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Nurses Compliance With Focused Antenatal Care In Siaya County Kenya

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Abstract
Background: *Antenatal care (ANC) is widely used to improve the health of pregnant women and encourage skilled attendant at birth. Based on multicenter randomized controlled trial in 2002, WHO recommended implementation of focused antenatal care (FANC) which is a goal oriented antenatal care approach, consisting of four ANC visits and a well-defined set of activities proven to be beneficial for maternal and neonatal health. Despite Kenya having adopted Focused Antenatal Care (FANC) for over a decade ago, little is known about the extent to which the nurses comply with the performance of the procedures stipulated in its guideline. Especially the maternal morbidity and mortality as well as poor perinatal outcomes have remained a major problem.*
The objective *of this study was to assess the compliance of nurses with procedures set in the focused antenatal care (FANC) guidelines in Siaya county of Kenya.*
Methods: *This was a cross sectional observational study whereby quantitative health facility based data was collected by observing the nurses' performed actions during antenatal care service delivery. The study was carried out in government of Kenya antenatal clinics in Siaya County of the former Nyanza province of Kenya. A stratified random sample of 110 nurses working within the county health facilities was drawn using proportion allocation method. Three tools were used in data collection.*
Findings: *Nurses in Siaya County did not fully comply with focused antenatal care guideline; health education is given the least consideration. Compliance was however associated with availability of adequate supplies, amount of time the nurse spent with the client, the time the clinic services began and the period of time the nurse had worked in the particular clinic.*
Conclusion and Recommendations: *Compliance of nurses can be improved by ensuring availability of supplies and allowing nurses to have adequate time with clients. There is need to re-examine the core procedures of Focused Antenatal Care guideline, thus the limited time be used for the procedures found to be most beneficial during the specific visit which have a great implication in improve nursing care and women health.*
Key words: *Antenatal care guidelines, Focused antenatal care, Nurses' compliance, Siaya County*.

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What this paper adds:

- Despite the effort made by the Kenyan Ministry of Health in this context, maternal morbidity and mortality remain a major reproductive health problem.
- Nurses in Siaya County did not fully comply with Focused Antenatal Care guideline; health education is given the least consideration.
- Compliance of nurses can be improved by ensuring availability of supplies and allowing adequate time with clients.
- There is need to re-examine the core procedures of Focused Antenatal Care guideline, thus the limited time be used for the procedures found to be most beneficial during the specific visit which have a great implication in improve nursing care and women health.

I. Introduction

The basic value of health is guaranteed through continuing enhancements in the well-being of women, newborns and their families, to ensure that they can not only survive, but thrive and transform. Inspired by the Global Strategy for Women's, Newborn's and Adolescents' Health 2016–30 [(1)]

Even though there has been a decline in maternal mortality worldwide, sub-Saharan Africa still has the highest maternal mortality ratio among developing regions[(2)]. In the year 2015, it was estimated that 303,000 women died due to causes related to pregnancy and child birth globally which translated to 830 maternal deaths daily out of which 530 were from sub-Saharan Africa[(3)]. Kenya, the African high density country in which maternal morbidity and mortality and perinatal mortality remain major public health problems [(4)]. Maternal mortality rate stands at 362 deaths in every 100,000 births country wide with disparity between counties. Siaya county is one of the Kenyan counties with a relatively high maternal mortality rate compared to the national rate and currently it stands at 691 per 100,000 live births[(5)].Furthermore it has been

estimated that 25% of maternal deaths that occur in Kenya occur within the former Nyanza province where Siaya is located[6].

Appropriate antenatal care is one of the pillars of safe motherhood initiative, a universal effort launched by world health organization (WHO) and other collaborating agencies in 1987 with an aim of reducing the number of deaths associated with pregnancy and child birth[7]. Previous observational studies however tend to show that women who receive antenatal care have lower maternal and perinatal mortality and better pregnancy outcomes[8]. Antenatal care is a key element aimed at improving women's health through detection and treatment of pregnancy related illnesses or identification of women at risk of complications and ensuring that adequate measures are put in place to manage the complications[9].

A randomized controlled trial carried out in 2001 to compare the traditional or standard antenatal care model with a new WHO model with limited number of visits (four visits) showed that there were no significant differences between the two models in terms of outcome. The new basic model later named Focused Antenatal Care (FANC) is meant for women with no evidence of pregnancy related problem and the guideline requires that women are evaluated during the first visit to rule out any need for specialized care[10].

Kenya adopted FANC in 2003 and added some components to the guideline in response to the national needs. Basic steps in the FANC requires the health care provider to gather information through history taking, examine the mother and foetus by carrying out a physical examination and antenatal profile tests namely haemoglobin estimation, blood group and rhesus type, venereal diseases research laboratory (VDRL), urinalysis and microscopy, HIV test and any other test stipulated in the facility. The nurse then interprets the gathered information to make a diagnosis and evaluate any risk factors .An individualized care plan is made for every client, if no abnormalities are identified, the care plan will focus on counselling, birth preparedness and complication readiness. If the mother needs specialized care, the plan will be to refer her to a higher health facility. Follow up care in subsequent visits will depend on initial findings of the first visit plus the findings in the subsequent visits[6].

Clinical guidelines are set to ensure uniformity as well as quality in the provision of care and compliance with these guidelines translates into the extent to which care giving practice conforms to evidence based practice[11]. It is further thought to be the minimum requirement in relation to quality assurance.

The intriguing question here, while the international community is quite optimistic about the potential of antenatal care to ensure better maternal and neonatal outcomes, antenatal care programs routinely recommended in developing countries are often poorly implemented and clinic visits can be irregular with long waiting times and poor feedback to the clients. Consistent with this despite the effort made by the Kenyan Ministry of Health and other development partners to train nurses and other health care workers on focused antenatal care, maternal morbidity and mortality as well as poor perinatal outcomes remain a major problem in some parts of the country.

An antenatal care service like other health care services is provided by a team of health care providers, at the core of this team is the nurse or midwife who in most cases run the antenatal clinics. The success of care given depends so much on the nurses' compliance with the antenatal care guidelines which comprise a number of procedures that are supposed to be performed by the nurse at every antenatal clinic visit[12].

Previous research papers have outlined some factors that could inhibit effective implementation of FANC such as inadequate staff training, shortage of equipment/supplies and inappropriate infrastructure[13], however not much has been looked into in Kenya as far as the compliance of nurses with Focused Antenatal Care guidelines is concerned. **The objective** of this study was therefore to establish if the nurses in Siaya County perform all the procedures outlined in the focused antenatal care guideline and to determine their level of compliance with focus on the barriers encountered in this context.

II. Materials And Method

Design:

A cross sectional observational research design was utilized.

Setting:

The study was carried out at the antenatal clinics in ministry of health facilities in Siaya County, Kenya. Health care at the county is offered at four levels namely: Dispensaries, Health Centers, Sub County and County hospitals.

- Dispensaries being the first level are 82; each has one nurse offering antenatal care services.
- The second level is the health centers which are 77; each has one nurse offering antenatal care services.
- Sub-county hospitals are the third level and are 9 in total and each has 3 nurses offering antenatal care services.
- County hospital is the highest level and referral facility for the county, it has three nurses working in the antenatal clinic.

Subjects:

Subjects of the study consisted of a stratified random sample of 110 nurses working in the previously mentioned antenatal clinics throughout the county using proportion allocation method according to the number of nurses in the facilities which total to 189 nurses offering antenatal care services in the county. Epi info program v 7.0 was used to estimate the sample size by applying the following information:

- Dispensaries have 82 nurses, required sample is 44 nurses.
- Health centers have 77 nurses, required sample is 43 nurses.
- Sub county hospitals have 27 nurses and the required sample is 20 nurses.
- County hospital has three nurses working in antenatal clinic and all were included in the sample.

