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Quality of antenatal care and associated factors in public and private facilities of Western Hararghe Zone Ethiopia using WHO framework

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Achieving equitable health and meeting the sustainable development goals commitment of "leaving no woman behind" requires high-quality antenatal care that ensures a positive pregnancy experience. However, limited studies have assessed the quality of antenatal care using the WHO's quality of care framework, encompassing both experience of care and structural dimensions. This cross-sectional study, conducted from September 1 to October 2, 2020, in the Western Hararghe Zone, Ethiopia, examined the quality of antenatal care among 340 participants selected through multistage stratified sampling. Data were analysed using descriptive statistics and binary logistic regression in SPSS version 27, with significance set at $p < 0.05$. Results showed that 51.5% [95% CI 46.6–56.8%] of women received quality antenatal care. The domains of effective communication had relatively low quality followed by supportive care then respect, and dignity. The quality of antenatal care was found to be 65.9% and 37.1% in private and public health facilities respectively. Public facilities lacked essential diagnostic equipment, particularly ultrasound. Factors associated with poor antenatal care quality are rural residency, low income, unplanned pregnancies, and public health facilities. Addressing inequities in experience of care coupled with structural attributes is crucial for improving the quality of antenatal care.

Keywords Antenatal care, Quality of antenatal care, Quality of care, Experience of care, Ethiopia

Abbreviations

ANC	Antenatal care
LMIC	Low- and middle-income countries
MMR	Maternal mortality rate
PCMC	Person-centered maternity care
QoC	Quality of care
RMC	Respectful maternity care
SDG	Sustainable development goal
VIF	Variation inflation factor
WHO	World Health Organization

Background

Antenatal care (ANC) is the care provided by skilled healthcare professionals to pregnant women and adolescent girls to ensure the best health conditions for both mothers and babies during pregnancy. ANC reduces maternal and perinatal morbidity and mortality both directly through the detection and treatment of pregnancy-related complications and indirectly through the identification of women and girls at increased risk of developing complications during labor and delivery[1].

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According to the World Health Organization (WHO) quality of care framework, quality of care is instrumental in achieving person-centric outcomes. A novel feature of the WHO framework for quality of care in maternal and newborn health is that it pays equal attention to both provision aspects of care and the experience of care in assessing the quality of maternity care after realizing that women's experience of quality of care plays a critical role in increasing maternal health status[2,3]. The two cross-cutting domains in this WHO framework are competent, motivated human resources and available essential physical resources. The WHO Framework highlights a global shift toward health systems that are person-centered in addition to being solely technically sound[4,5].

The provision of integrated high-quality ANC is a critical part of the global agenda of attaining equitable, people-centred universal health coverage[6]. According to the WHO quality framework, the two key domains of the quality of antenatal care are the provision of care and the experience of care[6–8]. Women's experience of antenatal care includes items related to effective communication, respect and dignity, and emotional support according to the experience dimensions[6,9,10]. These experience dimensions assess the critical aspects of the quality of antenatal care. The quality of antenatal care is dependent on the provision and content of ANC, as well as women's experiences with ANC, which rely on the availability of health providers and physical resources[1,11]. The key dimension of the quality of antenatal care that needs to be addressed is a positive experience of care, care that is respectful of and responsive to individual women and their families' preferences, needs, and values[6,12]. In the era of SDGs, the quality of antenatal care that results in positive pregnancy experiences is central to achieving the goal of reducing maternal deaths to less than 70 per 100,000 live births by 2030[13]. It is a critical component of quality care to enable treatment adherence and maximize health outcomes[14].

The vast majority of the maternal deaths (94%) occurred in low- and middle-income countries, where most of these maternal deaths could have been prevented if the women had been able to access high-quality food during pregnancy and childbirth[15]. The alarming rates of poor pregnancy experiences of women, particularly in low-income countries such as Ethiopia, include a high prevalence of disrespect and abuse during pregnancy and childbirth[5,16,17]. A qualitative study in Tanzania revealed that essential physical resources and competent, motivated human resources consist of items related to the availability and adequacy of equipment and infrastructure, client amenities, supplies, drugs, trained staff, availability of guidelines, and a good working environment required to provide ANC services[18].

Western Hararghe Zone, home to large pastoralist populations, the health facilities often face uneven resource allocation such as essential supplies such as ultrasound and skilled trained personnel, particularly in rural areas which could ultimately affect the quality of ANC. The WHO's emphasis on competent, motivated human resources and essential physical resources is particularly instrumental in Western Hararghe, where essential supplies and motivated staff shortages directly undermine the experience of ANC[19]. Cultural practices in West Hararghe further influence the quality of ANC. Patriarchal and gender norms often prioritize male decision-making restricting women's autonomy and decisions on health expenditures to seek high-quality ANC.

Despite these challenges and a paradigm shift at the global level toward a positive experience of care, assessing the quality of antenatal care has received far less attention in resource-limited settings such as Western Hararghe, particularly in the experience of care and structural dimensions[7,9]. However, some studies have focused on person-centred maternity care during childbirth[20,21]. Very few studies have sought to assess the quality of ANC from the perspective of women's experience of care and the structural attributes of ANC. Moreover, most prior studies on the quality of antenatal care have emphasized the service provision dimensions of quality of care[22–26]. This study was the first to emphasize the dimension of the experience of care and structural attributes of ANC to assess the quality of ANC which is a critical step toward addressing equity gaps. Therefore, the objective of this study was to assess the quality of antenatal care among pregnant women attending ANC at health facilities in the western Hararghe Zone of Ethiopia, 2020. This study fills a critical evidence gap in these underserved and resource-constrained settings to tailor interventions to local needs.

Methods

Study area

The study was conducted in the West Hararghe Zone, Oromia regional state, Ethiopia. The West Hararghe Zone is one of the 12 zones in the Oromia Regional State. It covers an area of 17,779.4 km^2. Available information from the zonal health office shows that the total population of the zone is estimated to be 2,435,350, of which 2,175,785 (90%) are rural and the remaining 259,565 (10%) are urban. The West Hararghe Zone is subdivided into 17 districts: 11 rural districts of agricultural, 4 rural districts of pastoralist, and 2 urban towns. According to the 2020 zonal health office, the health system of the zone consists of two general hospitals, three primary hospitals, eighty-five health centers, four hundred eighty-two health post facilities, and 25 private clinics.

