open up the birth passage.

Two extreme examples are described below. First, a woman delivering for the fourth time at home was subjected to 22 serial

examinations over about 2 h by a village 'doctor' under instructions from the attending TBA. However, as it started dawning on the TBA that the baby was not descending, she too examined the woman another four times, just to make sure. The woman in question failed to deliver at home and had to be transported to the hospital. Second, for a woman delivering in a health facility, the nurse midwife carried out eight pelvic examinations over a period of 6 h, whereas the accompanying TBA and mother-in-law carried out another 16 and 2 examinations, respectively (some in front of the nurse), in between strenuous efforts to apply fundal pressure.

All vaginal examinations at home, as well as about half of those conducted in health facilities, were carried out using one or two fingers of bare, ungloved hands, which were sometimes wiped *after* the procedure, often by using the woman's own skirt. Only one village 'doctor' dipped his (bare) fingers in dilute antiseptic solution before performing vaginal examinations.

#### *Fundal pressure*

We found the practice of applying bimanual fundal pressure to be near universal. In the local language, the practice was known variously as '*bâth denâ*' ('to use hands'), '*jor lagaana*' (to apply force) or '*taakat lagaana*' (to apply strength). Fundal pressure was often applied in rapid pulses—our investigators counted pressure being applied between 50 to 185 times during each delivery. We observed three positions for applying fundal pressure—(1) with the attendant sitting behind a woman seated on the floor with hands encircling her abdomen, (2) with the attendant standing or kneeling over the woman lying supine on the floor and (3) in case of facility deliveries, with the attendant standing on a footstep by the side of the woman lying supine on a labor table. The quantum of force was probably greatest when the birth attendant stood or knelt over the supine woman and transmitted a large part of her/his body weight onto her abdomen. Although key informants mentioned that the attendant should 'use her hands' only when the baby is on the verge of coming out, we observed fundal pressure being applied much earlier. On at least two occasions, this occurred in the early or latent phase of labor, as judged from mention of '2 to 3 cm dilatation' on pelvic examination. During one home delivery, fundal pressure was so strong that the baby shot out onto the floor, its head collided with a ledge almost a foot away and rebounded toward the mother's introitus. In this and in another home delivery in which a hefty village 'doctor' applied compressive pressure, the placenta ejected simultaneously, along with the baby.

Although women during FGDs had suggested that hospital staff tend to avoid '*using their hands*', we found nurse midwives, hospital attendants and even a doctor applying fundal pressure in all four births observed in a subdistrict or block-level health facility, as depicted in the quotes below.

*I am completely exhausted* (from applying fundal pressure)... (turning to the woman's mother-in-law who was also present in the labor room)—*Now you do it in my place*. (A nurse in a community health center labor room)

*Laloo! This much force will simply not suffice! You will need to eat almonds to become stronger!* (a health center doctor reproaching a hospital attendant who had climbed onto a footstep and was applying fundal pressure, evidently without much success).

### *Injections to accelerate labor*

In the anxiety to ensure that labor contractions occurred with sufficient strength, intramuscular injections were widely used. Our investigators noted two types of injection—oxytocin and valethamate bromide—the latter being a smooth muscle relaxant used by practitioners in India to shorten the first stage of labor,<sup>5</sup> but not featured in WHO guidelines for the management of childbirth.<sup>6</sup> In all the five observations of labor at home, TBAs or relatives invited modern providers to give heat injections (*'garmi ri bui'*), which we learnt, meant oxytocin. Four women received between one and five intramuscular injections. In the fifth instance, the auxiliary nurse midwife arrived too late to give an injection, as the baby and placenta had already been delivered by a TBA. Although the number and timing of injections was largely decided by the modern provider, in one instance, the TBA instructed the village practitioner to give repeated injections to quicken delivery—this woman underwent 27 pelvic examinations and received five oxytocin injections before being referred to the hospital where she delivered a fresh stillborn baby. In contrast to the demand for 'heat injections' (oxytocin) on the part of TBAs and family members, valethamate bromide (Epidosin) was administered largely at the modern provider's own discretion, as a kind of adjunct to oxytocin.

