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Factors that influence compliance for referral from primary care to hospital for maternal and neonatal complications in Bosaso, Somalia: A Qualitative Study

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Abstract

Objectives: To estimate referral compliance and examine factors that influence decisions to comply with referral for newborn and maternal complications in Bosaso, Somalia.

Setting: Bosaso, Somalia, is a large port city that hosts a large proportion of internally displaced persons. The study was conducted at the only four primary health centers offering 24/7 delivery services and the only public referral hospital in Bosaso.

Participants: All pregnant women who sought care at four primary centers and were referred to the hospital for maternal complications or mothers whose newborns were referred for neonatal complications were approached for enrollment from September – December 2019. In-depth interviews of 54 women and 14 healthcare workers were conducted.

Outcome Measures: This study examined timely referral compliance from the primary center to the hospital. In-depth interviews were analyzed for a *priori* themes investigating the decision-making process and experience of care for maternal and newborn referrals.

Results: Overall, 94% (n=51/54) of those who were referred, 39 maternal and 12 newborns, complied with the referral and arrived at the hospital within 24 hours. Of the three that did not comply, two delivered on the way, and one cited lack of money as the reason for noncompliance. Four themes emerged: trust in medical authority, cost of transportation and care, quality of care, and communications. The factors that facilitated compliance were the availability of transportation, family support, concern for health, and trust in medical authority. Healthcare workers raised the importance of considering the maternal-newborn dyad throughout the referral process, and the need for official standard operating procedures for referrals including communications between the primary care and the hospital.

Conclusions: High compliance for referral from primary to hospital care for maternal and newborn complications was observed in Bosaso, Somalia. Costs associated with transportation and care at the hospital need attention to motivate compliance.

What is already known on this topic

- An estimated 15% of pregnant women develop obstetric complications and need access to comprehensive obstetric care.
- Similarly, greater than 15% of newborns with complications of prematurity, infection, and other morbidities will require inpatient hospital care.
- Referrals for maternal and newborn complications from a primary care facility to a hospital is common practice in humanitarian and non-humanitarian settings.

What this study adds

- High (>94%) referral compliance rate from primary care facility to hospital for both maternal and neonatal complications can be achieved.
- Geographical proximity of the primary care facility to the hospital, trust in medical advice, concern for their health, and family support facilitated compliance for a referral.
- All who complied with the referral were admitted to the hospital within hours of arrival at the hospital.
- Coverage of costs associated with transportation from primary care to the hospital and coverage of the cost of care provided at the hospital were challenging for the family.
- Concern about perceived unnecessary intervention at the hospital for maternal and newborn complications was raised as a possible deterrent.
- Maintaining mother-baby dyad and the need for standard operating procedures to facilitate communications between levels of care were recommended by healthcare workers at the primary level.

How this study might affect research, practice, or policy

- While there is a high referral compliance rate and a strong family support system that facilitated referral, it is critical that coverage of costs associated with transportation and care at hospital be taken into consideration in the design and implementation of maternal and newborns health programs for communities affected by humanitarian crisis, such as Bosaso, Somalia and other similar humanitarian settings.

Introduction

Childbirth is the time of highest risk, when more than 40% of maternal deaths and stillbirths or neonatal deaths occur. [1] These deaths happen rapidly, and prevention requires a quick response by health care workers (HCWs) and often a referral to hospital where comprehensive care is available. Countries affected by conflict have weakened health systems and access to quality emergency obstetric and neonatal care is limited, resulting in high maternal mortality ratios and neonatal mortality rates. [2-3] Management of obstetric complications requires skilled HCWs, specialized care such as surgery or blood transfusions, and availability of services at all times, which often is restricted to hospital levels. Inpatient hospital care is needed for newborns with complications such as neonatal sepsis, complications of prematurity or low birthweight, jaundice, and respiratory distress. Timely referral from primary to hospital level care is essential to save lives of women and newborns. Most of the existing research is on maternal and newborn health referrals from home/community to primary care or from community to hospital. [4-6] There is limited literature on referral compliance and factors that influence compliance of referrals from a primary care facility to a hospital for maternal and newborn complications. However, overall delay in receiving care and challenges with transportation have been found in African studies.[7] We conducted such a study in Bosaso, Puntland, Somalia.

Somalia has a high maternal mortality ratio and newborn mortality rate, with 692 maternal deaths per 100,000 livebirths [7] and 38 newborn deaths per 1,000 livebirths.[8] According to the Essential Package of Health Services in Somalia, childbirth services are available at the primary care, referral health center, and hospital level. The Somali Health and Demographic Survey found that 21% of births occurred in a health facility. [8] Women of reproductive age confront several challenges to access health services, including lack of money and distance to the health facility. [8] The crisis in Somalia is characterized by armed conflict, climate shocks, and extreme poverty which have left 3 million people internally displaced and 7 million people in need of humanitarian assistance as of 2022. [10] The humanitarian crises have created a shortage of skilled HCWs, low coverage of health services, and fragile health governance. Within Somalia, the health system has limited financial resources and most public facilities benefit from assistance from non-government organizations (NGOs) and United Nations (UN) agencies.[11] The health care system has four levels – health posts, primary health centers, referral health centers, and hospitals. [8, 13]

This study is an extension of essential newborn care research that took place from 2016 to 2018 at four public primary maternal child health (MCH) centers offering 24/7 delivery services in Bosaso, Somalia. [13,14] The original study demonstrated it is possible to improve availability and quality of essential newborn care services at the primary health level in humanitarian settings like Bosaso, through contextualized evidence-based newborn intervention packages. While routine newborn care was improved, there were very few small and sick newborns presenting for care at the primary level. Recognizing that small and sick newborns may require additional care at the hospital level, the researchers sought to investigate the referral process and referral compliance from the MCH center to the hospital from the perspective of HCWs and those who were referred.

Methodology

A qualitative study was undertaken to investigate referral pathways, referral compliance, and factors that influence compliance in Bosaso, Somalia.

Study setting

Bosaso, Somalia, is a large port city in the northeastern autonomous region of Puntland that hosts a large proportion of internally displaced persons. MCH centers are a type of primary health care facility staffed by midwives, nurses, and community midwives who provide both preventive and curative services focused on women and children. MCH centers provide delivery care services for uncomplicated births, however, they lack the capacity for inpatient care and management of obstetric and neonatal complications. The study was conducted at four MCH centers and the only public referral hospital in the city which is run by the Ministry of Health.

Study population

The study was originally designed to enroll small or sick newborns (0 – 28 days) seeking care at the MCH, including those delivered at the MCH, who were then referred to a hospital. However, the number of newborns that were referred were very few. As a result, we expanded the study population and the study objective to include pregnant women in labor presenting to the MCH who were referred to the hospital for maternal complications.

All pregnant women who sought care at the MCH centers and were referred to the hospital for maternal complications or mothers whose newborns were referred for neonatal complications were approached for enrollment at the four selected MCH centers between September 2019 and December 2019. Those who consented to participate in the study were enrolled at the time of referral and contacted for an in-depth interview in their homes after completion of the referral or within 24 hours after referral. The overall sample included 54 women; 41 women were interviewed for maternal referral and 13 mothers and caretakers were interviewed for newborn referral.

In addition, 14 HCWs who worked in the labor room or cared for newborns at the MCH centers and at Bosaso Hospital were approached and those who consented were interviewed.

Data collection

The 15 enrollment officers and 2 interviewers involved in data collection were all females with a health science background. They had no affiliation with the facilities where they collected data to ensure an unbiased, neutral perspective. All were trained in research ethics, the consent process, and interview methods over five days by two of the co-authors and a research consultant in Bosaso. Enrollment officers were always present, 24 hours a day 7 days a week, at the four MCH centers and Bosaso Hospital to monitor when a referral from the MCH to the hospital was issued. Once clinical staff determined that a referral was required, the enrollment officer approached the mother or family for consent to participate in the study. Demographic and contact information were collected from the family at the time of enrollment. The family was contacted (either in

person or by phone) within 24 hours after discharge from the hospital to schedule an interview in their home.

The in-depth interview (IDI) guides for mothers and caretakers followed a case study approach adapted from the conceptual framework for increasing access to care for sick newborns through community volunteer assessment and referral (Table 1, Supplemental Figure 1). [3-4, 12] After collecting demographic and outcome information, the interviewer asked about each stage of the referral process, beginning with the decision to seek care all the way through the referral experience and discharge. Tools were translated from English to Somali and back translated to ensure meaning was preserved. The tools were pilot tested in the community and revised over a one-week period.

All interviews were conducted in the Somali language, audio-recorded, transcribed in Somali, and translated into English. The IDIs lasted between 45 and 90 minutes and were conducted in private areas to ensure confidentiality.