Study design and population

An institution-based analytical cross-sectional study was used to assess the quality of antenatal care among pregnant women attending antenatal care health facilities from September 1 to October 2, 2020.

Study population

All pregnant women were receiving antenatal care at each of the selected public and private health facilities from September 1 to October 2, 2020. The heads of the public health facilities (1 from each) from randomly selected public and private health facilities were used to assess the structural attributes of the quality of antenatal care.

In private health facilities, health care providers are purposively selected from randomly selected facilities to assess the structural attributes of the quality of antenatal care.

Inclusion criteria

Pregnant women receiving antenatal care at the current facility.

Exclusion criteria
Women who had lived for less than six months in kebeles were severely ill, were unable to speak, had psychiatric problems, or were transferred from another health facility to continue their ANC contact were excluded.

Sample size determination and procedure
The sample size was calculated via the following double population proportion formula and Epi Info version™ 7 software. The magnitude of respectful maternity care (P1 = 58.1% and P2 = 58.1%) from a similar study conducted in Harar, Eastern Ethiopia, was used, with the assumption of a 95% confidence interval, 80% power, a design effect of 2 and a 5% nonresponse rate[27]. The final sample size estimated was 340, where n1 = 170 & n2 = 170. Where n1 = the sample size for women receiving antenatal care in private health facilities and n2 = the sample size for women receiving antenatal care in public health facilities.

A multistage stratified sampling technique was used; firstly, seven districts were selected among the seventeen districts in the Zone via a simple random sampling technique. Each district name was written on a ballot, placed in a container, and thoroughly shuffled to select districts. The selected districts were Chiro, Hirna, Mieso, Bedessa, Asabot, Mechara, and Gelemso town. Within the selected district, health facilities were stratified into private and public health facilities, with the assumption that the type of health facility could differently influence the quality of ANC. Secondly, once the facilities were stratified, seven health facilities were selected from 14 public health facilities and 7 health facilities from 12 private health facilities were selected via the simple random method from seven districts after identifying public and private health facilities rendering antenatal services in seven selected districts. Finally, proportionally allocated sample sizes were made for each stratum (public/private) based on the total number of monthly ANC users in the most recent quarterly report. Individual subjects were selected by systematic random sampling from each stratum. The K value was calculated by dividing the average number of monthly ANC attendees by the total sample size of private and public health facilities. That was K = 567/170 or 3 for public health facilities and K = 447/170 = 3 for private health facilities. This interval was used in private and public health facilities separately to select study subjects by systematic random sampling until the required sample size at each health facility reached the order of ANC clients coming to the health facilities. The starting point was a number between 1 and 3 that was selected randomly, which was 2 for both private and public health facilities Fig. 1.

Variable
Dependent variable
Quality of antenatal care.

Independent variables
Sociodemographic variables of the client (age, residency, educational status, partner's level of education, religion, marital status, occupation, monthly income, ethnicity, level of participation in household decision-making, domestic violence, self, or household member in the facility). The obstetrics and gynecologic history included parity, frequency of ANC contact, type of pregnancy, recent history of ANC contact, and recent history of delivery in health facilities. The sex of the provider and the type of facility are factors related to provider-related factors and facility-related factors that could influence the quality of antenatal care. In this specific study, these two factors are included as obstetric-related factors since they are interrelated with each other.

Structural attributes of the quality of antenatal care
Measurements
Quality of antenatal care

The quality of antenatal care was measured via the PCANC scale, which has three domains—effective communication, dignity and respect, and supportive care—with 6 items with binary responses (yes/no) and 26 items with a four-point response scale., i.e., 0 ("no, never"), 1 ("yes, a few times"), 2 ("yes, most of the time") and 3 ("yes, all the time"), and with negative items reverse coded (i.e., questions that were framed negatively, such as the physical, verbal abuse, waiting time, unofficial cost, etc., had to be recoded so that high numbers represented good care. Responses that were recorded as "not applicable" were considered missing values. To be consistent with variables with binary responses, we recoded the PCANC variables from a four-point frequency response scale to binary responses, coding "no, never and a few times" together and "yes, most of the time and all the time" together. As a result, the scale score ranges from 0 to 32.

Effective communication scale

After the PCANC variables are recorded from a four-point frequency response scale to binary responses, 0 ("never or a few times"), 1 ("most of the time or all of the time), the total score ranges from 0 to 19.

Dignity and respect scale

Six items with a binary point scale, i.e., 0 ("never or a few times"), 1 ("most of the time or all of the time"), were used to measure dignity and respect. Therefore, the total score ranges from 0 to 6.

Supportive care scale

Each item has a binary point scale, i.e., 0 ("never or a few times"), 1 ("most of the time or all of the time"), so the total score ranges from 0 to 7[28].