This makes the total sample size to be 110 nurses. All the above sample sizes were based on; Expected frequency =50%, Acceptable error =10% and Confidence coefficient =95%

Tools:
Three tools were used to collect data for the study.
Tool I: Nurses' Socio-demographic data and working experience interview schedule.
Included: Gender, age, level of education, duration of experience in years, duration in current unit, previous training on focused antenatal care, and level of health care facility.
Tool II: FANC Compliance Observation Checklist
This tool was adopted from ministry of health Kenya FANC and mother and child booklet 2013 [(14)] to assess nurses' compliance with FANC. It consists of thirty eight items divided into three main sections as follows:
Patient assessment (N=23), Prophylaxis (N=6) and Health Teaching (N=9)
Section A: Patient Assessment includes three parts:
Part 1: History taking (6 items) which include: demographic data, medical and surgical history, family history, past obstetric and gynecological history, history of current pregnancy (parity, gravida, LMP, EDD), presenting complains if any.
Part 2: Physical examination (10 items) which include: weight and height, blood pressure, head to toe examination, signs of anemia, breast examination, abdominal palpation, abdominal auscultation for fetal heart, lower limbs for edema and vaginal exam if necessary.
Part 3: Laboratory investigations (antenatal profile) (7 items) which include: Blood for hemoglobin level, grouping and Rhesus typing, VDRL for syphilis, HIV, blood slide for malaria parasites, urinalysis for sugar and albumin, any other lab test done .
Section B: Prophylaxis:
Drugs administered (6 items) which include; Iron and folic acid, SP for malaria prophylaxis, tetanus toxoid injection, antihelminth (deworming tabs), Insecticide treated mosquito net given and ARVs for HIV positive clients.
Section C: Health Teaching:
This include (9 items) related to information about: danger signs in pregnancy, nutrition in pregnancy, infant feeding, sexually transmitted infection (STI), prevention of mother to child transmission of HIV (PMTCT), birth preparedness/individual birth plan, immunization for the baby, post-partum family planning and whether the nurse has elicited feedback and given client return date.
Scoring system
Each practice item was given a score and a total was obtained for each nurse as follows; completely and correctly done scored (3), incompletely or incorrectly done scored (2) and not done scored (1).
Nurses' compliance was computed using the following formula: Lowest score is 38, highest score is 114; 114 - 38 = 76, 76÷ 3 categories =25.333 which we round up to 25. Thus

- Poor compliance ranges from 38 to < 38+25 which is 38< 63.
- Fair compliance from 63 < 63+25 which is 63 to < 88
- Good compliance is above 88.

The same formula was used to categorize level of compliance in specific sections.
Nurses with good compliance score are regarded as compliant while poor and fair compliance scores are regarded as noncompliance.
Tool III: Nurses' compliance barriers to FANC.
This tool was developed by the researcher to asses barriers associated with compliance and included data about availability of equipment and supplies required in provision of focused antenatal care namely weighing scale, height measuring scale, blood pressure machine, and pinard stethoscopes.
Laboratory test reagents and equipment namely, urine testing strips, microscopes, HIV testing kits, blood group testing reagents, hemoglobin machine, malaria slides or rapid diagnostic test kits for antenatal profile.
Availability of necessary drugs specifically ferrous sulphate tablets, folic acid tablets, antimalarial tablets, tetanus toxoid vaccine and antiretroviral drugs
Staffing issues precisely time of starting to give services to clients, number of nurses, number of patients seen, time spent with every client, challenges faced by the nurses while offering antenatal care as well as other activities performed by the nurse alongside antenatal care that may affect compliance.

III. METHOD

The study was carried out according to the following steps:
Approvals:
Official approval from the directors of data collections settings was secured through an official letter from the faculty of nursing Alexandria University after explanation of the purpose of the study
Tools:
Tools I and III were developed by the researcher after extensive review of recent and relevant literature.
Tool II was adopted from ministry of Health Kenya Focused Antenatal Care poster and mother and child health booklet 2013 with some modifications.
Tools content validity was tested by a jury of 5 experts in the field of obstetrics and gynecologic nursing, recommended modifications were made and final tool produced after proving valid.
The tools reliability was done by Cronbach's alpha test and was found to be highly reliable at 0.808.

Pilot study:
A pilot study was carried out on 10 not included among the study participants. The main purpose of the pilot was to evaluate the clarity and applicability of tools and no modifications was done.

Collection of data:
Data was collected over a period of three months which started on 3rd April and ended on 30th June 2017. All nurses were individually interviewed to gather data for part I of tool I and tool II and the responses were filled by the researcher in the relevant tools.

Information on the pregnancy and antenatal care services given during the visit was collected through direct observation of each nurses' performed activities during her provision of antenatal care on at least three clients till the researcher observed all items on the check list and recorded in too II. Information on previous visits if required was confirmed from the client's clinic booklet.

Statistical analysis:
Data collected was categorized, coded, computerized, tabulated and analyzed using statistical package for social sciences (SPSS) version19 program. The necessary tables were then prepared and statistical formula were used as percentage, chi square test (X2) and fishers exact test at 5% level to find out the statistical significant difference of the results

Ethical considerations:
After getting ethical clearance from Faculty of Nursing, Alexandria University Ethics committee, Kenyan ethical clearance was sought from Maseno University Research and Ethics Committee (MUERC) for the research to be carried out in Kenya and this was granted.

Witness written consent was then obtained from the County Director of Nursing Services in Siaya County after explaining the purpose of the study. Confidentiality and privacy were maintained.

IV. Results

The results of this study is presented under the following headings; Nurses' socio-demographic characteristics (Tables I), Nurses' working experience (Table II), Nurses' performance of procedures in focused antenatal care (Tables III A,B,C - V), Nurses' total scores of compliance (Figure I and II), Barriers to nurses' compliance (Tables VI- VII and figure III-VII), and Statistical significance with compliance (Tables VIII -XI and Figures VIII -IX).

Table (I) represents the number and percent distribution of the study participants according to their socio-demographic characteristics. More than two thirds (68.2%), were female. Almost 80% of the nurses observed were below 40 years in age where 41.8% were aged between 22 and 30 years. The mean age of the study participants was 35.05 $\pm$ 9.295 years old. Considering marital status, more than three quarters of the study participants were married (77.3%). As regards level of education, 80% of the study participants were diploma holders.

Table (I): Number and percent distribution of study participants according to their socio-demographic characteristics.

Socio-demographic characteristics	Number (110)	Percentage (%)
Gender:		
- Female	75	68.20
- Male	35	31.80
Age (years):		
- 22-30	46	41.80
- 31-40	41	37.30
- 41-50	12	10.90
- Above 50	11	10.00
Minimum – Maximum	22 – 58	
Mean $\pm$ SD	35.05 $\pm$ 9.295	
Marital status:		
- Married	85	77.30
- Single	25	22.70
Level of Education:		
- Certificate	16	14.50
- Diploma	88	80.00
- Degree (BSN)	6	5.50

Table (II) illustrates the number and percent distribution of the study participants according to their work experience. About two thirds of the study participants (66.4%) had worked for ten years and below and only 3.6% had worked for more than 30 years. The vast majority of the study participants (97.3 %) had stayed in their current clinics for between 1-10 years. Almost three quarters (74.5%) of the study participants had attended some courses on antenatal care while 5.5% had done other courses like management of malaria in pregnancy, antiretroviral therapy in pregnancy and nutritional care in pregnancy. Concerning health facilities, the nurses worked in, two fifths of the study participants (40%) worked in dispensaries and a minority of them (2.7%) was working in the county referral hospital.

Table (II): Number and percent distribution of the study participants according to their working experience.