Table 1. Data Collection Tools

Tool	Data
Enrollment questionnaire	Demographic information, obstetric history, displacement status, infant information, place of birth (facility or home)
Maternal Child Health (MCH) Center referral log	Referral date and hour, the reason for referral, referral completion status
Hospital referral log	Admission date and time, reasons for admission, maternal outcome, newborn outcome, length of stay at hospital, discharge / death date and hour
In-depth interview guide: maternal and newborn referrals	Demographic information, birth history of newborn, reasons why they sought care at the MCH center, their experience receiving care at the MCH center, the decision-making process to comply or not with the referral advice by the provider, the referral process from the MCH center to the public hospital, their experience receiving care at the hospital (if the referral was completed), and any post-discharge reflections on the referral process.
In-depth interview guide: health care workers	Health care worker's qualifications, providers' experience caring for small or sick newborns, referring small or sick newborns, and recommendations about the referral process

Analysis

Our analytical approach was threefold. First, we conducted a descriptive analysis of the compliance rate and reasons for referral. Second, a *priori* themes based on the conceptual framework applied to the IDI guide were followed to organize and upload English translated versions of the transcripts into MAXQDA 2019 (VERBI Software, 2019) for data analysis.[13] Finally, the complete set of transcripts were read by two co-authors multiple times to identify overarching themes and draft a codebook of themes and sub-themes (Supplemental Table 1). The two co-authors coded six transcripts separately, met to discuss and revise the codebook

accordingly. They then coded three transcripts separately and analyzed to ensure inter-coder agreement. Disagreements were discussed and resolved until the inter-rater reliability was in the 90th percentile range. The co-authors coded independently until saturation was reached and reviewed the remaining transcripts for outlier situations and perspectives. Thematic analysis was used to interpret the data, summarize overarching themes, and present findings in the respondents' own words.

Patient and public involvement statement

Patients and the public were not involved in the study design. A coauthor, data collectors, and interviewers were from the community. The coauthor was engaged in the design of the study, the data collection, and the dissemination of the findings. The findings of the study have been and will continue to be shared for broader dissemination.

Results

Participant characteristics

The average age of the referral interview respondents was 26 years, 28% were currently displaced, 57% had no formal education, 41% were not able to read, and 93% were not employed. The mean gravidity and parity in the sample were 4 and 3 respectively (Supplemental Table 2).

Referral Compliance

Nearly all (94%, 51 of 54) participants, 39 of 41 maternal referrals and 12 of 13 newborn referrals, complied with a referral from the MCH center to a hospital (Supplemental Table 3). Of the three patients who did not complete the referral, two respondents gave birth on the way from the MCH center to the hospital and decided to return home with their newborns, and one decided to return straight home with her sick newborn, citing financial reasons.

The time between the referral from the MCH centers to admission at the hospital for maternal referrals averaged 4 hours and 17 minutes [range 5 minutes to 20 hours and 37 minutes], and for newborn referrals, the average time was 1 hour and 2 minutes [range 7 minutes and 2 hours and 5 minutes]. All (100%, n =51) maternal and newborn referrals who arrived at the hospital were admitted. Of the 39 women who complied with a maternal referral, 37 (95%) had a reason for hospital admission recorded in the logbook (Table 2). The mode of delivery for maternal referrals were 21 (51%) vaginal births and 20 (49%) cesarean births. There were no maternal deaths. Of the 12 newborns who completed referral from the MCH to the hospital, the reason for admission for the majority (75%) was respiratory distress.

Table 2. Reasons* for admission at Bosaso hospital for maternal and newborn referrals

	n	%
Maternal Referrals	N=39	
Obstructed / prolonged labor	13	35%
Previous cesarean	8	22%
Anemia	7	19%
Hypertension	4	11%

Bleeding	2	5%
Pre-eclampsia	2	5%
Other (Hypoxia, placenta previa, post-term, transverse position)	4	11%
Missing reason for admission	2	
Newborn Referrals	N=12	
Respiratory distress	9	75%
Hypoglycemia	2	17%
Infection	1	8%
Trouble feeding (Feeding problem)	1	8%
*Multiple reasons for admission could be recorded		

For pregnant women who were referred and admitted to the hospital, the average length of stay was 4.4 days (range <1 day to 9 days) and 4.7 days (range 1 to 7 days) for a vaginal birth and cesarean delivery, respectively. For newborns who were referred to the hospital, the average length of stay was 3.45 days (range 1 to 13 days).

Themes

Four themes emerged from the qualitative analysis, which included (a) trust in medical authority (b) cost of transportation and care at the hospital (c) quality of care, and (d) communications.

Trust in medical authority

The decision for the pregnant woman or caregiver to seek care at an MCH center was made at the start of labor, due to a complication with labor, or due to recognition that their newborn was sick (recognized symptoms included difficulty breastfeeding, vomiting, and fever).

For women who chose to visit the MCH center for delivery, they described the MCH center as clean, trustworthy, and reliable, they felt comfortable with the staff there. Many referenced proximity and the availability of cost-free health services. Some relied on recommendations from family, friends, or neighbors.

> *"The midwives were with us day and night, and the [girls] were available within minutes. It is a good place. A clean place. Your blood is continuously measured, you are being visited regularly and asked about your condition. It was a very well-organized place."* -Mother of a newborn who was referred, Age 23

Many respondents mentioned how concern for their own health, or the health of their newborn, led them to complete the referral to the hospital. Respondents also mentioned trusting the medical authority at the MCH centers who advised that the referral was necessary.

> *"They took the decision immediately because they appreciated the judgment of the health staff, and they took her to the hospital immediately."* -Woman who was referred, Age 21

Cost of transportation and care at the hospital

Most respondents took a taxi or borrowed a car to reach the MCH center, though some women went on foot if they were unable to get transportation. Time to reach the MCH took ten minutes to two hours on foot, or 20 - 60 minutes by car. Women mentioned the cost of transportation as a challenge, and many had to source the funds from others to hire a taxi.

While almost all the respondents complied with the referral from the MCH to the hospital in a timely manner, they described the challenges they overcame to do so and the factors that weighed into their decision. The most mentioned challenge was finances. Respondents described costs associated with transportation, hospital admission, and treatment. Many families stated that they did not have the money readily available to cover anticipated costs.

Both HCWs and community respondents brought up the need for a reliable ambulance or free transportation to facilitate referral cases. Transportation availability was also closely linked to finances, as the referral pathway relied on private transport (mostly taxi services) between the MCH center and the hospital. They mentioned that private cars and taxis were not always available or accessible when needed, and the cost could be prohibitive for some families.

For those who complied with the referral, in some cases, finances limited families from completing care at the hospital. The high cost of care and treatment at the hospital was consistently mentioned, particularly in contrast with the MCH centers, where all treatment and many medications were provided free of charge.

> *"I was worried about the costs at the hospital. There was a time when we had to leave the hospital due to finances and go back home. After we found the money, we went back to the hospital."* -Mother of a newborn who was referred, Age 19

Families were asked to pay some costs upfront, which delayed care when the family had to source the necessary money. Respondents explained that their family members were required to purchase certain medications and supplies from the hospital pharmacy or somewhere outside the compound. Purchasing medicine and supplies was another financial burden. Some women were surprised at the high cost of surgery, medications, or other medical interventions and mentioned that cost could be a barrier to staying at the hospital.

> *"Yes, I very much needed financial help for the services extended to me… the blood transfusions were costing money, which I thought were free. The blood was donated by my family and my husband. It cost us $150 total, but we had to stay one more night [to find the money] before being discharged*" -Woman who was referred, Age 36

> "*The color of the baby was blue when he was born. They took him to a separate room since the baby required oxygen and tube feeding. They measured the blood sugar of the baby very frequently. The baby become well at the 5th day but still needed hospital admission, but we couldn't afford to stay and took him to home."* -Woman who was referred, Age 35

While challenges to sourcing timely financial support were described in depth, most women were able to find monetary support from family, neighbors, HCWs, and NGOs.

> *"[During the referral] my husband's sisters were taking care of the child and keeping the house, and if somebody is sick, the money is nothing, you can get money, but you can't get health. If a person is bedridden, money will come, it's compulsory, even if you don't have it yourself*." -Mother of a newborn who was referred, Age 26

Quality of care

After arriving at the MCH center in labor, respondents described receiving a vaginal exam and having their blood pressure taken. After the initial assessment and monitoring of labor, some respondents were sent away and told to return when their labor had progressed. One respondent gave birth on the road on her way home after being told by the MCH staff to return later.

Many women who went to the MCH while in labor praised the HCWs at the MCH for immediate, attentive care. A few respondents expressed concern that the MCH was too quick to refer without proper assessments, particularly if they arrived at the MCH during the night.

> **"***They didn't give me good care because the staff changed each shift. There was an old lady during the night, and she was not active compared to the others in the day. In the morning there were active girls. They were measuring the blood pressure and did some blood analysis."* -Woman who was referred, Age 23

Several respondents expressed concern about seeking care at the referral hospital due to fear of medical procedures, like Caesarean section or blood transfusions, or perceived quality of care available at the hospital. While they expressed these fears during the interview, it did not prevent any of the respondents from completing the referral.

At the hospital, respondents who were referred during labor were attended to immediately. Most respondents stated that they were able to receive care soon after arrival at the hospital, or as soon as their condition was deemed as critical. Upon arrival, the hospital staff assessed, treated, and monitored the mother and newborn throughout the labor and delivery process.

> *"When I reached the entrance of the hospital I got out of the car and I walked, although it was so difficult to me. Then we saw a nurse and my husband gave her our paper and she immediately call the hospital manager and they prepared me for surgery. Then they began the surgery, and when I gave birth, they administered oxygen to the baby. My mom looked after the baby and my husband looking after me until my conscious become normal*." -Woman who was referred, Age 33

In a few instances, care was delayed by HCWs' breaks (late at night, prayer times, and around lunch hour) or by specialist availability, such as for ultrasound.

The respondents' descriptions of care received by their newborns varied depending on the needs of the newborn. Most newborns referred to the hospital were immediately placed on oxygen, received nasogastric-feeding tubes, and/or were treated for hypoglycemia.

