Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Utilization and Determinants of Antenatal Care Skilled Birth Attendance and Institutional Birth Delivery among Women in Rural Galmudug Somalia

Mohamed Ahmed Omar
mohamedjimale@sordi.so
Somali Research and Development Institute
Geeta Nanda
International Rescue Committee
Asia Mohamed Mohamud
Somali Research and Development Institute
Muna Jama
International Rescue Committee
Grace Kimemia
International Rescue Committee
Carolina Cardona
Johns Hopkins Bloomberg School of Public Health
Hawa Abdullahi Mohamed
Somali Research and Development Institute
Maryan Abdulkadir Ahmed
Somali Research and Development Institute
Ahmed Abdi
International Rescue Committee
Hassan Adan Abdi
International Rescue Committee
Abdirisak Dalmar
Somali Research and Development Institute
Naoko Kozuki
International Rescue Committee

Research Article

Keywords: CBMNC, ANC, SBA, Institutional birth delivery, MNH Somalia

Posted Date: September 9th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10780946/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

In rural Somalia, many preventable maternal and newborn deaths occur because of issues such as limited healthcare facilities, cultural norms, and socioeconomic disparities. These challenges hinder the utilization of services such as antenatal care (ANC), skilled birth attendance (SBA), and institutional birth delivery (IBD). This study assesses the utilization of facility-based ANC, SBAs, and institutional birth delivery in seven rural villages in Galmudug State, Somalia, and identifies the factors associated with using these services.

Methods

As part of the EQUAL Research Programme Consortium, this cross-sectional study was conducted in 2023 in seven rural villages in Galmudug State, Somalia. The study surveyed 351 women aged 15–49 years who had self-reported having been born in the past twelve months. Data on socioeconomic and demographic characteristics, ANC, and location and birth attendants at birth were collected. In addition to descriptive analyses, multivariate logistic regression analyses were performed to identify factors associated with at least one or at least four facility-based ANC visits, SBAs, and IBDs.

Results

Approximately 60.9% had been married for less than 18 years. The mean number of total pregnancies was 5.9. Approximately 52.4% of women received at least one facility-based ANC visit, and 11.7% received more than four facility-based ANC visits. The SBA rate was 33.1%, and the IBD rate was 29.1%. Receiving at least one ANC visit, the number of total pregnancies, and awareness of family planning were significantly associated with both SBAs and IBD. Age at first marriage and travel time to health facilities were positively associated with institutional birth delivery. Decision-making on women's health and awareness of family planning were also associated with receiving at least one ANC visit.

Conclusion

Rates of receiving facility-based services for pregnancy and childbirth remain critically low, as a large proportion of women continue to deliver at home. These findings underscore the urgent need for targeted interventions to increase access to and demand for quality facility-based MNH services and, in parallel, to invest in community-based services to fill the healthcare gap in the rural areas of Somalia.

Introduction

Maternal and neonatal mortality remains a significant global concern, with approximately 287,000 women dying during pregnancy and childbirth and 2.3 million newborns dying during the first month of life. (1) In 2023, the global maternal mortality ratio (MMR) was determined to be 197 deaths per 100,000 live births (2), and the neonatal mortality rate averaged 17.2 deaths per 1,000 live births. (3) Humanitarian crises, conflicts, and fragile situations worsen maternal and neonatal mortality. In 2023, 346 deaths per 100,000 live births were reported in low-income countries, whereas 10 per 100,000 live births were reported in high-income countries. In addition, the lifetime risk of death for women is higher in low-income countries, which is 1 in 66 countries versus 1 in 7933 in higher-income countries. (4) Somalia faces significant obstacles in ensuring the health and survival of mothers and newborns. (5–7) The Somalia Health and Demographic Survey (SHDS) highlights the severity of the situation, with an MMR of 692 maternal deaths per 100,000 live births. (5) UNICEF estimated that there are 36 neonatal deaths per 1,000 live births and 28 stillbirths per 1,000 live births in Somalia. (8)

Access to facility-based services is critical to improving maternal and newborn health (MNH) outcomes. (9) In resource-constrained settings such as Somalia, the lack of high-quality healthcare facilities and a shortage of trained health staff drive women to rely on unskilled care during childbirth, including the use of traditional birth attendants (TBA). (7) Per the SHDS, 31% of women received antenatal care (ANC) from skilled providers during their last pregnancy, with only 24% of them meeting the recommended minimum of eight ANC visits. (5, 9, 10) Approximately 32% of deliveries were assisted by skilled birth attendants (SBAs), while the large majority (68%) were either attended by unskilled individuals or went unassisted. (5, 11) Moreover, 79% of deliveries occurred at home, often with TBAs, indicating a significant gap in facility-based deliveries. (5) These statistics on the utilization of facility-based maternal and newborn care services in Somalia highlight a profound challenge to the safety and well-being of both mothers and their newborns.

Since 2011, the International Rescue Committee (IRC) has been advancing health and nutrition programs in Somalia's Galmudug State. Their efforts have integrated reproductive health initiatives into broader health services, supporting increased investment in sexual and reproductive health and rights (SRHR) over the past decade. The IRC has led multiple SRHR projects aimed at providing essential services such as contraception and safe postabortion care. These initiatives have focused particularly on supporting women, adolescent girls, and young people, ensuring that these vulnerable groups receive the care and support they need.

