

# TRADITIONAL ETHIOPIAN COFFEE CEREMONY IN A RURAL ETHIOPIAN HOSPITAL TO INCREASE HOSPITAL-BASED DELIVERY RATES: A RANDOMIZED CONTROLLED TRIAL

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## ABSTRACT

**BACKGROUND:** Ethiopia has an estimated maternal mortality ratio of 353 per 100,000 live births. In an effort to improve acceptability of hospital-based deliveries, health facilities have adopted traditional practices in the labor ward. We hypothesized that offering postpartum coffee ceremonies would increase the hospital-based delivery rate.

**TRIAL DESIGN:** Non-blinded randomized controlled trial

**METHODS:** From April to June 2015, pregnant women presenting for their first antenatal care visit were block-randomized per day to receive a postpartum coffee ceremony, compared to not receiving a coffee ceremony postpartum. The primary outcome was presentation for delivery at Gambo General Rural Hospital.

**RESULTS:** 254 Women were randomized to the ceremony group and 185 to the no-ceremony group. There was no significant difference in hospital-based delivery rates between the randomized groups (32.1% versus 31.7%; relative risk 1.01; 95% CI, 0.76 to 1.35). 12.7% of women self-reported that the coffee ceremony served as motivation to deliver in the hospital. Hospital delivery was positively associated with shorter travel time, higher education grade, and previous delivery at a health-facility. It was negatively associated with previous home delivery and a higher number of antenatal care visits.

**CONCLUSIONS & RECOMMENDATIONS:** The likely flawed randomization process undercuts our ability to draw conclusions about the effect of this sociocultural intervention on the observed hospital-based delivery increase. This study exemplifies the difficulty of applying conventional research concepts to sociocultural interventions, especially in a setting of low educational levels, language barriers, and limited research capacity.

**CLINICAL TRIAL REGISTRATION:** ClinicalTrials.gov NCT04232137

**KEY WORDS:** Maternal health, hospital-based delivery, coffee ceremony

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## INTRODUCTION

Maternal mortality remains at an alarmingly high level in Ethiopia, despite many efforts to combat this public health concern. The World Health Organization reports 353 deaths per 100,000 live births<sup>1</sup>. Maternal mortality can be significantly reduced by the presence of a skilled labor attendant in the peripartum period<sup>2</sup>. However, the uptake of antenatal care and delivery services has historically been very low in Ethiopia, with a strong preference for home deliveries<sup>3, 4</sup>. Many barriers to skilled delivery services in Ethiopia have been identified and addressed, including lack of transportation, low level of education, medical knowledge deficits, financial burden, and long distances to a health facility<sup>5-13</sup>. Sociocultural factors also play a major role in persistent sub-optimal health facility utilization. Ethiopian women lack decision-making power with regards to health and financial decisions, which usually lies with the husband or relatives<sup>5, 11, 12, 14-16</sup>. The concept of birth is regarded as a phenomenon not necessitating medical intervention, with the best outcomes at home in the presence of a traditional birth attendant, relatives, and/or a religious leader<sup>5, 6, 10, 13, 15-17</sup>. In the hospital environment, important customs and traditions are not recognized or accepted. Women have expressed the desire to be able to deliver in an upright position, bring their relatives into the delivery room, have their bellies massaged with butter, bring the placenta home for burial, or have female providers<sup>5, 6, 15, 16</sup>. Many of these birth-related preferences are regional in nature, but the most ubiquitous Ethiopian cultural phenomenon is the traditional coffee ceremony.

Ethiopia is considered the birthplace of coffee. Reportedly, coffee has strong female symbolism; it represents the woman, with the split coffee berry a metaphor for childbirth. Coffee ceremonies play a ritual, spiritual, and communal role, and are a vital part of life events including childbirth and burials<sup>18, 19</sup>. In a recent study exploring dissatisfaction with obstetric services, the lack of a postpartum coffee ceremony was ranked highest, superseding a lack

of emergency transport<sup>20</sup>. In a healthcare setting, ceremonies have been used as a tool to engage local community and increase uptake of HIV counseling and cervical cancer screening<sup>21-23</sup>. In an effort to improve acceptability, health facilities have started to organize coffee ceremonies in the labor ward<sup>24</sup>. There is no data available regarding the effects of these efforts on health facility utilization.