> *"Yes. The bed rent was free. The place was clean. The child was taken care of. They were telling us to take care of the child and feed it. The child was continuously monitored. You will be awakened at night."* -Mother of newborn who was referred, Age 21

> *"However, I would suggest that the hospital staff need to help the sick and poor people. They should continuously follow up with their patients, not just come once and not come back. Anything can happen to a sick person at any minute*." -Mother of a newborn who was referred, Age 23

When interviewed about their baby's health post-discharge, most respondents stated that their child's condition was improved. A few respondents mentioned that they felt their newborns were discharged while they were still unwell, which led to seeking care at different facilities or alternative practitioners. A few women reported returning home from the hospital still feeling ill themselves. Overall, most respondents stated that the quality of care at the hospital was good, though costly.

Communications

Most respondents were able to explain why they were referred from the MCH center to the Hospital. For newborns that were referred, many respondents described the reason for referral as related directly to supplies or medications that were not available at the MCH center at the time of care, specifically oxygen, fever medications, and blood tests.

> "*I didn't ask them his weight when he was born, and after a week, I took him to get vaccination. He started to vomit, and they said he need to get diagnosed in order to give him medicine, and they couldn't provide it and referred him to the hospital*." -Mother of a newborn who was referred, Age 33

Those born at the hospital with complications were immediately taken to a separate room for treatment. When newborns had to be separated from their mothers, there was often miscommunication between the caretakers and HCWs about the treatment required and the prognosis of the newborn.

Specific to communication for the referral process, multiple HCWs suggested creating official, supported channels of communication and accountability between the MCH and the hospital. The suggestions included official referral slips and communication channels to inform each other of referrals, outcomes, and follow-ups.

> "*We counsel them as much as we can and we sometimes pay for the taxi costs. We sometimes give them the ambulance and if the ambulance is not available, then we give them money from our pockets. We convince the family who are with the*

mother to take care of the [other] children at home. We tell them the child is at risk of dying and the mother should do as much as she can to save [the child], but if the child is taken home, nothing can be done for it." -MCH HCW

Health Care Worker (HCW) perspective on newborn referral

To elicit more context on referrals within the Bosaso health system, HCWs were interviewed for their perspectives on newborn referrals. The HCWs at the MCH centers all mentioned a low number of small or sick newborns that seek care at the MCH.

"*It [cases of small or sick newborns] is not many. They are brought to you in such condition, but often the ones that are delivered here are more. Now I remember two cases in the whole of last year*." -MCH HCW

At the hospital, contrary to the MCH centers, the HCWs described a high caseload of sick newborns and infants. Low birthweight was cited as a common reason to admit newborns to the hospital, and in such cases, the HCWs provided nasogastric feeding, breastfeeding support, and kangaroo mother care. HCWs mentioned that many of the severe cases are born in the community and have a long distance to travel to seek care at the hospital, and therefore have worse outcomes. At both the MCH and hospital, HCWs identified specialized staff, training, and equipment as areas that need to be improved.

"Yes, the equipment's is available but has no usage. And the usage requires training so that is the challenging case … it can be managed if there is no difficult condition. But the premature requires an incubator and the incubator is locked in a room and we don't have the training, but we have the skills and techniques to work." -Hospital HCW

The MCH staff were not in communication with the hospital to know whether the hospital had enough beds to admit small and sick newborns, nor to alert the hospital that they were sending patients for admission. Additionally, no official documentation was required for referrals of mothers or newborns. If medications were provided, HCWs might write on a blank piece of paper describing the medications given for the patient to take to the hospital. Transportation from the MCH to the hospital was usually by private car or taxi organized by the patient's family. If the referral patient was in critical condition, a HCW would accompany the patient to the hospital, if possible.

Discussion

Our study found a high rate (94%) of maternal and newborn referral compliance between MCH centers and the public hospital in Bosaso, Somalia. The urban location, proximity between MCH centers and hospitals, availability of transportation, and familial support were facilitators for the high compliance. Respondents attributed their concern for health (their own and their newborn's) and trust in medical authority as primary reasons they completed the referral in a timely manner. Our study also found that most referred patients were admitted and received care soon after arrival. One respondent who was unable to complete the referral cited the financial barrier as the primary reason not to go to the hospital.

The compliance rate in our study was higher than the compliance rates for referrals from the community level found in other studies in African countries. [4,14] This could be due to the location, the source of referral (facility-based staff instead of community health workers), and the respondent population. Our study participants had demonstrated health care utilization behavior and trusting relationships with providers by already seeking care at the MCH center. Trust in medical authority was described as their main reason for complying with the referral, this is informed by previous personal experience, or family and friends' experiences, on receiving care at the MCH centers. A critical element of a successful referral pathway is a trusting relationship between patient and providers, which requires clear communication on the reasons for the referral and the urgency. [15] When communicated, the concern for the mother-baby wellbeing was a facilitating factor for referral compliance. Two of the three who did not complete the referral did not arrive at the hospital after giving birth on the road as they felt the reasons for referral (prolonged labor and multiparity) were not relevant anymore.

Distance, cost, and quality of care are often cited as factors for delayed care seeking for maternal health. [16] In our study, most complied with referrals immediately and received care on arrival at the hospital. Our study findings were consistent with the literature in that cost was cited as a barrier for transportation to the appropriate level of care. While most respondents were able to complete the referral, almost all mentioned the financial stress it put on their families to source the money for transportation, hospital care, and medications. Our respondents were able to access financial support from extended family, community members, NGOs, and UNHCR.

In theory, the referral initiating health facility should inform the receiving health facility, for them to anticipate the patient's medical need and expect their arrival. Similarly, feedback from the receiving health facility back to the referring center will facilitate any follow-up need of the patient and to inform future referrals.[16] In our study setting, there were no formal communications (phone or paper) between the MCH centers and Bosaso Hospital, and this was identified as a key area for improvement by both the HCWs and patients who were referred. This lack of communication between referring and receiving health facilities has been reported as a reason for referral decline or delay in receiving care. [17] While most respondents noted that they were admitted and received timely (within an hour) initiation of care at the hospital, there were respondents that reported delays at the hospital due to staff capacity or staff breaktime. Mobile phones provided by the health system have been used effectively in other settings to increase communications between referring and receiving health facilities. [17]

When considering programmatic interventions to improve newborn health through referral pathways, the maternal-newborn dyad must be considered in fragile settings like Bosaso, Somalia. Our study showed that HCWs at the primary level were quick to refer complicated deliveries to the hospital level while the mother was still in labor could have contributed to a better birth outcome and maternal survival. In a review of neonatal referrals in Vietnam researchers found that those who self-referred had lower case fatality rate than those referred from provincial hospitals (3.4% versus 21.3%) and attribute the difference to be delay in initiation of appropriate treatment. [18] In our study the MCH was often not used by families for neonatal complications as they preferred to go directly to hospital. While the HCWs respondents

employed at the MCH could discuss in detail how they would stabilize and treat small or sick newborns, in practice, they referred immediately to the hospital without stabilization interventions for those born at the health facility. The content and quality of pre-referral care in newborn health is an area that needs further investigation.[17]

Study strengths and limitations

Our study findings are not generalizable to Bosaso or Somalia. First, given that the institutional delivery rate in Somalia is estimated at around 21%, this study population represents a small segment of the general Somali population.[7] Second, the experiences of our study population might be different from the general population on several counts, including the ability to overcome financial challenges in transportation and care at the hospital. Third, our study sites are not reflective of access to hospital care in Somalia in that it is an urban setting, the hospital was near the MCH centers, and the availability of means for transportation in the form of taxicabs that one can call through a mobile phone.

There is a possibility of social desirability bias in the responses. That said, the fact that the interview was confidential, done outside a health facility, by community members who weren't at the time working at the health facility would have minimized the bias.

The strength of the study was the high sample size for a qualitative study, the ability to examine factors that affect the decision at all levels for both mother-baby dyad, and our ability to collect perspectives from HCWs. Timing and language used for the interview was a strength in that we waited for the mother-baby dyad to return to their home (not in the middle a of medical crisis), Somali language were used for the interview, and native speakers from the community conducted the interview.

Conclusion

This study found high rates of compliance with referrals from the primary to secondary levels for maternal and newborn referrals. Proximity, concern for health, and trust in medical authority were cited as contributing factors for referral compliance. Cost was the main barrier that impacted the respondents' decisions to seek care and comply with referral and care in this study.

The HCWs at the MCH centers identified most complications during labor and immediately referred from the MCH center to the hospital. This emphasizes the importance of the maternal-newborn dyad in places like Bosaso, Somalia, and the need for high-quality intrapartum care availability that considers the needs of both the mother and newborn. Without specialized certifications or designated roles, delivery attendants must have the knowledge, skills, and equipment to attend to both the mother and newborn during delivery. Midwives staffing the MCH centers must be able to recognize potential complications and stabilize the patient while arranging transportation to the hospital.

Our findings illustrate that high compliance can be achieved if circumstances are conducive. Assistance with cost and transportation and improvements to the quality of care and referral processes would help in making referrals to necessary, hospital-level care is more accessible and inclusive in Bosaso.

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Contributors

CM drafted the initial manuscript, reviewed and revised the manuscript. CM and KM conducted data analysis. RA, HH, SB, CM, KM, and MH, contributed to study methodology, development of tools, data analysis, reviewed and revised the manuscript. ZH reviewed and revised the manuscript. HH and SB trained data collectors, interviewers and contributed to data quality.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work

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Competing interests

None declared

Patient and public involvement

Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further analysis.

Patient consent for publication

Verbal consent obtained

Ethics approval

Approval for this study was obtained from the Puntland, Somalia Ministry of Health, the Save the Children ethics review committee, and a nonresearch determination by the US Centers for Disease Control and Prevention (CGH HSR Tracking #: 2016-0119). Verbal consent was obtained from women, caretakers, and health care workers. Personal identifiers collected to facilitate interview were destroyed immediately after completion of the data collection process. No identifying information was recorded in the transcripts. Transcripts were only available to the research staff.