The IRC country program in Somalia planned to implement a new community-based maternal and newborn care (CBMNC) program in seven rural villages in Galmudug State, Somalia, over two years (slated for December 2023–December 2025 at the time of writing). The CBMNC program aims to deliver services to hard-to-reach locations reporting notably low access to facility-based services while also still promoting the utilization of facility-based antenatal, intrapartum, and postpartum services (Annex 1). The program hypothesizes that community-based service delivery can deliver critical life-saving services and commodities directly to areas with limited health access while also increasing SBA and institutional birth delivery rates through health promotion and demand generation. The IRC's CBMNC program serves as a precursor to the federal government's ambitions to scale a community-based Female Health Worker program nationally in the future. (12, 13)

The primary objective of this paper is to assess the utilization of facility-based ANC, SBA, and institutional birth delivery as baseline data before the rollout of the CBMNC program and identify the factors associated with the utilization of these services in the targeted communities. These findings contribute population-level data from the context of critically high health needs to highlight gaps in MNH service utilization and help inform opportunities and challenges for the IRC's CBMNC program.

Methods

Study setting

The study was conducted in seven rural villages in Galmudug State of central Somalia, which is 511 km away from the capital city of Mogadishu. Galmudug, with a population of 1.3 million, remains fragile and faces many challenges, including political instability, insecurity, clan violence, and climate-related shocks (e.g., droughts). Among the state's population, 31% are nomadic, and 10% are rural. (13, 14) The communities in these villages are primarily pastoralist and depend solely on livestock for their livelihood. (15) The delivery of health services is challenging, and health facilities are either nonexistent or not functioning well.

Study design

This cross-sectional survey was conducted between October and November 2023 as part of a larger implementation research study to assess the functionality of a newly implemented CBMNC program in Dhusamareb, rolled out by the IRC. The survey serves as the baseline to capture key maternal and newborn care indicators before the implementation of the CBMNC

program to subsequently determine changes before and after the implementation of the program, which is expected to run for two years. While the baseline survey collected more data, this paper focuses specifically on ANC, SBA, and IBD.

We conducted the study in villages selected as implementation sites for the CBMNC program. (15) Eight villages were selected, considering both programmatic reach and security concerns. These included Gadoon, Balicad, Mareerguur, Ceeldheere, Faragooy, Halanley, Haadfull, and Olol, which are located between 20 and 65 km from the city of Dhusamareb. However, as the survey was being launched, security concerns due to armed conflict between government troops and Alshabab, combined with poor road and communication infrastructure, hindered data collection efforts in Haadfull village, resulting in a total of seven villages. See Table 1 for population estimates and distance from Dhusamareb city center, the capital city of Galmudug State, where the nearest health facility is also located.

Prior to data collection, we conducted sensitization meetings with key stakeholders in selected villages to introduce them to the research and the CBMNC program to ensure their awareness and support. These stakeholders included key government officials such as those from the Ministry of Health (MoH), community leaders, TBAs, members of women's associations, and healthcare providers. However, the public or patients/clients did not participate in different stages of the study.

Study population

The inclusion criteria for the baseline survey were as follows: girls and women aged 15–49 years with a self-reported birth in the past 12 months; residing in one of the study villages; and willing and able to provide informed consent. The pool of eligible study participants was identified via a pregnancy mapping exercise that was conducted by the IRC one month before the baseline survey (description is available in Annex 2). The purpose of the pregnancy mapping exercise was twofold: 1) to identify girls and women who had given birth in the past 12 months as potential participants for the baseline survey (in other words, for research purposes) and 2) to identify girls and women who were pregnant at the time of the mapping exercise to enroll them in the CBMNC program (in other words, for the IRC's service delivery purposes). These data were gathered using the CommCare digital platform for women who met either of the above criteria with consent.

Sample size and sampling frame

The sample size used for the study was 351 participants. Since the CBMNC program is focused on increasing the use of several MNH services and behaviors and because early initiation of breastfeeding was the only newborn health indicator with nationally or regionally representative data available at the time of the study, the sample size was calculated using this indicator. Early initiation of breastfeeding was estimated at 62% coverage in rural Somalia on the basis of the SHDS 2020. (5) The sample size was calculated with the intention of detecting an absolute 10% increase in the early initiation of breastfeeding following the implementation of the CBMNC program while also reporting changes in other essential newborn care behaviors (thermal care and clean umbilical cord care) and the utilization of relevant facility-based services.

A total of 470 eligible girls and women were identified in the pregnancy mapping exercise, and this list comprised the sampling frame for the baseline survey. We divided the eligible number of study participants in the sampling frame across the study villages using a probability proportional to the size of the sampling approach based on the number of eligible women per village. We then used simple random sampling to select the desired number of eligible participants at the village level. No one refused to participate in the survey during data collection. In situations where the potential study participants were not available during the data collection period, we replaced them with new participants, using simple random sampling from the list of remaining eligible women in the sampling frame, until the desired sample size was reached.

Data collection and data quality assurance

The research team conducted five days of training for enumerators and supervisors in Dhusamareb, the capital city of Galmudug State. To ensure that enumerators were prepared to conduct the survey ethically and effectively, they received

training on relevant topics such as an overview of the CBMNC program and interventions, introduction to research, human subjects' research principles and ethics, informed consent processes, the operationalization of survey tools, standards for ensuring data quality, and hands-on activities such as role-playing. During data collection, trained enumerators approached the selected women in their households, explained the purpose of the study, and obtained informed consent for participation.

The data collection tool (Annex 3) was translated from English into Somali and back-translated into English by four bilingual members of the research team (MO, AM, HA, MA) from the Somali Research and Development Institute (SORDI) to validate the translation and check for consistency. The survey was administered in the Somali language. The tool was preprogrammed into ONA, an online platform, and piloted by the research team before data collection. Data were collected using a mobile/tablet data collection application, known as the Open Data Kit (ODK). Tablets were distributed to the enumerators; each had a unique username and password assigned by the research coordinators. Enumerators downloaded the data collection form from the server into their ODK application. At the end of each day of data collection, enumerators sent the completed data collection forms to the server, and MO and AM downloaded the data and conducted quality checks and reviews, with support from GN, MJ, and NK. This process minimized data collection errors and facilitated the data quality assurance process in real time.

