

# The quality of and women's satisfaction with maternal referral practices in Sub-Saharan African low and lower-middle income countries: A systematic review

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## Research article

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## Abstract

**Background:** Sub-Saharan African Low and Lower-Middle Income Countries (SSA LLMICs) have the highest burden of maternal and neonatal morbidity and mortality in the world. Timely and appropriate obstetric referral to a suitable health facility is a sign of effective health system. This paper presents the findings of a systematic review that aimed to identify what referral practices are delivered according to accepted standards for pregnant women and newborns in SSA LLMICs by competent healthcare providers and in line with the need and wishes of women. **Methods:** Six electronic databases were systematically searched for primary data studies (2009-2018) in English reporting on maternal referral practices and effectiveness. We conducted a content analysis of data in the findings of each paper guided by a framework for assessing the quality of maternal referral. **Results:** Seventeen articles were included in the study. Most studies were quantitative (n=11). Quality maternal referral was defined as occurring as a result of: the timely identification of signal functions, established guidelines or standards, adequate documentation, staff accompaniment and prompt care by competent healthcare providers at the receiving facility. Two studies reported that women were dissatisfied due to delays in referral processes that affected their health. We found lack of accompaniment to upper levels of healthcare, delays in referral processes, transportation challenges and poor documentation of referral cases. Some healthcare providers administered essential drugs such as misoprostol prior to referral. **Conclusions:** Efforts to improve maternal health in LLMICs should aim to enhance maternal healthcare providers' ability to identify signal functions that are integral to referral. Low cost transport is needed to mitigate transportation barriers to referral. To ensure quality maternal referral, mechanisms should be instituted for health managers at the district level to monitor and evaluate referral documentation, quality and efficiency of maternal referrals on regular basis.

## Background

Timely referral to an appropriate health facility to address obstetric needs is a key indicator of a functional health system [1, 2]. An efficient referral can result in an 18%, 27% and 50% reduction in neonatal death, stillbirth, and maternal death respectively [3]. High quality referral is critical in low and lower-middle income countries (LLMICs) to prevent severe maternal morbidity that occurs in 8% of deliveries in health facilities [4, 5]. In sub-Saharan Africa (SSA), obstructed labour, hypertension disorder, unsafe abortion, infection and hemorrhage are the principal causes of postpartum morbidity [6]. Multi-sectoral collaboration and well-coordinated levels of care linking communities with essential maternal and newborn health services is a necessary component of a high-quality referral system. Treatment delays and poor detection and management of complications is a major cause of maternal and newborn mortality in LLMICs, particularly in SSA [7] where efforts are focused on improving standards of maternal and newborn referral [8, 9].

Maternal services that require referral are usually the result of complications that necessitate the delivery of life-saving services, or '*signal functions*' recommended by the World Health Organization (WHO) [10] that cannot be provided by the receiving facility. In the case of basic maternal services, seven signal functions are recommended for basic emergency obstetrics and newborn care (BEmONC): the administration of parenteral (1) antibiotics; (2) uterotonic drugs (e.g. oxytocin); (3) anticonvulsants (e.g. magnesium sulphate); (4) manual removal of retained placenta; (5) removal of other products of conception; (6) performing assisted vaginal birth and (7) neonatal resuscitation. Two additional services are recommended for referral facilities where comprehensive EmONC (CEmONC) services should be available: caesarean section and blood transfusion [10].

The WHO's third standard for improving the quality of maternal and newborn care in health facilities states that all pregnant women should be correctly assessed upon presentation to establish if they can be attended to and if not immediately referred using a standard protocol. This should involve 'appropriate information exchange and feedback to relevant health care staff' [11]. This means that healthcare providers must communicate with the receiving facility in order for the woman to be received and treated efficiently. The receiving facility is also required to provide feedback on the status and outcome of the woman's status [11].

Some of the international standards and guidelines [11, 12] may be difficult to implement in some settings in sub-Saharan Africa due to limited human resources, funding, geographic challenges and cultural factors [13]. As a result, some countries such as Ethiopia, Ghana and Kenya have developed country-specific national level referral guidelines [14-16]. However, none of these acknowledged country-level referral guidelines is tailored towards maternal and newborn conditions but general healthcare emergencies.

We acknowledge that some systematic reviews on maternal and newborn referrals have been conducted in low and lower-middle income countries. However, some of these studies are based on evidence that is over a decade old [17, 18]. Others did not focus on referral services but other aspects of maternal and newborn care such as the effect of cash transfer and voucher use on maternal health service [19, 20]. The review by Das, Gopalan [21] was limited to quantitative studies and excluded women who accessed the service. Fikre [22] and Mahato, Van Teijlingen [23] limited their review to basic emergency and obstetric care (BEmOC) and this narrows the scope of maternal and newborn care as comprehensive care was not included. None of these recent studies examined the quality of maternal and newborn referral practices and women's satisfaction across sub-Saharan African low and lower-middle income countries (SSA-LLMICs). This study, therefore, synthesised the primary research literature to examine the patterns of obstetric referral, the quality of referral and women's experiences of the process to provide insights to improving referral in SSA-LLMICs.

## Definitional and conceptual issues

### *Conceptual Framework: framework for assessing the quality of maternal referral*

A framework is a useful way to examine maternal and newborn referral in research particularly in assessing the elements of quality that are necessary for effective referral (see Figure 1). This framework has been adapted from the work of Hulton, Matthews [24] and seeks to assess the quality of maternal referral by linking some key distinct components of institutional healthcare provision. These components comprise health facility management, medicines and psychosocial support. Newborn referral is subsumed under maternal referral by the framework. The framework has two main components, namely, the provision of maternal referral service as provided by the health care system (supply) and the experience of the referral service as reported by women who utilise the healthcare service (demand). Most of the components under the supply section reflect elements of WHO's health system building blocks indicating that strengthening maternal and child health services and referrals could also improve the health system in general [25].

The *Referral system* implies how the referral service is provided including how referrals are initiated and conducted, from BEmOC to Comprehensive Emergency Obstetric Care (CEmOC) services or from one CEmOC facility to another CEmOC level of care. Referral practice should be in line with internationally accepted standards [10, 11]. *Human resource for health* as indicated in the framework refers to the availability, competency and motivation of healthcare providers to recognise and refer cases to the appropriate facilities in a timely manner (provision of maternal and newborn referral service). It also encompasses the satisfaction or assessment of women about healthcare providers' referral practices (experience of referral service). *Maternity information systems* focus on the documentation of cases that are referred including what data is collected, where and by whom. *Medicines and equipment* involve the availability and appropriate use of essential lifesaving commodities for maternal and newborn health such as the provision of a pre-referral loading dose of magnesium sulfate to be administered to a woman if she is to be transferred.

In terms of the demand side, *Cognition* focuses on whether the woman understood and was satisfied with the explanations given to her by healthcare providers. *Respect, dignity, and equity* are concerned with whether the woman felt the care was respectful and equitable. A woman's view about the level of cleanliness, availability of medicines and equipment in health services as well as value for money is mirrored by *satisfaction with facility, commodities, and cost*. Lastly, *emotional support* is concerned with a woman's perceptions of the sensitive and responsive support health professionals provided.

## Methods

### Study design

The review question for this study was: "What referral practices are delivered according to accepted standards for pregnant women and newborns in Sub-Saharan African Low and Lower-Middle Income Countries by competent healthcare providers and in line with the need and wishes of women?" This was guided by Population, Interventions, Comparators, Outcomes (PICO) framework [26]. The outcomes of the study broadly fall under three key areas: quality of care (providers, referral system, information, medicines, and guidelines), satisfaction (women and family experience of referral) and effectiveness where available (reported health outcomes associated with referral). This systematic review was carried out following an a priori protocol registered with PROSPERO [CRD42018114261].

## Data sources and search strategy

We searched six databases: African Journals Online (AJOL), CINAHL (Ebsco), Embase (Ovid), MEDLINE (Ovid), Pubmed and Scopus for quantitative, qualitative or mixed-method primary articles. The search focused on studies published in English Language and conducted in sub-Saharan African Low and Lower-Middle Income Countries (LLMICs) according to the World Bank definition [27]. We included studies published between 2009 and 2018. The following search terms were used in our search to identify relevant peer-reviewed articles from the databases: “maternal referral” OR “obstetric referral” OR “referral practice” OR “obstetrics” OR “pregnancy complications” OR “maternal health services” OR “maternal and child health” OR “emergency obstetrics and newborn care (EmONC)” OR “comprehensive emergency obstetric and newborn care (CEmONC)” OR “referral guidelines” OR “referral standards” OR “referral effectiveness” OR “signal functions” OR “women satisfaction” OR “family’s satisfaction” AND “sub-Saharan Africa” OR “Africa South of the Sahara” AND “low income countries” OR “lower-middle income countries”, (see S1). Relevant references from bibliographies of identified articles were hand-searched in order to identify and include all relevant peer-review articles. All searches were conducted from 22<sup>nd</sup> October to 29<sup>th</sup> November 2018.