Data availability statement

The excerpts of the transcripts relevant to the study have been shared in the manuscript. There is no additional data available.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily reflect the official policy or position of the U.S. Centers for Disease Control and Prevention, nor the United States Government.

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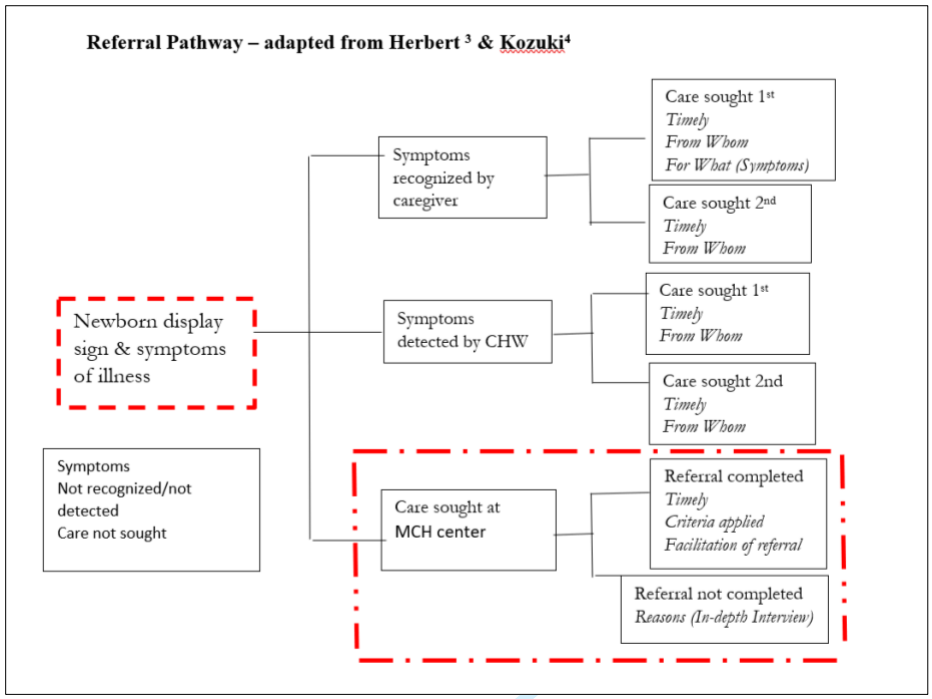
Supplemental Reference Tables

Supplemental Table 1: Codebook

Codebook	
Parent Code	Sub-code
The Decision to Seek Care	Reasons for Initially Seeking Care
	Recognizing Newborn Danger Signs
	Reasons for choosing initial care facility
	Process to seek initial Care
Care and Referral at the MCH	Care for Mother received at MCH
	Care for Newborn received at MCH
	Supplies and Medications at MCH
	Opinions about Quality of Care received at MCH
	Reasons for Referral
	Advice from HCWs
	Referral Documentation
The Referral Decision	Factors: Finances
	Factors: Concern for Health
	Factors: Transportation
	Factors: Trust in Medical Authority
	Factors: Religious / Socio-cultural Influences
	Factors: Concerns about medical procedures at referral facility
	Factors: Belief about quality of care at referral facility
	Factors: Concern about home responsibilities
	Factors: Familial Influences
The Referral Process	Patient Experience of Referral
	Referral Procedures
	Referral Companions
Care at the Referral Hospital	Care for Mother received at Hospital
	Care for Newborn received at Hospital
	Supplies and Medications at the Hospital
	Opinions about Quality of Care received at Hospital
	Compliance with Treatment Plan
	Post Discharge Health Issues
Recommendations for Improvement	Community Education and Awareness
	Transportation
	Subsidized / Free care at the Hospital
	Training for HCWs
	Supplies and Equipment at MCH and Hospital
	Referral Processes
	Quality of Care at Hospital
	Formal connection of MCHs and Hospital

Supplemental Figure 1. Referral Pathway Conceptual Framework



Supplemental Table 2: Demographics of Study Participants

Respondent Demographics		N= 54	%
Age	Average Age	26	
Gravidity	Average Number of Pregnancies	3.7	
Livebirths	Average Livebirths	3.1	
Current Number of Children Alive		3	
Displacement Status	Yes	15	28%
	No	38	70%
	No Response	1	2%
Occupation of Mother	Government	1	2%
	Small Business	1	2%
	Other	2	4%
	Not Employed	50	93%
Occupation of Father	Agriculture	2	4%
	Fishing	2	4%
	Government	3	6%
	Small Business	5	9%
	Other	29	54%
	Not Employed	7	13%
	No Response	6	11%

Education of Mother	No Formal Education	31	57%
	Primary	14	26%
	Secondary	5	9%
	Associates	1	2%
	Bachelor	2	4%
	No Response	1	2%
Education of Father	No Formal Education	21	39%
	Primary	12	22%
	Secondary	7	13%
	Associates	0	0%
	Bachelor	6	11%
	Masters or Higher	2	4%
	No Response	6	11%
Literacy	Yes	28	52%
	No	22	41%
	No Response	4	7%

Supplemental Table 3: Referral Outcomes

Referral Compliance (went to hospital within 24 hours) N=54:				
Maternal Referrals	Compliant	39	95%	NOTE: 2 chose to go to a private hospital instead of Bosaso hospital, but went within 24 hours
	Noncompliant	2	5%	NOTE: In both cases, the mother delivered on her way from the MCH to the hospital and decided to return home instead of continue to hospital
Newborn Referrals	Compliant	12	92%	
	Noncompliant	1	8%	NOTE: cited financial reasons
MNH Referrals	Compliant	51	94%	
	Noncompliant	3	6%	*Note 1 cited finances, 2 delivered enroute & returned home

Referral Time (between MCH referral and admission to Hospital)			
Maternal Referrals	Average length of time	4hr 17 min	
	Shortest Referral Time	5 min	*Not sure if this is fully accurate. But had 5 referrals under 20 minutes so could be possible
	Longest Referral Time	20 hr 37 min	
Newborn Referrals	Average length of time	1hr 2 min	
	Shortest Referral Time	7 min	
	Longest Referral Time	2 hr 5 min	

Type of Delivery, n = 41				
Maternal Referral	Cesarean	20	49%	
	Vaginal Delivery	21	51%	NOTE: 2 were on the road, 1 was a known stillbirth

Newborn Outcome (at Hospital), n =43				
Maternal Referrals	Alive and Healthy	21	49%	Includes 1 set of healthy twins
	Alive but Unwell*	16	37%	Required some sort of specialized newborn intervention
	Stillbirth	2	5%	
	Early neonatal Death <24 hr	4	9%	Includes 1 set of twins who both died
Newborn Outcome (at Hospital), n = 12				
Newborn Referrals	Discharged by Provider	9	75%	
	Death	3	25%	

Reason for Referral (Multiple reasons considered), n = 41				
Maternal Referrals	Obstructed / Prolonged Labor	16	39 %	
	Anemia / Blood Transfusion	7	17 %	

	Hypertension	5	12 %	
	Previous Cesarean	4	10 %	
	Bleeding	2	5%	
	Breech Position	2	5%	
	Placenta Previa	2	5%	
	PROM	2	5%	
	Ultrasound	2	5%	
	OTHER	5	12 %	(Injury, low blood pressure, multiparity, oligohydramnios, pre-eclampsia)
Reason for Admission (Multiple reasons considered), n = 37				
Maternal Referrals	Obstructed / Prolonged Labor	13	35%	
	Previous Cesarean	8	22%	
	Anemia	7	19%	
	Hypertension	4	11%	
	Bleeding	2	5%	
	Pre-eclampsia	2	5%	
	OTHER	4	11%	(Hypoxia, placenta previa, post-term, transverse position)
	Unrecorded / Missing Data	2	5%	

Reason for Referral (Multiple reasons considered), n = 13				
Newborn Referrals	Respiratory Distress	8	62%	
	Infection	2	15%	
	Hypoglycemia	2	15%	
	Hypothermia	1	8%	
	Other	1	8%	
Reason for Admission (Multiple reasons considered), n = 12				
Newborn Referrals	Respiratory Distress	9	75%	
	Hypoglycemia	2	17%	
	Infection	1	8%	
	Trouble Feeding	1	8%	

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Page 1 Lines 1-2
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 2 Lines 1-25
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Page 4 Lines 2 - 17
Purpose or research question - Purpose of the study and specific objectives or questions	Page 4 Lines 38 - 41
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Pages 5-6
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 5 Lines 30 - 34
Context - Setting/site and salient contextual factors; rationale**	Page 5 Lines 5 - 11
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Page 5 Lines 13 - 27
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 16 Lines 1-7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Page 5-6 Lines 30 - 12

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 6 Lines 3 - 14
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 7 Lines 12-15
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Pages 6-7 Lines 16 - 4
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Pages 6 – 7 Lines 16 -4
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 6 Lines 20 - 23

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Pages 7 - 12
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Pages 8 - 12

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Pages 12 - 14
Limitations - Trustworthiness and limitations of findings	Page 14 Lines 7 - 25

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 15 Line 30
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 15 Lines 20 - 28

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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Factors that influence compliance for referral from primary care to hospital for maternal and neonatal complications in Bosaso, Somalia: A Qualitative Study

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Factors that influence compliance for referral from primary care to hospital for maternal and neonatal complications in Bosaso, Somalia: A Qualitative Study

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Abstract

Objectives: To estimate referral compliance and examine factors that influence decisions to comply with referral for newborn and maternal complications in Bosaso, Somalia.