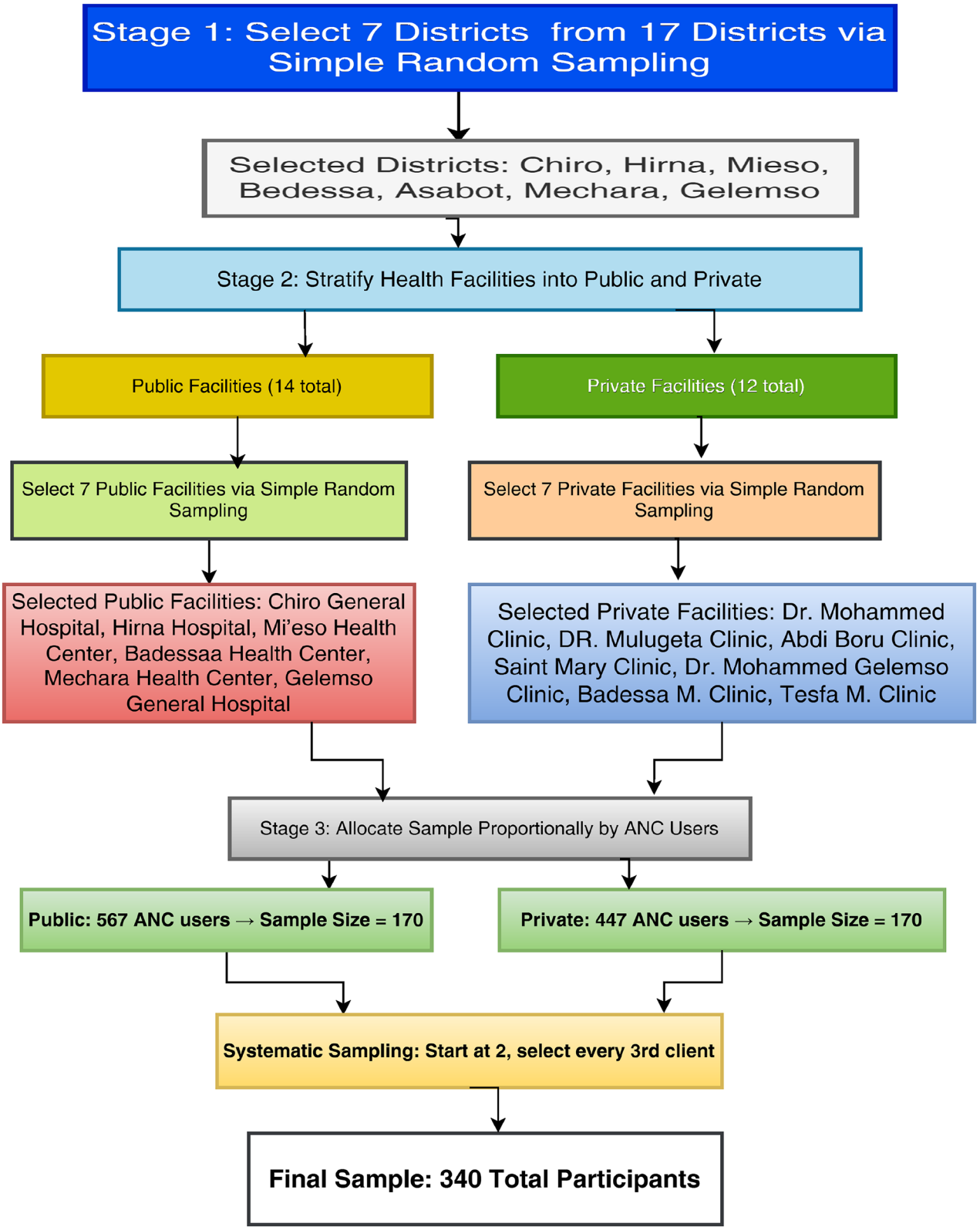


Fig. 1. Schematic diagram of sampling technique among public and private health facilities, 2020.

High-quality antenatal care
If the clients scored above or equal to 75% of the total possible maximum score of PCANC, they were categorized as high quality[29].

Low-quality antenatal care
If the respondent's score was less than 75% of the total possible maximum score of PCANC, it was categorized as low quality (16).

Structural attributes of the quality of antenatal care
It includes items related to essential physical resources and competent and motivated human resources, which include the availability of an appropriate physical environment; equipment, supplies, and medicines; and diagnostics of the availability of competent, motivated human resources to provide ANC services according to the WHO Quality of Care Framework for Maternal and Newborn Health[18,30].

Data collection tool and procedures

Data were collected through client exit interviews via a pretested structured Afaan Oromo version questionnaire. The study used a standard validated tool adapted from a person-centred maternity care scale developed in Kenya, with a Cronbach's alpha of 0.86[28]. The other questions included in the questionnaire were prepared by reviewing different works in the literature[31]. The questionnaire included questions about sociodemographic characteristics, obstetrics history, and provider and facility characteristic-related factors.

Data on the structural aspects of the quality of antenatal care were collected via a semi-structured structural inventory checklist to assess the structural attributes of the quality of antenatal care according to the WHO quality framework and after reviewing the literature[18,30]. The checklists include items related to essential physical resources and competent and motivated human resources. The questionnaire was first developed in English, translated into the local language Afaan Oromo and retranslated back into English by blind translators to ensure its consistency. The data collectors were ten university students who lived where the study was conducted. The training was given to the collectors for two days before the normal data collection time. The questionnaire in the English and local Afaan Oromo versions is available in Supplementary Table S1 and Supplementary Table S2 respectively.

Data quality control

A pre-test was conducted using a 5% (17) sample size at a non-selected health facility (Micheta Health Center), and the necessary correction was made accordingly. The internal reliability of this study was checked by calculating Cronbach's alpha for each of the domains to examine the extent to which the respondents answered consistently to the theoretically similar items in each domain. The quality of ANC scale used in this study has 32 items, and the possible score ranges from 0 to 32. These items were grouped into three domains per the WHO's latest quality of care framework, comprising effective communication, respect and dignity, and supportive care domains. These subscales have maximum possible scores of 19, 6, and 7, respectively. Reliability tests revealed that the effective communication scale, respect and dignity scale, supportive care scale and overall quality of ANC scale had Cronbach's alpha values of 0.889, 0.662, 0.754 and 0.931, respectively.

Data processing and analysis

The data were checked for completeness and consistency and then coded and entered Epi.Info version ™ 7 software and exported to the SPSS version 27 software package for analysis. Binary logistic regression was used to analyse the data. Subgroup analysis was also used to compare the quality of ANC between private and public health facilities.

