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CLINICAL ARTICLE

The effect of prenatal and intrapartum care on the stillbirth rate among women in rural Ethiopia

Karen Ballard ^{*}, Zelalem Belete, Hirut Kinfu, Mebkyou Tadesse, Mohammed Amin, Habtamu Atnafu

Hamlin Fistula Ethiopia, Addis Ababa Fistula Hospital, Addis Ababa, Ethiopia

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ABSTRACT

Objective: To determine whether community-based prenatal and intrapartum care in Ethiopia results in a lower stillbirth rate. **Methods:** Between May and December 2014, a randomly selected sample of women in northern and eastern Ethiopia who had delivered a neonate in the preceding 12 months completed a face-to-face survey about their experiences of maternal services and the fetal outcome for each delivery. The stillbirth rates among women delivering at home and at health facilities were compared. **Results:** Overall, 4442 women completed surveys. Stillbirth was reported by 42 (1.7%) of the 2437 women who had received prenatal care and 53 (2.8%) of the 1921 women who did not receive prenatal care ($P = 0.01$). The stillbirth rate was similar among women who delivered in a health center (27/1417 [1.9%]), in a hospital (6/126 [4.8%]), and at home (62/2725 [2.3%]; $P = 0.13$). However, women experiencing an intrapartum emergency were twice as likely to deliver in a health facility (odds ratio 2.6, 95% confidence interval 2.2–3.0). Satisfaction with health-center care was moderately good (median score 77.5/100). **Conclusion:** The stillbirth rate was reduced among women receiving prenatal care, although delivering in a health facility did not reduce the risk of stillbirth. Improving the quality of health-center care could lead to their planned use for childbirth, which might reduce stillbirth rates.

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1. Introduction

For decades, Ethiopian women have been delivering their neonates at home, which is perhaps unsurprising because health centers—originally introduced in 1952 as the backbone of the Ethiopian health service—were slow to appear in the rural areas where the vast majority of people live. In 1974, there were just 93 health centers across the whole country [1], and approximately 20 years later, there were only 451 health centers and 119 hospitals for a population of 77 million [2]. It is only in the past 3–4 years that the number of health facilities has increased, although in 2014, there were still only 3245 health centers and 127 hospitals for a population of almost 86 million [3].

The fairly recent appearance of “widespread” healthcare coverage in Ethiopia makes it easy to understand that health centers have been viewed by women as neither necessary nor customary for childbirth and their subsequent preference for a homebirth [4,5]. Consequently, women often perceive the health facility as a place to seek help only in the event of a complication [6], leading to a persistently low institutional delivery rate of just 16% [5] and a maternal mortality ratio of 671 per 100 000 live births [7]. Likewise, the national

stillbirth and perinatal mortality rates have remained high, at 2.1% and 4.6%, respectively [7].

Encouraging delivery in a health facility is hindered by the suboptimal quality of care that women often receive in facilities [4,8] from poorly skilled staff [9,10]. Indeed, in 2008, only 1.3% of Ethiopian health centers were fully functioning as facilities providing basic emergency obstetric and newborn care (BEmONC) [11]. One study in 2010 [12] revealed that just one-third of hospital-based maternal-care staff had knowledge of the signs of obstructed labor and knew how to treat postpartum hemorrhage.

Recognizing the inadequacies of the services, in 2010, the Ethiopian Government prioritized maternal health care, increasing the provision of rural health centers, midwives, surgically trained health officers, and ambulances [13]. However, little is known about whether women have embraced these improved maternal health services and whether the care they experience leads to improvements in fetal outcomes.

The aim of the present study was to determine women's satisfaction with the community-based maternal services provided in Ethiopia and whether the use of facility-based prenatal and intrapartum care leads to a reduction in stillbirth rates.

2. Materials and methods

A survey-based investigation was undertaken in two regions (Amhara and Oromia) of Ethiopia, a country divided into 11 regions

^{*} Corresponding author at: Hamlin Fistula Ethiopia, Addis Ababa Fistula Hospital, PO Box 3609, Addis Ababa, Ethiopia. Tel.: +44 7715 487233.
E-mail address: k.ballard@surrey.ac.uk (K. Ballard).

and with an estimated population of 91 million [14], and where the vast majority of people are subsistence farmers living in rural areas with limited transport. All prenatal, intrapartum and postnatal care received within government facilities is free, although charges are made for items such as gloves, sutures, and medication. The main source of facility-based maternal care is through the government-run health centers, supported by lower-level care from health posts based within villages and staffed by health extension workers (HEWs).

The present study was part of a larger investigation that used a household survey of women's maternal experiences to determine whether a maternal health package introduced into eight health centers in 2010–2011 improved the quality of prenatal and intrapartum services when compared with 18 health centers without the package. The maternal health packages were provided by Hamlin Fistula Ethiopia (HFE), a non-governmental organization offering free care for women with vesicovaginal and rectovaginal fistulas, and BSc midwifery training for students recruited from rural areas of Ethiopia. The packages were introduced in three zones of Ethiopia—South Gondar, West Gojjam, and Eastern Harraghe—and consisted of two midwives trained at HFE who were provided with continuous mentoring, accommodation near to the center, telephone credit, any necessary equipment or drugs, and access to an ambulance for referral to higher-level care.