Study measures

Respondent characteristics

The variables that were collected included sociodemographic (age, educational level, total number of pregnancies, age at first marriage, and disability status), economic (employment status and wealth quintile), and health care-seeking (time to travel to the health facility and decision-making on women's health). The wealth quintile was calculated on the basis of the Somaliland Equity Tool (16) using predefined variables from the tool (as there were no data available for Somalia in the Equity Tool). For the disability status variable, we used the Washington Group Questions on Disability (17) to capture disability-related data, and for the analysis, the data were categorized as binary: having or not having a disability (if the responses to one of the six questions were "cannot do it at all," "a lot with difficulty," or "some difficulty," versus "no difficulty"). These variables were used as independent variables for regression analyses, as described below.

Facility-based ANC and SBA/institutional birth delivery rate (IBD). Several ANC data points were captured, such as the number of facility-based ANC visits, when the first and last ANC visits were made during pregnancy, and what services were received during ANC. We also collected data on antenatal services or commodities received, regardless of the location of receipt. In addition, data on SBAs at delivery (defined as a qualified health professional (doctor, nurse, or midwife) who assisted with the delivery) (18) and IBDs (defined as delivery at a health facility under the supervision of skilled health personnel) (19) were collected.

Additional data on essential newborn care practices (including early initiation of breastfeeding, clean umbilical cord care, and thermal care) and other types of postpartum care were collected in the survey but will be presented elsewhere.

Data analysis

First, we described the population-based coverage of four key facility-based maternal health service utilization indicators: i) at least one facility-based ANC visit; ii) at least four facility-based ANC visits; iii) skilled birth attendance (SBA); and iv) IBD. Next, we summarized the sociodemographic and economic characteristics of the women included in the analytical sample to describe the composition of the study population. We then tabulated these characteristics by each outcome of interest to assess compositional differences between groups. To examine whether these differences were statistically significant, we conducted tests of independence for all sociodemographic and economic characteristics across outcome groups using one-way analysis of variance (ANOVA) and reported the corresponding p values from the F statistics.

Second, we fitted logistic regression models to examine the sociodemographic and economic factors associated with maternal health service utilization. Covariates included maternal age, age at first marriage, parity, maternal education, household wealth, travel time to the health facility, decision-making regarding medical care, and awareness and previous use

of family planning methods. For the SBA and IBD models, we additionally adjusted for the receipt of at least one facility-based ANC visit to account for the potential influence of antenatal care utilization on delivery-related care-seeking behaviors. Standard errors were clustered at the village level to account for the intravillage correlation resulting from the clustered sampling design. Because the study included only seven villages, cluster-robust standard errors were estimated using a small number of clusters, which can reduce the accuracy of standard error estimates and associated statistical inference. Nevertheless, clustering remains preferable to ignoring the clustered sampling design, as it accounts for within-village correlation in the error terms. We therefore report cluster-robust standard errors. We also estimated an alternative specification using robust standard errors and village fixed effects to account for unobserved village-level heterogeneity. However, model fit statistics based on the Akaike information criterion indicated that the village-clustered standard error specification provided a better fit for the data. All analyses were performed using Stata version 19.

Results

Descriptive analysis:

Sociodemographic and economic characteristics

A total of 351 women were surveyed for this study. Twenty-six women included in the initial sample were replaced. For all 26 cases, the women had relocated to other villages looking for pasture and water for their livestock.

Table 2 describes the sociodemographic and socioeconomic characteristics of the study participants. Most of the participants (59.8%) were aged 20–29 years. Almost all the participants (94.3%) were married, with 60.9% of them married before 18. Most of the participants (81.5%) and fathers (74.8%) had no formal education. The mean number of total pregnancies was 5.9 (SD 3.4), and 82.7% of the participants intended to become pregnant during their last pregnancy. Most of the participants fell within the middle quantile (37%).

In terms of health care access, the most frequent mode of transportation used to reach the nearest health facility was by car/truck, with 78% of women using this mode of transportation. Additionally, only 19.3% of participants reported a travel time of less than 30 minutes to the nearest health facility. In terms of decision-making on medical care, 39.9% of the health decisions were made by the respondent, while 48.1% were made by husbands alone. Awareness of birth spacing methods was reported by 25.1%, while previous use of family planning (FP) methods was reported by 57 participants (16.2%). Only 17.7%, 2.6%, and 1.7% of the participants were counseled on breastfeeding, on umbilical cord care, and on keeping the baby warm during their last pregnancy, respectively.

Table 3 describes the antenatal, preventive maternal health, and delivery care utilization among recently delivered women. The average number of facility-based ANC visits was 1.5 (SD 2.1), the gestational age at the first ANC visit was 5.6 months (SD 2.0), and the average gestational age at the last ANC visit was 8.5 (SD 0.9).

Most of the participants (55.8%) used iron-folic acid (IFA) for 0–30 days, 46.7% always used insecticide-treated nets (ITNs), and only 7.7% used SP during their last pregnancy.

As shown in F**igure 1**, 52.4% of the participants had at least one facility-based ANC during their last pregnancy, whereas 11.7% had more than four facility-based ANC visits. With respect to institutional birth delivery, 29.1% of the participants delivered in a health facility, while 33.1% of the births were assisted by a health professional.