The multicollinearity was checked via the VIF and tolerance. The Hosmer–Lemeshow test was used to assess the goodness of fit of the model. The VIF and tolerance test for all models assessing the quality of antenatal care were less than 10 and 0.2, respectively. The Hosmer–Lemeshow test for the factors affecting the quality of ANC yielded a value of 0.77. Chi-square tests were used for comparisons between the two strata. Variables that had a P value of ≤ 0.05 in the bivariable test were entered into a multivariable logistic regression to control for confounding variables. Variables that had a P value of ≤ 0.05 in the multivariable model were considered statistically significant. Adjusted odds ratios with 95% confidence intervals (CIs) were used to report the strength of the associations between the outcome and independent variables. Finally, the findings were compiled and presented via tables, graphs, figures, and text. In this study, the variables with missing data are only structurally missing, which are logically missing for primigravida women due to study design. For example, variables such as prior ANC visits, prior pregnancy complications, etc. were logically missing for primigravida women due to the study design. Hence, the analysis was restricted to multigravida women. This aligns with recommendations for handling structural missingness[32].

Ethical approval and consent to participate

Ethical clearance was obtained from the Mekelle University College of Health Sciences Ethics Review Committee (Reference Number: ERC:1504/2020). All methods were performed in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki. Participants were informed of the study's purpose. Informed consent was obtained from all subjects before the interview. They retained the right to refuse participation or withdraw at any time. To ensure privacy, confidentiality and anonymity were maintained using unique codes instead of personal identifiers, and no names or directly identifying information were recorded. All data were securely stored with restricted access, and only anonymized data were used for analysis and reporting. All participants consented to the publication of their anonymized data.

Results

Sociodemographic characteristics of the respondents

In this study, a total of 340 women were involved, one hundred seventy from each facility, for a response rate of 100%. Approximately 111 (65.3%) of the women in private health facilities and 66 (38.8%) in public facilities resided in urban areas. Nearly half of the women (127; 74.7%) at public health facilities and only 88 (51.8%) in private facilities had occupations with low incomes. Approximately 92 (54.1%) of the women at public facilities and 59 (34.7%) at private facilities had low participation in household decision-making Table 1.

Obstetric characteristics of the respondents

Among the respondents, 92 (57.9%) of the women at private health facilities and 72 (45.0%) of the public clients had a history of ANC contact prior to pregnancy. Approximately 118 (69.4%) of the clients at private health facilities and 89 (52.4%) of the clients at public facilities had planned pregnancies Table 2.

Structural attributes of the quality of antenatal care

On the structural (inventory) checklist, many private and public health facilities have available drugs that have specific importance for pregnant women. However, regarding the availability of diagnostic materials, particularly ultrasounds, in health facilities, out of seven public health facilities, only two had functional ultrasound access, whereas six private health facilities had ultrasound access. Among the seven health facilities, six private health facilities and five public health facilities had available infrastructure and equipment. Four private health facilities and three public health facilities had client amenities such as waiting areas. Seven private and six public health

Variables	Category	Private	Public	X^2 (*p* value)
Age	Below 19	11(6.5%)	10 (5.9%)	1.93 (0.75)
	20–24	37 (21.8%)	42 (24.7%)	
	25–29	78 (45.9%)	84 (49.4%)	
	30–34	38 (22.4%)	30 (17.6%)	
	above 35	6 (3.5%)	4 (2.4%)	
Religion	Orthodox	52 (30.6%)	57 (33.5%)	0.98 (0.9)
	Muslim	86 (50.6%)	84 (49.4%)	
	Protestant	23 (13.5%)	18 (10.6%)	
	Catholic	8 (4.7%)	10 (5.9%)	
	Waaqeffanna	1 (0.6%)	1 (0.6%)	
Residence	Urban	111 (65.3%)	66 (38.8%)	22.8 **(0.00*)**
	Rural	59 (34.7%)	104 (61.2%)	
Education	Illiterate	12 (7.1%)	25 (14.7%)	5.1 **(0.02*)**
	Literate	158 (92.9%)	145 (85.3%)	
Partner level of education	Illiterate	9 (5.3%)	33 (19.4%)	15.6 **(0.00*)**
	Literate	161 (94.7%)	137 (80.6%)	
Occupation	House wife	62 (36.5%)	75 (44.1%)	**32.7 (0.00*)**
	Merchant	41 (24.1%)	35 (20.6%)	
	Government	41 (24.1%)	8 (4.7%)	
	Farmer	16 (9.4%)	34 (20.0%)	
	student	10 (5.9%)	18 (10.6%)	
Marital status	Married	169 (99.4%)	170 (100.0%)	1.34 (1)
	Divorced	1 (0.6%)	0 (0.0%)	
Ethnicity	Oromo	124 (72.9%)	139 (81.8%)	5.94 (0.11)
	Amhara	30 (17.1%)	16 (9.4%)	
	Somale	4 (2.9%)	6 (3.5%)	
	Gurage	12 (7.1%)	9 (5.3%)	
Monthly income	< 3000	69 (40.6%)	106 (62.4%)	**15.3 (0.00*)**
	> 3000	101 (59.4%)	64 (37.6%)	
Self or household member	Yes	11 (6.5%)	13 (7.6%)	0.04 (0.83)
	No	159 (93.5%)	157 (92.4%)	
Domestic violence	Yes	49 (28.8%)	76 (44.7%)	**8.55 (0.03*)**
	No	121 (71.2%)	94 (55.3%)	
Participation in household	Low	59 (34.7%)	92 (54.1%)	**12.2 (0.00*)**
	High	111 (65.3%)	78 (45.9%)	

Table 1. Sociodemographic characteristics of respondents in private and public health facilities in the West Hararghe Zone, Oromia, Eastern Ethiopia, 2020 (n = 340). Significant values are in bold.