Setting: Bosaso, Somalia, is a large port city that hosts a large proportion of internally displaced persons. The study was conducted at the only four primary health centers offering 24/7 delivery services and the only public referral hospital in Bosaso.

Participants: All pregnant women who sought care at four primary centers and were referred to the hospital for maternal complications or mothers whose newborns were referred for neonatal complications were approached for enrollment from September – December 2019. In-depth interviews of 54 women and 14 healthcare workers were conducted.

Outcome Measures: This study examined timely referral compliance from the primary center to the hospital. In-depth interviews were analyzed for a *priori* themes investigating the decision-making process and experience of care for maternal and newborn referrals.

Results: Overall, 94% (n=51/54) of those who were referred, 39 maternal and 12 newborns, complied with the referral and arrived at the hospital within 24 hours. Of the three that did not comply, two delivered on the way, and one cited lack of money as the reason for noncompliance. Four themes emerged: trust in medical authority, cost of transportation and care, quality of care, and communications. The factors that facilitated compliance were the availability of transportation, family support, concern for health, and trust in medical authority. Healthcare workers raised the importance of considering the maternal-newborn dyad throughout the referral process, and the need for official standard operating procedures for referrals including communications between the primary care and the hospital.

Conclusions: High compliance for referral from primary to hospital care for maternal and newborn complications was observed in Bosaso, Somalia. Costs associated with transportation and care at the hospital need attention to motivate compliance.

Strengths and Limitations of this Study

- Trust of medical authority, availability of transportation, and the urgency of the medical emergency were facilitators of referral compliance, and out of pocket expenses for transportation and care at hospital were cited as barriers.
- This study presents qualitative data from a study population that included mothers, caretakers, and healthcare workers providing a diverse perspective, however, the patient sample size was small for quantitative analysis
- The study population, those who sought institutional delivery at a primary care facility, represents a small segment of the general Somali population where institutional delivery rate is 21% and this study took place in an urban setting where primary facilities were geographically near hospitals and private means of transportation were available, hence, the findings are not generalizable beyond the study population and setting.
- The investigators sought to minimize social desirability bias in the responses this through confidential interviews done outside a health facility setting, by community members who were not working at the health facility.

Introduction

Childbirth is the time of highest risk, when more than 40% of maternal deaths and stillbirths or neonatal deaths occur. [1] These deaths happen rapidly, and prevention requires a quick response by health care workers (HCWs) and often a referral to hospitals where comprehensive care is available. Countries affected by conflict have weakened health systems and access to quality emergency obstetric and neonatal care is limited, resulting in high maternal mortality ratios and neonatal mortality rates. [2-3] Management of obstetric complications requires skilled HCWs, specialized care such as surgery or blood transfusions, and availability of services at all times, which often is restricted to hospital levels. Inpatient hospital care is required for newborns with complications such as neonatal sepsis, complications of prematurity or low birthweight, jaundice, and respiratory distress. Timely referral from primary to hospital level care is essential to save lives of women and newborns. Most of the existing research is on maternal and newborn health referrals from home/community to primary care or from community to hospital. [4-6] There is limited literature on referral compliance and factors that influence compliance of referrals from a primary care facility to a hospital for maternal and newborn complications. However, overall delay in receiving care and challenges with transportation have been found in African studies.[7] We conducted such a study in Bosaso, Puntland, Somalia.

Somalia has a high maternal mortality ratio and newborn mortality rate, with 692 maternal deaths per 100,000 livebirths [7] and 38 newborn deaths per 1,000 livebirths.[8] According to the Essential Package of Health Services in Somalia, childbirth services are available at the primary care, referral health center, and hospital level. The Somali Health and Demographic Survey found that 21% of births occurred in a health facility. [8] Women of reproductive age confront several challenges to access health services, including lack of money and distance to the health facility. [8] The crisis in Somalia is characterized by armed conflict, climate shocks, and extreme poverty which have left 3 million people internally displaced and 7 million people in need of

humanitarian assistance as of 2022. [9] The humanitarian crises have created a shortage of skilled HCWs, low coverage of health services, and fragile health governance. Within Somalia, the health system has limited financial resources and most public facilities benefit from assistance from non-government organizations (NGOs) and United Nations (UN) agencies.[10] The health care system has four levels – health posts, primary health centers, referral health centers, and hospitals. [8, 10] Primary health centers are equipped and staffed to care for uncomplicated childbirth, essential newborn care, and newborn resuscitation, and are expected to refer anyone with complications including prolonged labor, hypertensive disorders of pregnancy, neonatal sepsis, or complications of prematurity to hospital.

This study is an extension of essential newborn care research that took place from 2016 to 2018 at four public primary maternal child health (MCH) centers offering 24/7 delivery services in Bosaso, Somalia. [11,12] The original study demonstrated it is possible to improve availability and quality of essential newborn care services at the primary health level in humanitarian settings like Bosaso, through contextualized evidence-based newborn intervention packages. While routine newborn care was improved, there were very few small and sick newborns presenting for care at the primary level. Recognizing that small and sick newborns may require additional care at the hospital level, the researchers sought to investigate the referral process and referral compliance from the MCH center to the hospital from the perspective of HCWs and those who were referred.

Methodology

A qualitative study was undertaken to investigate referral pathways, referral compliance, and factors that influence compliance in Bosaso, Somalia.

Study setting

Bosaso, Somalia, is a large port city in the northeastern autonomous region of Puntland that hosts a large proportion of internally displaced persons. MCH centers are a type of primary health care facility staffed by midwives, nurses, and community midwives who provide both preventive and curative services focused on women and children. MCH centers provide delivery care services for uncomplicated vaginal births, and are expected to refer mothers and babies with complications that require inpatient care, assisted vaginal delivery, cesarean section, and management of other obstetric and neonatal complications. The study was conducted at four MCH centers and the only public referral hospital in the city which is run by the Ministry of Health.

Study population

The study was originally designed to enroll small or sick newborns (0 – 28 days) seeking care at the MCH, including those delivered at the MCH, who were then referred to a hospital. However, the number of newborns that were referred were very few. As a result, we expanded the study population and the study objective to include pregnant women in labor presenting to the MCH who were referred to the hospital for maternal complications.

All pregnant women who sought care at the MCH centers and were referred to the hospital for maternal complications or mothers whose newborns were referred for neonatal complications were approached for enrollment at the four selected MCH centers between September 2019 and December 2019. Those who consented to participate in the study were enrolled at the time of referral and contacted for an in-depth interview in their homes after completion of the referral or within 24 hours after referral. The overall sample included 54 women; 41 women were interviewed for maternal referral and 13 mothers and caretakers were interviewed for newborn referral.

In addition, 14 HCWs who worked in the labor room or cared for newborns at the MCH centers and at Bosaso Hospital were interviewed. Twelve were qualified midwifes working at the MCH centers, one was a clinical officer in charge of the pediatric ward, and one was a nurse in the pediatric ward at Bosaso Hospital.

Data collection

The 15 enrollment officers and 2 interviewers involved in data collection were all females with a health science background. They had no affiliation with the facilities where they collected data to ensure an unbiased, neutral perspective. All were trained in research ethics, the consent process, and interview methods over five days by two of the co-authors and a research consultant in Bosaso. Enrollment officers were always present, 24 hours a day 7 days a week, at the four MCH centers and Bosaso Hospital to monitor when a referral from the MCH to the hospital was issued. Once clinical staff determined that a referral was required, the enrollment officer approached the mother or family for consent to participate in the study. Demographic and contact information were collected from the family at the time of enrollment. The family was contacted (either in person or by phone) within 24 hours after discharge from the hospital to schedule an interview in their home.

The in-depth interview (IDI) guides for mothers and caretakers followed a case study approach adapted from the conceptual framework for increasing access to care for sick newborns through community volunteer assessment and referral (Table 1, Supplemental Figure 1). [3-4, 13] After collecting demographic and outcome information, the interviewer asked about each stage of the referral process, beginning with the decision to seek care all the way through the referral experience and discharge. Tools were translated from English to Somali and back translated to ensure meaning was preserved. The tools were pilot tested in the community and revised over a one-week period.

All interviews were conducted in the Somali language, audio-recorded, transcribed in Somali, and translated into English. The IDIs lasted between 45 and 90 minutes and were conducted in private areas to ensure confidentiality.

Table 1. Data Collection Tools

Tool	Data
Enrollment questionnaire	Demographic information, obstetric history, displacement status, infant information, place of birth (facility or home)

Maternal Child Health (MCH) Center referral log	Referral date and hour, the reason for referral, referral completion status
Hospital referral log	Admission date and time, reasons for admission, maternal outcome, newborn outcome, length of stay at hospital, discharge / death date and hour
In-depth interview guide: maternal and newborn referrals	Demographic information, birth history of newborn, reasons why they sought care at the MCH center, their experience receiving care at the MCH center, the decision-making process to comply or not with the referral advice by the provider, the referral process from the MCH center to the public hospital, their experience receiving care at the hospital (if the referral was completed), and any post-discharge reflections on the referral process.
In-depth interview guide: health care workers	Health care worker's qualifications, providers' experience caring for small or sick newborns, referring small or sick newborns, and recommendations about the referral process

Analysis

Our analytical approach was threefold. First, we conducted a descriptive analysis of the compliance rate and reasons for referral. Second, a *priori* themes based on the conceptual framework applied to the IDI guide were followed to organize and upload English translated versions of the transcripts into MAXQDA 2019 (VERBI Software, 2019) for data analysis.[14] Finally, the complete set of transcripts were read by two co-authors multiple times to identify overarching themes and draft a codebook of themes and sub-themes (Supplemental Table 1). The two co-authors coded six transcripts separately, met to discuss and revise the codebook accordingly. They then coded three transcripts separately and analyzed to ensure inter-coder agreement. Disagreements were discussed and resolved until the inter-rater reliability was in the 90th percentile range. The co-authors coded independently until saturation was reached and reviewed the remaining transcripts for outlier situations and perspectives. Thematic analysis was used to interpret the data, summarize overarching themes, and present findings in the respondents' own words.