Factors associated with ANC, SBA, and institutional birth delivery

As Table 4 shows, having at least one facility-based ANC visit was associated with higher odds of having SBAs (AOR 2.042, 95% CI: 1.177–3.354) and IBDs (AOR 2.134, 95% CI: 1.135–4.013). The number of total pregnancies was associated with lower odds of having both SBA (AOR 0.943, 95% CI: 0.901–0.988) and IBD (AOR 0.925, 95% CI: 0.883–0.969). Medical decision-making by husbands/others was negatively associated with having at least one facility-based ANC visit (AOR 0.713; 95% CI: 0.582–0.873) and at least 4 ANC visits (AOR 0.475; 95% CI: 0.275–0.820). Awareness of birth spacing was positively

associated with having at least one ANC visit (AOR 2.547, 95% CI: 1.149–5.645), having SBAs (AOR 2.239, 95% CI: 1.291–3.884), and having IBD (AOR 2.703, 95% CI: 1.407–5.129). Age at first marriage (AOR 1.495, 95% CI: 1.078–2.074) and travel time to health facilities (AOR 2.238, 95% CI: 1.086–4.613) were significantly associated with IBD.

Discussion

Few studies from Somalia have captured population-level data from rural contexts on maternal and newborn care or have identified predictors of key health service uptake, such as antenatal care (ANC), skilled birth attendance (SBA), and institutional birth delivery (IBD). This study contributes to the evidence base in a rural, fragile context, bringing attention to gaps in access to critical life-saving care. The surveyed rural villages in Dhusamareb in Galmudug state of Somalia reflect the conditions of other rural communities across the country that experience similar barriers, including limited access to health services, poor infrastructure, and insecurity.

Most births occurred outside a health facility, indicating limited access to clinical care. Our study revealed an institutional birth delivery rate of 29.1%, which was slightly higher than the national facility delivery rate of 21%.(5) The SHDS 2020 reported health facility delivery rates for rural populations of 25%, nomadic populations of 4%, and urban populations of 34%.(5) Similarly, the SBA rate was 33.1%, which is almost comparable to the national SBA rate of 32%.(5) The SBA rate for the rural population was 37%, that for the nomadic population was 8%, and that for the urban population was 51%, as reported in the SHDS 2020.(5) Better rates of service utilization in urban contexts are seen in other studies: A study conducted in major towns in Somalia reported a higher institutional birth delivery rate of 57%(11) and an SBA rate of 44%. (20).

Beyond the descriptive findings, we found that receiving at least one facility-based ANC visit was positively associated with SBAs and institutional birth delivery, which reflects the concept of the continuum of care (CoC), as ANC visits play a critical role in facilitating the utilization of safe birth delivery. These findings are consistent with studies conducted in rural communities in the Somali region of Ethiopia (21) and other sub-Saharan countries, which emphasize the significance of ANC in promoting institutional birth delivery and SBA. (22, 23) Another study conducted in Somalia revealed that women who did not receive ANC were more likely to deliver at home. (11) The association between ANC and delivery care can represent both similar facilitators and barriers for women and girls to reach health facilities for any MNH while also demonstrating the potential for the ANC role to promote safe births in health facilities. There is a need to innovate to address shared challenges in women's and girls' access to facility-based care while also identifying opportunities during ANC visits to build confidence in and demand for SBA and institutional birth delivery.

The reasons for disparities in the uptake of these services are multifaceted and reflect systemic challenges within Somalia's healthcare system and the broader socioeconomic context. Limited access to healthcare services, poor infrastructure, and low socioeconomic status are further compounded by women's lack of agency in decision-making, lack of awareness of pregnancy-related danger signs, and transportation challenges, which all hinder access to and utilization of adequate maternal and newborn care. (7, 24, 25) Conflict and instability exacerbate these issues, disrupting healthcare systems and increasing health risks for mothers and newborns. (26–29) Moreover, cultural practices and gender disparities influence healthcare-seeking behaviors, particularly in rural and underserved communities. (25)

Evidence from other studies in rural areas of LMICs suggests that context is essential and critical to understanding which strategies might work to improve the utilization of skilled health personnel for childbirth. (30) In other words, a strategy to increase the use of SBAs or institutional birth delivery in one setting may not be effective in another setting, depending on factors related to health services and the community. In many pastoralist communities in Somalia, women rely on TBAs because of the limited availability of maternal and newborn health care to serve these populations. (14) There is also some evidence to suggest that many Somali women prefer using TBAs instead of health facilities because of their limited understanding and lack of awareness regarding the potential risks associated with pregnancy, as well as their trust and familiarity with TBAs. (25) Other reasons that have been identified to explain why Somali women prefer home births include limited financial and transportation resources and general comfort with delivering at home. (14) A systematic review of interventions across 20 countries, including Uganda, Tanzania, and Nigeria, which aimed to integrate TBAs into the formal

health care system, revealed that the use of SBAs increased, with the caveat that the impact depended on context and multiple factors, such as access barriers, community support, and the role of the TBA. (31) Whether as part of the IRC's CBMNC program or the ambitious national strategy to scale Female Health Workers, these considerations of barriers to care should be integrated and studied.