Variables	Category	Private	Public	X^2 (P Value)
Pregnancy complications[a]	Yes	64 (40.3%)	72 (45.0%)	0.55 (0.46)
	No	95 (59.7%)	88 (55.0%)	
Received ANC in a recent pregnancy[a]	Yes	92 (57.9%)	72 (45.0%)	**4.78 (0.03*)**
	No	67 (42.1%)	88 (55.0%)	
Prior facility delivery[a]	Yes	10 (63.5%)	84 (52.5%)	3.54 (0.06)
	No	58 (36.5%)	76 (47.5%)	
Number of ANC contact	1st contact	22 (12.9%)	32 (18.8%)	2.66 (0.45)
	2nd contact	66 (38.8%)	57 (33.5%)	
	3rd contact	53 (31.2%)	50 (29.4%)	
	4th contact and above	29 (17.1%)	31 (18.2%)	
Number of births[a]	1	11 (6.9%)	8 (5.0%)	4.23 (0.24)
	2	37 (23.3%)	32 (20.0%)	
	3	52 (32.7%)	70 (43.8%)	
	4 or more	59 (37.1%)	50 (31.2%)	
Health insurance	Yes	30 (17.6%)	28 (16.5%)	0.02 (0.88)
	No	140 (82.4%)	142 (83.5%)	
Type of pregnancy	Planned	118 (69.4%)	89 (52.4%)	**9.7 (0.002*)**
	Unplanned	52 (30.6%)	81 (47.6%)	
Sex of service provider	Male	106 (62.4%)	46 (27.1%)	**41.4 (0.00*)**
	Female	64 (37.6%)	124 (72.9%)	

Table 2. Obstetric characteristics of respondents in private and public health facilities in the West Hararghe Zone, Oromia, Eastern Ethiopia, 2020 (n = 340). All totals equal 340 except where noted by an [a]; these have a total of < 340 due to missing data.

facilities had enough trained staff. All public health facilities had ANC guidelines, whereas five private health facilities had ANC guidelines.

Quality of antenatal care

The overall quality of antenatal care among pregnant women who had ANC contact at health facilities was 51.5% [95% CI 46.6, 56.8%]. The quality of antenatal care in the domain of effective communication among pregnant women was 50.6% [95% CI 45.3, 56.2%]. The quality of antenatal care in the domain of respect and dignity among pregnant women accounted for 60.6% [95% CI 55.2%, 65.7%]. Moreover, the quality of antenatal care in the domain of supportive care among pregnant women accounted for 52.9% [95% CI 47.9, 58.5%] Fig. 2.

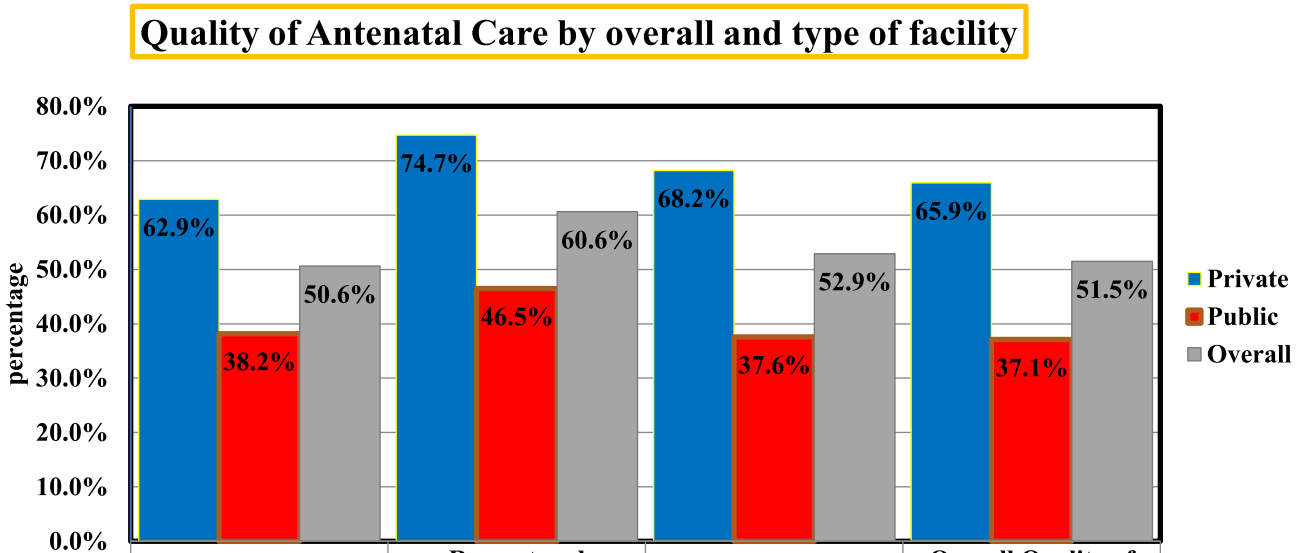
Factors associated with the quality of antenatal care

The results of the bivariate analysis revealed that respondent residency, level of education, level of partner education, occupational status, level of income, having a self or household member in a health facility, experiencing domestic violence, pregnancy status, level of participation in household decisions, having pregnancy complications, having prior ANC contact and facility delivery, number of ANC contacts, having health insurance and type of health facility were significantly associated with the quality of antenatal care (p value ≤ 0.05). The results of the multivariable logistic analysis revealed that respondent's residency, level of income, type of pregnancy, and type of facility were significantly associated with the quality of antenatal care (p value ≤ 0.05).

The odds of high-quality antenatal care were 11.1 times [AOR: 11.1, 95% CI 3.12, 39.6] greater among women who came from urban areas than among women who came from rural areas. Those respondents who had an average family monthly income of greater than 3000 Ethiopian birrs were 9.7 times [AOR = 9.7 (95% CI 2.85, 33.05)] more likely to have high-quality antenatal care than those who had an average family monthly income of less than or equal to 3000 Ethiopian birrs. Compared with respondents who had an unplanned pregnancy, those who had planned pregnancies had 12.7 times [AOR = 12.7 (95% CI 3.5, 46.2)] greater odds of receiving quality antenatal care. The odds of high-quality antenatal care were 4.2 times [AOR: 4.2, (95% CI 1.45, 12.43)] greater among women who had ANC contact at private health facilities than among women who had ANC contact at public health facilities Table 3.