Working experience	Number (110)	Percentage (%)
Duration of experience in years:		
- 1-10	73	66.40
- 11-20	22	20.00
- 21-30	11	10.00
- More than 30	4	3.60
Minimum- Maximum	1 – 36	
Mean + Standard deviation	10.39 + 8.830	
Duration in the current unit in years:		
- 1-10	107	97.30
- 11-20	2	1.80
- 21-30	1	0.90
Minimum- Maximum	1-30	
Mean + Standard deviation	3.06 + 3.465	
Previous training in ANC:		
- Yes	82	74.50
- No	28	25.50
Training title:		
- FANC	48	43.60
- PMTCT	40	36.40
- EMONC	12	10.90
- Others	6	5.50
- Not applicable	28	25.50
Health facilities the nurses work in:		
- County Referral Hospital	3	2.70
- Sub-County Hospital	20	18.20
- Health centre	43	39.10
- Dispensary	44	40.00

Table (III) represents the number and percent distribution of the study participants according to their performance in patient assessment (history taking, physical examination and laboratory investigations). More than two thirds of the study participants (67.3%) took the demographic data completely and correctly while 32.7% of them took incomplete demographic data. The findings of the study also demonstrate that more than two fifths of the study participants (42.7%) took complete medical and surgical history while 22.8% did not take any medical/surgical history at all. In addition, family history was taken completely and correctly by 66.4% of the study participants whereas 23.6% of the participants did not take any family history. Concerning past obstetrics and gynecological history, the study revealed that 28.2% of the study participants took it completely and correctly while more than half of the study participants (52.7%) did not take past obstetrics and gynecological history at all. Finally, current pregnancy history was taken by vast majority of the study participants (98.2%) with only 1.8% taking it partially. **(Table III A)**

Table (III A): Number and percent distribution of study participants according to their performance in patient assessment. (History taking)

A – History taking								
Nurses' performance in history taking	**Complete and correctly performed**		**Partially or incorrectly performed**		**Not performed**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
-Demographic data	74	67.30	36	32.70	0	0.00	110	100
-Medical/surgical history	47	42.70	38	34.50	25	22.80	110	100
-Family history	73	66.40	11	10.00	26	23.60	110	100
-Past obstetric and gynaecological history	31	28.20	21	19.10	58	52.70	110	100
-Current pregnancy history	108	98.20	2	1.80	0	0.00	110	100
-Presenting complains	94	85.50	N/A	N/A	16	14.50	110	100

According to nurses' performance in physical examination**,** almost all (98.2%) of the study participants took the weight of the clients and only 1.8% did not, however height measurement was done by two fifths (40%) only while 60% did not measure clients' height. The table also illustrates that blood pressure of the clients was taken by majority (94.5%) of the study participants while 5.5% did not take the blood pressure. Additionally, head to toe examination was performed completely by only 10.9% of the study participants. As far as assessment for anemia is concerned 48.2% of the study participants performed it completely and correctly. Breast examination was performed completely by 26.4% of the study participants and 67.3% did not perform breast examination on their clients. It was observed that abdominal palpation and auscultation for the fetal heart was performed completely by all study participants at 100%. However, assessment for edema

was performed completely by about one third of the study participants (31.8%). Lastly, vaginal examination was performed by a minority of the study participants (5.5%). **(Table III B)**

Tables (III B): Number and percent distribution of study participants according to their performance in patient assessment. (Physical examination)

B – Physical examination								
Nurses performance of physical examination	**Complete and correctly performed**		**Partially or incorrectly performed**		**Not performed**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
-Weight measurement	108	98.20	N/A	N/A	2	1.80	110	100
-Height measurement	44	40.00	N/A	N/A	66	60.00	110	100
-Blood pressure measurement	104	94.50	N/A	N/A	6	5.50	110	100
-Head to toe examination	12	10.90	24	21.80	74	67.30	110	100
-Anaemia assessment	53	48.20	3	2.70	54	49.10	110	100
-Breast examination	29	26.40	7	6.40	74	67.30	110	100
-Abdominal palpation	110	100	0	0	0	0.00	110	100
-Abdominal auscultation	110	100	0	0	0	0.00	110	100
-Oedema assessment	35	31.80	0	0	75	68.20	110	100
-Vaginal Examination	6	5.50	N/A	N/A	104	94.50	110	100

In relation to performance of the study participants in laboratory investigations or antenatal profile, it depicts that 62.7% of the study participants ensured that hemoglobin estimation was done for their clients. It was noticed that an equal percentage of the study participants (66.4%) ensured that their clients had blood for grouping and rhesus typing done as well as being screened for syphilis. HIV screening was performed by all study participants at 100% while screening for malaria parasites was performed by 88.2% of the participants. Finally, 63.6% of the study participants ensured that their clients had urine analysis and microscopy done. **(Table III C)**

Table (III C): Number and percent distribution of study participants according to their performance in patient assessment. (Laboratory investigations)

C- Laboratory investigations (Antenatal profile)								
Nurses performance of lab investigations	**Complete and correctly performed**		**Partially or incorrectly performed**		**Not performed**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
-Haemoglobin level estimation	69	62.70	N/A	N/A	41	37.30	110	100
- Blood grouping and Rh typing	73	66.40	N/A	N/A	37	33.60	110	100
- VDRL (test for syphilis)	73	66.40	N/A	N/A	37	33.60	110	100
- HIV screening	110	100	N/A	N/A	0	0.00	110	100
- Malaria testing	97	88.20	N/A	N/A	13	11.80	110	100
- Urinalysis and microscopy	70	63.60	N/A	N/A	40	36.40	110	100
-Other laboratory tests	N/A	N/A	N/A	N/A	110	100	110	100

Table (IV) illustrates that 90% of the study participants gave their clients iron and folic acid supplementation for prevention of anemia in pregnancy. Regarding malaria prophylaxis, 95.5% of the study participants gave the clients intermittent preventive treatment (IPT) and 92.7% issued the clients with insecticide treated bed nets for protection against mosquito bites as a way of preventing transmission of malaria. Almost an equal percentage of the of the study participants (96.4%) administered tetanus toxoid to the mothers for prevention of neonatal tetanus. Furthermore, for prevention or treatment of intestinal worms to prevent anemia in pregnancy, antihelminth (mebendazole) prophylaxis was given by slightly above three quarters of the study participants (75.5. All the study participants (100%) issued antiretroviral therapy to those clients who were legible for it.

Table (IV): Number and percent distribution of study participants according to their performance in provision of prophylaxis to the clients.

Provision of prophylactic measures								
Nurses performance on prophylactic measures	**Complete and correctly performed**		**Partially or incorrectly performed**		**Not performed**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
- Iron and folic acid supplementation	99	90.00	N/A	N/A	11	10.00	110	100
- Malaria (IPT)	105	95.50	N/A	N/A	5	4.50	110	100
- Tetanus toxoid	106	96.40	N/A	N/A	4	3.60	110	100
- Antihelminths	83	75.50	N/A	N/A	27	24.70	110	100
-Insecticide treated bed nets (ITNs)	102	92.70	N/A	N/A	8	7.30	110	100
- Antiretroviral therapy for PMTCT.	110	100	N/A	N/A	0	0.00	110	100

Table (V) Outlines the performance of the study participants on health teaching to the clients. According to the findings more than half of the study participants (50.9%) did not tell the clients about danger signs in pregnancy. Health teaching on nutrition was given completely and correctly by 25.5% of the study participant while71.8% did not give the clients any education about nutrition in pregnancy. Regarding infant feeding, more than four fifths (85.5%) did not give the clients any health teaching on infant feeding. Additionally, health education about sexually transmitted infections in pregnancy was not given by almost three quarters of the study participants (74.5%). Concerning prevention of mother to child transmission of HIV (PMTCT), 34.5% of the study participants gave a complete and correct health talk to the clients, 4.5% gave it partially and 60.9% did not talk to the clients about prevention of mother to child transmission of HIV. Furthermore, client education on birth preparedness was given completely and correctly by 44.5% of the study participants. The majority of the study participants (96.4%) did not talk to the clients about immunizations. Regarding family planning only 15.5% of the study participants gave the clients complete and correct health education about family planning. At the end of the session around one fifth of the study participants (21.8%) asked for feedback from the clients to confirm if they understood the messages shared and they gave them a return date for the next clinic visit.

Table (V): Number and percent distribution of study participants according to their performance in health teaching to clients.

