

## Research Article

# Quality of Focused Antenatal Care Laboratory Services Provided at Public Health Facilities in Addis Ababa, Ethiopia

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## ABSTRACT

**Back ground:** Focused Antenatal Care (FANC) laboratory service is critical to identify life threatening conditions of maternal and child health. This study aimed to assess the quality of focused antenatal care laboratory services provided at public health facilities in Addis Ababa, Ethiopia.

**Methods:** Institutional based, cross-sectional study was conducted from April to May 2015. A total of 422 clients were taken for exit-interview about their satisfaction towards FANC laboratory services. This study supported by in-depth interview of laboratory services providers. Structured checklists were used to assess infrastructures of the laboratories. Data was computerized using Epi-info software and analysed using SPSS version 20 software. Logistic regression model was used to examine the effect of selected variables on clients' satisfaction with laboratory services. P-Value less than 0.05 were taken as statistically significant. The qualitative data was thematically analyzed.

**Result:** Of 422 pregnant mothers involved in this study, 56.9% (240/422) satisfied with FANC laboratory services, 44.8% (189/422) claimed that all ordered laboratory tests not available and 2.6% (11/422) missed laboratory investigation in previous due to unavailability of test request order in their antenatal care follow up centre. Clients who got FANC laboratory services from hospitals were two times more satisfied than those who got FANC laboratory services from health centres [AOR=2.64; CI (1.45-4.81)]. Of 422 mothers, 28.9% (122/422) were sent to private laboratories for FANC laboratory investigation, from these 7.1% (30/422) were missed from their appointment for FANC follow up due to shortage of money to pay for FANC laboratory investigation services in private facilities. Of 13 visited laboratories, 9 (69.2%), 6 (46.2%) and 13 (100.0%) performed Internal Quality Control (IQC) for HIV, Hemoglobin (CBC), and VDRL tests, respectively. The remaining all basic

FANC tests were run without IQC.

**Conclusion:** In this study the quality of focused antenatal care laboratory services was unsatisfactory. Shortage of supplies including all type of basic FANC reagents, IQC materials, limited IEQA participation and unavailability of basic FANC

**List of abbreviations:** ANC (Ante Natal Care); AOR (Adjusted Odds Ratio); FANC (Focused Ante Natal Care); HGB (Haemoglobin); HIV (Human Immune Virus); IEQAS (International External Quality Assurance Schemes); IQC (Internal Quality Control); REQAS (Regional External Quality Assurance Schemes); SOP (Standard Operating Procedures); SPSS (Statistical Package for Social Sciences); STI (Sexually Transmitted Infections); TB (Tuberculosis); TAT (Turn Around Time); WHO (World Health Organization).

## Introduction

Focused antenatal care (FANC) is the care of the woman during pregnancy. The primary aim of FANC is to promote and protect the health of women and their unborn babies during pregnancy [1]. The provision of quality maternal basic services is safe, simple and cost-effective interventions. Some studies have estimated that FANC alone can reduce maternal mortality by 20% [2,3]. All pregnant women should receive at least basic FANC laboratory services to early identify pregnancy related health complications and other potential problems that affect the outcomes of pregnancy [3-5].

In order to decrease maternal morbidity and mortality, strong health systems, accessible, available and satisfactory cares are needed. As a way of promoting safe motherhood and better outcomes for newborns, FANC laboratory screening services such as hemoglobin estimation for early diagnosis of anemia, HIV, syphilis and malaria tests can be carried out at health-care laboratories [1,6]. However, the limited capacity of health facilities in developing countries to provide adequate laboratory services remains a major problem for the quality of FANC delivers. FANC laboratory services in study setting are hampered by supply shortage, and equipment failure. In addition, the way health workers treat the mothers (mistreatment), the time taken to get FANC service (long waiting time, long time to get laboratory tests and obtain results), and client load to the health facilities are among the barriers that contribute to the low utilization of FANC services in Addis Ababa [7]. This may be challenges to screen pregnancy related complication. As result mothers might be dissatisfied by the service that is being delivered by health facilities.

