

Newborn care practices at home and health facilities in Tigray, Ethiopia: a qualitative assessment

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Research Article

Keywords: Newborn care, Home, Health Facility, Practices, referral, continuum of care, harmful traditional practices

Posted Date: July 19th, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-3132020/v1>

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Abstract

Background: The Most Vulnerable age group for child survival is neonatal period. In 2019, Newborn deaths accounted to nearly half of under-5mortality with 2.4 million deaths Worldwide. (1) The estimated neonatal mortality rate of Ethiopia is 30 deaths per 1000 live births. (3). The aim of this study is to assess the Newborn care practices at home and public health care system in Tigray.

Methods: A qualitative study was conducted with two techniques: focused group discussions and in depth interviews. Five zones from Tigray region were included in the study. A total of 16 focused group discussions and 46 in depth interviews were conducted among community representatives and health workers. Collected data was discussed, recorded data was transcribed ATLAS ti software was used for coding themes and experiences. The transcribed data were analyzed using an inductive approach. Before coding, the themes were identified and thoroughly discussed.

Results: Community perspective: Despite satisfactory knowledge of the community on basic new born care and harmful traditional practices, there is still significant and unresolved problem with the practices. Financial and social factors were found to affect the active participation of parents especially the mother in care of the baby in the facility. Health care professionals perspective: Unlike Facility births, weight measurement practice for home births is variable with most being not weighed. There are missed home births despite presence of home birth notification framework. HEWs do postnatal care using scheduled home visit care package. Up-referral continuum of care and referral feedback from hospitals is poor. Widespread shortages of electric power, phototherapy machine, and lack of awareness on the community side on care of preterm and LBW babies are among the findings. Economic insecurity and social factors were critical factors affecting parents experience.

Conclusion: As the Ethiopian Federal Ministry of Health focuses on decreasing the huge Neonatal mortality rate, improving the newborn care practices both at home and in health facilities would be important. It is necessary to invest on strengthening the HEP and Health education programs and have an actionable strategy with dedicated resources to provide effective services at facility level.

Background

The Most Vulnerable age group for child survival is neonatal period. In 2019, Newborn deaths accounted to nearly half of under-5mortality with 2.4 million deaths Worldwide. (1) Intrapartum-related events, preterm complications, sepsis, meningitis, congenital problems were included among the causes. (2) Sub-Saharan Africa and Southern Asia were responsible for the 4/5th of newborn deaths (4) the estimated neonatal mortality rate of Ethiopia is 30 deaths per 1000 live births. (3) Most preterm babies survive with the available evidence based and Cost effective care without requiring ICU care. (6)

Outcomes for these newborns can be improved through quality postnatal interventions in the facilities and basic home care. Neonatal deaths occur both in facilities and at home. Ministry of health of the country has given focus on facility based newborn care by facilitating establishment of NICU in hospitals.

Moreover; Ethiopia is known to introduce the health extension program (HEP) to reach the community through home visits using the trained Health extension workers (HEWs) and woman development groups (WDA). The Health Extension Program is one of the most innovative community-based health programs in Ethiopia which became operational since 2004/2005. (7) One of the health packages the HEWs implement is maternal and newborn care through ANC follow up of mothers and post-natal care through home visits based on post-natal follow-up schedule and creating linkage with WDA who are community members dedicated in linking mothers with the trained HEWs.

Reduction in Stillbirths, Neonatal and perinatal mortality was demonstrated in a meta-analysis done on all community-based interventions till 2010. It also showed an increase in referrals to health facility for pregnancy-related complications and improved rates of early breastfeeding and hence; its impact on early neonatal mortality was remarkable. (8, 9) Another review suggested early home visits within the first 48h of delivery for better outcome. (10) The proof-of-principle studies also demonstrated similar findings; where its estimate showed a 45% reduction. (11) Such findings would likely support the need of strengthening the existing HEP of the country that links the HEWs with the community representatives (WDA) working together to improve the newborn survival.

Methods

A qualitative assessment was conducted from March to April, 2017 across five zones of Tigray, one of the nine regional states of Ethiopia. The five zones are Southern, South eastern, Eastern, central and Mekelle. The Regional state has total of seven zones. Qualitative methods were used to gather rich data to inform “how” and “why” newborn care practices affect neonatal survival. Data collectors conducted (i) In depth interviews with 15 mothers with small babies born in the previous 1 month, 11 Community health workers (health extension workers and women development group) and 11 health workers (nurses and midwives) in health facilities. (ii) 3 IDI and 1 FGD with grandmothers and (iii) 6 IDIs and 2 FGDs with grandfathers of young children under 2 year of age. Parents and grandparents with children less than 2 years of age were selected to be participants to avoid recall bias.

The study setting

This Qualitative study was conducted in five zones of Tigray region, which is located in the northern part of Ethiopia with a population size of 5,055,999 and neonatal mortality of 34/1000. The socio-characteristics of study region is shown in Table 1.

Table 1
Socio-demographic characteristics of Tigray, 2019

Characteristics of the study Region	The Region (Tigray)
Demographic indicators	
Population, No.	5,055,999
Male	49.2%
Female	50.8%
Neonatal mortality, No. per 1,000 live births)	34
Facility Birth	72.4%
Percentage of women with a postnatal check during the first 2 days after birth	62.9%
primary health care coverage	96%

Mini EDHS 2019 and National 2015/16 census projection

Study design

This Qualitative study was employed with a participatory approach with two data collection techniques: focused group discussions (FGDs) and in depth interviews (IDIs).