Women whose health decisions were made by their husbands or someone else were less likely to have at least one or four facility-based ANC visits in our study. Additionally, a study conducted in Bangladesh revealed that women who decide on their own healthcare have higher odds of utilizing maternal health services.(32) This suggests that the more women are empowered to decide for themselves or be involved in the decision, the greater the likelihood that they will seek ANC services. In Somalia, literature on women's autonomy in decision-making with respect to their health is limited; however, culturally, men often have a final say in terms of household decision-making. Interventions increasing shared decision-making and the involvement of women in the decision-making process may improve MNH care seeking. For example, an intervention implemented in Malawi, which involved male peer outreach workers providing husbands with reproductive health information, motivation, and behavioral skills, led to significant improvements in joint decision-making by shifting from male-dominated decisions to more collaborative approaches. This resulted in increased communication about family planning, with men initiating more conversations and women becoming more involved.(33) A systematic review conducted in LMICs also revealed that involving the husband in ANC services was associated with the utilization of SBAs and institutional birth delivery. (34) There is also a need to conduct qualitative research to obtain a deeper understanding of the pattern of MNH decision-making and male involvement to better inform MNH program implementation, including the design of culturally acceptable interventions.

Based on our findings, 52.4% of participants received facility-based ANC at least once during their last pregnancy. The proportion of women who had at least 4 ANC visits was 11.7%. In contrast, two studies conducted in urban cities in Somalia reported that 85% and 84% of women, respectively, had at least one ANC visit during their last pregnancy, while 23% and 28%, respectively, had at least four ANC visits. (9,35) Furthermore, the SDHS 2020 indicated that 18% had at least one ANC visit and that 26% had at least four visits in rural areas in Somalia. (5) The WHO recommends at least eight ANC visits (36) during pregnancy to ensure effective implementation of pregnancy monitoring and early detection of pregnancy complications. The low ANC attendance rate could be due to several factors, including the limited availability of health facilities in rural areas (37), transportation costs, and a lack of awareness, which pose significant barriers for women in terms of completing recommended ANC visits. (38)

Additionally, as intended with the CBMNC program, introducing community-based interventions has the potential to improve ANC utilization. A study conducted in Tanzania demonstrated that community-based safe motherhood promoters conducting home visits significantly increased the likelihood of women attending at least one ANC visit and initiating their first ANC visit earlier. (39) Similarly, a systematic review revealed that home visits as part of community-based primary health care significantly increase ANC attendance. (40) There is also the potential to utilize mobile networks in a context such as Somalia, where network coverage is high even in rural contexts; promising interventions may include interventions such as sending reminders to women for ANC appointments through text messages. (41)

Limitations

The study relied on self-reported data from the past twelve months, introducing the possibility of recall bias. Participants may not accurately recall or report information about their pregnancies, births, or healthcare utilization, leading to potential inaccuracies in the data. In addition, some women were not available during the data collection period in their villages, as they had moved to other villages looking for pasture and water for their livestock. In these situations, to reach the study sample size, the research team replaced them with new women randomly selected from the sampling frame. In addition, one village that was initially sampled was excluded from the baseline survey because of logistical challenges and safety concerns. These exclusions might have introduced selection bias by failing to fully represent the diversity of health indicators and socioeconomic conditions present in more remote or underserved areas, potentially skewing the findings toward areas that are more accessible and better connected. The objective of the main study from which these data were taken did not focus on

details of facility-based care; thus, we are not able to speak on the quality of institutional birth delivery or skilled birth attendance received by those surveyed in the study.

Conclusion

This study aimed to assess the utilization of maternal and newborn health services, specifically ANC, SBA, and institutional birth delivery, in rural Galmudug State, Somalia, and explore the factors associated with the use of these services. The findings revealed critical gaps in MNH service uptake among rural Somalia, highlighting the low rate of facility-based service utilization among rural Somali women. We observed that receiving at least one facility-based ANC visit, the number of total pregnancies, and awareness of family planning methods were significantly associated with both SBA and IBD, whereas decisions on women's health and awareness of FP were significantly associated with receiving at least one facility-based ANC visit.

Barriers such as limited health infrastructure in rural areas, travel distances to health facilities, and a lack of awareness restrict the access to and utilization of MNH services by rural Somali women. There is a need to address infrastructural barriers to service utilization while also investing in initiatives at the community level to increase demand for facility-based MNH services. Simultaneously, investments in sustainable approaches to delivering life-saving maternal and newborn services outside of the formal health system should be made to fill critical health gaps in these underserved regions.

Abbreviations

ANC
Antenatal care. SBA:Skilled birth attendant. IBD:Institutional birth delivery. MNH:Maternal and Newborn Health. MMR:Maternal mortality rate. TBA:Traditional birth attendant. CBMNC:Community-based maternal and newborn care

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Helsinki Declaration. The study was approved by the SORDI's Institutional Review Board (IRB) and the IRC's IRB. In addition, the study received research clearance from the National Institute of Health of the Federal Ministry of Health of Somalia. All the participants received a clear explanation of the study objectives, their rights, and confidentiality before their participation. Informed consent was obtained from the participants. All participants provided verbal informed consent to participate in the survey.

Clinical Trial Number

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The data for this study are available from the corresponding author upon request.

Competing Interests

The authors declare that they have no competing interests.

Funding

This research was funded by the UK International Development from the UK government (PO 8613) as part of the EQUAL Research Programme Consortium.

Authors' contributions

MO, GN, MJ, GK, and NK participated in the design phase of the study and the development of the protocol. MO, AM, HM, HA, and AA participated in the data collection. MO, CC, AM, HM, and MA conducted the data analysis, and MO, AM, MJ, GK, and MA prepared the first draft. GN and NK reviewed and edited the manuscript. AD contributed to the conception and design of the study and conducted overall supervision. All the authors read and approved the final draft.

Acknowledgment

We thank the IRC Dhusamareb office colleagues and the SORDI data collection supervisors and enumerators for their efforts during data collection. The authors thank the women and girls who participated in the survey, the enumerators and supervisors, and the community health workers for their efforts in the pregnancy mapping exercise. We also thank Dr. Ahmed Aweis, who is a reproductive health specialist and a research fellow at SORDI, for his contribution.