Health teaching								
Performance of Nurses on health teaching	**Complete and correctly performed**		**Partially or incorrectly performed**		**Not performed**		**Total**	
	No.	%	No.	%	No.	%	No.	%
- Danger signs in pregnancy	13	11.80	41	37.30	56	50.90	110	100
-Nutrition Education	28	25.50	3	2.70	79	71.80	110	100
- Infant feeding	14	12.70	2	1.80	94	85.50	110	100
-Sexually transmitted infections	24	21.80	4	3.60	82	74.50	110	100
- Prevention of mother to child transmission of HIV (PMTCT)	38	34.50	5	4.50	67	60.90	110	100
-Birth preparedness	49	44.50	21	19.10	40	36.40	110	100
- Immunizations	4	3.60	0	0.00	106	96.40	110	100
-Post-partum family planning	17	15.50	1	0.90	92	83.60	110	100
- Feedback from client and return date	24	21.80	86	78.20	0	0.00	110	100

Figure (I) shows the percent distribution of the study participants according to their total score of compliance and all the items assessed using the FANC checklist. As Compliance being defined as complete and correct performance of the procedures; the study findings show that slightly above half (55.50 %)of the study participants were compliant with taking history from clients while physical examination had only 20% compliant study participants. Laboratory investigations on the other hand had 64.50 % compliance. Regarding provision of prophylaxis to the clients, the majority (90%) of the study participants were compliant. However, compliance with health teaching had the worst performance as only 5.50% of the study participants were compliant. The study revealed that only about one quarter (25.50%) of the study participants were compliant with focused antenatal care. However, the mean total score of compliance was (83.03 ± 9.41)

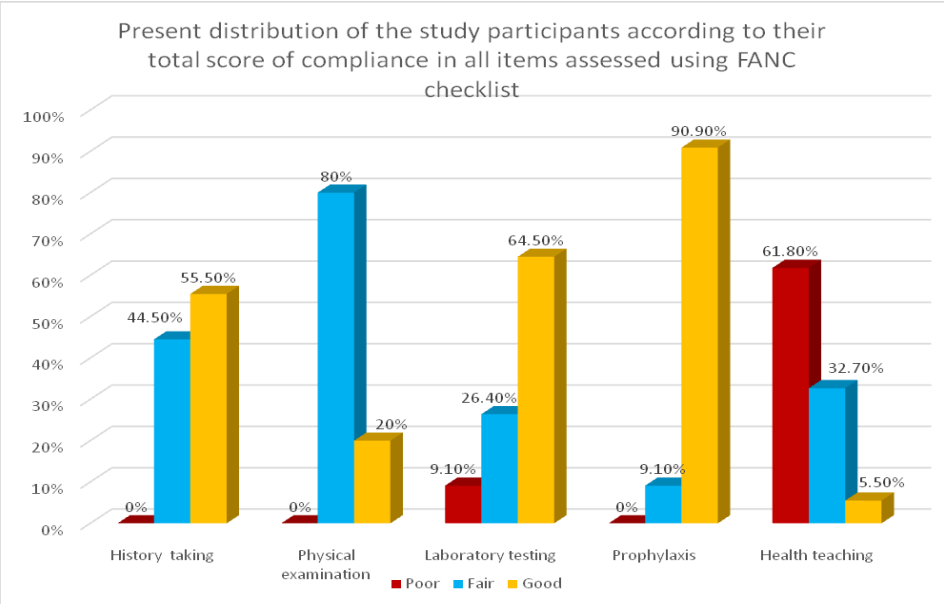

Figure (I): Percent distribution of study participants according to their total score in compliance with focused antenatal care (FANC).

Figure (II) represents the percentage distribution of the study participants according to their level total score of compliance with FANC. It was obvious that almost three quarters (74.50 %) of the study participants were fairly compliant with FANC compared to 25.50 % of them who had good compliance whereas no study participant had poor compliance.

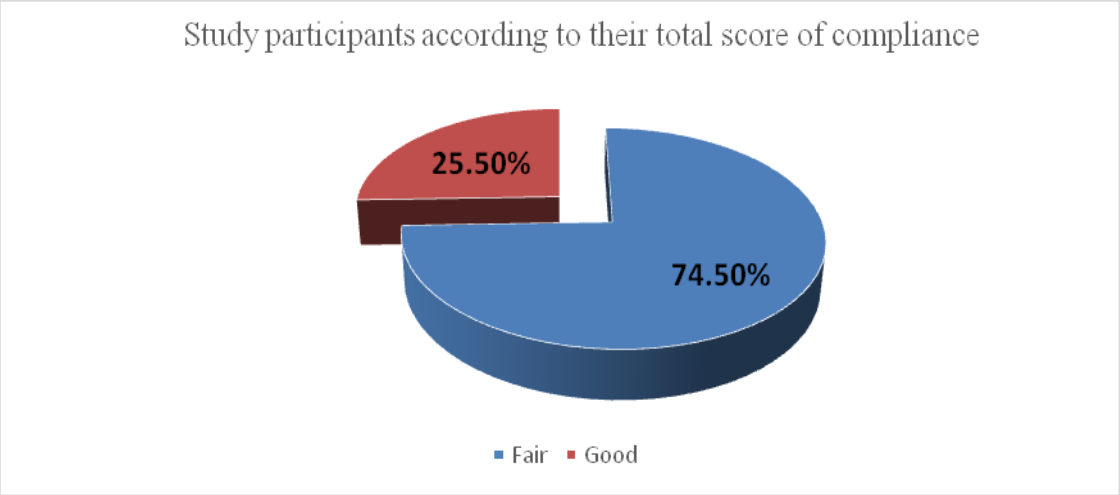

Figure (II): Percent distribution of study participants according to their total score of compliance with FANC

Barriers to compliance with FANC

Table (VI) demonstrates the findings on infrastructure assessment about availability of equipment, laboratory reagents and drugs required. Regarding equipment, the vast majority (98.20%) of the study participants had weighing scales and blood pressure machines respectively in their facilities. Also height measuring scale was available to 74.50% of the study participants. However stethoscopes were available to 69.10% of the study participants. Fetoscopes were available to all the 110 study participants at 100%. Looking at the laboratory equipment and reagents, almost an equal percentage of study participants (60.90% and 60%) had urine testing strips and microscopes in their facilities. All the study participants (100%) had HIV testing kits in their facilities; however blood grouping and rhesus typing reagents were available to 64.50% of the study participants. Furthermore hemoglobin estimation machine (haemocue) was available to 59.10% of the study participants. Malaria testing kits (rapid diagnostic test) was available in more than four fifths of the facilities (88.20%) where the study participants worked at. Concerning the prophylactic measures majority of the study participants had most of the drugs. Ferrous sulphate and Folic acid tablets were available to 92.70% and 91.80% of the study participants respectively, most facilities had the combination tablet of folic and ferrous popularly known as Ifas. All the study participants (100%) had antiretroviral drugs and sulfadoxine-pyrimethamine (SP or fansidar) tablets for malaria prophylaxis and tetanus toxoid was available to 99.10% of the study participants.