Sampling and sample size

Based on the 1991 zonal assignments of the region, there are seven zones: South, South eastern, Eastern, Central, Mekelle, Western and North western zones. In consultation with Tigray regional health bureau, five zones were selected for conducting focus group discussions and in-depth interviews (Table 2).

Table 2
The Five zones, districts and health facilities of the region included in this study.

Zones	Wereda (District)	Health facility
South	Maichew, Endamehoni, Nikaah	Maichew lemlem Karl hospital, Neksege Health Center
South eastern	Degua temben, Alasa, Arebay	Hagereselam primary hospital, Alasa Health Center
Eastern	Adigrat, Gantaafeshum, Kitagedeba	Adigrat hospital, Bizet Health Center
Central	Abi-adi, Guya	Abi-adi hospital, Guya Health Center
Mekelle	Mekelle, Serawat	Ayder Referral Hospital, Serawat Health Center

The 1991, Zonal and District assignments of Tigray region

In addition, for interview purpose, Staffs were selected from a subset of health facilities at each tier of the public health care system in each zone including health post (HP) and health centers (HC) before the actual data collection.

In this research, a total of 16 focused group discussions and 46 in depth interviews were conducted. Selection of the locations has considered different local characteristics such as urban, semi-urban, and rural and distance within 150km from Mekelle, the capital city of Tigray.

Study participants

In depth interviews were conducted with 11 Community health workers (health extension workers and women development group) and 11 health workers (nurses and midwives) in health facilities and 15 mothers with small babies born in the previous 1 month. Focused group discussions was made among mothers and fathers with young children under 2 years of age with each group containing 6 to 12 participants. 3 In depth interviews and 1 FGD was conducted with grandmothers and 6 IDIs and 2 FGDs with grandfathers of young children under 2 year of age. Health directors identified and gave detailed information about the participants prior to the study. Parents and grandparents with children less than 2 years of age were selected to get recent memory and avoid recall bias.

Data collection method

Designing and development of the data collection guide was made by the research team. The guides were designed to get in depth details about the care of newborns, newborn care related beliefs, norms and

practices in the community and facilities in the study area.

Data collectors were nine in number with masters of public health (MPH). They were first trained on qualitative research to bring perceptions of the data collectors with the research team members. The research team was composed of professionals from the department of pediatrics and child health, public health and experts from Tigray regional health bureau.

Participatory techniques with open ended questions and open informal interaction among discussants and with the facilitator was used during the FGDs to help participants project and share their ideas. A convenient place was arranged for participants to conduct the IDIs which on average took up to 1 hour each. A total of 16 FGDs were held in the five study areas. On average each group discussion took an hour to two hours.

Each process is recorded by digital recorders; then followed by debriefing of research team with the key informant researchers daily. Guide was developed for debriefing purpose. Important ideas and findings were being discussed during the daily debriefing sessions which helped the supervisors and data collectors to have shared understanding. In the process the debriefing guide was repeatedly refined and used the new version for the next interview.

Data analysis

Major findings of the data were discussed among the research team and the data collectors in the analysis workshop. Transcription of recorded data was made. The recorded data were transcribed. ATLAS ti software was used for coding themes and experiences. The transcribed data were analyzed using an inductive approach. Before coding, the themes were identified and thoroughly discussed.

Ethical Oversight

To conduct this qualitative study, ethical approval was obtained from the institutional review board of Mekelle University and by WHO Ethical review committee. TRHB has written support letter to each district health offices. Both written and verbal consent was taken from every participant.

Credibility

Data collection and coding was done by the key informant researchers who are all masters of public health (MPH). At each level of data collection and debriefing there was continuous research team supervision. Two Analysis workshops were conducted at the middle and at the end of data collection for learning to improve the data collection process and to have an overview of the findings respectively. Finally, Validation and dissemination workshops were also held where higher officials, Directors of the facilities and health workers from the study area have participated and put their impressions.

Results

Description of Sample

A total of sixteen focus group discussions (FGDs) were conducted with grandfathers, grandmothers, mothers who have child of less than two years of age and fathers who have child of less than two years of age of community representatives. From the total discussants two groups were grandfathers, one group was grandmothers, ten groups were mothers who have child of less than two years of age and three groups were fathers who have child of less than two years of age. In these FGDs the maximum number of participants in one group was twelve and the minimum number were six. Concerning age of the participants, the maximum age was seventy three years and the minimum age seventeen. The highest level of education of the discussants was diploma and there was considerable amount of illiterate participants in the FGDs. Regarding number of children they have, the maximum number is eight and the minimum was one.

In this study, a total of forty six in-depth interviews (IDIs) were conducted among community representatives and health workers. The health worker were nurses, midwives, HEWs and the community representative were WDAs, grandfathers, grandmothers, mothers with LBW/Preterm baby who initiate KMC and who did not initiate KMC. Of the total participants, from the health workers side four were nurses, ten were midwife, five were WDA and seven were HEW. From the community representatives six were grandfathers, three were grandmothers, six were mothers with preterm baby who did not initiate KMC and nine were mothers with preterm baby who initiated KMC at health facility.

In these IDIs, the maximum age of participants was sixty and minimum age was seventeen. Regarding working experience of health workers, the maximum year of experience was fourteen and the minimum was seven months. Almost all participants from health workers group their education level was degree graduate. Concerning education level of the community representatives the highest level was tenth grade and almost half of the participants were illiterate. Regarding community representatives' number of children they have, the maximum number was six. Half of mothers who participated in this in-depth interview had only one child.

Community perspective on newborn baby care

Health condition of a baby

The study participants repeatedly mentioned that a baby is healthy if the baby has weight gain, able to breast feed, physically active, sleeps well, able to breathe and cry but the cry shouldn't be prolonged, the baby should be free from symptoms of illness like coughing, vomiting, fever, and diarrhea.