Quality of FANC can be monitored through the content of services and womens' perception about quality of care received during their visits. The concept of clients' satisfaction is widely used to assess quality. There is a strong connection between health service quality perceptions and customer satisfaction. Therefore having customer satisfaction directly contributes to them experiencing quality, and naturally experiencing quality also leads to customer satisfaction [8,9]. Quality FANC services play an important role in the mothers' decision about whether

laboratory services severely truncated the quality of FANC laboratory services, which leading to mothers dissatisfied, delays in seeking and obtaining FANC services.

**Keywords:** FANC; Laboratory services; Clients; Satisfaction; Addis Ababa; Ethiopia

or not to return for further visits. This study aimed to assess the quality of FANC laboratory services provided at public health facilities in Addis Ababa, Ethiopia.

## Methods

### Study setting and context

Institutional based, cross-sectional study was conducted from April and May, 2015. A total of 422 clients were taken for exit-interview about their satisfaction towards FANC laboratory services. This study supported by in depth interview of laboratory services providers. Structure checklists were used to assess the laboratories infrastructures. The study was conducted in Addis Ababa, which is the capital city of Ethiopia. Even though the city health service coverage has increased over time to an estimated 100%, the maternal health laboratory services are under question, particularly laboratory supplies shortage is the major challenge to screen pregnant women [10]. Regarding FANC services, at the time of this assessment, only 6 hospitals and 74 health centres which providing FANC service at public health facilities in Addis Ababa. This study was conducted in 10 health centres and 3 public hospitals which have been providing FANC services for pregnant mothers.

### Sample size and sampling procedure

The sample size for quantitative study was determined by using a single population formula, based on the assumption that 50% of clients' attending in FANC laboratories services are satisfied (which gives maximum sample size due to the absence of previous similar study). The initial sample size was 384, however, considering 10% non-response rate the final sample size was 422. Respondents in each health facilities were selected by using systematic random sampling method. The interval of the respondents for the interview were determined by dividing the average total number of pregnant mothers (2563) per month who received FANC laboratory services at 13 health facilities during the year 2015, by the required sample size for the study. Therefore, every 6th pregnant mothers were selected for the interview at each health facility from FANC record books, they referred to laboratory. Simple random sampling technique was employed to select the first mothers. In addition, Health institutions were selected using simple random sampling with the plan of obtaining three hospitals from six public hospitals and ten health centres (one from each sub-city). For in-depth interview a total of 13 laboratory services providers (one from each selected study health facilities) were purposively selected for interviewing based on the purpose and the need of issue being raised.

### Data collection tool and procedures

Data was collected *via* face to face interview using pre-

tested structured questionnaires for pregnant mothers when they finished their laboratory examination and return to ANC clinic during the study period. The questionnaire was developed after reviewing relevant literatures [11-18]. The questionnaire was pre-tested over 5% of the sample size in two health facilities (one hospital and health center) out of the study site to ensure that it was clear for respondents. After pre-test, some modification of the questioner was made for unclear and difficult question. The pre-test participants were not included in the analysis of this study.

### Data management and statistical analysis

Standardized 5-point Likert's scale rating of very dissatisfied (1-point), dissatisfied (2-points), neutral (3-points), satisfied (4-points) and very satisfied (5points) was employed. Clients' satisfaction were classified, in to two categories satisfied and dissatisfied by using cut of point calculated using the demarcation threshold formula  $\{ (Total\ highest\ score - Total\ lowest\ score) / 2 \} + Total\ lowest\ score$  [11-14]. Internal consistency was checked using Cronbach's alpha coefficient and it has found to be 0.89 (cronbach's alpha coefficient > 0.7 is acceptable) [19]. Data was computerized using Epi-info software and analysed using SPSS version 20 software. Descriptive numerical summaries were used to present the findings of basic AFNC laboratories assessment and mothers' satisfaction in each satisfaction indicators. The qualitative data was thematically analyzed. Bivariate and Multivariate logistic regression model using Odds Ratio (OR) with a 95% Confidence Interval (CI) were calculated to predict the factors which influence the level of satisfaction with FANC laboratory services. P-Value less than 0.05 were taken as statistically significant.