References

1. WHO. World Health Statistics. 2024 [Internet]. 2024 [cited 2025 Mar 18]. Available from: https://iris.who.int/bitstream/handle/10665/376869/9789240094703-eng.pdf?sequence=1
2. UNICEF Maternal mortality. 2023. Available from: https://data.unicef.org/topic/maternal-health/maternal-mortality
3. UNICEF Neonatal mortality. 2023. Available from: https://data.unicef.org/topic/child-survival/neonatal-mortality/
4. (WHO). WHO Maternal mortality. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality
5. Somali Health and Demographic Survey [cited 2025 Mar 18]. Available from: https://nbs.gov.so/wp-content/uploads/2023/07/Somali-Health-Demographic-Survey-2020.pdf
6. Morrison J, Malik SMMR. Health equity in Somalia? An evaluation of the progress made from 2006 to 2019 in reducing inequities in maternal and newborn health. Int J Equity Health. 2024;23(1):46.
7. Onama V, Babughirana G. Access and Utilization of Maternal Newborn and Child Health Services in the Fragile Context of Somalia. Asploro J Biomedical Clin Case Rep. 2023;6(2):146.
8. UNICEF. Levels and trends in child mortality [Internet]. 2023 [cited 2024 Jun 7]. Available from: https://data.unicef.org/resources/levels-and-trends-in-child-mortality-2024/
9. Miikkulainen A, Abdirahman Mohamud I, Aqazouz M, Abdullahi Suleiman B, Sheikh Mohamud O, Ahmed Mohamed A, et al. Antenatal care utilization and its associated factors in Somalia: a cross-sectional study. BMC Pregnancy Childbirth. 2023;23(1):1–17. 10.1186/S12884-023-05871-4/TABLES/7 . PubMed PMID: 37573367.
10. Mouhoumed HM, Mehmet N. Utilization pattern of antenatal care and determining factors among reproductive-age women in Borama, Somaliland. J Prev Med Hyg. 2021;62(2):E439–46. 10.15167/2421-4248/jpmh2021.62. .2.1882 PubMed PMID: 34604585.
11. Said Sheikh N, Hussein AM, Said Mohamed S, Gele A. Does living in major towns favor institutional delivery in Somalia? [Internet]. 10.1101/2022.04.23.22274202
12. Bernard Olayojana Kunicovaruth Akisa Oriama. Retaining community-based female health workers to improve service delivery in Somalia [Internet]. 2023 [cited 2024 Jul 1]. Available from: https://blogs.worldbank.org/en/governance/retaining-community-based-female-health-workers-improve-service-delivery-somalia#:~:text=Marwo%20Cafimaad%20in%20Somali%20means,the%20quality%20of%20the%20services
13. GALMUDUG Report SOMALI HEALTH AND DEMOGRAPHIC SURVEY [Internet]. Available from: www.nbs.gov.so.
14. Duale HA, Farah A, Salad A, Gele S, Gele A. Constraints to maternal healthcare access among pastoral communities in the Darussalam area of Mudug region, Somalia a qualitative study. Front Public Health. 2023;11.

10.3389/FPUBH.2023.1210401. /FULL PubMed PMID: 37790717.

15. Kozuki N, Director rescueorg, Kulkin J, Sandberg S, Bernthal T. Community-based MNH care in Somalia. 2023.
16. EquityTool. Somaliland Equity Tool. 2018.
17. WG ILO Labor Force Survey Disability Module (LFS-DM) - The Washington Group on Disability Statistics. [cited 2024 Jul 1]. Available from: https://www.washingtongroup-disability.com/question-sets/wg-ilo-labor-force-survey-disability-module-lfs-dm/
18. WHO. SBA. 2018 [cited 2024 Jun 7]. Available from: https://www.who.int/data/nutrition/nlis/info/births-attended-by-skilled-health-personnel#:~:text=A%20skilled%20birth%20attendant%20is,the%20identification%2C%20management%20and%20referral
19. Gashaye A, Kibret GD, Bazezew Y, Mengist B. Factors affecting institutional delivery in Ethiopia: A multilevel analysis. Int J Afr Nurs Sci. 2021;15. 10.1016/j.ijans.2021.100331.
20. Yusouf FQSh. Assessment of Megnitude of Utilization the Skilled Birth Attendance Services in Hargeisa, Somaliland. 2016.
21. Zepro N. Determinants of institutional delivery service utilization among pastorals of Liben Zone, Somali Regional State, Ethiopia, 2015. Int J Womens Health. 2016;8. 10.2147/IJWH.S123189.
22. Berhan Y, Berhan A, Antenatal Care As A. Means Of Increasing Birth In The Health Facility And Reducing Maternal Mortality: A Systematic Review. 10.4314/ejhs.v24i1.9S
23. Adjiwanou V, LeGrand T. Does antenatal care matter in the use of skilled birth attendance in rural Africa: a multicountry analysis. Soc Sci Med. 2013;86:26–34. 2013.02.047 PubMed PMID: 23608091.
24. Amsalu R, Schulte-Hillen C, Garcia DM, Lafferty N, Morris CN, Gee S, et al. Lessons learned from helping babies survive in humanitarian settings. Pediatrics. 2020;146(Supplement2):S208–17.
25. Mohamed AA, Bocher T, Magan MA, Omar A, Mutai O, Mohamoud SA, et al. Experiences from the field: A qualitative study exploring barriers to maternal and child health service utilization in idp settings somalia. Int J Womens Health. 2021;13:1147–60. 10.2147/IJWH.S330069.
26. Harville EW, Beitsch L, Uejio CK, Sherchan S, Lichtveld MY. Assessing the effects of disasters and their aftermath on pregnancy and infant outcomes: A conceptual model. Int J Disaster Risk Reduct. 2021;62:102415.
27. Garry S, Checchi F. Armed conflict and public health: into the 21st century. J Public Health (Bangkok). 2020;42(3):e287–98.
28. Chi PC. Impact of armed conflict on maternal and reproductive health in sub-Saharan Africa. 2016.
29. Palmer O. Addressing Extreme Vulnerability: Remaining Barriers to Neonatal Healthcare Delivery in Conflict Areas. 2018.
30. Nelson JR, Ess RH, Dickerson TT, Gren LH, Benson LS, Manortey SO, et al. Strategies to increase rural maternal utilization of skilled health personnel for childbirth delivery in low-and middle-income countries: a narrative review. Glob Health Action. 2058;15(1). 10.1080/16549716.2022.2058170.
31. Byrne A, Morgan A. How the integration of traditional birth attendants with formal health systems can increase skilled birth attendance. International Journal of Gynecology and Obstetrics. John Wiley and Sons Ltd; 2011. pp. 127–34. 10.1016/j.ijgo.2011.06.019