The primary outcome measure was stillbirth rate, which we hypothesized would reduce if high-quality prenatal and intrapartum maternal services were available. To calculate the sample size required for the primary household survey, HFE clinicians advised that the maternal package would be a valuable addition to the community-based maternal services if it were capable of bringing about a 50% reduction in the stillbirth rate. According to the Ethiopian Demographic Health Survey (DHS) [7], the stillbirth rate in Amhara and Oromia is 46 per 1000 pregnancies. A design effect of 1.2 was applied to reduce errors due to cluster sampling techniques, meaning that the total sample size required was 4373 women, with a significance level of 5% and 80% power.

To select the sample for the survey, four or five health posts linked with each of the 26 health centers were selected according to their distance from the health center, providing one nearby health post, two a medium distance away, and one far away, leading to a total of 116 health posts. Subsequently, 28 000 households served by the health posts were randomly selected using random number tables from HEW household lists to provide a population of 140 000 women. Given the 3.5% annual pregnancy rate for this population [3], a sample of 4900 women was obtained. Allowing for 10% error in data collection, the required sample size would be achieved. The inclusion criterion was having delivered a neonate after a pregnancy lasting 7 months or more in the previous 12 months. The present study uses data collected from all selected households and does not set out to make comparisons between women served by health centers with and without a maternal health package. Data were obtained between May and December 2014.

Following ethical approval from the Oromia and Amhara regional health bureaus, and with permission from the heads of relevant districts, HEWs were recruited and trained to administer the survey. The HEWs were recruited from the health posts based within the villages selected for sampling. This was essential because the HEWs were knowledgeable about the location of all households within the village and how to access what are often very remote areas. Additionally, they were acquainted with most of the women in their village and were female, so able to ask questions that could be considered intimate and sensitive in nature. During the training session, 120 households were randomly selected from each HEW's list for surveying.

Because the vast majority of women were unable to read or write, the survey was administered verbally and the HEWs transcribed the answers. Before answering, women were read a participant information sheet, and if they agreed to participate, they were required to sign or place a fingerprint on the consent form.

The survey focused on women's use of the maternal services for the delivery in the past 12 months, but also asked about the place of birth

for all of their deliveries and the outcome for each neonate. The adapted Haddad 20-item scale [15], which has been validated in countries with similar health systems to Ethiopia, was used to assess satisfaction with the maternal care in the health centers among women using these services. A score of 0–100 was calculated, with 0 representing the lowest possible satisfaction with care and 100 representing the highest. The survey was translated into the appropriate languages and piloted.

Throughout the data collection period, a team of researchers visited the sites to perform random data accuracy and quality checks. Each HEW was located by phone and a selection of her completed surveys was readministered at the households to check for accuracy of the originally administered survey. At the end of data collection, the HEWs were paid for their completed surveys, with an additional bonus for accurate and complete datasets.

Additionally, records for the 26 health centers serving the surveyed women were assessed by members of the research team to determine the number and skill level of staff, availability of services, number of deliveries and outcomes, and the ability to provide BEmONC.

Data were entered into SPSS version 20 (IBM, Armonk, NY, USA). Data were not normally distributed and were therefore reported as medians with interquartile ranges (IQRs). Group differences were tested using the Pearson χ^2 test and differences in median scores across the four components of satisfaction scale were tested using the Friedman test. $P < 0.05$ was considered statistically significant. Odds ratios (ORs) with 95% confidence intervals (CIs) were used to estimate the chances of using health facilities for intrapartum care.

3. Results

A total of 4442 completed surveys were available for analysis. The median time travelled by foot to reach a health center was 60 min (IQR 40–120). A total of 1670 (37.6%) women delivered over the preceding 12 months in a health facility, with 1417 (31.9%) delivering in a health center, 126 (2.8%) in a hospital, 121 (2.7%) in a health post, and 6 (0.1%) in a private clinic. Overall, 2725 women (61.3%) delivered at home and 45 (1.0%) delivered on the roadside. Place of delivery was not stated by 2 (<0.1%) women. The 37.6% facility delivery rate in the preceding 12 months was greater than the 9.3% (338/3642) facility delivery rate reported for the previous delivery ($P < 0.001$). Indeed, the last neonate delivered was 9 times more likely to be delivered in a health facility compared with the last but one neonate (OR 9.5, 95% CI 7.2–12.5). Data reported across the 26 health centers revealed that 8320 (28.4%) of the estimated 29 300 pregnant women served by the health centers had delivered in one of these health centers in the past 12 months.

Overall, 2437 (54.9%) women received prenatal care from their nearest health center, 1040 (42.7%) of whom also delivered in the health center. Women receiving prenatal care from a health professional were significantly more likely to deliver in a health facility than were those who had not received such care (OR 3.5, 95% CI 3.0–3.9).

A prepartum or intrapartum emergency in the last delivery was reported by 668 (15.0%) women. The main emergency reported was a prolonged labor of more than 24 h (Table 1). More than half the women delivering at hospital, 28.9% delivering in a health post, and 19.5% delivering in a health center had an obstetric emergency. Delivery in a health facility was more common among women who experienced an obstetric emergency than among those who did not (382/668 [57.2%] vs 1261/3774 [33.4%]; $P < 0.001$). The odds of delivering in a health facility if experiencing an obstetric emergency were 2.6 (95% CI 2.2–3.0).

Overall, 33 (0.7%) women reported having a cesarean delivery, all of which were performed in a hospital setting. Of the 8320 deliveries performed in and reported by the 26 health centers, 292 (3.5%) were vacuum assisted.

Overall, 95 (2.1%) women reported that their most recent pregnancy ended in a stillbirth. This rate is considerably lower than the

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