Discussion

This study is the first to assess the quality of ANC and its associated factors among pregnant women attending ANC at health facilities in the Western Hararghe Zone, Oromia, Ethiopia, using the WHO Quality of Care framework, with a particular focus on experience of care and structural dimensions. Almost half of the respondents who attended ANC at both private and public health facilities had received low-quality ANC. However, the quality of ANC at private health facilities was better than that at public health facilities. Concerning the specific domains of quality of ANC, the domains of effective communication had relatively low quality, followed by supportive care, respect, and dignity. This study found that health facilities had limited availability



	Communication	Respect and dignity	Support	Overall Quality of ANC
Private	62.9%	74.7%	68.2%	65.9%
Public	38.2%	46.5%	37.6%	37.1%
Overall	50.6%	60.6%	52.9%	51.5%

Fig. 2. Quality of ANC among pregnant women in western Hararghe, Oromia, Ethiopia, 2020.

of infrastructure and diagnostic equipment such as ultrasounds. Residency, level of income, type of pregnancy, and type of facility were the factors that influenced the quality of ANC. The findings highlight disparities in the quality of ANC between private and public facilities, influenced by key structural and experience of care dimensions. Understanding the implications of these findings is critical in ensuring equitable, high-quality ANC services, particularly in resource-limited settings.

The quality of ANC among women who attended ANC at health facilities was 51.5% (95% CI 46.2–57.1%). This suggests poor pregnancy experience of care that did not consider women's preferences, needs, and aspirations. The consequences of this kind of care, which is not person-centred care, not only deprive or violate human rights but also have a devastating impact on maternal and newborn outcomes[1,8,33]. This finding was consistent with findings from Ethiopian public health facilities regarding respectful maternity care (57%)[34]. However, this finding was higher than a study conducted in Eastern Ethiopia (38.4%), Southeast Nigeria (25%) and lower than a study on respectfully focused ANC in Shashemene hospitals, Ethiopia (63%), North Eastern Ethiopia (64.5%), Kenya and India (62–66.9%)[20,21,27,35,36]. These variations could be attributed to various factors such as differences in measurement tools and operational definitions and socioeconomic disparities.

Moreover, findings from structural attributes of the quality of ANC in this study further explain the variations in quality of care between health facilities across different settings. This reveals that while both public and private health facilities generally had essential drugs available, critical diagnostic tools such as ultrasound were more available in private facilities, with six out of seven private facilities having functional ultrasound compared to only two out of seven in public facilities. Furthermore, while infrastructure and equipment were available in most facilities, the availability of client amenities, such as waiting areas varied between facilities. Additionally, five private facilities had a good working environment compared to only three public facilities. This underscores the need for health facilities with better infrastructure, diagnostic capacity, and a well-trained and motivated health workforce to ensure higher quality of ANC[8,12,37,38].

The quality of ANC among pregnant women attending ANC facilities at private health facilities was 65.9% [95% CI 58.2, 73.2%] compared to 37.1% [95% CI 29.4, 44.1%] for public health facilities. This implies that there is a prominent variation between private and public health facilities, which can be explained by the structural attributes of the quality of ANC from this study's findings, where private facilities demonstrated superior structural capacity, critical for high-quality ANC. In this study, six out of seven private facilities had ultrasound access, compared to two in seven public facilities. This diagnostic advantage enables early identification of high-risk pregnancies, a cornerstone of quality of care. Public facilities also lacked essential drugs and poor working environments such as adequate waiting areas, which eroded staff morale and adherence to protocols[38,39]. These disparities between private and public health facilities in the experience of care for pregnant women could be further explained by the health care provider behaviour implicit biases and burnout, socio-economic and cultural biases and high client loads, lack of client amenities under resource-limited settings like western Hararghe, Ethiopia[5,6,37–42]. These inequities eventually resulted in divergence within groups and societies that hampered universal health coverage to achieve SDGs, with the slogan of "NO ONE IS LEFT BEHIND"[12,13,43]. In addition, this implies that women's right to equality, freedom from discrimination, and equitable care, which

Variable	Categories	Quality of ANC		COR (95% CI)	AOR (95% CI)
		Low ANC	High ANC		
Residence	Urban	29 (16.4%)	148 (83.6%)	**25.7 [14.5, 45.6]*****	**11.1 [3.12, 39.6]*****
	Rural	136 (83.4%)	27 (16.6%)	Ref	Ref
Education	Not attend. Formal educ	34 (91.9%)	3 (8.1%)	Ref	Ref
	Literate	131 (43.2%)	172 (56.8%)	**14.9 [4.5, 49.5]*****	2.2 [0.24, 19.5]
Partner's Education	Not attend. Formal educ	34 (81.0%)	8 (19.0%)	Ref	Ref
	Literate	131 (44.0%)	167 (56.0%)	**5.4 [2.4, 12.1]*****	0.44 [0.09, 2.25]
Occupation	Occup. With low income	142 (66%)	73 (34%)	Ref	Ref
	Occup. With high income	23 (18.4%)	102 (81.6%)	**8.6 [5.06,14.7]*****	1.1[0.3, 3.6]
Level of income	≤3000	149 (85.1%)	26 (14.9%)	Ref	Ref
	>3000	16 (9.7%)	149 (90.3%)	**53.4 [27.5, 103]*****	**9.7 [2.85, 33.05]*****
Household member facility	Yes	2 (8.3%)	22 (91.7%)	11.72 [2.7, 50.7]*	3.5 [0.21, 59.8]
	No	163 (51.6%)	153 (48.4%)	Ref	Ref
Domestic violence	Yes	106 (84.8%)	19 (15.2%)	**0.07 [0.04, 0.12]*****	0.38 [0.08, 1.9]
	No	59 (27.4%)	156 (72.6%)	Ref	Ref
Participation in household decisions	Low	132 (87.4%)	19 (12.6%)	Ref	Ref
	High	33 (17.5%)	156 (82.5%)	**32.8 [17.8, 60.4]*****	0.94 [0.2, 4.45]
Pregnancy complications[a]	Yes	94 (69.1%)	42 (30.9%)	**0.25 [0.15, 0.39]*****	0.58 [0.17, 2.01]
	No	65 (35.5%)	118 (64.5%)	Ref	Ref
Received ANC in recent pregnancy[a]	Yes	33 (20.1%)	131 (79.9%)	**17.2 [9.9, 30.1]*****	1.86 [0 0.53,6.53]
	No	126 (81.3%)	29 (18.7%)	Ref	Ref
Recent facility delivery[a]	Yes	56 (30.3%)	129 (69.7%)	**7.6 [4.6, 12.7]*****	0.72 [0.18, 2.88]
	No	103 (76.9%)	31 (23.1%)	Ref	Ref
Number of ANC contact	1st contact	45 (83.3%)	9 (16.7%)	Ref	Ref
	2nd contact	74 (60.2%)	49 (39.8%)	**3.3 [1.48, 7.4]*****	0.68 [0.1, 4.3]
	3rd contact	33 (32.0%)	70 (68.0%)	**10.61 [4.64, 24.2]***	1.46 [0.2, 9.6]
	4th contact and above	13 (21.7%)	47 (78.3%)	**18.1 [7.04, 46.4]*****	2.66 [0.3, 22.5]
Health insurance	Yes	10 (17.2%)	48 (82.8%)	**5.86 [2.8, 12.04]*****	2.78 [0.45, 17.16]
	No	155 (55.0%)	127 (45.0%)	Ref	Ref
Type of pregnancy	Planned	43 (20.8%)	164 (79.2%)	**42.3 [20.9, 85]******	**12.7 [3.5, 46.2]*****
	Unplanned	122 (91.7%)	11 (8.3%)	Ref	Ref
Type of health facility	Private	58 (34.1%)	112 (65.9%)	**3.28 [2.1, 5.1]*****	**4.1 [1.45, 11.6]****
	Public	107 (62.9%)	63 (37.1%)	Ref	Ref

