

Intervention fidelity and its determinants of focused antenatal care package implementation, in South Wollo, Northeast Ethiopia.

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Abstract

Background: Rendering focused antenatal care activities are directed at sustaining the maternal health and improving the fetal wellbeing to ensure the delivery of a live healthy neonate. Failure to implement focused antenatal care package can results in inability to reduce maternal and neonatal morbidity and mortality, perinatal death and stillbirth in developing countries. However, due to evidence-practice gaps, thousands of maternal, fetal and neonatal lives are still losing every day mostly from preventable causes. This study aimed to assess focused antenatal care package intervention fidelity and its determinant factors in South Wollo Zone, Northeast Ethiopia.

Methods: A cross-sectional study design was employed and a total of 898 women who gave birth in the last six months prior to data collection were included. Also 16 health extension workers, working in the selected 10 health posts for facility audits, were included. Interviews and self-administered questionnaires were used to collect data from mothers and health extension workers. Facilities (Health posts) were audited to assess availability and functionality of drugs and supplies in the health posts to provide focused antenatal care. Mothers were asked whether or not the required level of care was provided. Health extension workers were provided self-administered questionnaires to assess socio-demographic characteristics, reception of training, facilitation strategies and ability to classify danger signs. Multilevel linear regression analysis was performed to identify individual and organizational levels factors influencing focused antenatal care package intervention fidelity.

Results: Overall weighted average focused antenatal care package intervention fidelity (implemented as intended/planned) was 49.8% (0.498) (95% CI: 47.7 – 51.8); which means the average amount of focused antenatal care package intervention a mother received is 49.8% (0.498). Of which 55.1% was implemented by health extension workers and 44.9% by skilled providers (nurses, midwives, health officers or medical doctors). Overall antenatal care coverage, irrespective of frequency (at least one visit), was 752 women (83.7%; 95% CI: 81.3–86.1); 263 women (35.0%; 95% CI: of 31.6 – 38.4) of them received at least four antenatal visits and 46 women (6.1%, 95% CI: 4.4 - 7.8) received all recommended components of focused antenatal care. Previous pregnancy-related problems, paternal education, and implementation of supportive/facilitation strategies were found to be significant factors enhancing focused antenatal care package intervention fidelity.

Conclusion: Focused antenatal care package intervention fidelity in the study area was low; this may imply that the current level of maternal, perinatal, neonatal mortality and stillbirth might be partly due to the low level of focused antenatal care fidelity. Improving implementation of facilitation strategies is highly required to contribute to the reduction of those mortalities.

Background

Focused antenatal care (FANC) is evidence based, client oriented, goal directed and individualized care provided to the pregnant women for improving maternal, perinatal and neonatal outcomes. The care includes the clinical assessment of the pregnant woman and her fetus during pregnancy period in order to achieve a favorable outcome for both the mother and fetus. FANC intervention includes identification and management of obstetrics complications and infections, promoting the use of skilled attendant and healthy behavior(1). Rendering FANC activities are directed at sustaining the maternal health and improving the fetal wellbeing to ensure the delivery of a live healthy neonate. Failure to implement the FANC package can results in inability to reduce maternal and neonatal morbidity and mortality, fetal death and stillbirth in developing countries (2,3).

Evidence shows that public health interventions during the antenatal period are effective to reduce maternal, perinatal and neonatal mortality and stillbirths (4). In all studies reviewed here, interventions during pregnancy significantly reduced neonatal mortality in addition to improving fetal and maternal health. Studies conducted in Indonesia, Sub-Saharan Africa, Bangladesh, and India indicated that increasing number of antenatal visit has shown to decrease maternal and neonatal mortality, perinatal death and stillbirth (5–9). Several studies demonstrated that prenatal iron and folic acid supplementation (10–16), tetanus toxoid vaccination (10,17–20), use of insecticide-impregnated bed nets during pregnancy (4), and syphilis screening and treatment (16) have shown to reduce maternal and neonatal mortality, perinatal death and stillbirth. Importantly, randomized trials and large observational studies showed significant reductions in neonatal mortality and improvement of maternal and childcare uptake after implementing these interventions as package at home-community settings (4,21–29). The bare number of antenatal visits does not have a significant reducing effect on those mortalities (23).