### Operational definition

Basic FANC laboratory testes: Blood group, Rhesus status (Rh), Hemoglobin, HIV test, Urine test for sugar, keteon and albumin, Stool examination for intestinal parasite, Rapid syphilis (RPR) test, Hepatitis B virus screening test and Blood glucose test.

Quality Focused antenatal care laboratory services: When clients get satisfied (score more than or equal to cut point) and the health facility laboratories have all type basic FANC laboratory tests and enough equipments, reagents and others supplies to provide focused antenatal care laboratory services consider as good quality but client's less than cut point value and incomplete basic FANC laboratory services consider as poor quality.

## Result

### Socio-demographic characteristics

A total of 422 pregnant mothers were involved in this study. Among these, 204 (48.3%) were from three public hospitals, the remaining 218 (51.7%) from ten health centres. Of 422 pregnant mothers, 211 (50.0%) were in the age group of 18-27 years, 393 (93.1%) were married, 239 (56.6%) had family monthly income between 500-1000 Ethiopian Birr, 142 (33.6%) had attended secondary school education, and 241 (57.1%) were housewife (Table 1).

**Table 1:** Socio demographic characteristics of respondents on pregnant mothers' satisfaction with Focused Antenatal Care laboratory services received at public health facilities in Addis Ababa, Ethiopia (n=422).

Variables	Frequency	Percentage (%)	
<b>Age group in year</b>	18-27	211	50.0
	28-37	204	48.3
	37 above	7	1.7
	<b>Total</b>	<b>422</b>	<b>100</b>
<b>Marital Status</b>	Single	14	3.3
	Married	393	93.1
	Divorced	2	0.5
	Widowed	1	0.2
	Cohabitation	10	2.4
	No response	2	0.5
	<b>Total</b>	<b>422</b>	<b>100</b>
<b>Educational status</b>	Illiterate	41	9.7
	Read and write	29	6.9
	Primary school	99	23.5
	Secondary school	142	33.6
	College and above	111	26.3
<b>Total</b>	<b>422</b>	<b>100</b>	
<b>Current living place</b>	Addis Ababa	402	95.3
	Out of Addis Ababa	20	4.7
	<b>Total</b>	<b>422</b>	<b>100</b>
<b>Occupation status</b>	Housewife	241	57.1
	Employed self	82	19.4
	Employed [wedge]	60	14.2
	Jobless	28	6.6
	Student	11	2.9
	<b>Total</b>	<b>422</b>	<b>100</b>
<b>Income class</b>	Less than 500 ETB	20	4.7
	500-1000 ETB	239	56.6
	Over 1000	151	35.8
	None response	12	2.8
	<b>Total</b>	<b>422</b>	<b>100</b>

ETB=Ethiopian birr=1 USD ~27ETB

### Satisfaction level of pregnant mothers with FANC laboratory services

The demarcation threshold for overall satisfaction was found to be 43.3. One hundred and eighty-two (43.1%) of the clients scored below the demarcation threshold level of satisfaction (dissatisfied) and the rest 240 (56.9%) clients scored 43.3 and above the demarcation threshold level considered as they were satisfied with FANC laboratory services. Of 422 mothers, 339 (80.3%) and 345 (81.8%) were satisfied with measures taken by health care providers to keep confidentiality, cleanliness and comfort of waiting area, respectively, and 311 (73.7%) were satisfied by service providers' behaviours. On the other hand, 181 (42.9%), 187 (44.3%) and 189 (44.8%) of study participant were dissatisfied by completeness of information when and how to collect specimen outside the laboratory, completeness of information when and how clients receive laboratory results and claimed that all ordered laboratory tests were not available in the laboratory, respectively (Table 2).

Of 422 mothers, 11 (2.6%) mothers missed laboratory investigation in previous, due to unavailability of tests request order in their FANC follow up Centre and 122 (28.9%) were sent to private laboratories for FANC laboratory investigation,

from these 30 (7.1%) mothers missed from their appointment for FANC follow up due to shortage of money to pay for FANC laboratory investigation services in private facilities (Tables 3 and 4).

**Table 2:** Level of satisfaction of pregnant mothers' towards focused antenatal care laboratory services received at public health facilities Addis Ababa, Ethiopia.