Of the 1,186 articles identified in our search, 1,153 were excluded after screening because they did not have the outcomes of interest. A total of 33 were subjected to quality assessment after which 17 were included in our final analysis. Sixteen articles were excluded due to lack of clear methodology and limitation in the outcome of interest. The 17 included articles included eleven quantitative, four qualitative and two mixed-method studies as shown in the PRISMA Flow Diagram (Figure 2) [28]. **Quality assessment and data extraction**

The Critical Appraisal Skills Program (CASP) tool for qualitative research was used for accessing the qualitative studies [29]. The McMaster Critical Review form for quantitative studies was also used [30]. In the case of mixed-method studies, the quantitative aspects were assessed by McMaster Critical review form whilst the CASP tool was used for the qualitative aspects. Some of the studies were excluded due to the lack of a clear methodology. For instance, one study [31] did not provide a detailed explanation of the sampling approach.

## Data analysis

A content analysis [32] was applied to analyse the studies guided by the framework for assessing quality care in maternity services (Figure 1) [24]. Content analysis involves systematic and objective identification of key characteristics of texts in order to make inferences [32]. Each paper included in the review was first summarised according to the study aim, context, methodology and relevant findings (see Table 1).

The findings section of the papers were then scrutinised to identify the key outcomes of interest. Findings related to these outcomes were extracted and examined in the light of the main components of the framework described above (see Figure 1). These findings comprised direct quotations and quantitative data that were then examined in terms of their relevance to the main supply and demand components of the framework for assessing quality of maternal referrals.

# Results

## Characteristics of included studies

Of the 17 articles included in the review, 11 utilised descriptive quantitative methods [1, 8, 33-41], four employed qualitative methods [42-45] whilst two used a mixed-methods approach [46, 47]. These studies are from an urban setting in Angola [39], rural setting in Burundi [40], South Sudan [43] and Ethiopia [41, 46]. Other studies were conducted in urban settings in Tanzania [36, 44, 45] and predominantly urban locations in Nigeria [34, 35, 48] and Ghana [1, 33, 37, 38, 42, 47].

Among the 15 facility based studies, six included only CEmONC facilities comprising the district, regional and teaching hospitals [8, 34, 37, 40, 44, 45]. Three of these studies investigated the quality of referral from BEmONC facilities, comprising primary and secondary level hospitals and health centres [33, 41, 46]. Five studies investigated health facilities providing CEmONC, BEmONC and normal birth service [1, 36, 38, 42, 47]. One study from Angola included peripheral birth units that could only attend to normal births [39]. Health centres were described as facilities that provide normal birth service or provide less than six signal functions.

Most of these studies (n=13) investigated the quality of referral from the perspective of healthcare providers either through interviews or audit of health facility records [1, 8, 34-42, 45, 46]. Two studies explored women's experiences of maternal and newborn referral [33, 44]. One study included both healthcare providers and women's perspectives [47] whilst one South Sudan based study included the perspectives of stakeholders from the local government sector, Faith-Based Organisations (FBOs), non-governmental organisations (NGOs), and community religious leaders in addition to healthcare providers [43]. The common conditions that prompted referral included premature rupture of membrane, obstructed labour and postpartum complications, such as haemorrhage and fistula [8, 37, 44-46]. The outcomes identified in these studies are summarised in Table 2.

### **Provision of maternity referral service**

All the 17 articles reported on various aspects of maternal and newborn referral service provision and are presented under the following sub-themes as outlined by the supply side of framework for assessing the quality of maternal referrals (see Figure 1).

#### *Referral system*

The characteristics of maternal and newborn referral systems were discussed in 12 papers [1, 33, 34, 36-43, 47]. Two studies indicated the use of standard maternal and newborn referral procedures, the availability of standardised referral forms and health provider escorts [1, 38]. Despite a lack of detail of these mechanisms, Awoonor-Williams, Bailey [1] indicated that such procedures were accompanied by telephoning ahead to prompt the receiving hospital about the referral.

In Ghana, one study that explored maternal and newborn referral among health workers in 16 facilities revealed that healthcare providers escorted all referred women and their newborns from health centres to the BEmOC and CEmOC facilities. However, details about the specific providers who escorted women and how this was done was not reported [1]. Meanwhile, two studies investigating referral from CEmOC, BEmOC and facilities offering normal birth service reported that health care providers rarely escorted women to the next facility in Ghana [42, 47]. Some nurse administrators and medical doctors indicated that some referrals were unaccompanied because they were not emergencies [47]. Women who were unaccompanied sometimes arrived late to the receiving facility, but details were not provided about the socio-demographics of these women or their circumstances [47].

Four referral pathways/routes were identified in the study by Elmusharaf, Byrne [43]. These were zigzag referral (where a woman was sent back and forth between two healthcare providers), late referral to appropriate health facility, multiple referral (referring a woman to a number of non-functioning facilities before she finally arrived at the appropriate health facility) and by-passing (where health care provider at the first facility refers a woman directly to a specific higher level service in order to bypass non-functional health facilities). The by-passing pathway was found to result in timely arrival at the next facility. One woman narrated her zigzag referral:

*Family members lifted the pregnant woman onto a donkey-driven cart and went to the village's medical assistant. When they arrived, her water broke. The medical assistant prescribed drugs and told them that she was in labour and that the midwife should deliver her straight away. He sent them back to the midwife for birth. After spending three hours with the midwife without progress, the pregnant woman was exhausted. The midwife advised them to go back to the medical assistant. They spent most of the night going back and forth between a midwife and a medical assistant until the midwife insisted on the medical assistant referring them to Renk hospital (5JMD) [43].*

Delay was described as a major feature of the maternal and newborn referral system. In one study from Angola delays of up to 13.7 hours were noted in the triage of a referred woman upon arrival at the receiving facility [39]. Referred women and their newborns were simply added to the queue with other patients. When healthcare providers were alerted about this issue, a meeting was held to better identify referred women and prioritise them upon arrival. After this strategy was implemented, referred women and their newborns spent an average of nine minutes to meet a midwife and 71 minutes to be assessed by a doctor.

In Ghana, triage initiation for women in labour was found to vary by shift or timing of the day at Ridge Regional Hospital according to the study by Goodman, Srofenyoh [37]. The average waiting time for triage in the morning was 35 minutes, 28 minutes in the evening and 55 minutes in the night, meanwhile, referral arrivals were even across shifts. The reasons for the disparity in the triage period were not indicated. Women in the first stage of labour were triaged within 35 minutes and moved to labour ward in 24

minutes afterward. Those in the second stage were evaluated in 30 minutes and moved to the labour ward within 10 minutes after triage [37].

One rural based study from Burundi found a 15% higher chance of neonatal deaths for women who took three or more hours to arrive at the next facility after they have been referred. The facilities did not have ambulances and had to call for an ambulance from another facility which sometimes delays [40]. A study from Nigeria reported that 11 of 123 women died after being referred. Ten of the 11 women died of severe pre-eclampsia. Five of the women died during the postpartum period, five died during the intrapartum period whilst one died before labour commenced. Of these women, seven were referred from secondary health facilities, three from private hospitals and one from maternity home to the teaching hospital where the study was conducted [34].

Papers in the review identified various forms of transport that were used by women and their newborns to reach the facility to which they were referred. In the absence of ambulances, donkey-driven carts, tractors, pick-up trucks, public transport (taxis and lorries), motorised tricycles and motorbikes were used for referral purposes [33, 34, 38, 41, 42, 47]. Among the 720 confirmed pregnant women surveyed from five sub-districts in one study in Ghana, 15% took approximately one hour to make an arrangement to hire a private vehicle to transport them due to the non-availability of transport at health facilities [33]. Ambulance use for all referrals from BEmONC or CEmONC services were implemented in a study from Ghana, but the resultant outcome was not reported [1].

Some health facilities in the included papers were not equipped with telephones and some healthcare providers from primary health centres in southern Ethiopia were described as having to use their personal phones to notify receiving facilities that women were being referred to them [41]. Carnahan, Geller [36] described a communication system for facilitating referrals in 14 government health facilities in Tanzania. Meanwhile, details about how the communication systems enhance referrals were not explained. One study from a teaching hospital in Nigeria, however, reported the absence of initial communication to the hospital in all referrals [34]. The survey did not report on reasons accounting for this practice.

Two studies indicated that referring health facilities are not always given feedback from the receiving facility so that opportunities for improvement can be identified [42, 47]. The high workload of health care workers was cited as the main reason why health providers did not receive any feedback about the outcome of women and newborns. A Medical Officer from Ghana reported:

*"We don't receive any feedback from the hospitals. At least it would help us understand what we could have done better."* (In-depth Interview, Medical Officer) [47].

However, one study indicated that feedback was sent to referring facilities and that this was provided verbally by the women and/or their families [1].