Patient and public involvement statement

Patients and the public were not involved in the study design. A coauthor, data collectors, and interviewers were from the community. The coauthor was engaged in the design of the study, the data collection, and the dissemination of the findings. The findings of the study have been and will continue to be shared for broader dissemination.

Results

Participant characteristics

The average age of the referral interview respondents was 26 years (SD =7.2), 28% were currently displaced, 57% had no formal education, 41% were not able to read, and 93% were not employed. The mean gravidity and parity in the sample were 4.3 (SD = 3.7) and 3.7 (SD = 3.2) respectively (Supplemental Table 2).

Referral Compliance

Nearly all (94%, 51 of 54) participants, 39 of 41 maternal referrals and 12 of 13 newborn referrals, complied with a referral from the MCH center to a hospital (Supplemental Table 3). Of the three patients who did not complete the referral, two respondents gave birth on the way from the MCH center to the hospital and decided to return home with their newborns, and one decided to return straight home with her sick newborn, citing financial reasons.

The time between the referral from the MCH centers to admission at the hospital for maternal referrals averaged 4 hours and 17 minutes [range 5 minutes to 20 hours and 37 minutes], and for newborn referrals, the average time was 1 hour and 2 minutes [range 7 minutes and 2 hours and 5 minutes]. All (100%, n =51) maternal and newborn referrals who arrived at the hospital were admitted. Of the 39 women who complied with a maternal referral, 37 (95%) had a reason for hospital admission recorded in the logbook (Table 2). The mode of delivery for maternal referrals were 21 (51%) vaginal births and 20 (49%) cesarean births. There were no maternal deaths. Of the 12 newborns who completed referral from the MCH to the hospital, the reason for admission for the majority (75%) was respiratory distress.

Table 2. Reasons* for admission at Bosaso hospital for maternal and newborn referrals

	n	%
Maternal Referrals	N=39	
Obstructed / prolonged labor	13	35%
Previous cesarean	8	22%
Anemia	7	19%
Hypertension	4	11%
Bleeding	2	5%
Pre-eclampsia	2	5%
Other (Hypoxia, placenta previa, post-term, transverse position)	4	11%
Missing reason for admission	2	
Newborn Referrals	N=12	
Respiratory distress	9	75%
Hypoglycemia	2	17%
Infection	1	8%
Trouble feeding (Feeding problem)	1	8%
*Multiple reasons for admission could be recorded		

For pregnant women who were referred and admitted to the hospital, the average length of stay was 4.4 days (range <1 day to 9 days) and 4.7 days (range 1 to 7 days) for a vaginal birth and cesarean delivery, respectively. For newborns who were referred to the hospital, the average length of stay was 3.45 days (range 1 to 13 days).

Themes

Four themes emerged from the qualitative analysis, which included (a) trust in medical authority (b) cost of transportation and care at the hospital (c) quality of care, and (d) communications.

Trust in medical authority

The decision for the pregnant woman or caregiver to seek care at an MCH center was made at the start of labor, due to a complication with labor, or due to recognition that their newborn was sick (recognized symptoms included difficulty breastfeeding, vomiting, and fever).

For women who chose to visit the MCH center for delivery, they described the MCH center as clean, trustworthy, and reliable, they felt comfortable with the staff there. Many referenced proximity and the availability of cost-free health services. Some relied on recommendations from family, friends, or neighbors.

> *"The midwives were with us day and night, and the [girls] were available within minutes. It is a good place. A clean place. Your blood is continuously measured, you are being visited regularly and asked about your condition. It was a very well-organized place."* -Mother of a newborn who was referred, Age 23

Many respondents mentioned how concern for their own health, or the health of their newborn, led them to complete the referral to the hospital. Respondents also mentioned trusting the medical authority at the MCH centers who advised that the referral was necessary.

> *"They took the decision immediately because they appreciated the judgment of the health staff, and they took her to the hospital immediately."* -Woman who was referred, Age 21

Cost of transportation and care at the hospital

Most respondents took a taxi or borrowed a car to reach the MCH center, though some women went on foot if they were unable to get transportation. Time to reach the MCH took ten minutes to two hours on foot, or 20 - 60 minutes by car. Women mentioned the cost of transportation as a challenge, and many had to source the funds from others to hire a taxi.

While almost all the respondents complied with the referral from the MCH to the hospital in a timely manner, they described the challenges they overcame to do so and the factors that weighed into their decision. The most mentioned challenge was finances. Respondents described costs associated with transportation, hospital admission, and treatment. Many families stated that they did not have the money readily available to cover anticipated costs.

Both HCWs and community respondents brought up the need for a reliable ambulance or free transportation to facilitate referral cases. Transportation availability was also closely linked to finances, as the referral pathway relied on private transport (mostly taxi services) between the MCH center and the hospital. They mentioned that private cars and taxis were not always available or accessible when needed, and the cost could be prohibitive for some families.

For those who complied with the referral, in some cases, finances limited families from completing care at the hospital. The high cost of care and treatment at the hospital was

consistently mentioned, particularly in contrast with the MCH centers, where all treatment and many medications were provided free of charge.

> *"I was worried about the costs at the hospital. There was a time when we had to leave the hospital due to finances and go back home. After we found the money, we went back to the hospital."* -Mother of a newborn who was referred, Age 19

Families were asked to pay some costs upfront, which delayed care when the family had to source the necessary money. Respondents explained that their family members were required to purchase certain medications and supplies from the hospital pharmacy or somewhere outside the compound. Purchasing medicine and supplies was another financial burden. Some women were surprised at the high cost of surgery, medications, or other medical interventions and mentioned that cost could be a barrier to staying at the hospital.

> *"Yes, I very much needed financial help for the services extended to me… the blood transfusions were costing money, which I thought were free. The blood was donated by my family and my husband. It cost us $150 total, but we had to stay one more night [to find the money] before being discharged*" -Woman who was referred, Age 36

> "*The color of the baby was blue when he was born. They took him to a separate room since the baby required oxygen and tube feeding. They measured the blood sugar of the baby very frequently. The baby become well at the 5th day but still needed hospital admission, but we couldn't afford to stay and took him to home."* -Woman who was referred, Age 35

While challenges to sourcing timely financial support were described in depth, most women were able to find monetary support from family, neighbors, HCWs, and NGOs.

> *"[During the referral] my husband's sisters were taking care of the child and keeping the house, and if somebody is sick, the money is nothing, you can get money, but you can't get health. If a person is bedridden, money will come, it's compulsory, even if you don't have it yourself*." -Mother of a newborn who was referred, Age 26

Quality of care

After arriving at the MCH center in labor, respondents described receiving a vaginal exam and having their blood pressure taken. After the initial assessment and monitoring of labor, some respondents were sent away and told to return when their labor had progressed. One respondent gave birth on the road on her way home after being told by the MCH staff to return later.

Many women who went to the MCH while in labor praised the HCWs at the MCH for immediate, attentive care. A few respondents expressed concern that the MCH was too quick to refer without proper assessments, particularly if they arrived at the MCH during the night.

> **"***They didn't give me good care because the staff changed each shift. There was an old lady during the night, and she was not active compared to the others in the*

day. In the morning there were active girls. They were measuring the blood pressure and did some blood analysis." -Woman who was referred, Age 23

Several respondents expressed concern about seeking care at the referral hospital due to fear of medical procedures, like Caesarean section or blood transfusions, or perceived quality of care available at the hospital. While they expressed these fears during the interview, it did not prevent any of the respondents from completing the referral.

At the hospital, respondents who were referred during labor were attended to immediately. Most respondents stated that they were able to receive care soon after arrival at the hospital, or as soon as their condition was deemed as critical. Upon arrival, the hospital staff assessed, treated, and monitored the mother and newborn throughout the labor and delivery process.

"When I reached the entrance of the hospital I got out of the car and I walked, although it was so difficult to me. Then we saw a nurse and my husband gave her our paper and she immediately call the hospital manager and they prepared me for surgery. Then they began the surgery, and when I gave birth, they administered oxygen to the baby. My mom looked after the baby and my husband looking after me until my conscious become normal." -Woman who was referred, Age 33

In a few instances, care was delayed by HCWs' breaks (late at night, prayer times, and around lunch hour) or by specialist availability, such as for ultrasound.

The respondents' descriptions of care received by their newborns varied depending on the needs of the newborn. Most newborns referred to the hospital were immediately placed on oxygen, received nasogastric-feeding tubes, and/or were treated for hypoglycemia.

"Yes. The bed rent was free. The place was clean. The child was taken care of. They were telling us to take care of the child and feed it. The child was continuously monitored. You will be awakened at night." -Mother of newborn who was referred, Age 21

"However, I would suggest that the hospital staff need to help the sick and poor people. They should continuously follow up with their patients, not just come once and not come back. Anything can happen to a sick person at any minute." -Mother of a newborn who was referred, Age 23

When interviewed about their baby's health post-discharge, most respondents stated that their child's condition was improved. A few respondents mentioned that they felt their newborns were discharged while they were still unwell, which led to seeking care at different facilities or alternative practitioners. A few women reported returning home from the hospital still feeling ill themselves. Overall, most respondents stated that the quality of care at the hospital was good, though costly.