Ethiopia is implementing focused antenatal care (FANC) package at home-community settings since 2013 to achieve a reduction in maternal and neonatal mortality, perinatal death and stillbirth (30). This package links one to five networks (which includes health development armies), health extension workers (HEWs) working in the community (health posts), and skilled professionals (nurses, midwives, health officers or medical doctors) working in health facilities (health centers & hospitals). It aims at early identification of pregnant women and provision of FANC by linking home-community levels of care to primary health care units. Even after the introduction of this package, however, those maternal and child health indicators in Ethiopia are still among the highest in the world. The main question here is, why those maternal, neonatal and child health indicators remained high while these effective intervention packages are implemented? We hypothesize that these interventions may not be properly implemented as per the plan/standard, commonly known as evidence-practice gaps. To our knowledge, no study thus far assessed whether this FANC package intervention is implemented with fidelity or not, and facilitators (factors enhancing FANC implementation fidelity) and barriers (Factors inhibiting FANC intervention fidelity) influencing its implementation. Intervention fidelity refers to the degree to which interventions are implemented as planned in the original implementation document (31). Therefore, Focused antenatal care (FANC) package intervention fidelity is defined as the degree to which the FANC package is implemented as described by community-based new-born care (CBNC) plan, which was developed by the Ministry of Health of Ethiopia. Or in short it can be expressed as FANC intervention implementation as

intended by Federal Ministry of Health of Ethiopia or FANC intervention implementation adherence to plan. This study aimed to assess FANC package intervention fidelity and its determinants in South Wollo Zone, Northeast Ethiopia.

Methods

Design: Cross-sectional study design was used for evaluating the intervention fidelity of FANC package in south Wollo Zone, North east Ethiopia.

Context: FANC package is a combined effective and efficient public health intervention provided in household, health post, health center and hospital levels. Main implementers are HEWs, health development armies (HDAs), and skilled health providers working in health centers. HEWs, who are young females with 10th grade education completed, have been trained and certified to provide family health services at community level, including FANC, diseases prevention and control, hygiene and environmental sanitation, health education, and communication (32–34). HEWs work in health posts (the first level of health care) under supervision and support of health centers. Health development army (HDA) or Women development army (WDA) is an innovative, inclusive and collaborative initiative composed of unpaid women volunteers in the neighboring households by Ministry of Health of Ethiopia since 2010 (35).

Targeted sites and populations: The study was conducted in South Wollo Zone of the Amhara region, which is 400 kms far from north of Addis Ababa, capital of Ethiopia. There were 900 rural and 150 urban HEWs, 499 health posts, 126 health centers and 9 hospitals (one zonal) in the Zone. All mothers who gave birth in the last six months of data collection, HEWs and health posts in the selected kebeles' were included in the study. In Ethiopia, Kebele is the smallest administrative unit.

Intervention description: FANC requires a continuum of care provided at the household - health post - health center- hospital levels (Home-Community platform). Main goal of the intervention package is to transform evidence into action for reducing maternal mortality/morbidity, perinatal death, stillbirth and newborn mortality by increasing the reach to every pregnant mother and every newborn in the community. Services/contents include provision of four antenatal visits, counseling on (nutrition, impregnated bed net use, pregnancy danger signs, and mother to child transmission of HIV). It also includes birth preparedness and complication readiness planning, treatment of diagnosed sexually transmitted infections (STI), blood pressure, height and weight measurement in addition to identification of maternal danger signs and referral if necessary, provision of two doses of tetanus toxoid vaccination, promotion of facility birth, iron, and folate supplementation and detection and management of complications. Facilitation strategies include weekly supervision and support of HEWs by health center staff, monthly supervision by Woreda health office, community and HDA support (30).

Subgroup (Sampling): Kebeles from South Wollo Zone were selected randomly using computer-generated random numbers. All mothers who gave birth in the last six months (for individual-level variables and fidelity assessment), all HEWs, and all health posts in the selected kebeles (for cluster-level variables)

were included. Mothers were interviewed at their homes and HEWs completed the questionnaires by themselves while facility was audited (facility audit is a review of a facility's assets important for the provision of FANC for knowing what they have).

Outcomes: Primary outcome of this study, FANC package intervention fidelity, was computed by the weighted average of program reach (contact coverage), adherence to FANC content, and frequency. Program reach was measured by the proportion of mothers who visit or visited at least once, irrespective of frequency, by any health care providers in any health care delivery setting for recent pregnancy. The number of antenatal visits and components provided for the mothers, who were contacted, was considered as frequency and content respectively.