#### *International standards for the management of emergency obstetrics*

Five studies reported on the availability and or application of guidelines for maternal and newborn referrals [1, 38, 42, 45, 47]. Nwameme, Phillips [47] indicated that more than 75% of staff from two of the three facilities surveyed were trained on how to use the national referral guidelines. Shimoda, Leshabari [45] reported that midwives interviewed at one hospital and one health centre followed the guidelines of midwifery care in undertaking examinations leading to referral [45]. However, the study did not identify the guidelines. Two of the three studies reporting the availability of the national referral guidelines in Ghana indicated adherence at health facilities [1, 47] whilst one noted non-adherence to the national referral guidelines [42]. Adherence implies that healthcare providers initiate and execute referrals according to the steps outlined by the national guidelines. These include documentation of referral indication, telephoning the referral facility ahead of time and making arrangements for means of transport preferably ambulance [42]. Kyei-Onanjiri, Carolan-Olah [38] reported that in Ghana, most of the 120 health facilities surveyed were guided by the national referral guidelines. For instance, 94% had standard referral forms and 83% followed a standard referral procedure [38].

In Tanzania, Shimoda, Leshabari [45] reported that guidelines for midwifery care were used by midwives' at the studied hospital and health centre in managing intrapartum monitoring processes leading to emergency referrals of 11 obstetric and prolonged labour. As compared to the WHO guidelines and recommendations [11, 49], the national guidelines of Ghana do not specify the uterotonics or oxytocics to be applied.

Twelve studies reported on elements relating to the competencies of health providers involved in referring women and newborns to other facilities [1, 33, 35, 36, 38, 41-43, 45-48]. While a variety of providers were described as involved in maternal and newborn referral, few details were available regarding their experience and training. Three papers reported that midwives and nurses had between two and 12.5 years of experience in their positions [41, 45] and doctors and nurses with midwifery training had at least 6 years [36].

In the study by Carnahan, Geller [36], 17% of 115 healthcare providers (comprising nurses with midwifery training, nurses without midwifery training and medical/clinical doctors) surveyed from 14 government health facilities offering maternity services in Tanzania could correctly diagnose post-partum haemorrhage (blood loss  $\geq 500$  mL, or blood loss  $< 500$  mL with shock symptoms) [36]. These facilities were urban CEmOC and BEmOC hospitals, health centres and dispensaries in Tanzania. Almost all the healthcare providers (98.3%) knew that misoprostol can be used for post-partum haemorrhage (PPH) but 62.6% of providers were able to state the recommended dose (600  $\mu$ g) and only 36.5% were able to prescribe it because it was not always available [36]. No significant differences were found in the mean score of the PPH-related knowledge index between providers who had more than six years of experience and those with less than six years of experience.

Women who had been referred to a higher level facility in one study from Ghana (76.6%) reported that healthcare providers at the receiving facility were competent enough to solve the problems for which they were referred, however, details about the providers' competencies were not explained [33]. In Nigeria, 79.0% (n=128) of Trained Birth Attendants (TBAs) surveyed in Kwara State indicated that they did not refer in a timely and appropriate manner [35]. These TBAs were not formally trained but acquired their skills through either inheritance or self-initiation. However, TBAs (9 of 20) with at least a supervisory visit by qualified personnel were able to conduct timely and appropriate referral. Timely and appropriate referral involved the ability to refer high-risk pregnancies including women who had a previous stillbirth and women who were experiencing bleeding pregnancies. In addition, nine (N=13) TBAs who had attended more than one training course referred women with complications such as seizures, prolonged labour or retained placenta in a timely and appropriate manner [35].

Okafor, Arinze-Onyia [8] also reported that some trained TBAs 155 (75.6%) in Nigeria, especially those who obtained the skill by inheritance delayed referral for women who showed signs of difficulty in childbirth by more than 12 hours [8]. A senior manager at the Reproductive Health and Midwifery Department in the Renk County of South Sudan complained about the competency of TBAs:

*In the past, TBAs have arrived in Renk hospital with pregnant women with their babies partly delivered; parts of the foetus, such as the head, the arm or the leg, outside the woman's body and the rest of the body still inside. (Senior Manager at the Reproductive Health and Midwifery Department) [43].*

The poor skill set of lower level doctors and midwives were reported in Ghana:

*"Last time a pregnant woman came here.... And I was saying but there is a doctor at your place, so why did you rush here without a midwife accompanying you, and she said 'Auntie, I had been admitted there for a long time. And each time the doctor came, he said let's wait a bit more, and I was experiencing a lot of discomforts, and I insisted that they discharge me, so they finally reluctantly discharged me.' And when she arrived here, true, it was twins. But one was IUD (macerated) already. So she was able to get the first twin, but the second twin was macerated. (Midwife, District Hospital).*

Health professionals noted the need for ongoing professional development. One midwife said:

*"They (staff at the district hospital) need refresher courses... They should allow them to go to workshops so that they will see what is going on.... Me, I always learn from my junior nurses and midwives because I joined it [midwifery] about 10 years ago, and things are changing. Even the instrument[s] we are using [are] changing." (Midwife, Health Center) [42].*

Mirkuzie, Sisay [46] investigating obstetric referral in Addis Ababa, Ethiopia noted that midwives at an urban health centre, which is a BEmOC facility, promptly referred women whenever they identified obstetric complication induced by premature rupture of membranes (PROM):

*"if a mother said that her water is broken, we consider her as PROM and we will immediately refer her to hospital for management"*  
(an informant from HC A)

### *Maternity information systems*

Five studies reported on maternity information systems [1, 37, 38, 42, 47]. Some studies from Ghana reported that some health facilities routinely used logbooks, care plans, referral letters, referral forms or slips correctly [1, 37, 38, 47]. Documentation was reported to be correctly done if all the necessary information about a woman were captured in the facility's records as required by the national referral guidelines [15].

Meanwhile, poor documentation relating to referral was reported by one study from Ghana where six out of the 11 sampled health facilities had referral registers, which were documents for recording referral cases [42]. Some referral cases and indications for referrals were improperly/incompletely documented. This documentation lacked details concerning the treatment offered by the referring facility, the current status of the referred woman and the required treatment at the receiving end [42, 47]. This resulted in instances where the accompanying staff member was unable to respond to specific questions about the care given before referring the woman. In the study by Nwameme, Phillips [47], only one EmOC facility among the three surveyed health facilities had a computerised referral information system.

### *Medicines and equipment*

Of the seventeen included articles, four included information concerning medicines and equipment [1, 36, 39, 45]. Carnahan, Geller [36] reporting from Tanzania revealed that misoprostol was used for treating post-partum haemorrhage for received cases. However, this was not available in certain instances for some of these facilities that received referred cases [36]. These facilities were urban-based CEmOC and BEmOC hospitals, health centres and dispensaries. A decline in correct use of partograph was reported from Ghana among some sending and receiving facilities by Awoonor-Williams, Bailey [1]. The impact of this on referral was undisclosed by the study. An audit of periphery health facilities that provide normal birth service in Angola revealed poor quality of partographs [39]. However, the reasons contributing to the poor quality as well as how these affected referral rates were not disclosed. From Tanzania, Shimoda, Leshabari [45] reported that catheters were correctly used to enhance referral decision making by midwives in monitoring intrapartum processes:

*"When she put in the catheter, we saw some blood starting to pass. That is the sign of obstructed labour. That's why I decided to refer immediately."* (F) [45].

### **Experience of referral service**

Two of the included articles reported on two aspects of the experience of referral service [44, 47]. These aspects are human resource for health and satisfaction with facility, commodities and cost. None of the articles included in this review provided insights into cognition and emotional support aspects of referral that formed part of the conceptual framework.

### *Human resource for health*

In a study from Tanzania, some women in a primary health facility indicated that doctors were not readily available to check their progress and then refer them to the facility where EmOC can be provided if necessary [44]. One woman narrated her story:

*"When we got to the dispensary nurses told me to wait. At 8 pm labour pains became intense, I started pushing but the baby could not come out, and the doctor was not around. Next day I continued pushing the whole day again until at around 8 pm when the doctor came..."* (Divorced, aged 33, MboriDodoma), [44].

The poor attitude of nurses was reported by some women. In Accra Ghana, just over 10 percent (N= 390) of women at three health facilities (two health centres and one polyclinic) indicated that poor attitude of nurses was a source constraint to referral [47]. However, the specific attitudes were not disclosed by the study.

### *Satisfaction with facility, commodities and cost*

Only one study reported on the satisfaction women had for the services they received or should have received [47]. Sixteen of 390 women surveyed at three urban facilities that provide BEmOC and normal birth services were dissatisfied with the performance of the health facilities. Another 180 of 390 complained about the cost whilst three reported previous bad experiences as sources of dissatisfaction and constraint to referrals. Nwameme, Phillips [47] did not provide details regarding the specific aspects of the facility that affected their satisfaction.