Variables	Very Satisfied F (%)	Satisfied F (%)	Neutral F (%)	Dissatisfy F (%)	Very Dissatisfy F (%)	Average Level of satisfaction
Ability of the Laboratory person to answer questions	150 (35.5)	233 (55.2)	27 (6.4)	8 (1.9)	4 (0.9)	383 (90.8)
Cleanness and comfort of waiting area	105 (24.9)	240 (56.9)	67 (15.9)	9 (2.1)	1 (0.2)	345 (81.8)
Availability of laboratory staff on working hours	120 (28.4)	241 (57.1)	37 (8.8)	24 (5.7)	0 (0)	361 (85.5)
Respect and courtesy	82 (19.4)	229 (54.3)	93 (22.0)	18 (4.3)	0 (0)	311 (73.7)
Privacy during blood drawing	99 (23.5)	154 (36.5)	115 (27.3)	54 (12.8)	0 (0)	253 (60)
Information on how and when to collect specimen	54 (12.8)	127 (30.1)	153 (36.3)	87 (20.6)	1 (0.2)	181 (42.9)
Latrine accessibility and availability	35 (8.3)	156 (37.0)	104 (24.6)	121 (28.7)	6 (1.4)	194 (45.3)
Information on how and when to receive laboratory result	57 (13.5)	130 (30.8)	128 (30.3)	96 (22.7)	11 (2.6)	187 (44.3)
Confidentiality measure	140 (33.2)	199 (47.2)	77 (18.2)	6 (1.4)	0 (0)	339 (80.3)
unavailability of ordered test	40 (9.5)	151 (35.8)	117 (27.7)	109 (25.8)	5 (1.2)	189 (44.8)
Cleanliness of blood drawing area	109 (25.8)	188 (44.5)	98 (23.2)	26 (6.2)	1 (.2)	297 (70.4)
Over all laboratory service satisfaction	70 (16.6)	177 (41.9)	114 (27.0)	53 (12.6)	8 (1.9)	247 (58.5)

**Table 3:** Factors affecting overall satisfaction of clients with focused antenatal care laboratory services received at public health facilities Addis Ababa, Ethiopia. April to May, 2015.

Variables		Satisfied	Dissatisfied	Total f (%)	X <sup>2</sup>	df	P-Value
Waiting time to give laboratory specimen	<30 minutes	180	64	244 (57.8)	67.9	3	0.00
	30minutes-1 hour	47	91	138 (32.7)			
	1hours-2 hours	9	15	24 (5.7)			
	>2 hours	4	12	16 (3.8)			
Number of needle stick	Only one time	207	140	347 (82.3)	14.2	3	0.03
	Two times	23	16	39 (9.2)			
	Three times	10	26	36 (8.5)			
Bruise development due to phlebotomy	No	212	147	359 (85.1)	4.6	1	0.03
	Yes	28	35	63 (14.9)			
provision of information on how to lessen bruise	No	170	132	302 (71.6)	0.15	1	0.70
	Yes	70	50	120 (28.4)			
Turn Around Time	<1 hour	132	15	147 (34.8)	121	2	0.00
	1 hour-2 hours	91	95	186 (44.1)			
	>2 hours	17	72	89 (21.1)			
Availability of ordered test.	No	78	111	189 (44.8)	32.9	1	0.00
	Yes	162	71	233 (55.2)			
Clients referral to private laboratories	No	209	91	300 (71.1)	69.3	1	0.00
	Yes	31	91	122 (28.9)			
Miss/withdraw any Appointment due to shortage of money	No	21	71	92 (21.8)	70.3	2	0.00
	Yes	10	20	30 (7.1)			
Mothers willing to visit and recommended to others mothers	No	9	36	45 (10.7)	51.8	1	0.00
	Yes	237	140	377 (89.3)			

**Table 4:** Determinants on satisfaction of clients towards focused antenatal care laboratory services received at public health facilities in Addis Ababa, Ethiopia. April to May, 2015.