At Gambo Hospital, a rural 170-bed hospital in the Oromia region, less than 20% of women attending antenatal care delivered in the hospital over a 2-year period (2012-2014). In this study we aimed to determine if implementation of postpartum coffee ceremonies would increase the hospital-based delivery rate for women attending antenatal care at Gambo Hospital.

## METHOD AND MATERIALS

### Trial design

This study was approved by the Gambo Hospital Ethics Review Committee (GH/LUC/909), conducted in agreement with CONSORT guidelines<sup>25</sup>, and registered retrospectively with ClinicalTrials.gov (NCT04232137, 14 January 2020, <https://clinicaltrials.gov/ct2/show/NCT04232137>). A non-blinded, randomized controlled trial was conducted in which women attending antenatal care for the first time were assigned to receive a postpartum coffee ceremony (intervention group), compared to not receiving one (control group). Women were to receive, or not receive, the supplies for a postpartum coffee ceremony for up to 5 people.

Women were eligible if they were pregnant and presented for their first antenatal care visit at Gambo Hospital. The only exclusion criterion was the presence of a nonviable pregnancy. Verbal consent was obtained by antenatal care staff, as many of the study participants were illiterate. To prevent upsetting social norms, we randomized all women that presented on the same day for their first antenatal care visit to the same group. Randomization was determined by coin toss prior to the start of each clinic day, performed by assigned

medical record personnel, theoretically leading to a 1:1 allocation. An increase in hospital-based deliveries could be explained by either a decrease in home deliveries or a shift from deliveries at surrounding health facilities to the hospital. In an attempt to monitor location of delivery, women therefore received a multi-lingual research card at time of enrollment. They were instructed to hand this to their caregiver at time of delivery, to allow for collection from surrounding health posts and health centers at the conclusion of the trial. A postpartum survey was administered to those women who presented for hospital delivery to assess their motivation for a hospital delivery.

### Outcomes

Socio-demographic data was collected at time of study enrollment. The primary outcome was defined as presentation for delivery at Gambo Hospital. Secondary outcome measurements were presentation for delivery at a surrounding health post or health center and reported motivations for hospital-based delivery. Pre-specified subgroup analyses were performed to assess which patient characteristics were significantly associated with hospital-based delivery.

### Statistical analysis

We used a convenience sample over a 60-day time period. An a priori power analysis was not performed due to a lack of prior research that could serve to inform effect size. Analyses of the primary outcome were performed using chi-square and Fisher's exact tests. Relative risks were estimated using Poisson regression with robust error variance. P-values for associations between participant characteristics and hospital-based delivery were estimated using Student's t-test for continuous variables and Fisher's exact test for categorical variables. P-values were considered significant when  $<0.05$ . Analyses were performed using statistical software STATA (15<sup>th</sup> edition, Stata Corp 2017).

## RESULTS

Over a 60-day period from April to June 2015 (Megabit to Ginbot 2007, Ethiopian calendar), 449 consecutive women were assessed for inclusion in the study. Ten women were excluded based on findings of a non-viable pregnancy on the day of enrollment. 254 women were randomized to receive a postpartum coffee ceremony, and 185 were randomized to receive no coffee ceremony (Fig 1). All data were missing for 35 women (8.0%; 17 women in the coffee and 18 in the no-coffee group), therefore 404 women were included for the final analysis.

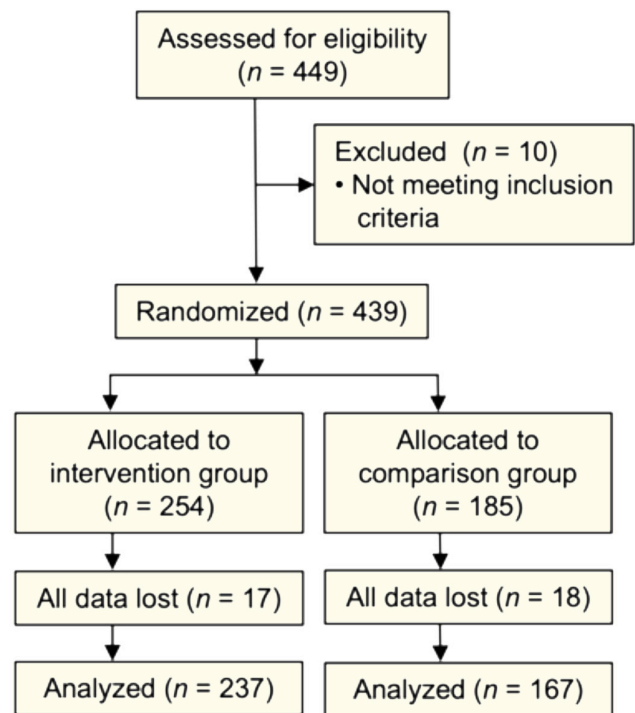


Fig 1. Randomization and Analysis

None of the demographic characteristics differed significantly between the randomization groups (Table 1).