### **Socio-cultural factors affecting women's adherence to referral**

While the framework did not include socio-cultural factors, these were identified as having an effect on a woman's referral to another facility for care. In the study by Afari, Hirschhorn [42], health care providers in Ghana reported that socio-cultural beliefs relating to fear of blood transfusion and fear of death at higher level facilities affected women's desire to travel to the next level facility. Nuamah, Agyei-Baffour [33] report that 57% (N=720) of the women they surveyed at a CEmOC health facility in Ghana had to speak to their husbands before they were able to follow the advice of health professionals [33]. According to Mselle and Kohi [44], some women in rural Tanzania who were suffering from obstetric fistula indicated that the decision to travel to the next facility was made by their uncles, grandmothers, husbands and mothers-in-law.

## **Discussion**

This study synthesized evidence on maternal and newborn referral practices and the quality of the referral service in sub-Saharan African low and low-middle income countries. We found that the presence of referral guidelines does not imply their full application in maternal and newborn referral service provision. This is because application of the available guidelines is hindered by heavy workloads, the low competence of healthcare providers, and non-availability of ambulances [13, 42, 43]. This requires greater policy attention and reaffirms the inadequacy of competent staff and lack of essential medicines for managing obstetric conditions [50-53]. Strategies such as task sharing, involving the upskilling of lower cadres of staff to conduct assessments to refer promptly or immediately receive women for treatment may be useful [54].

Few quality referrals were reported among lower-level healthcare midwives, nurses and TBAs. Training and supervision were however deemed to be associated with quality referrals [35]. For TBAs, our finding reinforces the position of Sibley, Sipe [55] about the need to train TBAs to refer women especially in the area of intrapartum and postnatal care. Strong teamwork and collaboration between TBAs, lower and higher level healthcare providers could as well result in better outcomes [56]. Our finding corroborates the position of Murray, Davies [57] about the need to equip district level managers to monitor the effectiveness of maternal and newborn referrals. Consistent professional development is needed for all health workers to identify and manage complications and refer in a timely manner at all stages of labour [58].

We found that some women could not be referred on time due to delays in referral decision making by healthcare providers. Knowledge of such potential delays meant that some women bypassed lower level facilities as noted in other studies [59, 60]. Other studies across SSA have similarly noted that in situations where women are referred, systemic factors such as delays in triage initiation and delay in the decision to refer compromise the quality of referrals [9, 61]. Regular monitoring and evaluation of referral processes especially at the district level may be essential in improving referral processes. Such activities can focus on specific indicators such as triage duration, referral decision-making competencies, referral outcomes and availability of means of transport for all obstetric emergencies [57].

Some included studies report on lack of detailed referral documentation or system used to relay critical information about the women's condition to the next service. One study in our review identified poor referral record keeping [42]. This is consistent with other studies [70] resulting from the limited knowledge of healthcare providers or financial constraints [71, 72]. Mechanisms that provide reminders to encourage healthcare providers to have detailed documentation, in addition to user-friendly forms and provider training on the relevance of documentation could improve the current situation.

A lack of reliable transport was found to compromise referral services in our review. The instrumental role of free or low cost, safe and reliable transport systems, preferably with ambulances, in improving maternal and newborn health has been widely acknowledged [73-76]. Motorcycle ambulances could be used as they are relatively cheaper options [77]. Our findings corroborate the position of Ngoma, Asimwe [78] on the need to strengthen transportation for maternal and newborn referral services that is

free of charge to women and their families. An efficient, low cost transportation system can provide women with a positive maternal referral experience thereby ensuring a women reaches the next facility [79]. This is because the element of “cost” originating from referral transport and other components of maternal and newborn referral service sometimes dissuade women from adhering to referral advice [80]. This requires that future maternal health policies should target approaches that will guarantee free or less expensive timely referral to appropriate health facilities. Such policies can take the form of pro-poor health insurance schemes, user-fee exemptions and maternal service vouchers [81, 82].

We identified that limited decision-making capacity of women, fear of blood transfusion and fear of death at higher level health facilities interfere with the referral. Similar reports have been noted by studies in SSA where men, in-laws and elder decide whether a women should travel [83-85]. In rural Uganda, Kyomuhendo [86] noted that women who could endure obstetric pain were considered brave since pregnancy was perceived as a test of endurance. These women considered referral facilities as the last resort due to a preference for traditional birthing practices at home [86]. Active community engagement is essential in overcoming these socio-cultural barriers [87]. Evidence indicates that involving men or women’s partners is beneficial [88, 89] because men can escort women or their wives if they best understand why the women are referred [90].

We found that cost borne by women and their families, poor performance of health facilities and bad experience in the past were sources of dissatisfaction for referred women. Poor performance is likely to be a source of dissatisfaction that may often be the case where there is a shortage of skilled health professionals who can identify adverse maternal and newborn conditions and provide the requisite obstetric and newborn care [50-52]. A lack of medical supplies and essential utilities such as electricity and clean water could also result in poor care experiences as reported in South Sudan [91]. Training adequate numbers of obstetric healthcare providers and ensuring an equitable distribution of these in areas of need can mitigate some of the challenges confronting quality maternal and newborn referrals [92, 93].

None of the studies in our review investigated the experience of women about their experiences on human-centered and dignified care (i.e. cognition; respect, dignity and equity; and emotional support). One divorced woman was delayed until the next day and this could be as a result of her marital status. Women in unions are accorded high recognition in a number of African countries [94]. Women who feel that they were respected, treated with equity and offered the required emotional support tend to have better post-partum psychological outcomes [95]. The WHO notes that about 10% of pregnant women and 13% of women who have just given birth encounter mental health issues globally [96]. These are even higher (15.6% during pregnancy and 19.8% after birth) for developing countries such as low and lower-middle income countries in sub-Saharan Africa. These prompt the need for maternal and newborn healthcare providers to prioritise the emotional wellbeing of women, especially for referral cases.

Quality referral was interpreted differently by authors in the studies included in this review. Some studies focused on the ability of healthcare providers to identify and initiate referral, having means of transport and detailed documentation of referral cases. These fit well within our conceptual framework as indispensable elements in achieving high-quality maternal and newborn referral that can result in positive maternal and newborn experience [24]. These findings imply the absence of a standard definition or conceptualisation of quality referral, yet these key elements must characterise a maternal and newborn referral system that seeks to achieve desirable outcomes and a positive maternal experience. Monitoring and evaluation aimed at determining whether referrals reflect the identified features reported by the included articles and those outlined by WHO are needed to enhance referral [11, 74].

### **Strengths and limitations**

The study followed a systematic search of articles and the PRISMA Statements for conducting systematic reviews. The study was underpinned by a framework that provides a balance for the phenomenon studied by embracing quality of maternal and newborn referrals from the perspective of both healthcare providers and women. It is worthy of note that all the included articles were descriptive studies. The study was limited to articles that were published in English Language from low and lower-middle income countries in SSA.

## **Conclusions**

Our study has indicated that referral guidelines are not always properly implemented due to human resource constraints, referral costs borne by women and their families, poor coordination between levels of care and limited availability of equipment and medicines and, transport issues. Governments, planning agencies and healthcare administrators need to focus on more operationally-oriented guidelines to enable health facilities to function optimally in relation to maternal and newborn referral. The study suggests the need for well-coordinated and strengthened teamwork and collaboration between PHC, BEmOC and CEmOC healthcare providers. Community education and interventions can encourage men to be active in the maternity care of their partners by highlighting the life-saving and prevention of poor outcome potential of referrals. Low cost transport is needed to mitigate transportation barriers to referral. To ensure quality maternal and newborn referral in entirety, mechanisms should be instituted for health managers at the district level to monitor and evaluate referral documentation, quality and efficiency of maternal and newborn referrals on regular basis.

## Abbreviations

BEmONC: Basic Emergency Obstetric and Newborn Care; CEmOC: Comprehensive emergency and obstetric care; EmOC: Emergency and Obstetric Care; EmONC: Emergency obstetric and newborn care; FBO: Faith-Based Organisation; GIS: Geographic Information Systems; NGOs: Non-governmental Organisations; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SSA-LLMICs: Sub-Saharan African Low and Lower Middle Income Countries; TBA: Traditional Birth Attendant; WHO: World Health Organisation

## Declarations

### Authors' Contributions

EKA conceived the study, conducted the search and extracted the data. EKA and CN conducted the quality assessment. EKA, CN, AD and NTT compiled, designed the study, interpreted the data and revised the manuscript. All authors read and approved the final version.

### Funding

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### Availability of data and materials

All analysed data are included in this article.

### Ethics approval and consent to participate

Not applicable

### Consent for publication

Not applicable

### Competing interests

The authors declare that they have no competing interests.