Variables	Overall satisfaction		Crude Odds Ratio (95%CI)	P-value	Adjusted OR (95%CI)	P-value
	Sat (No)	Diss. (No)				
<b>Facility type</b>						
Health centre	81	137	1			
Hospital	159	45	5.98 (3.89, 9.19)	0.00	2.64 (1.45, 4.81)	0.00**
<b>Age group in year</b>						
18-27	128	83	1			
28-37	110	94	0.76 (0.51, 1.12)	0.16	0.90 (0.51, 1.62)	0.73
37 and above	2	5	0.26 (0.05, 1.37)	0.11	0.62 (0.06, 6.90)	0.70
<b>Educational status</b>						
Illiterate	27	14	1			
Read and write	20	9	1.15 (0.42, 3.18)	0.78	0.89 (0.24, 3.38)	0.88
Primary school	56	43	0.67 (0.32, 1.44)	0.31	0.67 (0.25, 1.83)	0.44
Secondary school	88	54	0.84 (0.41, 1.75)	0.65	0.91 (0.35, 2.40)	0.85
College and above	49	62	0.41 (0.19, 0.86)	0.04	0.51 (0.18, 1.46)	0.21
<b>Marital status</b>						
Single	10	4	1			
Married	222	171	0.52 (0.16, 1.68)	0.27	0.62 (0.12, 3.270)	0.57
Cohabitation	5	5	0.40 (0.73, 2.18)	0.29	0.79 (0.00, 1.30)	0.95
Others	3	2	0.40 (0.02, 8.07)	0.55	0.12 (0.01, 1.22)	0.72
<b>Economic status</b>						
Less than 1000	165	94	1			
Over 1000	68	83	0.47 (0.31, 0.70)	0.00	0.84 (0.43, 1.65)	0.51
<b>Waiting time to give laboratory specimen</b>						
>30 minutes	52	116	1			
<30minutes	188	66	6.35 (4.13, 9.77)	0.00	2.61 (1.47, 4.65)	0.00**
<b>Provision of information on how to lessen the possible bruise</b>						
No	170	132	1			
Yes	70	50	1.09 (0.71, 1.67)	0.72	1.41 (0.74, 2.68)	0.29
<b>Availability of place in blood drawing room to put client material</b>						
No	168	159	1			
Yes	72	23	2.96 (1.77, 4.97)	0.00	3.58 (1.75, 7.33)	0.00**
<b>Turn Around Time</b>						
>1hours	108	167	1			
<1hour	132	15	13.61 (7.57, 24.5)	0.00	6.03 (2.86, 12.7)	0.00**
<b>Availability of ordered test</b>						
Yes some only	78	111	1			
Yes all	162	71	3.25 (2.17, 4.85)	0.00	1.06 (0.53, 2.14)	0.87
<b>Refer to other laboratory</b>						
Yes	31	91	1			
No	209	91	6.74 (4.19, 10.85)	0.00	2.75 (1.31, 5.76)	0.07
<b>Miss/absent from any appointment</b>						
Yes	10	20	1			
No	21	71	0.59 (0.24, 1.46)	0.25	2.62 (0.03, 5.14)	0.78
<b>Any missed investigation in previous due to unavailability of tests</b>						
Yes	4	7	1			
No	236	175	2.36 (0.68, 8.19)	0.18	0.90 (0.15, 5.36)	0.91
<b>Mothers willing to visit &amp; recommended to others mothers</b>						
No	9	36	1			
Yes	237	140	6.77 (4.21, 11.89)	0.00	2.75 (1.72, 5.13)	0.00**

\*\*Statistically high significant P&lt;0.005

### Factors affecting the level of clients' satisfaction towards Focused Antenatal Care laboratory services

The Chi-square ( $\chi^2$ ) was calculated to assess whether the level of pregnant mothers' satisfaction with explanatory variables. The results from the cross-tabulations analysis showed that there was significant relationship between most independent variable and mothers' satisfaction with  $P$ -value $<0.05$  (Table 3). However, results of multiple logistic regression analysis showed that, waiting less than 30 min to get blood drawing services, waiting less than 1 h to get laboratory results, separate place in blood drawing room had significant relationship with mothers' satisfaction with  $P$ -value $<0.05$  (Table 4). In addition, pregnant mothers willing to visit for the next time and to recommend for a relative or friend for FANC laboratory services were two times more satisfied than those who did not [AOR=2.75; CI (1.72-5.13)]. Clients who got FANC laboratory services from hospitals were two times more satisfied than those who got FANC laboratory services from health centers [AOR=2.64; CI (1.45-4.81)] (Table 4). However, this study did not show a statistically significant association between overall satisfaction with age group, educational status, marital status, and others independent variables with  $P$ -value $>0.05$  (Table 4).