Table (VI): Number and percent distribution of the study participants according to availability of supplies and equipment required for compliance with FANC

Equipment and supplies	Study participants (n = 110)			
	Available		Not available	
	No.	%	No.	%
A. Equipment				
Weighing scale	108	98.20	2	1.80
Height measure	82	74.50	28	25.50
Blood pressure machine	108	98.20	2	1.80
Stethoscope	76	69.10	34	30.90
Fetoscope	110	100	0	0.00
B. Laboratory testing reagents and equipment				
Dipsticks for urinalysis	67	60.90	43	39.10
Microscope for microscopic examinations	66	60.00	44	40.00
HIV test kits	110	100	0	0.00
Blood grouping reagents	71	64.50	39	35.50
Haemoglobin estimation machine	65	59.10	45	40.90
Malaria testing kits (slides or RDT)	97	88.20	13	11.80
C. Drugs				
Ferrous sulphate tabs	102	92.70	8	7.30
Folic acid tabs	101	91.80	9	8.20
Antiretroviral drugs	110	100	0	0.00
Antimalarial tabs (SP)	110	100	0	0.00
Tetanus toxoid	109	99.10	1	0.90

Fig (III) illustrates that almost three quarters (74.50%) of the study participants had adequate supplies and equipment required for compliance in their health facilities

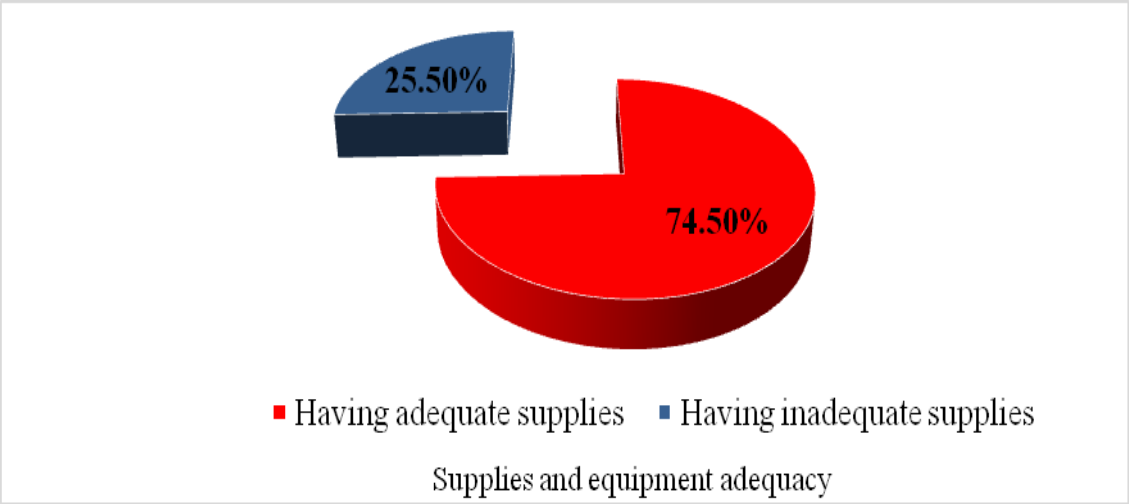

Figure (III): Percent distribution of the study participants according to supplies and equipment adequacy in their facilities of work.

Figure (IV) demonstrates that slightly above three quarters (75.40%) of the study participants started attending to the clients between 8.30am and 9.30am while 16.40% started between 7.30am and 8.30am. However, 8.20% of them started giving services at the clinic after 9.30am.

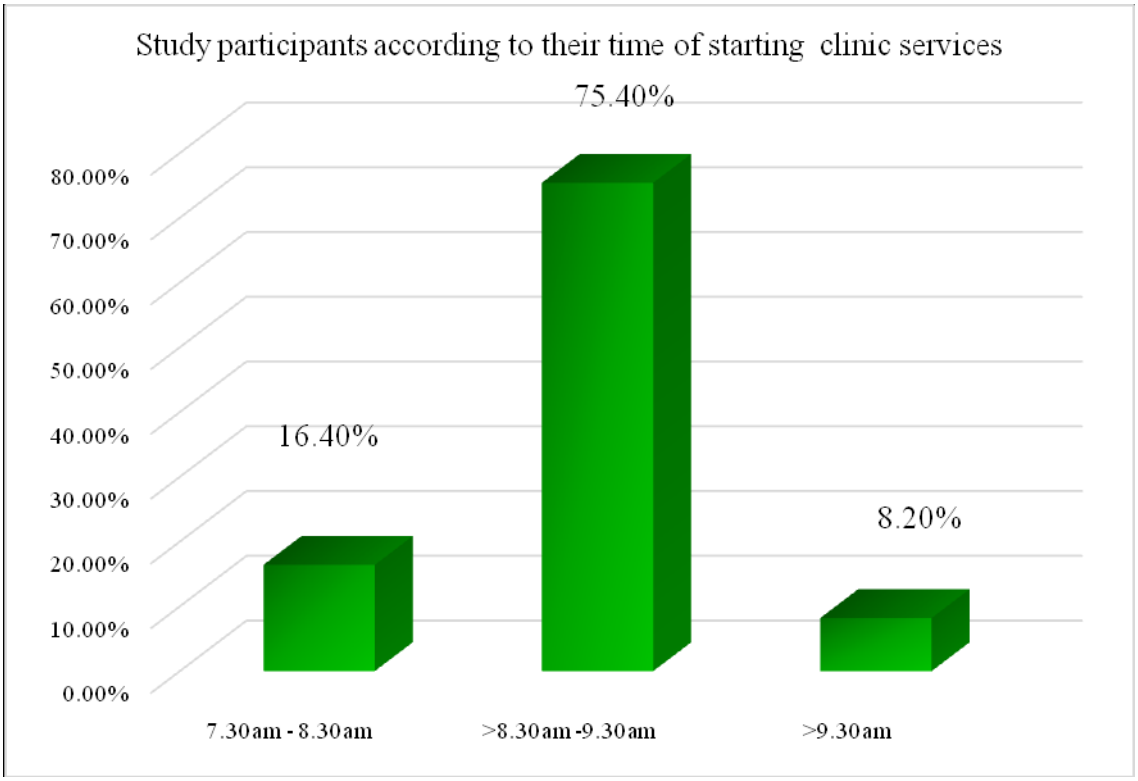

Figure (IV): Percent distribution of the study participants according to their time of starting clinic services

Figure (V) reveals that almost two thirds of the study participants worked alone in the clinic accounting for 65%, whereas 32% worked in clinics where they were two nurses and lastly 3% worked in clinics where they were three nurses.

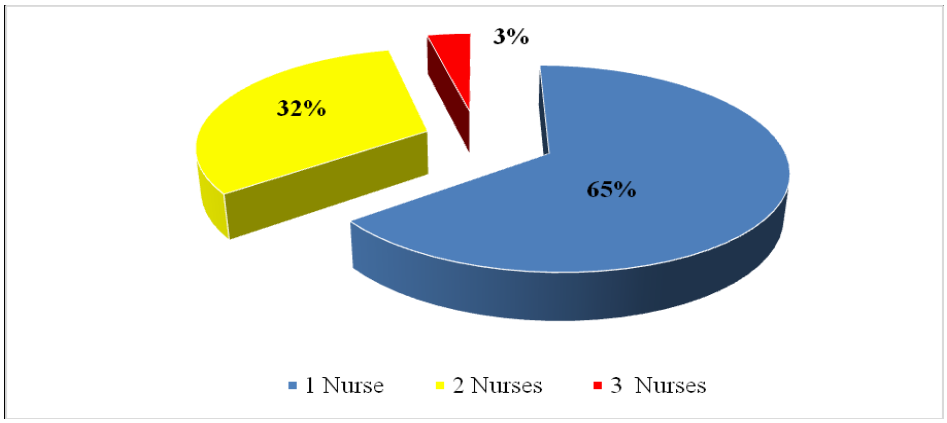

Figure (V): Percent distribution of the study participants according to the number of nurses working in their clinics.

Figure (VI) outlines the average number of antenatal clients seen by the study participants per day. It was evident that 15.50% of the study participants saw an average of less than five antenatal clients every day while more than half (59.10%) of them saw 5-10 clients daily. Furthermore, 19% of them saw 11-20 clients daily, while 5.50% of them saw averagely 21-30 clients daily. Only one participant saw more than 30 client's daily accounting for 0.90%.