Sample Size Determination: Considering 52% of pregnant mothers who received 4+ antenatal care visits and all contents of antenatal care (36), 95% confidence level, 5% margin of error with 10% non-response rate, 422 participants were required. However, due to cluster sampling of kebeles, we collected data from 898 mothers. In addition, sixteen HEWs were included, and ten health posts where those HEWs are working were audited.

Table 1. Components of focused antenatal care package provided by HEWs and skilled providers qualification in South Wollo Zone, Ethiopia.

Contents		Number of mothers (%)	By HEWs (%)	By skilled provider (%)
<i>Weight measured</i>	Yes	629 (83.6)	296 (47.1)	333 (52.9)
	No	123 (16.4)	101 (82.1)	22 (17.9)
<i>Height measured</i>	Yes	488 (64.9)	252 (51.6)	236 (48.4)
	No	264 (35.1)	145 (54.9)	119 (45.1)
<i>Blood pressure measured</i>	Yes	558 (74.2)	305 (54.7)	253 (45.3)
	No	194 (25.8)	92 (47.4)	102 (52.6)
<i>Advised for institutional delivery</i>	Yes	686 (91.2)	372 (54.2)	314 (45.8)
	No	66 (8.8)	25 (37.9)	41 (62.1)
<i>Advised for BPCR*</i>	Yes	645 (85.8)	350 (54.3)	295 (45.7)
	No	107 (14.2)	47 (43.9)	60 (56.1)
<i>Advised on danger signs during pregnancy and birth</i>	Yes	606 (80.6)	327 (54.0)	279 (46.0)
	No	146 (19.4)	70 (47.9)	76 (52.1)
<i>Advised on personal hygiene</i>	Yes	695 (92.4)	372 (53.5)	323 (46.5)
	No	57 (7.6)	25 (43.9)	32 (56.1)
<i>Advised for PMTCT*</i>	Yes	633 (84.2)	320 (50.6)	313 (49.4)
	No	119 (15.8)	77 (64.7)	42 (35.3)
<i>Advised and screened for STI*</i>	Yes	622 (82.7)	308 (49.5)	314 (50.5)
	No	130 (17.3)	89 (68.5)	41 (31.5)
<i>Advised for bed net use</i>	Yes	527 (70.1)	299 (56.7)	228 (43.3)
	No	225 (29.9)	98 (43.6)	127 (56.4)

<i>Mothers tested for HIV</i>	Yes	678 (90.2)	345 (509)	333 (49.1)
	No	74 (9.8)	52 (70.3)	22 (29.7)
<i>Advised for nutrition during pregnancy</i>	Yes	634 (84.3)	350 (55.2)	284 (44.8)
	No	118 (15.7)	47 (39.8)	71 (60.2)
<i>Told to seek care for pregnancy danger signs</i>	Yes	669 (89.1)	363 (54.3)	306 (45.7)
	No	82 (10.9)	34 (41.5)	48 (58.5)
<i>Number of TT* vaccine received</i>	No	58 (7.7)	23 (39.7)	35 (60.3)
	TT ₁	287 (38.2)	185 (64.5)	102 (35.5)
	TT ₂₊	407 (54.1)	189 (46.4)	218 (53.6)
<i>Iron folic acid received</i>	Yes	425 (56.5)	203 (47.8)	222 (52.2)
	No	327 (43.5)	194 (59.3)	133 (40.7)
<i>Referred for institutional delivery</i>	Yes	475 (63.2)	284 (59.8)	191 (40.2)
	No	277 (36.8)	113 (40.8)	164 (59.2)
<i>Expected date of delivery told</i>	Yes	462 (61.4)	228 (49.4)	234 (50.6)
	No	290 (38.6)	169 (58.3)	121 (41.7)

*BPCR- Birth preparedness & complication readiness, PMTCT- Prevention of mother to child transmission of HIV, STI- Sexually transmitted infection, TT-Tetanus toxoid

Results

Socio-demographic characteristics

Mean age of mothers at the time of interview was 30.96 ± 7.22 years. Of 898 mothers, 449 (50%) were between 25 and 36 years of age. Six hundred thirty eight (71.4%) mothers did not attend any formal

education, 768 (85.5%) were married and 662 (74%) of them were housewives.