### Basic FANC laboratory facility assessment

Thirteen laboratories were involved in this study. Among these, 10 (76.9%) were health centers laboratories. Shortage of supplies including all type of basic FANC reagents, IQC reagents, encounter one or more basic FANC laboratory diagnostic services interruption within the last one year and poor storage condition were identified in most peripheral laboratories. However, all peripheral laboratories used the appropriate Personal Protective Equipment (PPE) when performing laboratory procedures and they used incinerator to dispose solid wastes. Of 13 visited laboratories, 8 (61.5%) did not provide one or more basic FANC laboratory tests during the study period, 6 (46.2%) did not check reagent quality (reagent verification) prior to use, 12 (92.3%) had regular water supply and 9 (69.2%) had back up electric power supply (Table 5).

Among the total visited laboratories, 11 (84.6%) didn't have back up laboratory services for basic FANC laboratory Procedures (SOPs) and other reference materials for all basic FANC tests, 11 (84.6%) established Turn Around Time (TAT) for all FANC laboratory tests and all laboratories' staffs members were trained on basic FANC tests. Regarding customer services, all visited laboratories did not notify laboratory service status to customers, when the laboratory services faced delaying or interruptions in testing due to equipment failure, and 8 (61.5%) did not evaluate client satisfaction and they did not receive feedback to improve their services throughout a year (Table 5).

### Laboratory quality assurance

Internal quality control materials were lacking in all assessed laboratories. Owing to this 5 (62.5%) basic FANC tests run without IQC. Among the total 13 laboratories facility, 9 (69.2%), 6 (46.2%) and 13 (100.0%) were performed IQC daily for HIV test, Hemoglobin (CBC), VDRL, test respectively. The

**Table 5:** Laboratory facility assesment in Addid Ababapublic health facilities, April to May, 2015 (n=13).

Variables		Number	Percent
Having and proving all basic AFNC tests	Yes	5	38.5
	No	8	61.5
Any basic AFNC tests interruption in last one year	Yes	13	100.0
	No	0	0.0
Backup electric power supply (Generator)	Yes	9	69.2
	No	4	30.8
Backup water supply	Yes	12	92.3
	No	1	7.7
Run IQC parallel with all FANC tests	Yes	0	0.0
	No	13	100.0
Having SOPs, guideline and manuals	Yes	13	100.0
	No	0	0.0
Having Back-up laboratory services	Yes	2	15.4
	No	11	84.6
Having IQC materials for all FANC tests	Yes	0	0.0
	No	13	100.0
Evaluating client satisfaction	Yes	5	38.5
	No	8	61.5
Laboratory services status Notification	Yes	0	0.0
	No	13	100.0
Good storage condition for reagents	Yes	0	0.0
	No	13	100
Having request form and result log book	Yes	13	100.0
	No	0	0.0
Having TAT for all FANC laboratory tests	Yes	11	84.6
	No	2	14.4
Check reagent quality before processing	Yes	7	53.8
	No	6	46.2
Having personal protective equipment	Yes	13	100.0
	No	0	0.0
Having functioning incinerator	Yes	13	100.0
	No	0	0.0
The laboratory staff received training on FANC	Yes	13	100
	No	0	0.0
Laboratory participation in IEQAS	Yes	3	76.3
	No	10	23.7
Laboratory participation in REQAS	Yes	13	100.0
	No	0	0.0

remaining all basic FANC tests were run without IQC in all visited laboratories. Of 13 laboratories, 3 (23.1%) participated in International External Quality Assurance Schemes (IEQA) and the remaining 10 (76.9%) didn't participate in IEQAS. All laboratories participated in Regional External Quality Assurance Schemes (REQAS) on ZN-stained sputum smear microscopic rechecking and HIV retesting scheme (Table 6).