Focus group discussant mother who has children of less than 2 years old from semen health center, Mekelle city explained this condition "A baby is Healthy if he/she is able to sleep well for more than 12 hrs. Per day"

Another focus group discussant mother who has children of less than 2 years old from Bizet health center, Eastern Zone of the region explained "If a baby cries day & night, this might be because of health problem or the baby is sick"

Type of care needed to have a healthy baby:

According to the respondents; practice such as baby bath (hygienic care), exclusive breast feeding till 6 month then supplementary feeding, thermal care (keep warm/prevent exposure to coldness), initiate breast feeding by providing colostrum immediately after birth as much as possible, vaccination, ANC follow up, proper maternal nutrition, institutional delivery are the cares needed to have a healthy baby.

Focus group discussant mother who has children of less than 2 years old from semen health center, Mekelle city said “ Avoid providing butter as early initiation of feeding (previously it was given if the mother could not produce milk immediately) because a new born baby GI could not digest it & may create health problem”. During the in-depth interview, a grandfather from Neksege health center of southern zone said “Like a plant, newborn baby needs proper cultivation (Both plants and babies deserve strict care till they grow up properly”

Danger signs

The study participants repeatedly mentioned that the community/ family members become worried if a baby has a danger sign like vomiting & diarrhea symptoms of respiratory illness, unable to breast feed, high fever, symptoms of tonsillitis, uvulitis, measles /polio, convulsion, abdominal pain/cramp, excessive bleeding. Focus group discussant mother who has children of less than 2 years old from semen health center, Mekelle city describe this condition “I am very much worried if there is excessive bleeding from circumcision site of male baby”

Thermal care and Baby bath

Respondents repeatedly said that exposure to cold is responsible for respiratory illness which is expressed with manifestations of coughing, fast breathing, chest in-drawing, chest pain, unable to breast feed, vomiting & becoming physically weak. So early wrapping with more clothing is so important to keep warmth of the baby. Despite poor reasoning, all respondent groups recognized the importance of keeping newborns warm and well wrapped.

Focus group discussant father who has children of less than 2 years old from Guya health center, central zone. This situation described as “The father believed that if a newborn baby is exposed to coldness, he/she may develop eye discharge which might progress to Trachoma”

Focus group discussant mother who has children of less than 2 years old from Mekelle Hospital, Mekelle City stated “If a baby is exposed to coldness, he/she may develop pneumonia & this may progress to TB”

All respondents reported that newborns should be kept in a house and shouldn't be exposed outside the room for at least the first week of life and the door & windows of the room should be closed.

Interviewed grandmother from Serawat health center of Mekelle City on current practice of baby bath responded, “This time we delay baby bath till 24 hrs of age (not immediately as previous time) to prevent coldness then attach to his/her mother to Breast feed”.

Interviewed grandmother from Alassa central zone said “I believe Newborn baby should bath immediately after birth to clear the blood”

Breast feeding

Most of the respondents were aware of the importance of early initiation of BF and the advantage of colostrum. They said mothers who gave birth at health facility were advised to initiate breast feeding immediately and not to discard colostrum.

Focus group discussant mother who had less than 2yrs children in Bizet eastern zone “For my baby I initiate with Breast milk (colostrum) it should not be other thing (like butter or sugar & water)”

The main reason given by the respondents for early initiation of BF was to make sure that the infant received colostrum and food. Respondents reported that mothers are aware of practicing EBF for the first six months. Newborn baby unable to suck was fed breast milk via syringe after collecting from the mother.

Interviewed mother who had preterm and LBW baby in Meremeyti of southern zone said “at home as traditional belief, I may give butter as initiation of feeding”

Some mothers especially those who gave birth at home were unaware of the advantage of colostrum then they discarded it because they believed that the newborn baby’s stomach is unable to digest. In most cases babies delivered at hospitals were initiated with formula or cow’s milk especially if the baby is hospitalized in NICU or mother is unable to produce adequate breast milk then baby may start breast feeding after one day. HIV transmission from mother to child is also a concern reflected by some mothers.

Focus group discussant grandmother from Neksege, southern zone explained the condition as “I understand that the major concern of the society is HIV could be transmitted from mother to newborn baby through breast feeding”

Focus group discussant mother who had less than 2yrs children in Guya of central zone mentioned “In previous time, if a mother could not produce enough breast milk, the baby was breast fed by other’s breast milk (sister, grandmother, relative or neighbor)”

Cord care

Mothers reported that it was important to apply substances to the cord to quicken the healing. The commonly used substance was butter even though most of them believed that this is a harmful traditional practice. Focus group discussant mother who had less than 2yrs children in Guya, Central zone said “I do not apply anything except prescribed medication to the cord, it will dry by itself”

Family experience when neonate /child is hospitalized

Most Respondents reflected that Social factors could also impact parental participation in newborn care including: parental income (financial problem), household domestic responsibilities as mothers play the most active role in rearing children. When house hold responsibility is taken care of by the mother, she tends to be stressed, because children may be absent from school, starved. Mother become worried about such conditions, family members get affected psychosocially. Some mothers get support from Neighbors, grandmother, husband in taking care of the baby when she is hospitalized for prolonged period.

Care provision and Health Education

All respondents repeatedly mentioned that mothers received health education mainly from health professionals (HEWs, midwives, nurses, physicians), Women Development Army (WDA) and grandmothers. The education is all about newborn care like importance of colostrum feeding, exclusive breast feeding, supplementary feeding, the need & how to keep the baby warm, when & how to bath the baby, cord care.