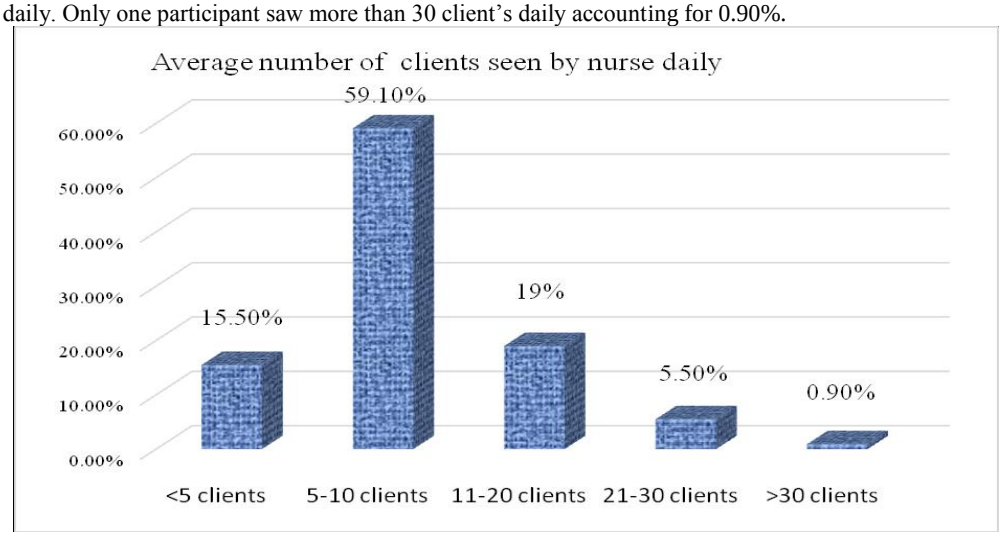

Figure (VI): Percent distribution of the study participants according to the average number of clients they saw per day.

Regarding the average amount of time spent with each client, **figure (VII)** demonstrates that 25.50% of the study participants spent ten minutes or less with their clients whereas more than half (52.70%) of the study participants spent averagely 11-20 minutes with their clients while 20.90% spent between 21 and 30 minutes with their clients. Only one participant accounting for 0.90% spent more than 30 minutes with the client.

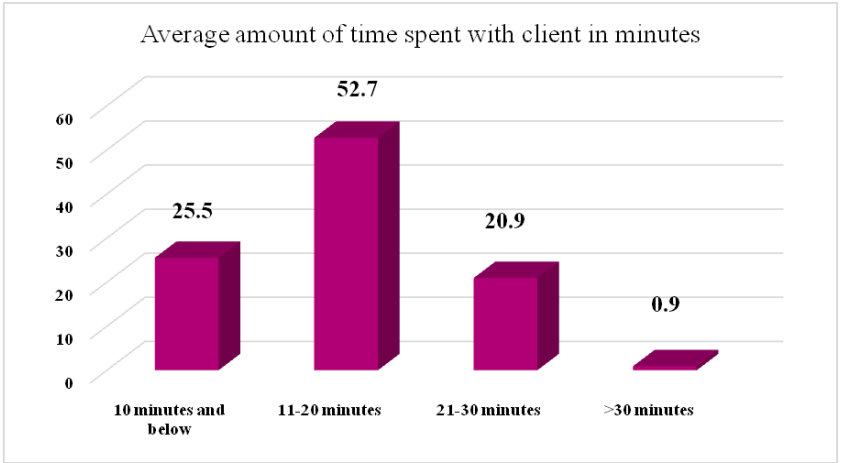

Figure (VII): Percent distribution of the study participants according to the average time they spend with each client in minutes

Table (VII) outlines the distribution of the study participants according to the challenges they face. It was noticed that almost half of the study participants (46.40%) were faced with a shortage of staff leading to heavy work load whereas almost two fifths (39.01%) were faced with lack of essential commodities thus not able to perform some procedures, this included some missing supplies, no laboratory in some facilities so antenatal profile cannot be done, some had no water and some had no electricity. Moreover, 14.50% of the study participants cited that late booking visit made by clients as a challenge as some came for first visit in third trimester and could not make the minimum four visits as required by focused antenatal care and some clients did not honor return visit dates. However, inadequate knowledge by some staff and clients on focused antenatal care was cited as a challenge by 6.40% of the study participants. Whereas the vast minority of the study participants (2.70%) said that when they refer clients for other services they are not able to offer in the clinic, client are reluctant to go to the referral facilities which poses a challenge to compliance. However an equal percentage of study participants (1.80%) had challenges with attitude and culture of the community in addition to delay in the laboratory during first visit making it not easy to accomplish other procedures stipulated for first visit. Furthermore, 3.60% cited poor roads and uphill terrain rendering the health facility inaccessible to some clients thus they would rather make one visit only and finally 6.40% of the study participants said they faced no challenges at all.

Table (VII): Number and percent distribution of the study participants according to the challenges faced during service provision.

Challenge #	**No. (n = 110)**	**Percent (%)**
Shortage of staff and heavy workload	51	46.40
Not able to offer some services due to lack of laboratory, ultrasound, some supplies, water, electricity etc.	43	39.10
Inadequate knowledge from some staff and clients	7	6.40
Clients not willing to go for referral services	3	2.70
Limited space thus patient privacy compromised	5	4.50
Culture and client negative attitude towards health care providers	2	1.80
First visit made late leading to fewer visits in total and some clients don't come for revisits	16	14.50
A lot of time is spent in the lab during the first visit leading to no counselling done during this visit	2	1.80
Poor accessibility of the facility due to bad roads or uphill terrain especially during the rains.	4	3.60
No challenge	**7**	6.40

#: Total is not exclusive (more than one response was obtained

Table (VIII) shows the number and percent distribution of study participants according to other activities they perform alongside antenatal care services. It was observed that more than two thirds of the study participants (67.30%) offered child welfare clinic services alongside antenatal care while 57.30% offered family planning services. Moreover, almost two fifths of the study participant (39.10%) gave clinical care to sick patients by clerking and prescribing treatment for them, 20% gave comprehensive care to HIV positive clients and care for HIV exposed infants while 6.40% carried out post-natal clinics and conducting deliveries too, only one participant reported performing cervical cancer screening. Finally, 15.40% of them gave antenatal care only.

Table (VIII): Number and percent distribution of the study participants according to other activities they perform alongside antenatal care services.

Activity #	**No. (n = 110)**	**Percent (%)**
Child welfare clinic	74	67.30
Family planning services	63	57.30
Post-natal clinic and delivery	7	6.40
Comprehensive HIV care and care of HIV exposed infants (HEI)	22	20.00
Cervical cancer screening	1	0.90
Clinical services (patient clerking and treatment)	43	39.10
None	17	15.40

Total is not exclusive (more than one response was obtained

Table (IX) represents the relationship between the nurses' demographic characteristics and their total score in compliance with focused antenatal care. It was observed that none of the socio-demographic characteristics had any statistical significance on the total score of compliance among the nurses who were observed. However, older nurses were more compliant than the younger ones whereby nurses in their forties and fifties (33% and 27.30%) respectively had better compliance than the younger age groups. Furthermore, gender had no statistical significance with the total score in compliance, however, looking at the percentages, the female appear to have better compliance (30.70%) than the male (14.30%) though no statistical correlation was found. Equally marital status as well as level of education bore no statistical correlation with compliance score**.**

Table (IX): Relationship between the nurses' socio-demographic characteristics and their total score of compliance with focused antenatal care.

Socio-demographic characteristics	Study participants (n=110)				Total		Significance
	Total score of compliance						
	Fair		Good				
	No	%	No	%	No	%	
Age (years):							
20 -30	35	76.10	11	23.90	46	41.82	X^2 =0.741
>31-40	31	75.60	10	24.40	41	37.27	P =0.902
>40 -50	8	66.70	4	33.30	12	10.91	
> 50	8	72.70	3	27.30	11	10.00	
Gender:							
Female	52	69.30	23	30.70	75	68.18	X^2 = 3.375
Male	30	85.70	5	14.30	35	31.82	P = 0.066
Marital status:							
- Married	60	70.60	25	29.40	85	77.27	X^2 = 3.086
- Single	22	88.00	3	12.00	25	22.73	P = 0.079
Level of Education:							
- Certificate	12	75.00	4	25.00	16	14.55	X^2 = 1.789
- Diploma	64	72.70	24	27.30	88	80.00	^{FE}P = 0.485
- Degree (BSN)	6	100.00	0	0.00	6	5.45	

X^2: Chi-square test ^{FE}P: Fisher's Exact test No Significance at P > 0.05

According to **table (X)**, nurses' total score of compliance had statistical association with their working experience in years and duration in the current unit where P = 0.048 and 0.015 respectively. That is to say, nurses with more years of experience had good compliance (50 %) compared to those who had less years of experience (23.30%). Moreover, those who had stayed in the clinic for more years also had better scores of compliance (100%) compared to those who had been in their clinics for shorter duration in years (24.30%).