Tables

Table 1
Description of selected villages

Faragoy	Estimated population (obtained from IRC Dhusamareb office)	Number of women expected to have had a birth in the last year (crude birth rate of 44/1000 people). (30)	Estimated # of households (using Somalia national average household size of 5.9). (31)	Estimated number of CHWs to be recruited and assigned for pregnancy mapping and service delivery (1:50 households)	Distance from Dhusamareb town in km
	1257	**55**	**213**	**3**	**20**
Ceeldheere	1500	66	254	4	30
Gadoon	2833	124	480	6	40
Balicad	1423	63	241	3	60
Olol	2000	88	338	5	65
Marergur	1257	55	450	6	30
Hananley	1000	44	200	5	20
TOTAL	11270	496	2176	30	N/A
Excluded					
Haadfuul	1000	44	169	2	22

Table 2

Sociodemographic, economic characteristics, and general health care access of the *surveyed women and girls (n = 351)*

Variables	**Mean/Prop.**	**Freq.**	**SD**
Mother's age (years)			
Less than 29	59.8	210	
30 and above	40.2	141	
Age at 1st marriage			
18 and above	39.1	134	
Less than 18	60.9	209	
Marital status			
Married	94.3	331	
Divorced/Widowed	5.7	20	
Father's age (years)			
Less than 29	20.3	48	
30 and above	79.7	188	
Mother's education			
No schooling/Quranic school	81.5	286	
Primary/secondary/higher	18.5	65	
Father's education			
No schooling/Quranic school	74.8	208	
Primary/secondary/higher	25.2	70	
Wealth categories			
Poorest and poorer quintiles	34.2	120	
Middle quintile	37.0	130	
Richer and richest quintiles	28.8	101	
Travel time to health facility			
<30 minutes	19.3	64	
30-<60 minutes	23.3	77	
1–2 hours	40.8	135	
2 + hours	16.6	55	
Mode of transportation to a health facility			
Car/Truck/Motorcycle/Bicycle	78.0	270	
Walking	22.0	76	
Decision on medical care			

*The FP question was asked without offering prompts to the respondents; thus, responses were not limited to modern FP methods.

Variables	Mean/Prop.	Freq.	SD
Respondent	39.9	140	
Husband/partner/Other	60.1	211	
Fertility intentions of last pregnancy			
No	17.3	59	
Yes	82.7	283	
Awareness of birth spacing methods			
No	74.9	263	
Yes	25.1	88	
Previous use of FP methods			
No	83.8	294	
Yes	16.2	57	
Birth location			
Not a health facility	70.9	249	
Health facility	29.1	102	
Counseled on breastfeeding			
No	82.3	289	
Yes	17.7	62	
Counseled on umbilical cord care			
No	97.4	339	
Yes	2.6	9	
Counseled on keeping baby warm			
No	98.3	342	
Yes	1.7	6	
Number of total pregnancies	5.9		3.4

*The FP question was asked without offering prompts to the respondents; thus, responses were not limited to modern FP methods.

Table 3
Antenatal, preventive maternal health, and delivery care utilization among recently delivered women

Variables	Mean/Prop.	Freq.	SD
Panel A: Antenatal Care Utilization and Timing			
Number of facility-based ANC visits	1.5		2.1
Gestational age at first ANC visit (months)	5.6		2.0
Gestational age at last ANC visit (months)	8.5		0.9
Panel B: Preventive Maternal Health Interventions			
IFA use			
No access	30.8	108	
0–30 days	55.8	196	
31–60 days	6.8	24	
61–90 days	1.7	6	
>90 days	0.9	3	
Do not know	4.0	14	
Frequency of use of bed nets			
No access	24.5	86	
Always	46.7	164	
Often	15.7	55	
Sometimes	9.4	33	
Rarely	1.4	5	
Never	2.3	8	
Use of SP			
Never	92.0	323	
Once	4.8	17	
Twice	2.6	9	
Thrice	0.3	1	
Do not know	0.3	1	
Panel C: Delivery Care and Birth Attendance			
Institutional birth delivery			
No	70.9	249	
Yes	29.1	102	
Birth Attendant			
Doctor	4.6	16	
Notes: Skilled Birth Attendant (SBA) includes a birth attendent by a doctor, nurse, or a midwife			