In health facilities, health care service (care of the baby) is always decided by health professionals and at home the decisions on type of care is mostly by grandmothers and sometimes by husbands.

All respondents acknowledge that most of the time mother is the one who participate mainly in taking care of the newborn baby but grandmother or mother-in-law take more responsibility in supporting the mother to take care of the baby especially if the mother is primigravida. However few fathers in urban area also help the mother in providing care for the baby.

Focus group discussant mother who had less than 2yrs children in Adigudom, Southern zone said “at home the decision about newborn care is mainly made by mother because mother is the one who is taking care of the baby”. Another Focus group discussant mother who had less than 2yrs children in Adigudom, Southern zone said “The community accept the practice done mainly by mother”

Most respondents agree that these days the society believes that parents do seek medical care immediately for tonsillitis or uvulitis. However, there is still traditional uvulectomy practice & treating tonsillitis using herbal medicine among the community especially in rural area.

Harmful traditional practices

Respondents said that some cases babies born at home, feeding may be initiated by sweet (water & sugar or Honey) than by breast milk especially if the mother is unable to produce breast milk. Some mothers believed that traditional uvulectomy is effective than medication in managing uvulitis. They also underlined that health facilities intervention is more effective for male circumcision than traditionally.

Health care professionals’ perspectives on the Newborn care practice

1. Newborn Care practice in Health Centers and at home by HEWs

1.1 Weight measurement

Nearly all participants including health extension workers (HEW) reported that the weight of all babies born at health facilities is measured along with the rest essential newborn care package. However, few Nurses and midwives acknowledged that there is instances where newborns were not measured their weight in some critical situation until the situation becomes managed.

“Sometimes there may be a situation where a newborn is not weighed for 2–3 days. For example, if the baby is hypothermic or very critical, it may be preferred to continue the oxygen and hypothermia treatment rather than interrupting the oxygen to measure weight; it does not matter to the baby whether weighed or not.” (A nurse profession working at NICU in Adigrat Hospital).

Participants reported that HEWs and women Development army (WDA) identify home births then enable mothers to visit health facility and have their babies weighed.

“I do not think babies are weighed at home. They rather come to health facility even at fourth stage. Even if, birth occurs at home, most are not kept at home before being weighed”. (A Midwife from Degua Tembien).

However, nearly all participants stated that newborns delivered at home could not be weighed due to lack of weighing scale. Some of the participants also mentioned that there is lack of awareness about the importance of weight measurement at home both by the community and health professionals (HEWs). Some of HEWs responded that they understand the importance of the weight measurement at home. The same HEWs stated that they have weighing scale and are weighing babies born at home during visit on 24 hours, 3rd day, 7th day and 42 days after delivery for postnatal care purpose. In addition, they reported that there is a growth monitoring schedule monthly at health post. But they affirmed that there is a gap in visiting according to the schedule. HEW from Guya Health Center described the experience of weighing babies by saying “There is no baby who is not weighed. All babies are usually weighed. In previous time simply we used to assess the cord and give Vitamin “A”, but in recent times, we have taken ICCM training in Mekelle, in 2016. Since then, it has got better attention and we started taking weighing scale during home visit and weigh the baby at home”.

HEWs also highlighted that there were many mothers who did not know their babies weight during the home visit. Most (80%) of participants know the right cut point of low birth weight (LBW) which is less than 2.5 kg. and the rest mentioned that LBW is < 2.2 kg. Participants reported that they use variety of methods to calibrate the weight scale. For example, nearly all Midwives and Nurses used pre-calibrated weight, like a bag of Normal saline and one kilogram stone to check the scale. However, few Midwives and Nurses and almost all HEWs used 0 as indicator for calibration of the weight scales.

1.2 Other Essential Newborn cares

Some participants reported that TTC eye ointment application, vitamin k administration, skin to skin contact and thermal care, like wrapping of the baby with dry close and use of sock and hat at health facility are practiced well. They also reported that advice is being given to mothers on how to maintain thermal care; like avoiding bath before 24 hours, wrapping of the baby with thick clothes, importance of frequent breastfeeding and to visit health facility immediately when they observe danger signs of the babies. Participants universally reported the discharge time was after 6 hours of delivery in the absence of any complication. In rural health centers and in non-congested health centers, the discharge time was after 24 hours. However, for mothers who have preterm or LBW baby or other additional maternal and neonatal complication, the discharge time is different from normal situation. Therefore, newborns under kangaroo mother care (KMC) may stay in health facility until the baby becomes stable and able to breastfeed or until the other problems become managed.

2. Existing Strategy to Identify Home Birth and Practice of Post Natal Care at Home

2.1 Methods of Home Birth Identification

70% of births in the region are Facility births. Missing the remaining births (30%) would definitely affect the progress to decrease the existing huge national and regional neonatal mortality (30 and 34 per thousand respectively). All participants universally reported that there is a network system among WDA, HEWs and Midwives. Moreover, each woman within the WDA, is also networked 1–5 in their catchment. Therefore, WDAs are responsible to survey and report the number of pregnant women in each network to HEWs. Even they can also communicate directly with midwives regarding this issue. According to the participants' explanation, their main focus was on mobilizing all pregnant women to deliver in health facility. Therefore, during labor time, mainly the family of the women and WDAs are responsible to call either HEWs or directly to ambulance or midwives. A midwife from Abi-Adi Hospital said "To my understanding, when a woman gives birth at home or during onset of labor, information will reach to HEWs through the established network. For example, a woman who gave birth at home in Kola tembien comes to our health center with the help of HEWs. So they have a strong network."