Regarding previous training in antenatal care and level of facility the nurse worked in, no statistical correlation of total score of compliance was observed as P= (0.571 and 0.067) respectively.

Table (X): Relationship between the nurses' working experience and their total score of compliance with FANC.

Working experience	Study participants (n=110)				Total		Significance
	Level of compliance						
	Fair (n = 110)		Good (n = 110)				
	No	%	No	%	No	%	
Duration of experience in years:							
1-10	56	76.70	17	23.30	73	66.36	X^2= 2.411
>10 -20	15	68.20	7	31.80	22	20.00	P = 0.048*
>20-30	7	63.60	4	36.40	11	10.00	
> 30	2	50.00	2	50.00	4	3.64	
Duration in the current unit in years							
1-10	81	75.70	26	24.30	107	97.30	X^2 = 3.675
>10 -20	1	50.00	1	50.00	2	1.80	P = 0 .015*
>20 -30	0	0.00	1	100.00	1	0.90	
Previous training in ANC							
Yes	60	73.20	22	26.80	82	74.50	X^2 = 0.321
No	22	78.60	6	21.40	28	25.50	P = 0.571
Level of Health facility of work							
County Referral Hospital	2	66.70	1	33.30	3	2.70	X^2 = 6.809
Sub-County Hospital	15	75.00	5	25.00	20	18.20	P = 0.067
Health centre	27	62.80	16	37.20	43	39.10	
Dispensary	38	86.40	6	13.60	44	40.00	

X^2: Chi-square test*: Significant at P ≤ 0.05

Figure (VIII) shows that there was a statistically significant correlation between adequacy of supplies and nurses total score of compliance. The nurses who had adequate supplies achieved 34.10% good compliance while those who had inadequate supplies achieved 0% good compliance with focused antenatal care, whereby P = 0.000

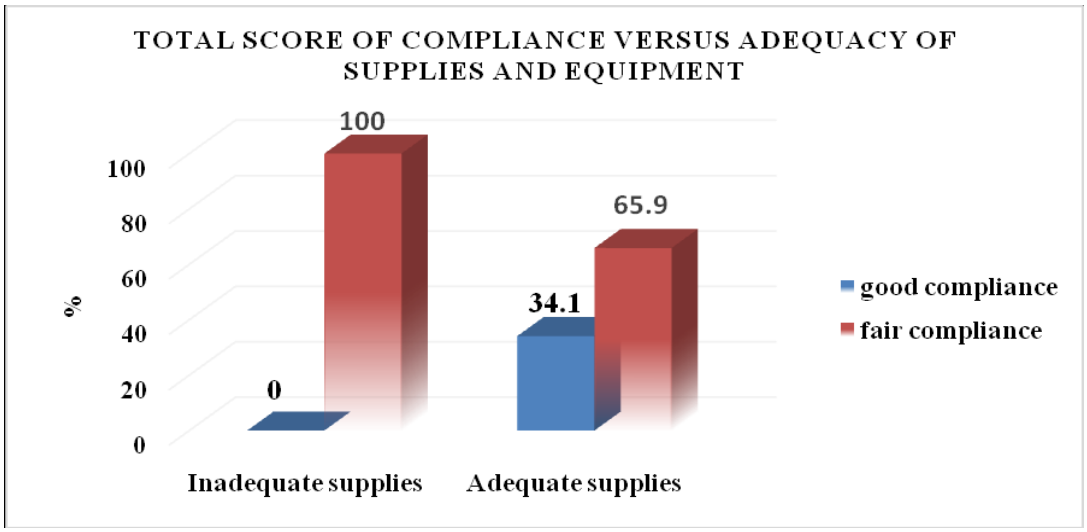

Figure (VIII): Relationship between adequacy of supplies and equipment and nurses' total score of compliance with FANC.

Table (XI) reveals that there was statistically significant correlation between nurses total score of compliance and the time when the clinic starts working in the morning (P =0.012) as well as average amount of time the nurse spent with a client (P = 0.013). This implies that nurses who started offering services to clients earlier achieved more good scores of compliance (38%) compared to those who started late (0%). Moreover, those nurses who spent more time with clients had better scores of compliance (100% good) than those who take a shorter period of time with their clients (7.40% good)**.** On the other hand, the number of nurses working in a clinic as well as number of clients seen per day had no statistical significant correlation with nurses' total score of compliance with focused antenatal care.

Table (XI): Relationship between the nurses' total score of compliance and FANC barriers.

Barriers	**Study participants (n=110)**				**Total**		**Significance**
	Total score of compliance						
	Fair		Good				
	No.	%	No.	%	No.	%	
Clinic starting time							
7.30 - <8.30am	31	62.00	19	38.00	50	45.40	$X^2 = 8.859$
8.30 – 9.30am	42	82.40	9	17.60	51	46.40	P= 0.012*
>9.30am	9	100.00	0	0.00	9	8.20	
No. of nurses in the clinic							
1	56	78.90	15	21.10	71	64.60	$X^2 = 3.937$
2	22	62.90	13	37.10	35	31.80	P= 0.125
3	4	100.00	0	0.00	4	3.60	
Average no. of clients							
<5	17	94.40	1	5.60	18	16.30	
5-10	47	73.40	17	26.60	64	58.20	$X^2 = 6.665$
11-20	13	61.90	8	38.10	21	19.10	P = 0.122
21-30	4	66.70	2	33.30	6	5.50	
>30	1	100.00	0	0.00	1	0.90	
Average time spent with client	25	92.60	2	7.40	27	24.50	$X^2 = 9.975$
≤ 10 minutes	43	72.90	16	27.10	59	53.60	P =0.013*
>10 -20 minutes	14	60.90	9	39.10	23	21.00	
>20 -30 minutes	0	0.00	1	100	1	0.90	
>30 minutes							

X^2: Chi-square test *: Significant at P ≤ 0.05

According to **Fig (IX)** a positive correlation between the time of starting the clinic services and the total score of compliance was observed (P = 0.012) as the nurses who started offering services earlier to their clients had more of good score of compliance. The nurses who started giving service between 7.30 and 8.30am had 38% percent good score of compliance while those who started after 9.30am had 0% good compliance score.

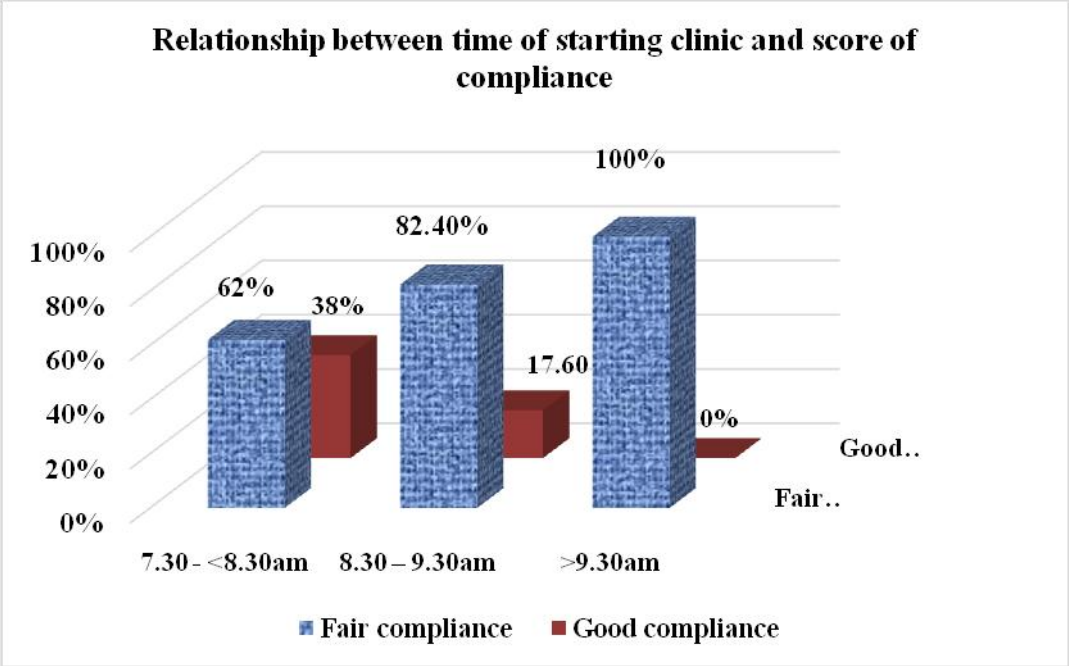

Figure (IX): Relationship between total score of compliance and time of starting clinic services.