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## Tables

**Table 1. Summary of Included Articles**

Reference	Country/Setting	Aim	Methods	Sample	Findings
Abodunrin et al, 2010	Nigeria (urban and rural communities in Ilorin, the capital of Kwara State)	To assess factors that determine the referral practices of Traditional Birth Attendants (TBAs).	Descriptive quantitative survey: pre-tested semi-structured questionnaire	162 Registered TBAs (mean age= 46 years, 89.5% females, 71.6% married, 92% Islam, 64.2% had at least primary school education, 85.8% were part-time TBAs)	<p>§ Identified timely and appropriate referrals among TBAs with more than one re-training (69.2%) and TBAs who have ever been visited by a supervisor (45%). The authors explained timely and appropriate referral as referring cases very high-risk cases such cases included previous stillbirths, bleeding in previous or current pregnancies, multiple pregnancies, abnormal lie and not interfering with them. It also comprised immediate referral of women who had complications (such as bleeding during labour, prolonged labour, tiredness or loss of strength, seizures and retained placenta) during labour management.</p> <p>§ Inappropriate referral comprised three conditions; delayed referral irrespective of the reason, wrong referral and non-referral. Delayed referral was defined as "not referring immediately any identified very high-risk pregnancies and complicated labour."</p> <p>§ Wrong referrals were the ones made to any other place instead of a modern health facility.</p> <p>§ A significant relationship was found between age, marital status, educational status, the initial source of skill acquisition, re-training, supervision and prompt/appropriate referral of high-risk pregnancies.</p>

					<p>§ Young and unmarried TBAs with higher education had a higher tendency of appropriate and timely referral.</p> <p>§ Most TBAs who started through inheritance usually refer late or do not refer.</p>
Afari et al, 2014	Ghana (4 health posts, 6 health centres and 1 district hospital in the Assin North Municipality)	To describe healthcare workers (HCW) identified systemic challenges and the significance of local engagement in developing strategies to enhance emergency obstetric care referral related processes.	Qualitative study: semi-structured interviews	18 HCWs (1 doctor, 2 emergency room nurses, 3 medical assistants, 4 community health officers, 8 midwives)	<p>§ Gaps in existing referral protocols-signal function recognition for referral, stabilising patients, initiating a referral, transportation arrangement for referral:</p> <p><i>“Sometimes they hire commercial vehicles and sometimes too they use the motorbike. If there is no commercial vehicle at the station, they will beg someone to use their motorbike to convey them to the nearest health center or hospital, and then maybe somebody’s private car. The person might sacrifice.”</i> CHO, Health Post</p> <p>§ Few facilities adhere to national referral protocols-poor referral documentation, lack of communication between sending and receiving facilities yet they existed. Some of these manifest in the following expressions:</p> <p><i>“Apart from that [one] guy (HCW) who calls, the others don’t call so you’ll be here and such a case comes in. And [...] with no...nobody accompanying... it’s really a challenge. Because if you know [...] somebody is coming with eclampsia... you know you’re</i></p>

					<p><i>supposed to prepare first so that you receive [appropriately]."</i></p> <p>Emergency Nurse, District Hospital</p> <p><i>"Somebody who is fitting (or convulsing), a pregnant woman who is fitting... somebody (HCW) needs to accompany. But this is someone who is coming with relatives. They don't know they have to turn the head to the side, [or] the person can aspirate saliva and any other thing[s]."</i> Nurse, District Hospital</p> <p>§ HCWs recommendations: standardising implementation of the referral protocol, enhancing the transportation system, ensuring dependable data reporting and management systems, actively engagement of community and offering continuous training for health staff.</p>
Akaba & Ekele, 2018	Nigeria (from either a primary, secondary, tertiary or private health facility to University of Abuja Teaching Hospital, Gwagwalada)	To determine maternal and fetal outcomes of emergency obstetric referrals and reasons for these referrals.	Prospective longitudinal study- November 2015 to March 2016, data retrieved from case-notes, cross-checked with referral documentation when available.	All women requiring emergency obstetric and referred from primary, secondary, tertiary or private health facility to University of Abuja Teaching Hospital, <20-44 years.	<p>§ Nine cases (7.3%) were transported by ambulance.</p> <p>§ There was 8.9% emergency referral fatality rate (i.e. 11 maternal deaths).</p> <p>§ 63.6% maternal deaths occurred among women referred from secondary health facilities.</p> <p>§ Poor emergency obstetric referrals and fetal outcomes were reported: 14 (11.5%) fresh stillbirths and six (4.9%) macerated stillbirths) due to late presentation.</p>
Awoonor-	Ghana (Upper	Obstetric and	Quantitative,	223 referred women	§ Observed enhanced referral

Williams et al, 2015	East Region)	newborn referral audit to strengthen the referral system for pregnant women and newborns in northern Ghana.	two-cycle prospective referral audit in March-May 2011; September-November, 2011; questionnaire, 32 facilities in all-16 facilities, 15 home facilities (comprising 12 health centres and 3 district hospitals) and a Regional Hospital.	and their newborns (223 in each of the two cycles)	facilitative mechanisms-increased use of ambulances/vehicles for referrals (48% to 63%); higher usage of referral slips (66% to 77%); alerting receiving facilities through phone calls (38% to 65%); increment in feedback from receiving facilities (58% to 70%); all 6 women referred twice in the 2 <sup>nd</sup> cycle were accompanied by a health staff.
Carnahan et al, 2016	Tanzania (13 government facilities providing maternal health services, Ilala Municipality)	To investigate healthcare providers regarding the prevention and management of postpartum haemorrhage (PPH).	Quantitative cross-sectional survey, questionnaire	115 healthcare providers (102(88.7%) nurses with midwifery training, 9(7.8%) nurses without midwifery training, 4(3.5%) doctors/medical/clinical officers) from 13 facilities (10 dispensaries (60.9% respondents), 2 hospitals (18.3% respondents), 1 health centers (20.9% respondents). 104 (90.4%) females, 71(62.8%) with more	<p>§ All 13 facilities had referred 42.6% of maternal cases within the past 3 months.</p> <p>§ Forty-nine (42.6%) providers had referred at least one woman in the 3 months preceding the survey.</p> <p>§ 67.8% of all 13 health facilities have consultation and referral communication systems in place.</p> <p>§ 65.2% had established maternal referral transport system.</p>

				than 6-year experience.	
Elmusharaf et al, 2017	South Sudan (Renk County, Upper Nile State)	To ascertain patterns and contributory factors of pregnant women's pathways from the onset of labour or complications until arriving at the suitable health facility.	Qualitative, Critical Incident Technique (CIT), Stakeholder Interviews.	28 key informants (2 from local government, 4 from county health department, 14 healthcare providers, 2 NGO employees, 3 Faith-Based Organisation (FBO) employees, 3 community religious leaders).	<p>§ Identified four referral pathways-late referral, zigzagging referral, multiple referrals and bypassing non-functioning facilities.</p> <p>§ Women who directly went to appropriate health facilities and bypassed non-functioning facilities survived.</p> <p>§ Competencies of healthcare providers and functionality of the initial point of service determined the pathway to further healthcare.</p> <p>§ Trained midwives were found to be competent but TBAs were not.</p>
Goodman et al, 2017	Ghana (Ridge Regional Hospital (RRH), Accra)	To describe obstetric referrals received at Ridge Regional Hospital (RRH) and explore the timeliness with which women enter CEmOC.	10-week prospective cohort study gathered time-sequence information at woman arrival and from their records and logbooks in 10-week period (September 9-November 11, 2012).	1,082 women with pregnancy complications, 15-46 years, 0-8 parity range, 24-49 weeks gestation age.	<p>§ Long waiting time upon arriving at receiving facility-40 minutes on average.</p> <p>§ The most distant referral facilities were 50 km from RRH.</p> <p>§ Gaps were identified in how maternal vital signs and labour assessment were recorded-that is 25 of 90 referrals were potentially inappropriate because the fundal height was less than 40 cm, which does not permit referral decision.</p>
Kyei-Onanjiri et al, 2018	Ghana (120 health facilities across Upper East region)	To investigate the availability of emergency obstetric care interventions in Upper East region.	Quantitative cross-sectional survey, questionnaire.	120 health facilities (9 public and private hospitals, 17 clinics, 41 health centres, 52 CHPS centres, 1 maternity home).	<p>§ 94% health facilities were having standardised or printed referral forms for obstetric referrals.</p> <p>§ 83% had a standard obstetric referral procedure.</p> <p>§ 64% had shortwave radio/telephone for referral communication.</p>

					<p>§ 56% of facilities without shortwave radio/telephone could not access one within minutes in instances where it is needed.</p> <p>§ Most of the facilities indicated that they always had a trained health provider.</p> <p>§ 73% had a midwife or doctor either on call or present at all times.</p>
Mirkuzie et al, 2016	Ethiopia (10 public health centres with similar staff profile and providing EmONC, Addis Ababa)	To assess the proportion of obstetric referrals resulting from premature rupture of membranes and investigate its correctness and management in Healthcare centres.	Sequential explanatory mixed methods, routine retrospective data from birth and intrapartum referral logbooks and interviews, focused interview guide.	2,820 women with obstetric complications; 10 head midwives	<p>§ All healthcare centres with high referral rates had excess skilled providers per their caseloads.</p> <p>§ 77.8% of the referred women who had spontaneous labour and birth could have been misclassified as not having labour when referred.</p> <p>§ Some health centres observed women for about 8 hours before referral initiation:</p> <p><i>“... when we get mothers saying that their water has broken, after we evaluate them, they will be admitted to our health center and observed for about eight hours. If there is no spontaneous labour in eight hours we refer them to hospital after giving them a loading dose of Ampicillin... in the referral slip we write how long the mothers had been observed in our health center.”</i> (An informant from HC I).</p>
Mselle & Kohi, 2016	Tanzania (Comprehensive Community	To use women’s narratives to	Qualitative, narrative research, semi-	16 women with obstetric fistula, aged between 19 and 43	§ Delay in making referral decision was reported:

	Based Rehabilitation, a private, non-governmental organisation in Dar es Salaam)	demonstrate the challenges leading to failure in accessing adequate obstetric care in a timely manner	structured interview guide	years, 82% rural dwellers, all unemployed, 88% had no or primary education	<p>“... it took 4 days at the village health facility, I could not give birth and then I was referred to the big hospital” (Divorced, aged 29, Kibakwe, Dodoma).</p> <p>“...In the health facility, I spend the night until morning ... I had pains, the day passed, I slept again until morning again, and it was when a decision was made to transfer me to another hospital. They said it was because I had urine retention. On the third day is when I was transported to a big hospital” (Divorced, aged 20, Mlandizi-Pwani).</p>
Nuamah et al, 2016	Ghana (Antenatal clinics, Amansie West District in the Ashanti region)	To evaluate the role of socio-economic factors, perception and transport availability in fulfilling obstetric referrals	Quantitative cross-sectional study, questionnaire	720 confirmed pregnant women from 5 sub-districts (Manso Nkwanta-120, Edubia-141, Agroyesum-114, Antoakrom-140, Esuowin-205), less than 20 to over 40 year range, 65.5% cohabitating, 28.8% married, 49.6% JHS/Middle School, 17% No formal education	<p>§ The referral was honoured by about 21.7% of women.</p> <p>§ More than 90% reported that they meet the staff at the receiving facility always.</p> <p>§ 76.6 % disclosed that health staff at the receiving facility solved their problems.</p> <p>§ Most women were referred once and were not referred further.</p> <p>§ Commercial cars (88.2%) are often used for referral than ambulances (6.6%).</p>
Nwameme et al, 2014	Ghana (ante-natal care (ANC) clinics (Abokobi Health Centre; Madina Polyclinic, Kelele and	To examines the situation faced by women when they need emergency obstetric care	Mixed Method, Questionnaire, In-depth Interview guide, Referral and facility	390 women attending ANC antenatal care clinic attendees and in-depth interviews with principal healthcare personnel, 17-46 aged women, 92% married,	§ Out of 17 women referred in their current pregnancies, none of them was sent by Ambulance, ten had public transport whilst seven made their own transportation arrangement.

	Pentecost Medical Centre, Madina) in three healthcare facilities of Ga East District, Greater Accra Region)		review checklist	44.6% Unorthodox Christians, 35.6% Orthodox Christians, 52.1% Junior High School, 12.8% no education, 76.2% traders, 43.6% parity 1, 29.7% parity 2	<p>§ Of the 17, fourteen (14) got to the referral centre within 24 hours, two (2) within 48 hours and one (1) woman got there after 10 days.</p> <p>§ 15 (88.2%) were issued referral letters in their current pregnancies, but only 1 (5.9%) was accompanied by staff.</p> <p>§ Only one hospital (Pentecost Hospital) had information computerized for easy access.</p> <p>§ The referring health facilities hardly receive feedback from the referral centre on the women's status:  <i>"We don't receive any feedback from the hospitals. At least it would help us understand what we could have done better."</i> (In-depth Interview, Medical Officer)</p> <p>§ During obstetric emergencies, they contact the referral centres by mobile phone to find out if beds are available:  <i>"There are hindrances between the two hospitals, no beds, no doctors...all these contribute to the delays."</i> (In-depth Interview, Nursing Administrator).</p>
Okafor et al, 2015	Nigeria (Semino Hospital and Maternity (SHM), Enugu State)	To audit childbirth emergency referrals by trained TBAs	Quantitative, retrospective study, case records (folders) retrieved and relevant data extracted with case record	205 women with childbirth emergencies, <20 to 50 years, 41.5% rural dwellers, 58.5% urban dwellers, 90.2% married, 58.5% unemployed, 56.1% nullipara (i.e. never given birth)	<p>§ 155 (75.6%) of the women were delayed for more than 12 hours before referral.</p> <p>§ 75.6% (155/205) arrived walking unsupported prior to admission whilst 24.4% (50/205) could not walk at admission.</p>

			forms (data entry pro forma)		
Shimoda et al, 2015	Tanzania (urban, one regional referral hospital and one health center in Dar es Salaam city)	To describe how midwives monitor and manage childbirth process in order to achieve early consulting and timely referral to obstetricians	Qualitative, semi-structured interviews	11 midwives, 12.5 average year experience, 6 at the regional referral hospital, 5 at the health centre during the day, 4 with certificate, 4 with diploma, 2 with bachelor's degree, 1 with master's degree, 30-80 daily average births for their wards.	<p>§ Care of Midwives concerning intrapartum management and monitoring/examination to arrive at referral decision consisted of 3 phases: 1) initial encountering, 2) monitoring, and 3) acting that finally resulted in referral.</p> <p>§ Prompt referral upon identifying signal function beyond the facility's capacity:  <i>"When she put in the catheter, we saw some blood starting to pass. That is the sign of obstructed labor. That's why I decided to refer immediately."</i> (F)</p> <p>§ In instances where mother and fetus conditions are worsening, midwives decide earlier without taking time to confirm the labor.</p>
Strand et al, 2009	Angola (3 peripheral birth units-Cazenga, Palanca and Sambizanga)	To assess the efficacy of the newly established network of peripheral birth units and their linkage to the hospitals.	Two-phase quantitative survey, review of maternal records	249 referred women (157 for first and 92 for the second phase), 24.1 mean age in both phases, 36% less than 20 years, 43% primiparous, 32% grand multiparous ( $\geq 4$ previous births) in the first phases, in second phase 29% less than 20 years, 40% primiparous, 22% grand multiparous,	<p>§ 27/157 deaths occurred among the traced referrals in the first phase, i.e. 17.8% case fatality rate but no maternal death in the second phase.</p> <p>§ There was a reduction in the proportion of referred women who were left without medical evaluation/treatment observed from the women's records (45% in the first period to 27% in the second (<math>p=0.007</math>)).</p>
Taylor-Smith	Burundi (rural)	To describe	Cross-sectional	1,478 ambulance call-	§ The median referral time (time

et al, 2013	district, Kabezi)	Medecins sans Frontieres (MSF)'s communication and ambulance service, examine the relationship between referral times and maternal and early neonatal deaths and explore the effect of referral service on coverage of complicated obstetric cases and caesarean sections.	study, retrospective analysis	outs/referrals.	<p>between call-out to the ambulance returning with the patient at CURGO) was 78 min.</p> <p>§ One maternal death occurred among referred women but it was not possible to evaluate the linkage between death and referral time.</p> <p>§ 3-hour referral duration or higher were associated with increased risk of early neonatal mortality-15% as compared with 9% when referral times were less than 3 hours.</p>
Windsma et al, 2017	Ethiopia (20 health centres in the Eastern Gurage Zone)	To assess the birth of basic emergency obstetric and newborn care (BEmONC), knowledge of high-risk pregnancies and referral capacity at health centres	Cross-sectional survey	37 healthcare providers (18 heads of health centres, 14 midwives, 3 nurses, 1 health officer, 1 other), 45 months average of professional experience among heads of health centres with 27.5 median age, median age of 24 years for other respondents with 24 months average professional experience.	<ul style="list-style-type: none"> <li>· Most staff used their own mobile phones for referral correspondence- only 5 facilities (26.3%) had a working landline telephone and 1 (5.3%) facility had a mobile phone.</li> <li>· There were 5 ambulances for the Eastern Gurage Zone population: Two were stationed at health centres and three at District Health Offices.</li> <li>· Distance to the referral hospital (Butajira General Hospital) used by all health centres was 16.5 km on average.</li> <li>· There is the need to train staff of the health centres in the</li> </ul>

					identification signal functions and BEmONC.
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Table 2. Summary of findings