An overriding concern among birth attendants was that the woman might fail to deliver and would need to be transported to hospital. To families this meant that the provider had failed to conduct the delivery. We learnt from FGDs and key informant interviews with older women and TBAs, that the strength of labor contractions is rooted in the traditional hot and cold humoral concept—successful delivery requires the strength that comes from a 'hot' condition of the body. A healthy and strong woman is able to generate sufficient heat and *'taakat'* (strength or force) to deliver the baby by herself. However, nowadays, women of the younger generation fail to generate adequate heat and consequently run out of strength. This is because (younger) women no longer seem to work hard, do not use a hand mill to personally grind flour and instead, consume *rotis* (unleavened bread) made from flour ground in an electric mill. Their lack of strength during labor needs to be compensated by administering heat injections and external force or *'taakat'* in the form of fundal pressure, to help expel the baby and placenta. Thus, both measures were intended to reinforce the woman's own efforts at bearing

down and to obviate the need for going to hospital, thereby also saving the provider's reputation.

After reviewing the findings from the direct observation of deliveries, we again interviewed six grandmothers to assess the historical evolution of key practices. All of them mentioned that during their time, deliveries took place only at home at the hands of a *dai* or a female relative. Barring one stray instance, they did not mention any practice of administering heat injections to facilitate delivery. Instead, concoctions comprising tea, jaggery and hot pepper would be administered to a woman before delivery to induce heat. As one grandmother said, *'in our times, that was the (source of) garmi (heat)'*. However, all these key informants had themselves experienced fundal pressure and believed it to be a mandatory part of the delivery process. This was obvious from statements like *'without halkiya (fundal pressure), delivery just does not happen.'*

According to older TBAs, fundal pressure was meant for women who could not bear down properly and was to be applied when the 'mouth' (cervical os) had opened about three fingers. These were the very same indications for giving injections. As one TBA stated, *'some women have zor (strength) while others don't, so someone has to help.'*

### *Immediate care of the newborn*

*Resuscitation.* Two newborns delivered in facilities (government Community Health Center and private nursing home) failed to cry after birth. The Community Health Center doctor repeatedly tapped the baby's back and feet and used an electric suction machine for over 12 min, before attempting to give oxygen, and bag and mask resuscitation. In the private nursing home, the accompanying TBA held the baby upside down by the ankles and repeatedly slapped it till it cried. As it turned out, both babies survived the neonatal period, though we do not have further follow-up data. The following narrative account by the investigator observing the process highlights the gaps in preparedness for resuscitation in the community health center.

*'The baby did not cry at birth. The attending doctor tapped its feet and back, carried out throat suction using an electrical machine, listened to the heart and tried to give oxygen through a nasal tube. After 12 min, a pediatrician was called—he too tapped the baby's feet and back, repeated suction and unsuccessfully tried to give oxygen with the nasal tube, but the tube kept coming out. He then realized that the oxygen cylinder was empty. Another cylinder was quickly wheeled in from another room. An ambu bag was then applied and compressed about 12 times... Twenty minutes after birth, the doctor came out of the labor room and advised the family to rush the baby to the city hospital. At this point, a nurse midwife who had stayed behind in the labor room held the baby upside down and slapped it twice, and it started crying. An injection prescribed by the pediatrician was hurriedly procured from a shop outside the health center and administered.'*

*Drying, wrapping and bathing.* In the three instances in which delivery was completed at home, the birth attendants made no attempt to receive the newborn in their hands—the baby exited directly onto the bare floor or jute mat. No attempt was made to pick up the baby, or to dry and wrap it, until after the placenta delivered. The placenta clearly took precedence—after it came out, the attendant waited for the cord to stop pulsating and then tied it with bare, unwashed hands. The baby was covered 5 to 15 min after birth. During facility deliveries, we observed that except for one instance, birth attendants did receive the newborns in their hands. However, the wiping cloth was hurriedly taken from the family after birth of the baby, and the same wet cloth was used to cover or wrap the baby. FGDs and case interviews with women revealed a dominant pattern of bathing the newborn soon after birth, and after that, to dry, wrap and place it next to the mother.

(Moderator: After how much time is the baby bathed?)

After about an hour, till then it might as well remain lying around. (We) let it lie till then on the floor... (it) remains lying on the floor...

(Moderator, pointing to mud floor: You mean it remains lying on a floor like this?)

Nothing spoils (goes wrong), Behanji (sister)! If everything has been given in the baby's hands (if the baby is blessed) then nothing will go wrong. If not then it will go (die). (FGD with grandmothers)

(Moderator—When is the baby laid near the mother?)