Most of participants were not denying that many mothers who gave birth at home due to ambulance delay, lack of family around the mother or if they consider they are safe. However, they were investing efforts to bring them to health facility even after delivery for checkup and essential care using the existing network. Acknowledging this effort, still many mothers were not visited at home in instances, where there was meeting, training, due to distance factor and lack of report either from the mother or WDAs. Few participants also marked the existence of gaps in communication between HEWs, Midwives and WDAs. Sometimes; HEWs hear about the home delivery after 2–7 days. HEWs also stipulated that there were some instances where they may not hear about the home birth, if a woman came from out of their catchment area.

A HEW from Alassa kebele described a usual scenario happening in his kebele as follows “In situations where the pregnant women are living far from their parents, We recognized that the pregnant women continue their ANC follow up in their own nearby health post or other facility but when they reached term, especially if they were nulliparous, they prefer to deliver at kebele where their father or mother lives in to get better social support. Nowadays, we have started to inform the HEWs found in that kebele by telephone if that kebele is in the same district. However, if they are out of the same kebele, it was difficult for us to follow such women....this is a usual scenario happening with us.”

Participants emphasized on importance of continuing the existing strategies (Network) in identifying home birth. However; increasing the number of HEWs and strengthening of the already established network between WDA and HEWs deserves to be given attention. In addition, few participants also recommended to create awareness on the risk of home delivery in community and to train HEWs how to maintain thermal care and implementation of KMC at community level. A midwife from Alassa health center p3 explained the status of the facility “The main problem is absence of bed rooms in maternity waiting rooms. Had this precondition fulfilled many mothers would have stayed here with us since fourth visit of ANC. Moreover, there is no food provision in the health center, so many mothers leave to their home. If this is not resolved, home delivery will continue and identification of home born babies may not be easy.”

2.2 PNC at home by HEWs

In rural areas, HEWs were responsible to provide postnatal care at home after delivery. In principle, they have a schedule when to visit home to home however according to their explanation they are not strictly following this schedule due to meeting or training. For example, they are supposed to visit on 24 hours, 3rd day, 7th day and 42 days after delivery. Their visit was inconsistent. Few mentioned that there was time when they could not visit until 2 weeks. Some of the HEWs reported that midwives were expected to cover these activities when the HEWs are not available. Midwives and Nurses working at hospital reported that they are not expected to offer PNC at home but they mentioned that they advise mothers at discharge to revisit the health facility for PNC based on the schedule. Based on the participants’ description, the most common practice for postnatal care at home by HEWs were cord observation for bleeding, weight measurement, breastfeeding assessment, and assessing danger signs.

3: Referral system for Newborns

3.1 Reason for referral

The most frequently mentioned reason for referral from the lowest to highest health facility were; Preterm and LBW babies, unable to breastfeed, breathing difficulty, and congenital malformation. Few participants from health center also mentioned additional reasons such as “no improvement after KMC”, umbilical cord complications, jaundice, sepsis and vomiting everything. Midwife from Bizet health center p2 described the referral condition of the facility “If the service is not available here and if we consider that they will be better served there, we will refer them. Now for example, if Preterm or LBW baby didn’t

improve after KMC, could not take expressed milk, we refer the baby to higher hospital to be fed by Nasogastric Tube”

3.2 Referral Chains and Challenges around the Referral System for Newborn

The referral system was implemented in both directions from lower to higher and vice-versa. Referral from higher to lower level facility is meant for follow up purpose particularly, from health centers to health posts (HEWs). More than half of the participants mentioned that during referral of a sick baby, providers accompany the baby along with his mother using ambulance in most of referrals. But two hospitals mentioned that sometimes there was limitation in routine availability of ambulance service because they don't have their own ambulance. A nurse working in NICU from Adigrat Hospital described about ambulance service “We use ambulance from the town administration for referral when we have a case. I believe, this has to be improved. The hospital should have its own ambulance. There is time when this ambulance service is interrupted, then we are forced to send them with public transport. The nursing mother may be soaked with blood, there is neonate and her family, and it is distressing to send them with public transport. You can imagine that how it is difficult including the expense for transport”

Nearly all HEWs and few midwives mentioned that they used referral slip to refer a baby. Only two participants mentioned that they apply thermal care and breastfeeding on the way to referral center. It was also reported that the chain of referral linkage is from HEWs at health post to health center (HC) and from HC to Hospital or directly individuals can visit HC and hospital. A Nurse working at Neonatal Intensive Care Unit (NICU) described the challenges in referral system as follows: “Some institutions refer a baby without a problem to hospital. I doubt, the delivery service workers, that they are well capacitated. Most Health officers or Midwives lack skill for good attachment during breastfeeding, they refer many neonates with a reason of unable to suck or early neonatal sepsis. But we are not denying that some institutions refer babies with real problems that has to be managed at hospital level. Over all there is a problem in the referral system”.

The down ward referral system from health center to HEWs seems better as compared to from hospital to health center. According to the midwives and HEWs explanation, there were green and yellow cards which were given to mothers during discharge to link them with HEWs and Women Development Army respectively for follow up and postnatal care. In addition to this, HEWs reported that the midwives sometimes inform them by telephone to follow the mother with her baby after discharge. But few participants acknowledge that some women might keep silent while the card is in their hand. Moreover, participants from both hospital and health center also reported that there was no feedback from hospitals to health center.

4: Health problems and recommended care for Preterm and LBW babies

4.1 Health problems associated with Preterm and LBW babies

The most frequently mentioned possible problems are associated with preterm birth (PTB) and LBW babies were; unable to suck, breathing difficulties (Respiratory distress syndrome), Hypothermia, and sepsis. Hypoglycemia, pneumonia, malnutrition, jaundice and weak baby also reported as complication of PTB and LBW by few respondents.