### Provider in-depth interview

To strengthen the findings of the quantitative study, an in-depth interview of laboratory personnel were conducted. Thirteen full-time laboratory service providers were included in the interview. Most of the laboratory service providers noted

**Table 6:** Quality assurances of basic FANC laboratory test in Addis Ababa, in public health facility, April to May, 2015 (n=13).

Variables		Participating in IEQA Numbers (%)	Participating in REQAS Numbers (%)	Run IQC daily Numbers (%)
Blood group	Yes	3 (23.1)	0 (0.0)	0 (0.0)
	No	10 (76.9)	13 (100.0)	13 (100.0)
Hemoglobin (CBC)	Yes	3 (23.1)	0 (0.0)	6 (46.2)
	No	10 (76.9)	13 (100.0)	7 (53.8)
Urinalysis	Yes	0 (0.0)	0 (0.0)	0 (0.0)
	No	13 (100.0)	13 (100.0)	13 (100.0)
Stool examination	Yes	3 (23.1)	0 (0.0)	0 (0.0)
	No	10 (76.9)	13 (100.0)	13 (100.0)
VDRL/RPR	Yes	3 (23.1)	0 (0.0)	13 (100.0)
	No	10 (76.9)	0 (0.0)	0 (0.0)
HIV	Yes	3 (23.1)	13 (100.0)	9 (69.2)
	No	10 (76.9)	0 (0.0)	4 (30.8)
HBsAgs test	Yes	3 (23.1)	0 (0.0)	0 (0.0)
	No	10 (76.9)	13 (100.0)	13 (100.0)
Blood glucose	Yes	3 (23.1)	0 (0.0)	0 (0.0)
	No	10 (76.9)	13 (100.0)	13 (100.0)

that “clients are satisfied with the services they are getting from the laboratories. However, there are some factors affecting clients’ satisfaction. The major problems that contribute for clients’ dissatisfaction in their laboratories are delay in returning laboratory result due to work load, long waiting time to get laboratory services and services interruption due to different reason”. Some of providers reported, “Due to unavailability of some reagents for long time mothers were referred to other facility, mostly to private laboratories for FANC laboratory investigation, this made mothers highly dissatisfied and mostly they complained due to services interruption”.

Regarding reagent and IQC materials, one provider aged 28, female and technologist said, “Poor quality of reagents and others laboratory supplies is major problems to deliver quality services, because we had experienced erroneous false positive result released from our laboratory. This may cause of conflicts between providers and clients, as result may clients’ loss trusts on the quality of laboratory services and dissatisfied overall laboratory services”. Hence she noted, “Implementation of QA program including EQA and availability of IQC materials is a key to minimize errors in laboratory”.

Providers anonymously agreed that there is written TAT for all laboratory tests including basic FANC laboratory tests, but result not released based on established TAT due to client load, one providers told, “Even if we have written TAT, we collect sample in the morning and the result will deliver to ANC clinic in the afternoon due to work load, there is no mechanism to prioritized pregnant mothers to treat early”. He recommended “health facilities give priority to pregnant mothers by establishing separate laboratory facilities for FANC laboratory services”.

## Discussion

In the current study pregnant mothers satisfied with FANC laboratory services was lower than the previous report of 87.6%

in Addis Ababa, 77% in Jimma University specialized hospital, 87.6% in eastern Ethiopia, 77% in Tanzania [12,15-17]. The reason might be clients’ dissatisfaction related with long waiting time to get laboratory services, services interruption, quality of care, inadequate laboratory facilities including unavailability of tests, might differ in these study setting. However, the maternal satisfaction were comparable with studies conducted in Jimma hospital, health enters and eastern Ethiopia, which were reported 60.4%, 54.1% and 57.1% respectively [11,16,18].

This study finding had higher maternal satisfaction than other studies conducted in Amhara region and Tigray-zonal hospital, which had a result of 22% and 43.6%, respectively [21,22]. The underlying justification for higher clients’ satisfaction with FANC laboratory services, might be due to this study was conducted during the time is high attention for maternity services by the government and many donors. Particularly in study setting maternal health services including FANC laboratory services are being deliver free of charge.