	Provision of maternal referral service (Supply)					Experience of maternal referral service (Demand)				
	Referral system	International standards for EmOC	Human resource for health	Maternity information systems	Medicines and equipment	Human resource for health	Cognition	Respect, dignity and equity	Satisfaction with facility, commodities and cost	Emotional support
Abodunrin et al, 2010			✓							
Afari et al, 2014	✓	✓	✓	✓						
Akaba & Ekele, 2018	✓									
Awoonor-Williams et al, 2015	✓	✓	✓	✓	✓					
Carnahan et al, 2016	✓		✓		✓					
Elmusharaf et al, 2017	✓		✓							
Goodman et al, 2017	✓			✓						
Kyei-Onanjiri et al, 2018	✓	✓	✓	✓						
Mirkuzie et al, 2016			✓							
Mselle & Kohi, 2016						✓				
Nuamah et al, 2016	✓		✓							
Nwameme et al, 2014	✓	✓	✓	✓		✓			✓	
Okafor et al, 2015			✓							
Shimoda et al, 2015		✓	✓		✓					
Strand et	✓				✓					

al, 2009										
Taylor-Smith et al, 2013	✓									
Windsma et al, 2017	✓		✓							

**Table 1. Summary of Included Articles**

Reference	Country/Setting	Aim	Methods	Sample	Findings
Abodunrin et al, 2010	Nigeria (urban and rural communities in Ilorin, the capital of Kwara State)	To assess factors that determine the referral practices of Traditional Birth Attendants (TBAs).	Descriptive quantitative survey: pre-tested semi-structured questionnaire	162 Registered TBAs (mean age= 46 years, 89.5% females, 71.6% married, 92% Islam, 64.2% had at least primary school education, 85.8% were part-time TBAs)	<p>§ Identified timely and appropriate referrals among TBAs with more than one re-training (69.2%) and TBAs who have ever been visited by a supervisor (45%). The authors explained timely and appropriate referral as referring cases very high-risk cases such cases included previous stillbirths, bleeding in previous or current pregnancies, multiple pregnancies, abnormal lie and not interfering with them. It also comprised immediate referral of women who had complications (such as bleeding during labour, prolonged labour, tiredness or loss of strength, seizures and retained placenta) during labour management.</p> <p>§ Inappropriate referral comprised three conditions; delayed referral irrespective of the reason, wrong referral and non-referral. Delayed referral was defined as "not referring immediately any identified very high-risk pregnancies and complicated labour."</p> <p>§ Wrong referrals were the ones made to any other place instead of a modern health facility.</p> <p>§ A significant relationship was found between age, marital status, educational status, the initial source of skill acquisition, re-training, supervision and prompt/appropriate referral of high-risk pregnancies.</p>

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					<p><i>supposed to prepare first so that you receive [appropriately]."</i></p> <p>Emergency Nurse, District Hospital</p> <p><i>"Somebody who is fitting (or convulsing), a pregnant woman who is fitting... somebody (HCW) needs to accompany. But this is someone who is coming with relatives. They don't know they have to turn the head to the side, [or] the person can aspirate saliva and any other thing[s]."</i> Nurse, District Hospital</p> <p>§ HCWs recommendations: standardising implementation of the referral protocol, enhancing the transportation system, ensuring dependable data reporting and management systems, actively engagement of community and offering continuous training for health staff.</p>
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	Based Rehabilitation, a private, non-governmental organisation in Dar es Salaam)	demonstrate the challenges leading to failure in accessing adequate obstetric care in a timely manner	structured interview guide	years, 82% rural dwellers, all unemployed, 88% had no or primary education	<p>“... it took 4 days at the village health facility, I could not give birth and then I was referred to the big hospital” (Divorced, aged 29, Kibakwe, Dodoma).</p> <p>“...In the health facility, I spend the night until morning ... I had pains, the day passed, I slept again until morning again, and it was when a decision was made to transfer me to another hospital. They said it was because I had urine retention. On the third day is when I was transported to a big hospital” (Divorced, aged 20, Mlandizi-Pwani).</p>
Nuamah et al, 2016	Ghana (Antenatal clinics, Amansie West District in the Ashanti region)	To evaluate the role of socio-economic factors, perception and transport availability in fulfilling obstetric referrals	Quantitative cross-sectional study, questionnaire	720 confirmed pregnant women from 5 sub-districts (Manso Nkwanta-120, Edubia-141, Agroyesum-114, Antoakrom-140, Esuowin-205), less than 20 to over 40 year range, 65.5% cohabitating, 28.8% married, 49.6% JHS/Middle School, 17% No formal education	<p>§ The referral was honoured by about 21.7% of women.</p> <p>§ More than 90% reported that they meet the staff at the receiving facility always.</p> <p>§ 76.6 % disclosed that health staff at the receiving facility solved their problems.</p> <p>§ Most women were referred once and were not referred further.</p> <p>§ Commercial cars (88.2%) are often used for referral than ambulances (6.6%).</p>
Nwameme et al, 2014	Ghana (ante-natal care (ANC) clinics (Abokobi Health Centre; Madina Polyclinic, Kelele and	To examines the situation faced by women when they need emergency obstetric care	Mixed Method, Questionnaire, In-depth Interview guide, Referral and facility	390 women attending ANC antenatal care clinic attendees and in-depth interviews with principal healthcare personnel, 17-46 aged women, 92% married,	§ Out of 17 women referred in their current pregnancies, none of them was sent by Ambulance, ten had public transport whilst seven made their own transportation arrangement.

	Pentecost Medical Centre, Madina) in three healthcare facilities of Ga East District, Greater Accra Region)		review checklist	44.6% Unorthodox Christians, 35.6% Orthodox Christians, 52.1% Junior High School, 12.8% no education, 76.2% traders, 43.6% parity 1, 29.7% parity 2	<p>§ Of the 17, fourteen (14) got to the referral centre within 24 hours, two (2) within 48 hours and one (1) woman got there after 10 days.</p> <p>§ 15 (88.2%) were issued referral letters in their current pregnancies, but only 1 (5.9%) was accompanied by staff.</p> <p>§ Only one hospital (Pentecost Hospital) had information computerized for easy access.</p> <p>§ The referring health facilities hardly receive feedback from the referral centre on the women's status:  <i>"We don't receive any feedback from the hospitals. At least it would help us understand what we could have done better."</i> (In-depth Interview, Medical Officer)</p> <p>§ During obstetric emergencies, they contact the referral centres by mobile phone to find out if beds are available:  <i>"There are hindrances between the two hospitals, no beds, no doctors...all these contribute to the delays."</i> (In-depth Interview, Nursing Administrator).</p>
Okafor et al, 2015	Nigeria (Semino Hospital and Maternity (SHM), Enugu State)	To audit childbirth emergency referrals by trained TBAs	Quantitative, retrospective study, case records (folders) retrieved and relevant data extracted with case record	205 women with childbirth emergencies, <20 to 50 years, 41.5% rural dwellers, 58.5% urban dwellers, 90.2% married, 58.5% unemployed, 56.1% nullipara (i.e. never given birth)	<p>§ 155 (75.6%) of the women were delayed for more than 12 hours before referral.</p> <p>§ 75.6% (155/205) arrived walking unsupported prior to admission whilst 24.4% (50/205) could not walk at admission.</p>

			forms (data entry pro forma)		
Shimoda et al, 2015	Tanzania (urban, one regional referral hospital and one health center in Dar es Salaam city)	To describe how midwives monitor and manage childbirth process in order to achieve early consulting and timely referral to obstetricians	Qualitative, semi-structured interviews	11 midwives, 12.5 average year experience, 6 at the regional referral hospital, 5 at the health centre during the day, 4 with certificate, 4 with diploma, 2 with bachelor's degree, 1 with master's degree, 30-80 daily average births for their wards.	<p>§ Care of Midwives concerning intrapartum management and monitoring/examination to arrive at referral decision consisted of 3 phases: 1) initial encountering, 2) monitoring, and 3) acting that finally resulted in referral.</p> <p>§ Prompt referral upon identifying signal function beyond the facility's capacity:  <i>"When she put in the catheter, we saw some blood starting to pass. That is the sign of obstructed labor. That's why I decided to refer immediately."</i> (F)</p> <p>§ In instances where mother and fetus conditions are worsening, midwives decide earlier without taking time to confirm the labor.</p>
Strand et al, 2009	Angola (3 peripheral birth units-Cazenga, Palanca and Sambizanga)	To assess the efficacy of the newly established network of peripheral birth units and their linkage to the hospitals.	Two-phase quantitative survey, review of maternal records	249 referred women (157 for first and 92 for the second phase), 24.1 mean age in both phases, 36% less than 20 years, 43% primiparous, 32% grand multiparous ( $\geq 4$ previous births) in the first phases, in second phase 29% less than 20 years, 40% primiparous, 22% grand multiparous,	<p>§ 27/157 deaths occurred among the traced referrals in the first phase, i.e. 17.8% case fatality rate but no maternal death in the second phase.</p> <p>§ There was a reduction in the proportion of referred women who were left without medical evaluation/treatment observed from the women's records (45% in the first period to 27% in the second (<math>p=0.007</math>)).</p>
Taylor-Smith	Burundi (rural)	To describe	Cross-sectional	1,478 ambulance call-	§ The median referral time (time