4.2 Knowledge of health care providers on Preterm and LBW babies

Numerous important issues were mentioned by participants regarding the recommended types of care for Preterm and LBW babies. The frequently mentioned care were; breastfeeding for those who can suck/NG tube feeding with expressed milk, KMC or skin to skin contact (SSC), and use of Heater/incubator for thermal care. In addition, few participants also mentioned the importance of hygiene, sock, thick towel, and hat to prevent hypothermia, temperature measurement, formula feeding when the woman is unable to produce milk and follow up. A Nurse who works at NICU in Mekelle Hospital explained about newborn feeding: "Sometimes mothers may not have breast milk and they may feed formula milk. Scientifically, breast milk is the recommended one but when the mother doesn't have breast milk, she'll be forced to use formula milk".

4.3 Actual practice around the care of Preterm and LBW babies

Almost all midwives and nurses reported advising mothers on frequent breastfeeding, exclusive breastfeeding, the importance of KMC. They also reported expression of breast milk and feeding the babies with syringes and nasogastric tube when direct breastfeeding is not possible (baby unable to suck). However, some of the participants reported that they were using formula milk to feed the newborns when they encounter a woman with difficulty of breast feeding even though they understand this practice is not recommended scientifically. They also use hat, sock, and cotton clothes during thermal care practice provided by the mother from home and sometimes from the health facility even though most facilities did not have linen available for this purpose. They also reported preterm and LBW babies got essential newborn care like vitamin k and TTC eye ointment as term babies. A midwife, from Kasech Health Centre described about preterm newborn care "If the newborn is premature we will apply KMC immediately after delivery and we advise her to continue this practice at home."

Another Nurse who works in NICU at Adigrat hospital explained about NICU care provision "Here in this department all things are serious and implemented accordingly, all of us are well trained & accountable for any activity we do in NICU."

A HEW from Neksege Health Centre explained about facility discharge advice "Since I am working outside of the health center I am not sure that what has been done inside the health center. However I can be sure

that most mothers have awareness about the importance of skin to skin contact and frequent breastfeeding because I meet them in the health post after they are discharged from the health center. If there is frequent breastfeeding the baby will increase in weight, and he/she become strong.”

5: Challenges encountered by health workers during provision of Newborn care service

Participants overwhelmingly mentioned that they have shortage of sock, hat and towels during care of preterm and LBW even though pregnant mothers are advised to bring their own during ANC as part of birth preparedness and complication readiness. They also reported that most women having preterm or LBW baby prefer to go home before they achieve the KMC discharge criteria. Service providers were also challenged by shortage of electric power, phototherapy machine, and lack of awareness on the community side on preterm and LBW care. A health officer from Bizet health center described about shortage of clothes for newborns “In previous time materials like sock, hat and towel were donated by nongovernmental organization (NGO) to our health center. Even though we advise mothers during ANC to bring these materials, many mothers still don’t this one.”

Discussion

This article provides the newborn care practices in the home and facility through both community and health care providers’ perspective using the qualitative approach

Community perspective on newborn baby care

In this Perspective of the study the findings may be considered good, looking in to the description most forwarded about the sick newborn except that they did not mention anything about congenital anomaly. Unlike our study, a previous Similar but quantitative study done in Ethiopia showed poor knowledge of mothers about newborn danger signs with only 29.3% of mothers were able to name 3 or more danger signs out of list of 11. (12) A study done in mekelle, Tigray demonstrated that 50.6% of mothers had awareness of at least 3 newborn danger signs. (13) A study done in southern Ethiopia in arbaminch showed 40.9% of the study mothers had good knowledge regarding neonatal danger signs (14)

This Study showed that the participants were able to report the best experiences of newborn care although bad practices such as offering butter for early initiation of newborn feeding was a practice of certain members of the local society. The study also demonstrated that there is good awareness of the importance of early initiation of BF, the advantage of colostrum and practicing EBF for the first six months although some mothers especially those who gave birth at home are unaware of the advantage of colostrum and use sugar water, honey or butter as initial feeding. Similar findings were shown on the knowledge of early feeding with colostrum before breast feeding, the 6 month exclusive breast feeding and the types of reported foods by non-breast feeding mothers. (15) A study done in rural Karnataka, India revealed traditionally castor oil is given before initiation of breast feeding with the belief that it will

clean the babies inside. it also revealed that sugar water (sugar solution) is being given as prelacteal feed. (16)

The baby who becomes hypothermic and is not with the mother is less likely to feed properly, which will increase the risk of prolonged hypothermia due to lack of heat production and continued heat loss. (17) Although the respondents' correlation of cause and effect of cold exposure is poor, their strong belief on the importance of early wrapping and warming the baby with skin to skin contact and warming the room and the reported experiences of the community about health facilities is promising. A study done in Governmental Health Centers in Addis Ababa, Ethiopia showed that 68.6% of mothers who participated in the study believed that warm cloth prevents heat loss from neonate, while 50.8% of mothers mentioned that skin to skin contact prevents neonates from cold. (15)

Based on the country's national recommendation of cord care some health care providers provide a medication called chlorhexidine which is applied on to the umbilicus for infection prevention and to quicken the healing. Mothers reported that it was important to apply substances to the cord to quicken the healing. Application of butter to the stump was reported by the study participants. Callaghan-koru et al. has demonstrated in favor of this study where 21% of participants reported that butter was being applied in the cord. (12) Similar study done in Governmental Health Centers in Addis Ababa, Ethiopia, 10.4% of mothers reported that butter should be applied to the stump. (15) While a study done in India revealed 5.3% of traditional care providers burn the tip of cord with castor oil lump to prevent bleeding and infection which is different from our study. (16)