HEWs' mean age was 26 ± 3.67 years and 13 (81.3%) of them were married and they walked an average of around 3 hours (95% CI: 2:05 – 3:05) to reach to the most far away mother's home.

Coverage of FANC

Seven hundred fifty two of 898 mothers were contacted by health care providers at least once during their recent pregnancy, making an overall antenatal care coverage of 83.7% (95% CI: 81.28 – 86.12). Out of those 752 mothers who have got ANC for the recent pregnancy, 397 (52.8% (95% CI: 52.7 – 52.9)) provided by HEWs and 355(47.2% (95% CI: 47.1 – 47.3)) by skilled provider. Mean time of first antenatal care visit was 4.14 ± 2 months. Interestingly, from the total contacted mothers 344 (45.9%, 95% CI: 44.1 – 47.7) were seen by health care providers within the first trimester of gestation (less than 12weeks).

Frequency Components of FANC

Mean number of antenatal visits were 3 ± 1.6 , and a total of 263 women (35.0%; 95% CI: 31.6 – 38.4)) attended at least four ANC visits. Higher numbers of antenatal visit were related with increased FANC package contents provided to mothers (Figure 1).

A total of 46 women (6.1% (95% CI: 4.4 - 7.8)) received all the contents of FANC. Thirty three of 752 (4.3%) women received care from HEWs and 13(1.7%) from skilled providers (Table 1).

Overall weighted average FANC package intervention fidelity (implementation as planned or average amount of FANC package a pregnant woman received) was 0.498 (49.8%; 95% CI: 47.7 – 51.8): HEWs provided 0.62 (62.0%; 95% CI: 59.7 – 64.3) while skilled providers provided 0.566 (56.6%; 95% CI: 53.9– 59.2). Only 20 women (2.2%) received all the recommended FANC package intervention with full fidelity.

Provider related factors

Twelve (75%) of the HEWs were ever trained on FANC package while only 2 (12.5%) of them received refreshment training in the last three months. Only two health posts were supervised weekly from the catchment health center and 9 (56.3%) HEWs received onsite assistance for difficult cases. Nine of them responded that they were able to provide FANC.

Support strategies set by Ministry of Health were assessed from health center, district health offices, community and development armies' perspective. Eleven (68.8%) HEWs reported that implementation of support either from the community; health development armies or district health offices were lower than the planned standard.

Women related factors

Only 180 (20%) of mothers were living within 15-minutes' walking distance from the health post, while 333 (37.1%) of them had to travel ≥ 45 minutes on foot. Of those mothers who received antenatal care,

685 (91.1%) were self-referral. One hundred eighty seven (20.8%) encountered pregnancy-related problems (like bleeding, convulsions, high temperature) in their previous pregnancy.

Organizational related factors

No health post had all required functional equipment and medical supplies for FANC. Birth preparedness and complication readiness forms, supervision checklist, blood pressure cuffs, pregnant women registration books, stethoscopes and tape measures were the most frequently mentioned unavailable items in health posts.

Facilitators' and barriers' of FANC intervention fidelity

The ICC observed in the model was 17.7%, which indicates that 17.7% of the variation in FANC package intervention fidelity is explained by health post (cluster) level factors. This shows FANC package intervention fidelity varies between health posts and there are health post level factors which affect implementation of the package.

In the first level model, maternal age, distance from the health post, maternal education, pregnancy related problems in the previous pregnancy, partner's education, and total number of abortions were considered. Support/facilitation strategies, distance from the farthest household, and availability of supplies in the health post were considered in the second level model. Finally, pregnancy related problems in the previous pregnancy, partner's education and support/facilitation strategies were found to be statistically significant facilitators for FANC package intervention fidelity (Table 2). In this study, mothers' who encountered pregnancy-related problems in their previous pregnancy had a 0.09 times increase of FANC package intervention fidelity than mothers who did not encounter any problem. Mothers who had formally educated partners had a 0.08 times increase in the levels of FANC package intervention fidelity in their recent pregnancies than their counterparts. An average increase in an implementation of health post level supportive/facilitation strategies resulted in a 0.04 times increase in the level of FANC package intervention fidelity of their affiliated mothers.