**Table 1. Demographic Characteristics by Randomization Group.**

Characteristics	All women (n = 404)	Coffee (n = 237)	No Coffee (n = 167)	P-value
Age, mean (SD)	25.0 (5.4)	24.7 (5.3)	25.5 (5.5)	0.114
Parity, mean (SD)	2.59 (2.5)	2.55 (2.3)	2.66 (2.7)	0.658
Education grade, mean (SD)	5.1 (3.9)	5.0 (3.9)	5.3 (3.9)	0.412
Ethnicity, n (%)				
Oromo	381 (86.8)	226 (89.0)	155 (83.8)	0.116
Other	53 (12.1)	27 (10.6)	26 (14.1)	
Missing	5 (1.1)	1 (0.4)	4 (2.2)	0.368
Religion, n (%)				
Muslim	335 (76.3)	198 (78.0)	137 (74.1)	
Other	98 (15.6)	54 (21.3)	44 (23.8)	
Missing	6 (1.4)	2 (0.8)	4 (2.2)	
Antenatal care visits, mean (SD)	1.74 (1.0)	1.75 (1.0)	1.73 (1.0)	0.872
Travel time to hospital (minutes), mean (SD)	101.9 (52.6)	100.7 (53.0)	103.5 (52.2)	0.625
Cost of transportation (birr), mean (SD)	6.5 (11.6)	6.2 (10.3)	6.9 (13.3)	0.569
Cost > 10 birr, n (%)	127 (28.9)	71 (28.0)	56 (30.3)	0.597
Travel on foot, n (%)	222 (50.6)	129 (50.8)	93 (50.3)	0.915
Previous home delivery, n (%)	234 (58.2)	140 (59.1)	94 (57.0)	0.674
# home deliveries, mean (SD)	2.1 (2.4)	2.0 (2.3)	2.1 (2.6)	0.782
Previous health facility delivery, n (%)	162 (36.9)	91 (35.8)	71 (38.4)	0.584
# health facility deliveries, mean (SD)	0.50 (0.9)	0.51 (1.0)	0.5 (0.9)	0.885

SD, standard deviation; birr, Ethiopian currency

Of 404 women, 129 delivered at Gambo Hospital, which corresponds to an over-all hospital-delivery rate of 31.9% (95% confidence interval [CI] 27.4 – 36.5%). In the coffee ceremony group 32.1% delivered in the hospital, compared to 31.7% in the non-coffee group, which was non-significant (between-group difference, 0.4 percentage points;

relative risk 1.01; 95% CI, 0.76 to 1.35, P=0.944) (Table 2). There were no significant differences between the coffee ceremony and no-ceremony groups in c-section rate (6.6% versus 9.4%, P=0.551) and complication rates (18.4% versus 18.9%, P=0.949). No harms or unintended effects of the intervention were identified.

**Table 2. Delivery Location by Randomization Group.**

Randomization group	All women (n = 404)	Hospital delivery (n = 129)	Delivery elsewhere (n = 275)	Hospital-based delivery rate (%)	RR (95% CI)	P-value
Coffee ceremony, n (%)	237 (58.7)	76 (58.9)	161 (58.5)	32.1	1.01	P=0.944
No coffee ceremony, n (%)	167 (41.3)	53 (41.1)	114 (41.5)	31.7	(0.76-1.35)	

RR, relative risk; CI, confidence interval

**Table 3** shows analyses of associations between participant characteristics and place of delivery. Hospital delivery was positively associated with shorter travel time to the hospital ( $P=0.015$ ), higher education grade ( $P=0.008$ ), previous deliveries at a health-facility ( $P=0.003$ ), and a higher number of previous facility-based deliveries ( $P=0.009$ ). Hospital

delivery was negatively associated with having had any home deliveries ( $P<0.001$ ), a higher number of previous home deliveries ( $P=0.035$ ), and, notably, a higher number of antenatal care visits ( $P<0.001$ ). There was no significant association between hospital-based deliveries and variables such as age, parity, ethnicity, religion, and cost of transportation.