Table 3. Bivariable and multivariable logistic regression of the quality of antenatal care among women attending ANC at health facilities in the Western Hararghe Zone, Oromia, Ethiopia, 2020. Ref = Reference, statistically significant at *(P ≤ 0.05); **(P ≤ 0.01); ***(P ≤ 0.001); All totals equal 340 except those noted by an [a]; these have a total of < 340 due to missing data. Occup. with low income: house wife, farmer, and student; Occup. with high income: merchant and government employee. Significant values are in bold.

is stated in Article 5 of the WRA as a respectful maternity charter, is violated[33,44]. This finding is consistent with a study conducted in eastern Ethiopia, which reported rates of 58.1% and 35.1% for private and public health facilities, respectively[27]. These variations are also reported in other studies, where private health facilities have offered better quality of care compared to public health facilities[6,37,45]. These disparities in quality of ANC between private and public facilities underscore systemic inequities that must be addressed to achieve equity and reduce maternal mortality.

In the domain of effective communication, the quality of antenatal care among pregnant women attending ANC at health facilities was 50.6% [95% CI 45.3, 56.2%]. This finding was consistent with those of studies conducted in Northeast Ethiopia, Enugu Nigeria, and low- and middle-income countries[20,46,47]. The quality of antenatal care in the domain of effective communication at private health facilities accounted for 62.9% [95% CI 55, 70%] of all facilities, whereas it accounted for 38.2% [95% CI 30.6, 45.9%] in public health facilities. In resource-limited settings like Western Hararghe, Ethiopia. The low score in effective communication may be attributed to the reason that the dynamics of the healthcare service delivery system differ clearly between private and public health facilities. Private facilities often prioritize effective communication as a strategic approach to ensure quality, retain clients, and sustain their financial viability. On the contrary, public facilities often face significant bottlenecks such as high client loads, low wages for providers, and increased workload and burnout which often result in poor client-provider interactions. This highlights how economic incentives and systemic pressures influence effective communication. Additionally, socioeconomic, and urban biases may influence the providers to prioritize clients perceived as more compliant, affluent, wealthy and educated[42,48]. This

poor communication during pregnancy eventually not only diminishes client trust but also leads to inadequate knowledge about pregnancy complications, deters women from seeking facility-based care and perpetuates the existing disparities[18,38,40,42,49]. These disparities underscore the need for provider communication training and systemic reforms to promote accountability and person-centred care models.

In the domain of respect and dignity, the quality of antenatal care among pregnant women at health facilities represented 60.6% [95% CI 55.2%, 65.7%]. This implies that for approximately 6 in 10 women, the violation of article 4, which protects women's right to be treated with dignity and respect, is violated[44]. The quality of antenatal care in the domain of respect and dignity among women who attended ANC at private health facilities was 74.7% [95% CI 67.6, 80.9%], whereas that among women who attended ANC at public health facilities was 46.5% [95% CI 38.2, 54.7%]. These findings support existing evidence of widespread maternal rights violations in public facilities in low-resource settings[5,17]. These disparities could be attributed to poor provider attitudes, overcrowding, and limited resources[40]. Women who had ANC contact at private health facilities relatively receive respectful and dignified care driven by a strong institutional culture and economic benefit prioritizing client satisfaction. These variations highlight the need for structured training in respectful maternity care and enforceable accountability mechanisms particularly in public health facilities is crucial for improving maternal experiences, adherence to ANC, and ultimately, maternal and neonatal outcomes[50].

The quality of ANC in the domain of supportive care among pregnant women at health facilities accounted for 52.9% [95% CI 47.9, 58.5%]. This implies that almost half of the respondents are not routinely provided with mother-baby-family maternity care and are offered continuous support, which in turn results in a decrease in women's desire to seek care in the future[41,51]. Moreover, this aligns with findings from other LMICs, where lack of continuous maternity care discourages future health-seeking behaviours and contributes to lower facility-based delivery rates, thereby increasing the vulnerability of mothers to developing maternal and newborn complications[5,12,13,40]. The quality of ANC in the domain of supportive care in private health facilities was 68.2% [95% CI 61.2, 74.7%], whereas that in public health facilities was 37.6% [95% CI 30.9, 45%]. This contradicts the latest WHO ANC guidelines, which underscore the importance of providing relevant and timely information and psychosocial and emotional support within a well-functioning health system[1,6]. The quality of supportive care during ANC showed minimal differences between private and public facilities, with overall low performance even in private settings. This may reflect inconsistent access to supplies and diagnostics like ultrasound, as well as poor working conditions that contribute to provider stress and burnout—factors that ultimately diminish maternal satisfaction and pregnancy experiences[8,18,49].