(The baby) is bathed—washed and after that, laid near the mother. (FGD with mothers)

Those who advocated early bathing mentioned various benefits—the baby '*becomes clean and good*', does not give out odor ('*aamla*'), loses its lethargy and yet sleeps well and does not experience fear ('*ghabraave nahi*'). Several women said that they emulated the common practice seen in hospitals, of bathing a newborn immediately after birth. However, tribal community families residing in the remote cluster preferred to delay bathing till an auspicious day or till the day of the sun ceremony ('*sooraj pooja*') that was traditionally scheduled on the fifth, seventh or ninth day after birth.

We don't bathe the baby immediately. (We do so) only after 4 to 5 days (two to three women agreed). In our community there is *devi-devta's dosh* (negative influence of gods and goddesses). Even now (we) don't bathe (the baby) and earlier too, the older (generation) did not bathe. If *khetpaal* (guardian deity of the fields) happens to be hovering around the little baby when (it) is bathed, then it will '*haar ja*' (lose its life). Only after the sun ceremony is it bathed. (FGD with mothers of a tribal community)

An exception was made by all community groups whenever some supernatural processes (*lain-dain*) were perceived or a promise made by the family to the gods and goddesses had to be

honoured. In such cases, the local faith healer would be consulted and the baby would be bathed in accordance with his advice, generally after 5 to 9 days. Similarly, if the newborn happened to be suffering from '*ragtyo*' or '*lafdo*' (problems triggered by supernatural influences), it was not to be bathed, or else death would surely ensue. We had learned earlier from free listing and severity ranking of newborn illnesses that the community listed these two problems as the commonest causes of death on the day of birth.

*Cord care.* Focus group discussions suggested that the cord was usually cut using an available blade. A ceremonial multicolored thread called *lachcha* or the twine used to braid women's hair was used as cord tie. Observations of home deliveries revealed that although a new blade was preferred, it often was not available.

Earlier, (the cord) was cut with a sickle, now no one keeps (it). (The cord) is cut with a blade or knife and tied with a thread. (It) is tied with a *lachcha* (three to four women affirmed simultaneously). Nowadays even a *gathdi* (rubber band) will do—earlier *lachcha* was used to braid the hair, so (it) was removed from the hair and the cord was tied. (FGD with grandmothers)

Although the dominant pattern was for the umbilical stump to be left to dry, items like clarified butter (*ghee*) or powders and ointments prescribed by providers were often used.

*Sister (nurse) cut the cord...she gave a white tube (white ointment) to put on the cord.* (Interview with a mother who delivered at home)

Powder was put on the cord—the doctor had given, that was put. (Interview with a mother of six children, who delivered in a health facility)

During all the observed facility deliveries, the cord was clamped and cut using scissors, although gloves were not always worn at the time.

*Initiation of breast-feeding.* Except for one home delivery in which the mother breast-fed within half an hour of birth on the advice of a nurse midwife, in none of the home or facility situations was any attempt made to breast-feed the baby during the 1½ to 2 h of observation after delivery. Our observations correlated with findings from case interviews with mothers. Women in the communities believed that milk does not '*get down*' (that is, let down does not occur) until about 3 days after delivery, hence there is no point in trying to feed the newborn immediately after birth. Hospital staff did not appear to encourage early feeding, and unsupported attempts by some mothers to commence feeding early could even disappoint them.

At the hospital, *behanji* (nurse midwife) said breast-feed here itself, don't give anything else—so I gave the nipple in his mouth but he

did not feed. So later, the tea that I was drinking, (I) gave in his mouth. (I) gave 2–3 times. (I) breast-fed the baby after two days. (Case interview with a mother who delivered in a hospital)

Signs of positive change could be seen in the opinion of several TBAs who had received some training that the breast should be offered to the baby soon after birth. However, some other TBAs remained faithful to the notion that milk would get down only after about 3 days, before which attempting to breast-feed was pointless.

*Early discharge.* We observed that women were discharged within 2 h after the childbirth in a health facility, except for one instance in which the delivery occurred late at night when there was no transport available. Early discharge allowed little time for the mother to receive support in initiating breast-feeding. In the case of home deliveries, modern providers left within minutes of delivery of the placenta, whereas traditional providers stayed on for a few hours.

## Discussion

Our study in a district in rural Rajasthan found that unlike some other areas of India, there still are strongly held beliefs in favor of home-based childbirth although most people appear ready to take the woman to a health facility if there appears to be any problem. People in the study areas also favored institutional delivery if the pregnant woman was very young.