**Table 3. Participant Characteristics by Delivery Location.**

Randomization group	All women (n = 404)	Hospital delivery (n = 129)	Delivery elsewhere (n = 275)	P-value
Age, mean (SD)	25.0 (5.4)	24.8 (4.7)	25.1 (5.7)	0.634
Parity, mean (SD)	2.6 (2.5)	2.5 (2.5)	2.7 (2.4)	0.42
Education grade, mean (SD)	5.1 (3.9)	5.9 (4.0)	4.8 (3.8)	0.008*
Ethnicity, n (%)				
Oromo	381 (94.3)	119 (92.3)	262 (95.3)	
Other	18 (4.5)	7 (5.4)	11 (4.0)	
Missing	5 (1.2)	3 (2.3)	2 (0.7)	
Religion, n (%)				0.853
Muslim	335 (82.9)	105 (81.4)	230 (83.6)	
Other	63 (15.6)	22 (17.1)	41 (14.9)	
Missing	6 (1.5)	2 (1.6)	4 (1.5)	
Antenatal care visits, mean (SD)	1.7 (1.0)	1.4 (0.8)	1.9 (1.1)	<0.001*
Travel time to hospital (minutes), mean (SD)	101.9 (52.6)	92.5 (48.3)	106.6 (54.2)	0.015*
Cost of transportation (birr), mean (SD)	6.5 (11.6)	5.8 (11.2)	6.9 (11.8)	0.407
Cost > 10 birr, n (%)	92 (22.8)	23 (17.8)	69 (25.1)	0.105
Travel by foot, n (%)	222 (55.0)	75 (58.1)	147 (53.5)	0.378
Previous home delivery, n (%)	234 (58.2)	55 (43.3)	179 (65.1)	<0.001*
# home deliveries, mean (SD)	2.1 (2.4)	1.7 (2.4)	2.2 (2.4)	0.035*
Previous health facility delivery, n (%)	127 (31.4)	52 (40.3)	75 (27.3)	0.009*
# health facility deliveries, mean (SD)	0.5 (0.9)	0.7 (1.2)	0.3 (0.8)	0.003*

SD, standard deviation; birr, Ethiopian currency

\* Significant association

Due to transportation, time, and financial constraints, we were unable to collect the research cards that women received at enrollment. We were thus unable to estimate the delivery rates at surrounding health posts and health centers.

Table 4 shows results from the postpartum survey. Of 129 women that delivered in the hospital, 71 answered questions about their reasons for delivering in the hospital (missing data = 45.0%).

**Table 4. Postpartum survey: factors contributing to hospital delivery.**

All women that responded (n = 71)	n (%) <sup>*</sup>
Feeling of safety	59 (83.1)
Presence of a physician	25 (35.2)
Complication with a previous pregnancy	15 (21.1)
Complication with current pregnancy	12 (16.9)
Presence of coffee ceremony	9 (12.7)
Referral from health post or health center	6 (8.5)
Recommended by family	3 (4.2)

\*Multiple answers were possible

At time of delivery in the hospital, concern arose that a number of enrolled women expressed the expectation that they were to receive a coffee ceremony, despite having been randomized to the no-coffee group. Conversely, some women in the coffee ceremony group did not anticipate receiving postpartum coffee. Table 5 shows a sample of 31 women with no significant difference in coffee anticipation between the coffee and no-coffee groups. More than half the women in the coffee ceremony group did not anticipate receiving coffee. In addition, one of the women that reported coffee as a motivating factor for hospital delivery was randomized to the non-coffee group.