The odds of high-quality ANC were 11.1 times [AOR: 11.1, 95% CI 3.12, 39.6] greater among women who came from urban areas than among women who came from their counterparts. This was consistent with the findings of a study conducted in northeastern Ethiopia, where mothers living in rural areas had PCMC scores that were four times lower than those of mothers living in urban areas, and studies conducted in India[20,52]. This finding is also consistent with studies in low- and middle-income countries and Kenya, where those who reside in urban areas are positively associated with the highest PCMC scores[21,37]. This implies that there are significant disparities in positive experiences of care between rural and urban areas given that women in urban areas are more empowered to advocate for themselves and have increased access to communication and information about positive experiences of care[53,54].

Respondents who had an average monthly income greater than 3000 Ethiopian birrs were 9.7 times [AOR = 9.7 (95% CI 2.85, 33.05)] more likely to have a high quality of ANC than those who had an average family monthly income of less than or equal to 3000 Ethiopian birrs. This was consistent with the findings of a study conducted in eastern Ethiopia, where mothers with average monthly incomes ≤ 3000 Ethiopian birrs had a sixfold lower PCMC score than mothers with average monthly incomes greater than 3000 Ethiopian birrs did (β = − 6.19, 95% CI − 9.40–3.04)[27]. This was also consistent with respondents who had an average family monthly income of less than or equal to 3000 Ethiopian birrs and were 3.16 [AOR = 3.16 (95% CI 1.52–6.57)] times more likely to experience abuse during ANC than those who had an average family income of more than 3000 Ethiopian birrs[35]. This suggests that women who are employed and wealthier have the resources to access facilities that provide higher quality care and differential positive treatment from providers [53]. Furthermore, this implies that marginalized groups of women, such as those in low-income groups, receive low-quality of ANC[5].

Compared with respondents who had an unplanned pregnancy, those who had planned pregnancy were 12.7 times [AOR = 12.7 (95% CI 3.5, 46.2)] more likely to have high-quality ANC. This study was consistent with the findings of Shashamane Hospital, Ethiopia, where respondents who had unplanned pregnancies were 9.9 [AOR = 9.90 (95% CI 3.48–8.16)] times more likely to experience violence during ANC than those who had planned pregnancies[35]. This implies that the stability of a woman's relationships and social environment can influence the quality of ANC. The study in Bangladesh also reported that if the pregnancy is unplanned, the woman could experience uncertainty about whether to proceed with the pregnancy[45].

The odds of high-quality ANC were 4.2 times [AOR: 4.2, (95% CI 1.45, 12.43)] greater among women who had ANC contact at private health facilities than among women who had ANC contact at public health facilities. This was also consistent with studies conducted in other parts of Ethiopia and other corners of the world[20,27,55]. This hampered the goal of attaining a new global target of zero preventable maternal deaths by 2030, in which equity care is crucial to close the disparities within the facility[37,43]. This suggests the need for targeted interventions to reduce economic disparities and improve the quality of ANC across socioeconomic groups.

This study could suffer from social desirability bias, as women may not want to report negative experiences when interviewed at the facility due to fear of retaliation. Despite these limitations, the study also has strengths, such as assessing experiences of care and structural dimensions using a WHO quality of care framework. The data used in this analysis were collected via systematic random sampling; therefore, the findings can be generalized to the whole population. Another strength of this study is the assessment of the quality of ANC by including structural attributes of the quality of antenatal care as cross-cutting issues. The quality of ANC between private

and public health facilities was compared via subgroup analysis. The use of composite measures enabled us to assess multiple aspects of the quality of ANC on a continuum.

Conclusions

The quality of ANC is low among pregnant women attending ANC at health facilities in the western Hararghe Zone, Ethiopia. However, the quality of ANC at private health facilities was significantly better than the public health facilities. The domains of effective communication had relatively low quality, followed by supportive care, respect, and dignity. The availability of functional diagnostic material, particularly ultrasound, is lacking at public health facilities. In contrast, many private health facilities have ultrasound access. Rural residency, level of income, type of pregnancy, and type of facility were the factors that were significantly associated with the quality of ANC. The findings of this study revealed the critical gaps in the quality of ANC in both the experience of care and structural components of ANC in the Western Hararghe Zone, Ethiopia, particularly in public health facilities. Hence, improving the quality of ANC requires a dual focus on structural attributes of ANC and positive pregnancy experience through equity-driven, integrated and person-centered interventions. Investing in public health infrastructure, expanding financial support for ANC access, strengthening provider training, and integrating community-based service delivery models are crucial for the quality of ANC. To address disparities in the quality of ANC, it is critical to deploy mobile ultrasound units to rural public healthcare facilities. Systemic reforms should include integrating structural indicators from the WHO's Quality of Care Framework-such as ultrasound availability and staff-to-client ratios and experience indicators, such as effective communication and client decision-making autonomy, into Ethiopia's Health Management Information System (HMIS) to ensure accountability. Additionally, piloting pro-poor subsidy programs to enable rural women to access private ANC services would help women having socioeconomic barriers. Researchers need to focus on implementation research, which encompasses both provisions of care and experience of care dimensions of quality of ANC, which even include provider and women's perspectives. Moreover, developing a standardized validated tool helps to assess the quality of ANC is needed. Thorough implementation studies that are designed to capture macro and micro-level contributors to the quality of ANC, and provider behaviour studies need to be conducted to inform evidence-driven actions to eliminate the poor quality of ANC in Ethiopia.

Data availability

The datasets used for this study are available from the corresponding author upon reasonable request. All supplementary information files are included in this manuscript.

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Author contributions

HS, GF and KG made substantial contributions to the conception and design of the survey. HS designed the study; participated in data collection, analysis, interpretation, and writing; drafted the manuscript; and critically revised it. GF participated in the study design, analysis, and interpretation and critically revised the manuscript. KG participated in the study design, analysis, and interpretation; drafted the manuscript; and critically revised the manuscript. HS prepared Fig. 1 and Fig. 2. All the authors read and approved the final manuscript.

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Declarations

Competing interests

The authors declare no competing interests.

Additional information

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