Mothers not satisfied by incomplete information provided by laboratory personnel, about how to bring specimens outside the laboratory room, were closely related with other finding [15,16,20], while it was slightly lower than others studies conducted in Addis Ababa and eastern Ethiopia [12,16]. The reasons of this result for being low from other finding might be due to, client load on the laboratory facilities which lead to lack of attention to provide information on how to bring specimens outside the laboratory room. On the other hand, professional training on the way to guide and explain the advantage of submitting quality of specimen may differ in these studies setting. Frequent explanations and updates about what will occurs or is being done for the clients may calm anxious visitors in the waiting room [23].

Regarding to the availability of laboratory services, around 44.8% clients responded that, the laboratory test ordered was not available in the health facilities during the

study period, which was relatively lower than others studies [12,16,24]. The possible reason for low availability of ordered test may be due to laboratory services interruption due to unavailability of reagents and others laboratory supplies; this also supported by in-depth interview of laboratory services providers, they indicated that “Some reagents interrupted for long time then mothers refer to other facility, mostly private laboratories for FANC laboratory investigation”. Providing good-quality care can be ensuring the empowerment, and satisfaction of users, and improves the women-friendliness of health services [25].

In the current study, there was significant relationship between level of satisfaction with mothers willing to visit the health facilities for the next time and to recommend for a relative or a friend for FANC laboratory services. Clients who got FANC laboratory service from hospitals were two times more satisfied than those who got from health centres. This study has close finding with study conducted in Jimma University specialized hospital [15]. The possible reasons for this can be customers might perceive hospital has better services and expecting better care which might high level professionals in hospitals. In-contrary health centers may be referred as lack of an appropriate action in emergency maternal cases.

In the current study 5 (62.5%) of basic FANC laboratory tests performed without IQC and 10 (76.9%) laboratories didn't participate in IEQAS, these finding were supported by other research, which reported that except for HIV screening tests, no IEQA scheme was established for all visited health center laboratories [10]. Among basic FANC laboratory tests, majority of the tests were performed without IQC during study period. This indicates there is no quality monitoring systems that established in the laboratories, which might high tendency to generate false FANC laboratory results.

### Strengths and limitations of the study

To strengthen the reliability of the study finding we used both quantitative and qualitative data collection methods. However, the findings are not without limitations. Clients of FANC follow up might give biased information since interview was conducted in the health facilities.

### Conclusion

In this study the quality of focused antenatal care laboratory services was unsatisfactory. Shortage of supplies including all type of basic FANC reagents, IQC materials, limited IEQA participation and unavailability of basic FANC laboratory services **severely truncated the quality of FANC laboratory services**, which leading to mothers dissatisfied, delays in seeking and obtaining FANC services. Since such conditions may affect the outcome of pregnancy. Quality of maternal services depends on many factors including quality laboratory services that are interdependent and collectively influence the over performance. Hence administrators of public health facilities should give priority for maternal laboratory quality services and for the implementation of overall quality assurance systems in the laboratories.

### DECLARATIONS

Ethical approval and Consent to participate before the research work, ethical clearance was obtained from the Departmental Research and Ethics Review Committee (DRERC) of school of allied health science department of medical laboratory science, Addis Abba University. Moreover, all the study participants were informed verbally about the purpose and benefit of the study along with their right to refuse. Furthermore the study participants were reassured for confidentiality.

### CONSENT FOR PUBLISH

Permission was obtained from the Departmental Research and Ethics Review Committee (DRERC) of school of allied health science department of medical laboratory science, Addis Abba University.

### AVAILABILITY OF DATA AND MATERIALS

The datasets during and/or analyzed during the current study available from the corresponding author on reasonable request

### COMPETING INTERESTS

The authors declare that they have no competing interests.

### FUNDING

The authors had no funding support or funding to report.

### AUTHOR'S CONTRIBUTIONS

DMD conceived and designed the study and develops the proposal, led data collection, performed analysis, interpretation of data, and draft the manuscript. BT, SA and AA critically reviewed and made progressive suggestions from the design to final write up of the result. All of the authors participated in data collection, analysis, interpretation, critically evaluated and approved the manuscript.

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