Table 2. Significant level one (maternal level) variables with the corresponding effect size an

Variables		Estimate	95% Confidence interval
Level 1 variables			
Age of mothers (in years)		0.004	0.0003 - 0.008
Maternal problems in previous pregnancy	No	1	
	Yes	0.06	0.01 - 0.11
Total number of abortions		0.01	0.005 - 0.022
Husband education	No formal education	1	
	Attend formal education (1-8)	0.10	0.05 - 0.15
Combined model			
Pregnancy related-medical problems in previous pregnancy	No	1	
	Yes	0.09	0.02 - 0.15
Husband education	No formal education	1	
	Attend formal education (1-8)	0.08	0.02 - 0.13
Implementation of supportive/ facilitation strategy		0.04	0.02 - 0.05

In the final model, the ICC was reduced to 4.7% and both Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC) were decreased to 187.3 and 168.6 respectively, from the initial model (AIC=334.6 and BIC=349.0).

Discussion

Antenatal care coverage was 83.7%; 6.12% of mothers received all the recommended components and 35% received at least four ANC visits. Moreover, over 90% of mothers who had antenatal care visits were self-referral. The overall weighted average FANC package intervention fidelity was 49.8%, of these, 62.02% were by HEWs and 56.57% by skilled providers. Having pregnancy-related medical problems, formally educated partners, and implementation of supportive/facilitation strategies were significant facilitators for FANC package intervention fidelity.

In the study, the weighted average FANC package intervention fidelity (average FANC package intervention a pregnant woman received) was too low compared to the standard stated in the implementation plan. Durlak et.al. suggested that the level of an intervention implementation should be around 60% to produce a positive result (39). This might imply that the FANC package intervention fidelity, according to the finding, might be too low to result in an anticipated reduction in maternal mortality/morbidity, perinatal death, stillbirth and neonatal mortality. We have also shown that the level of FANC frequency was 35.0% and content of 6.12%. This implies that though reaching the target audience was optimal (83.7%), non-conformity with the prescribed frequency and content is evident. In the study, the observed increase in antenatal care visit (frequency) was accompanied by the reception of the recommended FANC contents, which is in line with the data from 41 countries' demographic and health surveys (40). The present study suggests that the mere increase in the contact coverage does not warrant the increase in the provision of expected contents and intervention fidelity of the FANC packages intervention.

It is indicated in this study that history of pregnancy related problem increases the use of FANC intervention package. This may indicate that mothers' pregnancy-related risk perception play an important role for their adherence to the recommended FANC package intervention implementation.

Partners' attendance of formal education facilitates FANC package intervention fidelity, but not mothers at the same level of educational status. This finding indicates that paternal education, even at the lowest level (elementary), contributes for improving service uptake and adherence to the recommended package of care. This might imply that maternal and child (MCH) health care uptake decision making might depends on partners particularly for mothers with low levels of educational status. Therefore, MCH policy development and implementation needs to involve partners as well particularly for mothers with low levels of education living in rural areas.

When the facilitation strategies that put in place to optimize the implementation of FANC package intervention increased, the intervention fidelity of FANC may be optimized to the expected level of the affiliated mothers. It means that when HEWs get support from community, HDA, health center and district health office staffs as planned, provision of FANC package intervention to pregnant women will be enhanced. This result indicates that measuring facilitating effects of supportive strategies is essential for optimizing and harmonizing the FANC package intervention implementation (41). The weakness in the facilitation/supportive strategy could be the possible reason for the observed low level of FANC package intervention fidelity, thereby contributing to the high level of maternal, perinatal, neonatal mortality and stillbirth in the country.

Nonetheless, since the last six months information was collected from the mothers by non-health professional data collectors, the effect of social desirability bias needs to be considered in interpreting the findings.

Conclusion

The study shows that FANC package intervention fidelity is too low. This might imply that high level of maternal, neonatal and child mortality indicators might be partly due to the low level of FANC package intervention fidelity (implementation problem). Maternal previous pregnancy related problems, partner's education, and implementation of facilitation strategies were significant facilitators of FANC package intervention fidelity. This indicates that paternal education and implementation of facilitation strategies plays significant contributions for improving focused antenatal care package intervention fidelity. Further studies that focus on why facilitation strategies were in a scarcity of implementation is needed.