Communications

Most respondents were able to explain why they were referred from the MCH center to the Hospital. For newborns that were referred, many respondents described the reason for referral as related directly to supplies or medications that were not available at the MCH center at the time of care, specifically oxygen, fever medications, and blood tests.

> "*I didn't ask them his weight when he was born, and after a week, I took him to get vaccination. He started to vomit, and they said he need to get diagnosed in order to give him medicine, and they couldn't provide it and referred him to the hospital*." -Mother of a newborn who was referred, Age 33

Those born at the hospital with complications were immediately taken to a separate room for treatment. When newborns had to be separated from their mothers, there was often miscommunication between the caretakers and HCWs about the treatment required and the prognosis of the newborn.

Specific to communication for the referral process, multiple HCWs suggested creating official, supported channels of communication and accountability between the MCH and the hospital. The suggestions included official referral slips and communication channels to inform each other of referrals, outcomes, and follow-ups.

> "*We counsel them as much as we can and we sometimes pay for the taxi costs. We sometimes give them the ambulance and if the ambulance is not available, then we give them money from our pockets. We convince the family who are with the mother to take care of the [other] children at home. We tell them the child is at risk of dying and the mother should do as much as she can to save [the child], but if the child is taken home, nothing can be done for it."* -MCH HCW

Health Care Worker (HCW) perspective on newborn referral

To elicit more context on referrals within the Bosaso health system, HCWs were interviewed for their perspectives on newborn referrals. The HCWs at the MCH centers all mentioned a low number of small or sick newborns that seek care at the MCH.

> "*It [cases of small or sick newborns] is not many. They are brought to you in such condition, but often the ones that are delivered here are more. Now I remember two cases in the whole of last year*." -MCH HCW

At the hospital, contrary to the MCH centers, the HCWs described a high caseload of sick newborns and infants. Low birthweight was cited as a common reason to admit newborns to the hospital, and in such cases, the HCWs provided nasogastric feeding, breastfeeding support, and kangaroo mother care. HCWs mentioned that many of the severe cases are born in the community and have a long distance to travel to seek care at the hospital, and therefore have worse outcomes. At both the MCH and hospital, HCWs identified specialized staff, training, and equipment as areas that need to be improved.

"Yes, the equipment's is available but has no usage. And the usage requires training so that is the challenging case … it can be managed if there is no difficult condition. But the premature requires an incubator and the incubator is locked in a room and we don't have the training, but we have the skills and techniques to work." -Hospital HCW

The MCH staff were not in communication with the hospital to know whether the hospital had enough beds to admit small and sick newborns, nor to alert the hospital that they were sending patients for admission. Additionally, no official documentation was required for referrals of mothers or newborns. If medications were provided, HCWs might write on a blank piece of paper describing the medications given for the patient to take to the hospital. Transportation from the MCH to the hospital was usually by private car or taxi organized by the patient's family. If the referral patient was in critical condition, a HCW would accompany the patient to the hospital, if possible.

Discussion

Our study found a high rate (94%) of maternal and newborn referral compliance between MCH centers and the public hospital in Bosaso, Somalia. The urban location, proximity between MCH centers and hospitals, availability of transportation, and familial support were facilitators for the high compliance. Respondents attributed their concern for health (their own and their newborn's) and trust in medical authority as primary reasons they completed the referral in a timely manner. Our study also found that most referred patients were admitted and received care soon after arrival. One respondent who was unable to complete the referral cited the financial barrier as the primary reason not to go to the hospital.

The compliance rate in our study was higher than the compliance rates for referrals from the community level found in other studies in African countries. [4,13] This could be due to the location, the source of referral (facility-based staff instead of community health workers), and the respondent population. Our study participants had demonstrated health care utilization behavior and trusting relationships with providers by already seeking care at the MCH center. Trust in medical authority was described as their main reason for complying with the referral, this is informed by previous personal experience, or family and friends' experiences, on receiving care at the MCH centers. A critical element of a successful referral pathway is a trusting relationship between patient and providers, which requires clear communication on the reasons for the referral and the urgency. [15] When communicated, the concern for the mother-baby wellbeing was a facilitating factor for referral compliance. Two of the three who did not complete the referral did not arrive at the hospital after giving birth on the road as they felt the reasons for referral (prolonged labor and multiparity) were not relevant anymore.

Distance, cost, and quality of care are often cited as factors for delayed care seeking for maternal health. [16, 17] In our study, most complied with referrals immediately and received care on arrival at the hospital. Our study findings were consistent with the literature in that cost was cited as a barrier for transportation to the appropriate level of care. While most respondents were able to complete the referral, almost all mentioned the financial stress it put on their families to source

the money for transportation, hospital care, and medications. Our respondents were able to access financial support from extended family, community members, NGOs, and UNHCR.

In theory, the referral initiating health facility should inform the receiving health facility, for them to anticipate the patient's medical need and expect their arrival. Similarly, feedback from the receiving health facility back to the referring center will facilitate any follow-up need of the patient and to inform future referrals.[18] In our study setting, there were no formal communications (phone or paper) between the MCH centers and Bosaso Hospital, and this was identified as a key area for improvement by both the HCWs and patients who were referred. This lack of communication between referring and receiving health facilities has been reported as a reason for referral decline or delay in receiving care. [18] While most respondents noted that they were admitted and received timely (within an hour) initiation of care at the hospital, there were respondents that reported delays at the hospital due to staff capacity or staff breaktime. Mobile phones provided by the health system have been used effectively in other settings to increase communications between referring and receiving health facilities. [18]

When considering programmatic interventions to improve newborn health through referral pathways, the maternal-newborn dyad must be considered in fragile settings like Bosaso, Somalia. Our study showed that HCWs at the primary level were quick to refer complicated deliveries to the hospital level while the mother was still in labor could have contributed to a better birth outcome and maternal survival. In a review of neonatal referrals in Vietnam researchers found that those who self-referred had lower case fatality rate than those referred from provincial hospitals (3.4% versus 21.3%) and attribute the difference to be delay in initiation of appropriate treatment. [19] In our study the MCH was often not used by families for neonatal complications as they preferred to go directly to hospital. While the HCWs respondents employed at the MCH could discuss in detail how they would stabilize and treat small or sick newborns, in practice, they referred immediately to the hospital without stabilization interventions for those born at the health facility. The content and quality of pre-referral care in newborn health is an area that needs further investigation.[18] In addition, future research ought to consider the evaluation of safety of the referral process including medical care provided during transportation.

Study strengths and limitations

Our study findings are not generalizable to Bosaso or Somalia. First, given that the institutional delivery rate in Somalia is estimated at around 21%, this study population represents a small segment of the general Somali population.[7] Second, the experiences of our study population might be different from the general population on several counts, including the ability to overcome financial challenges in transportation and care at the hospital. Third, our study sites are not reflective of access to hospital care in Somalia in that it is an urban setting, the hospital was near the MCH centers, and the availability of means for transportation in the form of taxicabs that one can call through a mobile phone. Our sample size was also small and has high margin of uncertainty in terms of referral compliance rate.

There is a possibility of social desirability bias in the responses. That said, the fact that the interview was confidential, done outside a health facility, by community members who weren't at the time working at the health facility would have minimized the bias.

The strength of the study was the qualitative study, the ability to examine factors that affect the decision at all levels for both mother-baby dyad, and our ability to collect perspectives from HCWs. Timing and language used for the interview was a strength in that we waited for the mother-baby dyad to return to their home (not in the middle a of medical crisis), Somali language were used for the interview, and native speakers from the community conducted the interview.

Conclusion

This study found high rates of compliance with referrals from the primary to secondary levels for maternal and newborn referrals. Proximity, concern for health, and trust in medical authority were cited as contributing factors for referral compliance. Cost was the main barrier that impacted the respondents' decisions to seek care and comply with referral and care in this study.

The HCWs at the MCH centers identified most complications during labor and immediately referred from the MCH center to the hospital. This emphasizes the importance of the maternal-newborn dyad in places like Bosaso, Somalia, and the need for high-quality intrapartum care availability that considers the needs of both the mother and newborn. Without specialized certifications or designated roles, delivery attendants must have the knowledge, skills, and equipment to attend to both the mother and newborn during delivery. Midwives staffing the MCH centers must be able to recognize potential complications and stabilize the patient while arranging transportation to the hospital.

Our findings illustrate that high compliance can be achieved if circumstances are conducive. Assistance with cost and transportation and improvements to the quality of care and referral processes would help in making referrals to necessary, hospital-level care is more accessible and inclusive in Bosaso.

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Contributors

CM drafted the initial manuscript, reviewed and revised the manuscript. CM and KM conducted data analysis. RA, HH, SB, CM, KM, and MH, contributed to study methodology, development

of tools, data analysis, reviewed and revised the manuscript. ZH reviewed and revised the manuscript. HH and SB trained data collectors, interviewers and contributed to data quality.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work

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Competing interests

None declared

Patient and public involvement

Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further analysis.