Variables	Mean/Prop.	Freq.	SD
Nurse	1.7	6	
Midwife	26.2	92	
CHW	1.7	6	
TBA	59.3	208	
No one/Do not know	6.6	23	
Notes: Skilled Birth Attendant (SBA) includes a birth attendent by a doctor, nurse, or a midwife			

Table 4
Socioeconomic and demographic correlates of antenatal care, skilled birth attendance, and institutional birth delivery among recently delivered women

Variables	At least one facility-based ANC visit	At least four facility-based ANC visit	Skilled birth attendance	Institutional birth delivery Delivery
Mother's age (years) *(Ref. 29 or less)*				
30 and above	0.948	1.433	1.599	1.673
	[0.661–1.360]	[0.422–4.866]	[0.698–3.664]	[0.697–4.020]
Age at 1st marriage *(Ref. 18 and above)*	0.948	0.646	1.360	**1.495****
Less than 18	[0.624–1.439]	[0.288–1.450]	[0.804–2.301]	[1.078–2.074]
Number of total pregnancies	0.989	1.070	**0.943****	**0.925*****
	[0.920–1.064]	[0.886–1.292]	[0.901–0.988]	[0.883–0.969]
Mother's education *(Ref. No schooling/Quranic school)*				
Primary/secondary/higher	0.802	**1.610***	1.207	1.171
	[0.447–1.439]	[0.990–2.618]	[0.655–2.224]	[0.753–1.821]
Wealth categories *(Ref. Lowest and lower quintiles)*				
Middle quintile	0.880	1.000	1.662	1.574
	[0.571–1.356]	[0.537–1.862]	[0.664–4.161]	[0.810–3.060]
Richer and richest quintiles	0.848	1.015	1.437	1.409
	[0.461–1.562]	[0.418–2.463]	[0.583–3.544]	[0.643–3.087]
Travel time to health facility (*Ref. <30 minutes)*				
30-<60 minutes	0.979	1.112	1.594	**2.238****
	[0.424–2.256]	[0.399–3.099]	[0.754–3.372]	[1.086–4.613]
1–2 hours	1.216	1.104	1.208	**1.954***
	[0.492–3.009]	[0.374–3.262]	[0.638–2.288]	[0.984–3.879]
2 + hours	0.700	**0.261***	1.077	1.248
	[0.320–1.531]	[0.062–1.104]	[0.431–2.692]	[0.489–3.187]
Decision on medical care *(Ref. Respondent)*				
Husband/partner/Other	**0.713*****	**0.475*****	0.768	0.873
	[0.582–0.873]	[0.275–0.820]	[0.546–1.081]	[0.634–1.202]
Awareness of birth spacing methods *(Ref. No)*				

Notes: Odds Ratios reported with 95% confidence intervals. Standard Errors clustered at the village level. *** = p value < 0.01, ** = p value < 0.05, * = p value < 0.10.

Variables	At least one facility-based ANC visit	At least four facility-based ANC visit	Skilled birth attendance	Institutional birth delivery Delivery
Yes	**2.547****	0.737	**2.239*****	**2.703*****
	[1.149–5.645]	[0.367–1.479]	[1.291–3.884]	[1.407–5.194]
Previous use of FP methods *(Ref. No)*				
Yes	1.143	0.757	0.759	0.657
	[0.460–2.843]	[0.318–1.805]	[0.309–1.861]	[0.275–1.570]
At least one facility-based ANC visit *(Ref. No)*				
Yes	n.a.	n.a.	**2.042****	**2.134****
	n.a.	n.a.	[1.177–3.541]	[1.135–4.013]
Constant	1.374	**0.156*****	**0.186*****	**0.105*****
	[0.457–4.133]	[0.083–0.292]	[0.052–0.668]	[0.034–0.326]
Observations	325	325	325	325
Notes: Odds Ratios reported with 95% confidence intervals. Standard Errors clustered at the village level. *** = p value < 0.01, ** = p value < 0.05, * = p value < 0.10.				

Figures

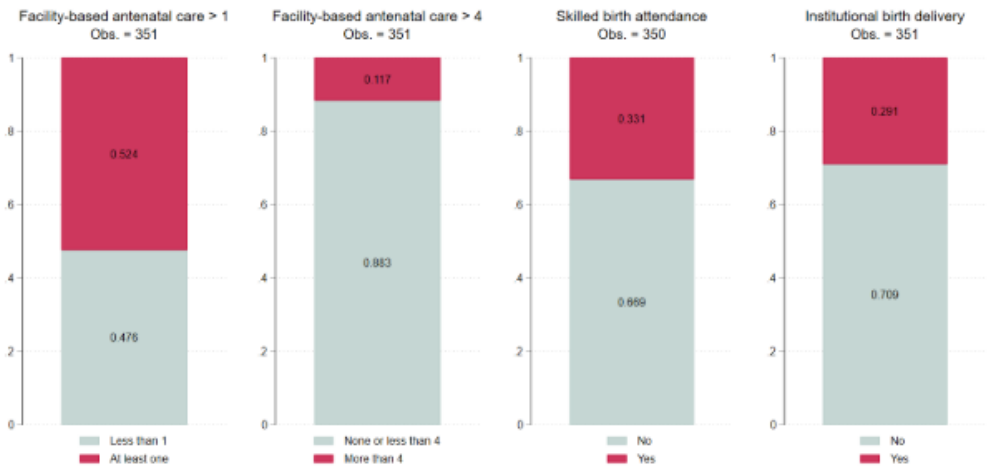


Figure 1

Utilization of antenatal care, skilled birth attendance, and institutional birth delivery among recently delivered women

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryMaterialAnnexes123.docx