This study showed that psychosocial factors also impacted parental experience in facility newborn care including: parental income (financial problem), household domestic responsibilities as mothers play the most active role in rearing children. Under such condition parents urge to leave the facility against medical advice before completion of newborn treatment. In a study done in Pediatric Wards at Al Jahra Hospital, Kuwait revealed that discharge against medical advice in neonates accounted for 17.5% of all pediatric wards in the hospital where the reason was domestic obligation and inconvenience of hospitalization in 31% of such discharges. (18)

Our study showed that mother is the one who takes the lead role mainly in taking care of the newborn baby but grandmother or mother-in-law take more responsibility in supporting the mother to take care of the baby especially if the mother is primigravid. However few fathers in urban area also help the mother in providing care for the baby. Similar study done in Uganda revealed that participation of men with patriarchal community values and norms influencing gender roles hindered male involvement with poor male sensitization in MCH care. (19)

All respondents repeatedly mentioned that mothers received health education mainly from health professionals (HEWs, midwives, nurses, physicians), Women Development Army and grandmothers. The education is all about newborn care like importance of colostrum feeding, exclusive breast feeding, supplemental feeding, the need & how to keep the baby warm, when & how to bath the baby and cord care. Experience in community based newborn care of India showed that with the participation of at least

a third of pregnant women and adequate population coverage, women's group practicing participatory learning and action are cost effective strategies to improve maternal and neonatal survival in low-resource settings. (8)

Health care professionals' perspectives on the Newborn care practice

This study noted that weight measurement at birth is routine in health facilities but delays in weighing are encountered when the newborn is critical and needing active resuscitation. There is variability in weighing practice for home births. Some HEWs do measure weight at home by carrying the portable scale that is meant for postnatal home visit, others do not have the scale and do not weigh during the visit. There are also HEWs that transport mothers to health facility for weighing and clinical assessment. Data available from the AFRican Neonatal Sepsis Trial (AFRINEST) studies in the Democratic Republic of the Congo, Kenya and Nigeria show that CHWs can adequately assess a newborn for signs of illness, weigh the infant, and refer for medical care if needed. (20, 21, 22)

Essential newborn care (ENC) is a comprehensive strategy that include interventions during periods of preconception, conception, soon after birth, and in the postnatal. Important newborn care practices such as early initiation of breastfeeding, skin-to-skin contact, delayed bathing to prevent hypothermia, and clean care of the umbilical cord has shown improvement through promotion of preventive behaviors through home visits. (15)

In this study some participants reported that ENC including wrapping of the baby with dry cloth and use of sock and hat at health facility and advice on how to further maintain thermal care to mothers, importance of frequent breastfeeding and to visit health facility immediately when they observe danger signs of the babies are practiced well. Participants universally reported the discharge time was after 6 hours of delivery in the absence of any complication but 24 hours for rural health centers and in non-congested health centers. However, for mothers who have preterm or LBW baby, Newborns on KMC or other additional maternal and neonatal complication, the discharge time is different from normal situation. A population-based survey on Knowledge and practice of Essential Newborn Care among postnatal mothers in Mekelle City, North Ethiopia showed that 81.1% of women respondents revealed the ENC practice is good. (23) 72.4% of births in the region are Facility births. (3) Missing the remaining births (27.6%) would definitely affect the progress to decrease the existing huge national and regional neonatal mortality (30 and 34 per thousand respectively). (3)

The existing network system among WDA, HEWs and Midwives is reported to be helpful in home birth identification and linkage to facilities. Despite the presence of the network, this study has shown that mothers gave birth at home due to ambulance delay, lack of family around the mother or if they consider they are safe. However the network invests efforts to bring them to health facility even after delivery for checkup and essential care if home delivery is entertained. The study has also noted that many mothers were not still visited at home due to meeting, training, distance factor and lack of report either from the mother or WDAs. There is also late notification of HEWs about home delivery when the woman came

from out of their catchment. A community based collaborative quality improvement approach on improving coverage of postnatal care in rural Ethiopia has shown that 34% of women timely notified the HEW during labor or within 48 hours of delivery. Among those mothers who notified the HEWs in a timely manner, 94% received the PNC by the HEW. In this study mothers having the mobile phone number of the care provider notified in timely manner compared to those without. (24)

Among countries included in a review of post-natal care with a focus on home visitation, only Sri Lanka has documented high coverage of Postnatal Home Visits at scale and sustained this performance over time. Most countries adopted ambitious PNHV visit schedules but subsequently have been unable to achieve visit coverage at scale that would meaningfully impact newborn mortality. (25) Based on our study HEWs were responsible to provide postnatal care at home after delivery in rural areas. In principle, they have a schedule when to visit home to home however according to their explanation they are not strictly following this schedule due to meeting or training and above mentioned reasons. The most common practice for postnatal care at home by HEWs were cord observation for bleeding, weight measurement, breastfeeding assessment, and assessing danger signs. A study done in rural Hebei china showed that only 8% mothers received a timely postnatal home visit (first week of birth), and among women who received post-natal home visit 37% were offered counselling on infant feeding, 32% on cord care. In the same study staff shortage and inconvenient transportation was a barrier to reaching out women at home. (26)

A study on Newborn Care in the Home and Health Facility done in Cambodia showed that Women observed and interviewed did not receive detailed instruction on breastfeeding from midwives around the time of birth, no in-depth counseling for problems, and typically stayed in the Health Center for less than 24 hours before returning home. (27)

Referral system for Newborns

The most frequently mentioned reason for referral from the lowest to highest health facility were; Preterm and LBW babies, unable to breastfeed, breathing difficulty, and congenital malformation. Few participants from health center also mentioned additional reasons such as “no improvement after KMC”, umbilical cord complications, jaundice, sepsis and vomiting everything.