Patient consent for publication

Verbal consent obtained

Ethics approval

Approval for this study was obtained from the Puntland, Somalia Ministry of Health, the Save the Children ethics review committee, and a nonresearch determination by the US Centers for Disease Control and Prevention (CGH HSR Tracking #: 2016-0119). Verbal consent was obtained from women, caretakers, and health care workers. Personal identifiers collected to facilitate interview were destroyed immediately after completion of the data collection process. No identifying information was recorded in the transcripts. Transcripts were only available to the research staff.

Data availability statement

The excerpts of the transcripts relevant to the study have been shared in the manuscript. There is no additional data available.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily reflect the official policy or position of the U.S. Centers for Disease Control and Prevention, nor the United States Government.

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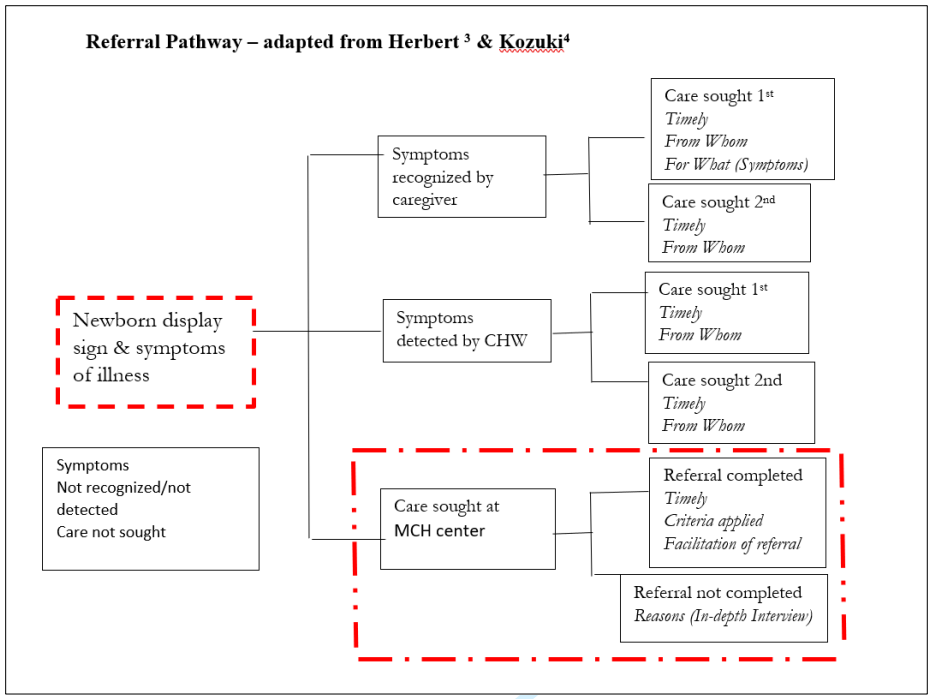
Supplemental Reference Tables

Supplemental Table 1: Codebook

Codebook	
Parent Code	Sub-code
The Decision to Seek Care	Reasons for Initially Seeking Care
	Recognizing Newborn Danger Signs
	Reasons for choosing initial care facility
	Process to seek initial Care
Care and Referral at the Maternal Child Health Center (MCH)	Care for Mother received at Maternal Child Health Centers
	Care for Newborn received at MCH
	Supplies and Medications at MCH
	Opinions about Quality of Care received at MCH
	Reasons for Referral
	Advice from Healthcare Workers
	Referral Documentation
The Referral Decision	Factors: Finances
	Factors: Concern for Health
	Factors: Transportation
	Factors: Trust in Medical Authority
	Factors: Religious / Socio-cultural Influences
	Factors: Concerns about medical procedures at referral facility
	Factors: Belief about quality of care at referral facility
	Factors: Concern about home responsibilities
	Factors: Familial Influences
The Referral Process	Patient Experience of Referral
	Referral Procedures
	Referral Companions
Care at the Referral Hospital	Care for Mother received at Hospital
	Care for Newborn received at Hospital
	Supplies and Medications at the Hospital
	Opinions about Quality of Care received at Hospital
	Compliance with Treatment Plan
	Post Discharge Health Issues
Recommendations for Improvement	Community Education and Awareness
	Transportation
	Subsidized / Free care at the Hospital
	Training for Healthcare Workers
	Supplies and Equipment at MCH and Hospital
	Referral Processes
	Quality of Care at Hospital
	Formal connection of MCHs and Hospital

MCH = Maternal Child Health Center

Supplemental Figure 1. Referral Pathway Conceptual Framework



Supplemental Table 2: Demographics of Study Participants

Respondent Demographics		N= 54	SD
Age	Average Age	26	7.1
Gravidity	Average Number of Pregnancies	4.3	3.7
Livebirths	Average Livebirths	3.7	3.2
Average Current Number of Children Alive		3.5	3.2
Respondent Demographics		N= 54	%
Displacement Status	Yes	15	28%
	No	38	70%
	No Response	1	2%
Occupation of Mother	Government	1	2%
	Small Business	1	2%
	Other	2	4%
	Not Employed	50	93%
Occupation of Father	Agriculture	2	4%
	Fishing	2	4%
	Government	3	6%
	Small Business	5	9%
	Other	29	54%
	Not Employed	7	13%
	No Response	6	11%
Education of Mother	No Formal Education	31	57%
	Primary	14	26%
	Secondary	5	9%
	Associates	1	2%
	Bachelor	2	4%
	No Response	1	2%
Education of Father	No Formal Education	21	39%
	Primary	12	22%
	Secondary	7	13%
	Associates	0	0%
	Bachelor	6	11%
	Masters or Higher	2	4%
	No Response	6	11%
Literacy	Yes	28	52%
	No	22	41%
	No Response	4	7%

1

Supplemental Table 3: Referral Outcomes

Referral Compliance (went to hospital within 24 hours) N=54:				
Maternal Referrals	Compliant	39	95%	NOTE: 2 chose to go to a private hospital instead of Bosaso hospital, but went within 24 hours
	Noncompliant	2	5%	NOTE: In both cases, the mother delivered on her way from the MCH to the hospital and decided to return home instead of continue to hospital
Newborn Referrals	Compliant	12	92%	
	Noncompliant	1	8%	NOTE: cited financial reasons
Combined	Compliant	51	94%	
	Noncompliant	3	6%	*Note 1 cited finances, 2 delivered enroute & returned home

Referral Time (between MCH referral and admission to Hospital)			
Maternal Referrals	Average length of time	4hr 17 min	
	Shortest Referral Time	5 min	*Not sure if this is fully accurate. But had 5 referrals under 20 minutes so could be possible
	Longest Referral Time	20 hr 37 min	
Newborn Referrals	Average length of time	%	
	Shortest Referral Time	7 min	
	Longest Referral Time	2 hr 5 min	

Type of Delivery, n = 41				
Maternal Referral	Cesarean	20	49%	
	Vaginal Delivery	21	51%	NOTE: 2 were on the road, 1 was a known stillbirth

Newborn Outcome (at Hospital), n =43				
Maternal Referrals	Alive and Healthy	21	49%	Includes 1 set of healthy twins
	Alive but Unwell*	16	37%	Required some sort of specialized newborn intervention
	Stillbirth	2	5%	
	Early neonatal Death <24 hr	4	9%	Includes 1 set of twins who both died
Newborn Outcome (at Hospital), n = 12				
Newborn Referrals	Discharged by Provider	9	75%	
	Death	3	25%	

Reason for Referral (Multiple reasons considered), n = 41				
Maternal Referrals	Obstructed / Prolonged Labor	16	39 %	
	Anemia / Blood Transfusion	7	17 %	

	Hypertension	5	12 %	
	Previous Cesarean	4	10 %	
	Bleeding	2	5%	
	Breech Position	2	5%	
	Placenta Previa	2	5%	
	PROM	2	5%	
	Ultrasound	2	5%	
	OTHER	5	12 %	(Injury, low blood pressure, multiparity, oligohydramnios, pre-eclampsia)
Reason for Admission (Multiple reasons considered), n = 37				
Maternal Referrals	Obstructed / Prolonged Labor	13	35%	
	Previous Cesarean	8	22%	
	Anemia	7	19%	
	Hypertension	4	11%	
	Bleeding	2	5%	
	Pre-eclampsia	2	5%	
	OTHER	4	11%	(Hypoxia, placenta previa, post-term, transverse position)
	Unrecorded / Missing Data	2	5%	

Reason for Referral (Multiple reasons considered), n = 13				
Newborn Referrals	Respiratory Distress	8	62%	
	Infection	2	15%	
	Hypoglycemia	2	15%	
	Hypothermia	1	8%	
	Other	1	8%	
Reason for Admission (Multiple reasons considered), n = 12				
Newborn Referrals	Respiratory Distress	9	75%	
	Hypoglycemia	2	17%	
	Infection	1	8%	
	Trouble Feeding	1	8%	

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Page 1 Lines 1-2
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 2 Lines 1-25
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Page 4 Lines 2 - 17
Purpose or research question - Purpose of the study and specific objectives or questions	Page 4 Lines 38 - 41
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Pages 5-6
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 5 Lines 30 - 34
Context - Setting/site and salient contextual factors; rationale**	Page 5 Lines 5 - 11
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	Page 5 Lines 13 - 27
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 16 Lines 1-7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	Page 5-6 Lines 30 - 12

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 6 Lines 3 - 14
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 7 Lines 12-15
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Pages 6-7 Lines 16 - 4
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Pages 6 – 7 Lines 16 -4
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 6 Lines 20 - 23

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Pages 7 - 12
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Pages 8 - 12

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Pages 12 - 14
Limitations - Trustworthiness and limitations of findings	Page 14 Lines 7 - 25

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 15 Line 30
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 15 Lines 20 - 28

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388