**Table 5. Coffee Anticipation by Randomization Group.**

Anticipated coffee ceremony	All women (n = 31)	Coffee (n = 24)	No Coffee (n = 7)	P-value
No	15 (48.4)	13 (54.2)	2 (28.6)	0.394
Yes	16 (51.6)	11 (45.8)	5 (71.4)	

## DISCUSSION

This non-blinded, randomized controlled trial of offering traditional Ethiopian coffee ceremony after delivery seems at first sight to indicate that this intervention did not influence women's decision-making on delivery location. However, a subsample of women reported that they were unaware of their randomization status. After delivery, we assessed women's self-reported reasons for delivery in the hospital. 12% of responders volunteered the presence of a coffee ceremony as a motivating factor. Only 31 women were specifically asked if they were expecting a coffee ceremony. It is unknown if this subsample was representative of all enrolled women. This undercuts our ability to draw any firm conclusions about the effect of this sociocultural intervention and to be able to formulate recommendations with regards to allocation of resources. This study illustrates the difficulty of designing and executing research in a setting with language barriers, women with low educational levels, and hospital staff without previous research experience. It also illustrates the need for careful ongoing quality control throughout the study. Moreover, this study was designed to assess an important Ethiopian cultural phenomenon as a possible contributor to improvement of maternity care. Sociocultural norms were taken into account, for example by performing group randomization per clinic day, to prevent some women being told that they would receive coffee, while others would not. However, it might still have been incomprehensible that some women would receive a coffee ceremony in celebration of their newborn, and others would not.

Another limitation of our study was the non-blinded nature of the intervention. Also, there were several



contributors to missing data. At Gambo Hospital, health records are paper-based and kept in a designated cardroom. Retrieval of records is contingent upon patients presenting a personal medical record number card. Without this card retrieval is almost impossible due to limited other helpful patient identifiers (for example, patients often are unaware of their date of birth). Even with the medical record number card the researchers were unable to locate 35 charts based on medical record number (8.0%). We were unable to quantify how many women we assume to have delivered elsewhere in fact delivered at Gambo Hospital as documented in a duplicate medical record. This makes it likely that we are underestimating the hospital-delivery rate in the study population. Survey responses and pregnancy complication data also suffered from missing data (45.0% and 30.2%, respectively).

Strengths of our study include the randomized controlled study design, which limited the presence of confounding variables that would have affected other study designs such as a pre-and post-implementation study. Furthermore, the trial was low cost.

Interestingly, the delivery rate of 31.9% (95% CI 27.4 – 36.5%) among our study population was notably higher than historic delivery rates at Gambo Hospital, which was less than 20% in the preceding 2 years. This increase in utilization of health services does fit a wider trend in Ethiopia. The most recent Ethiopian Demographic Health Survey reports a significant increase in births attended in a health facility, rising from 10% in 2006-2011 to 48% in 2014-2019<sup>4</sup>, reflecting a national effort to improve maternal health. We did not perform a formal pre- and post-intervention comparison due to financial and infrastructural barriers which precluded the ability to obtain reliable patient-level data from previous years. Also, several improvements in maternal care would have served as important confounders, such as the recent appointment of a physician dedicated to the Obstetrics & Gynecology department. Notably, 12.7% of women reported that the coffee ceremony played a role in their decision to deliver at the hospital. We can only

speculate that organizing postpartum coffee ceremonies had a positive effect on the perception of hospital-based obstetrical care. Outside of the study setting, we have experienced that the postpartum coffee ceremony can function as a well-attended platform for educational sessions for admitted and antenatal care women. Lastly, study populations are prone to the Hawthorne effect<sup>26</sup>, which could contribute to an improvement of hospital-based delivery rates.

With regard to predictors of hospital-based deliveries, our findings are mostly consistent with previously published Ethiopian data<sup>6-9, 11-13</sup>. Delivery at Gambo Hospital was positively associated with shorter travel time, higher education grade, and previous deliveries at a health-facility. Hospital delivery was negatively associated with any previous home deliveries. Contrary to several Ethiopian reports<sup>11, 13, 27, 28</sup>, we found that a higher number of antenatal care visits was negatively associated with hospital delivery. We speculate that women with a higher number of antenatal care visits felt more confident that their pregnancies were uncomplicated. They therefore preferred either a customary home delivery or a delivery closer to home in a health post or center.

## CONCLUSIONS & RECOMMENDATIONS

The likely flawed randomization process undercuts our ability to draw conclusions about the effect of this sociocultural intervention on the observed hospital-based delivery increase. We encourage future research on the effects of sociocultural interventions on maternal health outcomes. Consideration could be given to another randomized trial, but it might be more appropriate to consider a hospital implementation study with a similar hospital serving as a comparator. The coffee ceremony can also be further examined for its possible function as a platform for health education.

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The authors declare that they have no competing interests.

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