A Formative study on Newborn Care in the Home and Health Facility in Cambodia found that midwives in health centers did not report much experience or familiarity with treating newborns. Moreover patient’s preference to higher level hospitals directly without visiting health centers when they think it is severe. Others visit nearby health center because it is cheaper and nearest choice. (27)

The referral system was implemented in both directions from lower to higher and vice-versa. Providers accompany the mother and baby using ambulance in most of referrals. Limitation in routine availability of ambulance service was also marked. (28) This study revealed that there is Good experience in use of referral slip to refer a baby but poor continuum of care such as thermal care and breastfeeding during transportation on the way to referral center. Additionally unnecessary up referrals due to poor skill of care

providers was also mentioned. In a study done in India on a Status of Newborn Transport in Periphery and Risk Factors of Neonatal Mortality among Referred Newborns; Most of neonatal referrals were self or improperly organized transport and associated with inadequate Pre-referral stabilization, incomplete advice regarding care during transport and poor communication, skilled attendant accompanying newborn (11.4%) and advice regarding care (33%) during transport was provided in few of referred newborns. (29)

This study showed that the down referral linkage from health center to HEWs seems better as compared to from hospital to HC. Telephone call among HEWs and midwives for linkage and follow up of mothers after discharge is appreciable. Poor referral feedback from hospitals to the referring facility is also a critical finding. Pedrana et al revealed that referral feedback was 66.2% using SijariEMA system. (30)

Health problems and recommended care for Preterm and LBW babies

In our study, Health workers have fair knowledge on care of preterm and low birth weight babies. However, there is noticed gap in its actual practice by few providers. In a study done among health care providers in eastern zone public health facilities of Tigray: 74.65% had adequate knowledge on newborn care and overall 72.77% of the participants were having good newborn care practice. (31)

Challenges encountered by health workers during care of preterm/LBW Newborn

In the study, Shortage of sock, hat and towels during care of preterm and LBW is identified. It is noted that most women having preterm or LBW baby prefer to go home before they achieve the KMC discharge criteria. Shortage of electric power, phototherapy machine, and lack of awareness on the community side on preterm and LBW care are found to be the challenges. Availability of adequate materials and type of health facility were significant predictors for the health care providers newborn care practice. (25) Another study on assessment of KAP on immediate newborn care among health care providers in Addis Ababa, Ethiopia public health centers showed that the overall extra care for preterm and LBW babies was unsatisfactory with only 40.4% did practice at least half of the standard actions. (32)

Conclusion

Decreasing Nationwide and Regional Neonatal mortality requires high quality and timely care in the facility and appropriate newborn care practices at home. It is necessary to have an actionable strategy with dedicated resources to provide effective services at facility level. HEP should be strengthened and Health education programs be in place to better address the home birth issues, postnatal care home visit and tackle the community harmful traditional practices on newborns. Facility and community level awareness creation programs on importance of birth preparedness, weighing newborns at birth,

completing the facility based care before discharge, the wrong community perception on preterm and LBW babies would likely improve the overall newborn care practice in the facility and at home. Establishing effective referral system that includes referral care, keeping the warm chain and appropriate transportation and Capacitating care providers to understand the referral indications are essential elements that need to be improved for the best neonatal outcomes.

Abbreviations

FGD, Focus group discussion; IDI, In-depth interview, HEW: Health Extension Worker, LBW: Low birth weight, WHO: World Health Organization, KMC: Kangaroo Mother Care, HC: Health centre, HP: Health Post, WDA: Women development army, KAP: Knowledge, Attitude, Practice.

Declarations

Acknowledgements:

This study was coordinated by the WHO with financial support from the Bill & Melinda Gates Foundation. The Authors thank the Tigray Regional health bureau, the Administration and health workers of the health centers, the health posts, mothers, families and community representatives without whose cooperation this study would not have been possible.

Authors contributions

THA¹ conceived the study. THA¹ served as Principal investigator, designed the study and wrote the manuscript. THA¹, MYH¹, AHB¹, DSG¹, SAB³, AAM³ created the study instruments, implemented the study, analyzed the data and assisted with manuscript write-up. YBZ², TAB⁴ and FAG⁴ were involved in data collection and interpretation and contributed to manuscript preparation. All authors read and approved the final manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Availability of Data and Materials: No additional data available. All data generated or analyzed during this study are included in this article. The qualitative data, individual stories and narratives have been collected in personal circumstances. Informants were assured that their contribution will remain confidential to the research project and will not be shared.

Funding: Funding source was received from WHO along with the KMC scale up implementation project.

Ethical approval and consent to participate

Ethical approval to conduct the assessment was obtained from the Institutional review board of Mekelle University and by WHO Ethical review committee. In addition, support letter from Tigray regional health bureau and permission from medical directors of the respective facilities was obtained. On the other hand, written informed consent was taken from every key informant prior to data collection. All

procedures were performed in accordance with relevant guidelines. All data was kept in a safe and secure place in order to ensure confidentiality and beneficence was assured throughout the study period. Only the researchers were having access to those data for cross checking or validation.

Consent for publication: Not applicable.

Competing interests: This manuscript maintains no competing financial interest's declaration from any person or organization, or non-financial competing interests such as political, personal, religious, ideological, academic, intellectual, commercial or any other.

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