Multiple persons acted as 'birth attendants' and had varying influence on practices during labor and childbirth. 'Skilled attendants' were often not in a decision-making position even when present during delivery, and in some cases they lacked competence and/or reinforced irrational practices. As a result, the presence of a supposedly 'skilled attendant' at home or at a health facility did not guarantee that the woman and newborn received 'skilled care'.

Although important differences were to be expected between the management of labor in homes and facilities, we were surprised to find strong similarities, especially in how anxious providers 'augmented' labor to facilitate quicker birth and handled the newborn immediately thereafter. To a great extent, this blurring of differences occurred because on the one hand 'modern' providers were invited to participate in home deliveries, whereas even within the labor rooms of health centers, the providers in charge (nurse midwives and doctors) as well as attending family members and TBAs engaged in some 'traditional' practices, as well as some unhygienic actions. Monitoring of the progress of labor was effected through repeated vaginal examinations, mostly with little consideration for hygiene. Bare fingers were additionally inserted to open up the vaginal passage. The use of uterotonic injections (oxytocin) was rampant, as was the application of manual fundal

pressure throughout labor and childbirth. Although the literature has described these fundal pressure maneuvers in a more benign way as 'abdominal massage',<sup>7</sup> the quantum of compressive force as actually observed by us was much greater than that expected of a massage.

These harmful practices are a matter of concern. Intramuscular oxytocin given before delivery of the baby is a dangerous practice, because the dosage cannot be adapted to the level of uterine activity and can lead to hyperstimulation, which is harmful to both the woman and her fetus.<sup>8–9</sup> It can lead to impaired fetal oxygenation and hence fetal distress and asphyxia. An increase in the incidence of ruptured uterus, water intoxication and changes in blood pressure have been linked to this practice.<sup>10–11</sup> However, the practice is widespread—a retrospective recall survey of 1947 recently delivered women in two rural districts of Rajasthan, conducted by ARTH in 2007, revealed that intramuscular injections were used to hasten delivery during 92% of institutional deliveries and 29% of home deliveries.<sup>12</sup> Data from elsewhere in India too confirm the widespread misuse of oxytocin for labor acceleration during home births.<sup>13–15</sup>

The application of fundal pressure is expected to increase the risk of fetal distress (hence asphyxia) and birth trauma, including intracranial hemorrhage.<sup>16</sup> The above-mentioned survey in Rajasthan<sup>12</sup> found that fundal pressure was used in 94% of home and 63% of facility deliveries. The practice of multiple unhygienic vaginal examinations and manipulation of the birth passage substantially increases risk of puerperal genital infection<sup>17–21</sup> and could predispose to neonatal infection.

Finally, little attention was given to the newborn immediately after birth. Early care practices related to keeping the newborn warm, preventing infection and early initiation of breast-feeding were clearly inappropriate. Skills and preparedness of providers for resuscitation were clearly insufficient. Promoting immediate drying and wrapping of the baby, hygienic cord tying and cutting, skin-to-skin contact with the mother and initiation of breast-feeding within the first hour of birth will be critical to improving the survival of newborn infants, especially those that have a low birth weight.

Beneficial practices observed included preferring facility delivery for adolescents, ensuring a warm room for home delivery and giving importance to delivery of the placenta. These practices should be reinforced. At the same time, messages need to be developed to promote measures to prevent neonatal hypothermia and postpartum hemorrhage.

The Indian government's National Rural Health Mission has invested heavily in promoting delivery in health facilities from 2006 onwards,<sup>22</sup> and this has led to a marked increase in the numbers of institutional deliveries across India.<sup>23</sup> For the increased reliance on health facilities to make a positive impact on maternal and neonatal mortality, measures to regulate the quality of delivery and postpartum care in health facilities must be instituted as a priority. For example, given that most neonatal (and maternal)

deaths occur within 24 h of childbirth, health facilities must ensure that the woman and newborn are not discharged less than 24 h after delivery. Interventions to improve maternal and neonatal health need to address harmful practices through appropriate training of health providers, changing their perceptions and attitudes, and by monitoring their performance on the ground. Health system improvements together with communication interventions designed after a clear understanding of peoples' beliefs about childbirth and their constraints concerning use of health facilities can play an important role in saving maternal and newborn lives. Educational messages and other interventions must not only address pregnant women, but also target other family and community members as well as the various categories of health providers.

### Disclosure

All the authors have declared no financial interests.

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