et al, 2013	district, Kabezi)	Medecins sans Frontieres (MSF)'s communication and ambulance service, examine the relationship between referral times and maternal and early neonatal deaths and explore the effect of referral service on coverage of complicated obstetric cases and caesarean sections.	study, retrospective analysis	outs/referrals.	<p>between call-out to the ambulance returning with the patient at CURGO) was 78 min.</p> <p>§ One maternal death occurred among referred women but it was not possible to evaluate the linkage between death and referral time.</p> <p>§ 3-hour referral duration or higher were associated with increased risk of early neonatal mortality-15% as compared with 9% when referral times were less than 3 hours.</p>
Windsma et al, 2017	Ethiopia (20 health centres in the Eastern Gurage Zone)	To assess the birth of basic emergency obstetric and newborn care (BEmONC), knowledge of high-risk pregnancies and referral capacity at health centres	Cross-sectional survey	37 healthcare providers (18 heads of health centres, 14 midwives, 3 nurses, 1 health officer, 1 other), 45 months average of professional experience among heads of health centres with 27.5 median age, median age of 24 years for other respondents with 24 months average professional experience.	<ul style="list-style-type: none"> <li>· Most staff used their own mobile phones for referral correspondence- only 5 facilities (26.3%) had a working landline telephone and 1 (5.3%) facility had a mobile phone.</li> <li>· There were 5 ambulances for the Eastern Gurage Zone population: Two were stationed at health centres and three at District Health Offices.</li> <li>· Distance to the referral hospital (Butajira General Hospital) used by all health centres was 16.5 km on average.</li> <li>· There is the need to train staff of the health centres in the</li> </ul>

## Figures

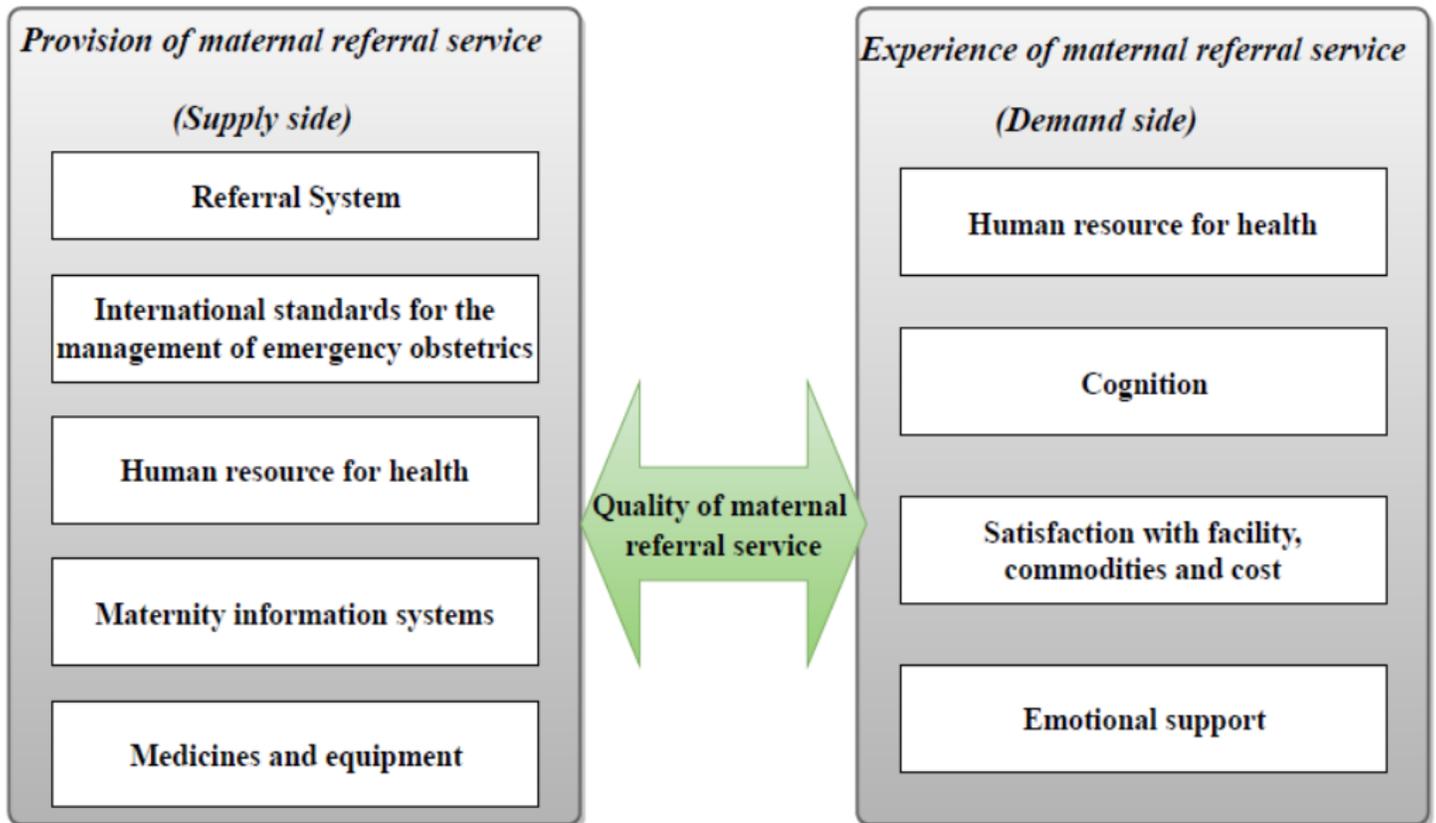


Figure 1

Framework for assessing the quality of maternal referrals Source: Adapted from Hulton, Matthews & Stones, 2000

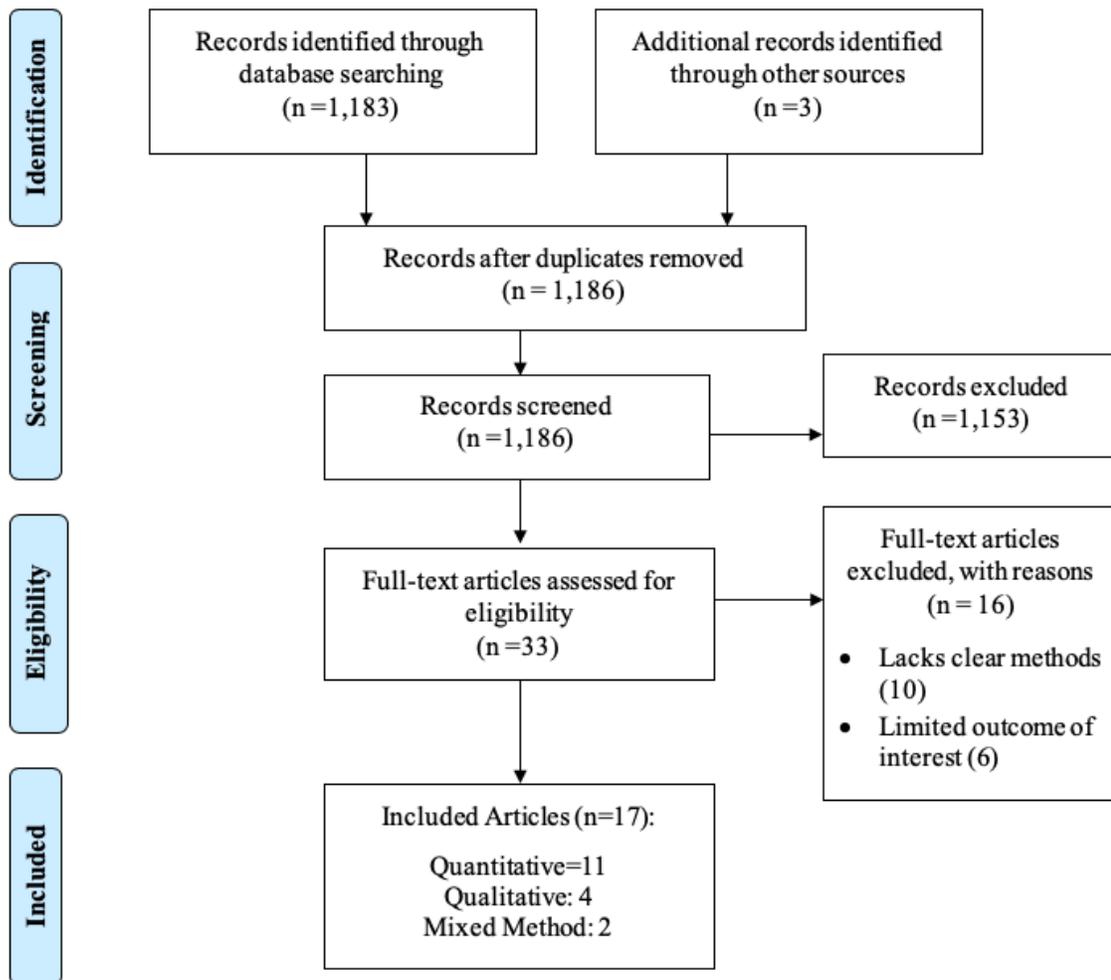


Figure 2

PRISMA 2009 Flow Diagram

## Supplementary Files

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- [supplement1.docx](#)
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