List Of Abbreviations

sSA	sub-Saharan Africa
SDG	Sustainable Development Goals
FANC	Focused Antenatal Care
HEWs	Health Extension Workers
CBNC	Community-Based New-born Care
HDA	Health Development Army
WDA	Women Development Army
KMs	Kilo-Meters
HIV	Human-Immunodeficiency Virus
STI	Sexually Transmitted Infection
ICC	Intra-cluster Correlation Coefficient
SPSS	Statistical Package for Social Sciences
AIC	Akaike's Information Criteria
BIC	Bayesian Information Criteria
StaRI	standards for reporting implementation research
ANC	Antenatal Care
MCH	Maternal and Child Health

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the ethical board of the University of Gondar (Ref. No O/V/P/RCS/05/810/2018), and written permission letters were granted from Amhara regional state health bureau, South Wollo Zone and district health offices. Written informed consent was taken from all participants.

Consent for publication

Not applicable

Availability of data and materials

The dataset used and analyzed for this study is available from the corresponding author. This data can be made available up on reasonable request.

Competing interest

The authors declare that there is no competing interest.

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Authors' contribution

AMT conceived the idea, develop and implemented the proposal, analyzed and interpreted data and wrote the manuscript under the supervision of AG, SM, KA, and ZT. AG, SM, KA, and ZT critically reviewed the manuscript. All authors read and approved the final manuscript.

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Figures

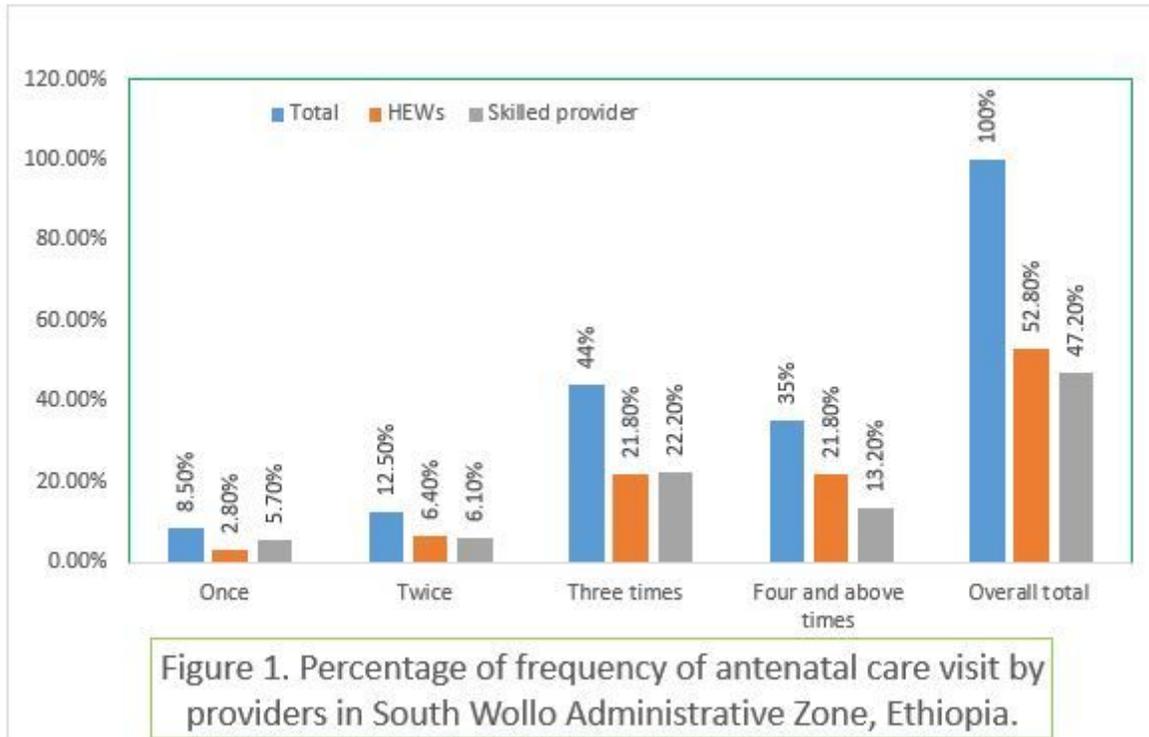


Figure 1

Percentage of frequency of antenatal care visit by providers in South Wollo Administrative Zone, Ethiopia.

Supplementary Files

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