$X^2 = 8.89$ $P = 0.012$*

*: Significant at $P \leq 0.05$ X^2: Chi-square test.

V. Discussion

In spite of FANC being recognized as effective method to detect and treat complications and emphasize on quality rather than quantity of care, generally speaking the current study revealed that the procedures stipulated in the guideline are not performed by all nurses. Some procedures were performed partially while others were omitted completely and the total mean score of compliance for all participants was fair.

Omissions of procedures have been noted in previous researches so this finding is not an isolated case and is supported by other researches done in Africa. Horner et al (2014)[15] found overall rate of compliance of nurses was not optimal as some procedures were omitted. Likewise, Karin Gross et al (2011)[16] revealed that the provision of ANC services varied widely and was not in accordance with the FANC guidelines due to omission of procedures. In a systematic review Grilli et al(1994)[17]concluded that the guidelines are not followed to the word and similarly Amoakoh et al (2016)[18] found that less than half of health care providers demonstrated complete compliance which they attributed to lack of awareness or not agreeing with the guideline or having a feeling that the guideline is not applicable to their daily practice.

Specific performances of the procedures reflect the findings above and are as follows:

Patient assessment

History taking

Findings of the current study indicate that study participants were not complained to history taking. This partial history taking could be attributed to the fact that at the time of conducting the study, most health facilities were lacking the mother and baby booklet which stipulates the history to be taken and apparently used as a guide to the nurses. Similar findings was documented by Birungi et al (2006)[13] that health care providers were not taking comprehensive history from the clients as some elements were ignored and all clients had partial history. On the contrary Horner et al (2014)[15] found that high compliance in history taking was achieved by all nurses. This difference could have been because the study audited retrospective data, actual performance was not observed. Furthermore health care in South Africa is more advanced compared to Kenya so the history taking could actually be more comprehensive.

According to Grilli et al (1994)[17] practice areas with less complex procedures had higher compliance rates though this was disapproved by the current study as history taking has no complex procedures yet the level of compliance was not as high. Nevertheless comprehensive history taking is the foundation of effective antenatal care as it helps in identification of risk factors in pregnancy as well as understanding of every client thus failure to take it can be detrimental to quality of care given.

Physical examination

Results of the current study revealed that only a minority of the study participants achieved good compliance score in physical examination. Procedures noted to have been performed by most nurses were weighing of the clients, checking of blood pressure, abdominal palpation to assess fundal height, lie and position of the baby plus auscultation of the fetal heart. Head to toe examination as well as assessing clients for anemia and edema were rarely carried out, also to note that breast examination and vaginal examination were rarely performed. This finding could be attributed to the routine mindedness of the nurses where weighing and checking of blood pressure is done at the triage and the client only goes to the room for abdominal palpation.

These findings are in agreement with other previous researches done which include Ouma et al (2010)[19]where the data before and after the training nurses on FANC agreed that majority of the health care providers palpated the clients abdomen and listened to the fetal heart. Moreover Mekonnenet al (2017)[20]found that weighing, blood pressure measurement, abdominal palpation and auscultation for fetal heart was done regularly and the same findings were echoed by Horner et al (2014)[15]. Conrad et al (2012)[21] also reported that the only procedures performed by all health care workers were abdominal palpation and fetal heart auscultation.

On the contrary Coleman et al (2016)[18] had abdominal palpation and auscultation as the least performed procedure by the nurses in Ghana. The difference can be attributed to the fact that the above study looked at performance during first antenatal clinic visit only and if this is done in first trimester as required by the guideline then the abdomen may have no palpable mass and fetal heart sounds cannot be heard on auscultation. Similarly Sarker et al (2010)[22]reported that blood pressure was not taken for most clients because there was no working blood pressure machine. This finding as explained just points out to lack of compliance due to unavailability of equipment. A rise in blood pressure is a sign that can precede cases of pre-eclampsia thus if noted early can be treated to improve on the pregnancy outcome thus blood pressure measurement is considered as one of the best practices in antenatal care.

Participants who attempted to perform head to toe examination on their clients did not examine the client completely and a very small minority performed a complete head to toe exam, this however did not include listening to heart and lung sounds, this is because most nurses observed were diploma holders and at their level they are not trained to auscultate the chest. Assessment for anemia and edema was done by almost half of the participants, however breast examination was attempted by a very small fraction of nurses and some male nurses expressed that some women would not allow them to examine their breasts. Lodge N et al (1997)[23]had made the same observation where majority of gynecology patients expressed feelings of embarrassment while being given intimate care involving exposure of the private parts by a male nurse. Moreover, vaginal examination was not performed by almost all of the study participants but this could be attributed to the fact that most clients seen were in second trimester.

Laboratory investigations (antenatal profile)

Concerning laboratory investigations, results of the current study revealed that there was good compliance in ensuring that clients had the investigations done especially those carried out by the nurses which are HIV screening and malaria screening in some clinics. This is attributed to the fact that HIV/Aids services in the county is largely supported by donor partners who ensure that the testing kits and antiretroviral drugs are available to promote adherence and they also go an extra mile to employ nurses in some facilities to ensure that the care is not compromised. In addition, screening and prevention of malaria is also donor funded and these partners have made sure that rapid diagnostic tests are available in most health facilities making it easy for the nurses to test the patient for malaria parasites where laboratory services are not available for a blood slide for malaria parasites to be done.

The other tests that required clients to be sent to the lab had lower percentages in performance as some clinics lacked labs or lab technologist or even the reagents. Hemoglobin estimation, blood grouping and Rhesus typing, VDRL and urine analysis and microscopy were done in facilities of more than two thirds of the study participants.

The current study findings are contrary to an earlier research done in Kenya by Van Eijk et al (2006)[24]which indicated performance of laboratory tests was very low and the only tests offered were hemoglobin testing, syphilis and urine analysis. The difference could be attributed to lack of laboratory supplies during that study which apparently had improved and all antenatal mothers were being tested for HIV while the other tests were also performed when supplies are available. Secondly Gross Schelenberg et al (2011)[16]reported that most health facilities did not check clients hemoglobin levels since they did not have an HB machine, clients were told to come at a later date for screening for syphilis while HIV screening was not done at all. Additionally, Villar et al (2007)[25]points out that routine hemoglobin checking is best done after 30 weeks gestation though Iron and folic acid should be supplemented throughout pregnancy to ensure no woman goes into labor with a low hemoglobin level.

Prophylaxis

The findings of the current study demonstrate that this was the best performed activity since averagely all nurses had good compliance. This was a great improvement compared to a previous finding by Pell, Menacaet al (2013)[26] in Kenya, Ghana and Malawi where inconsistency in provision of prophylaxis was reported due to unavailability of the necessary drugs or inability of the women to pay for the services. The improvement can be attributed to free antenatal and delivery services as well as donor support in some facilities.

Malaria prophylaxis in the current study was actually being given under direct observation treatment (DOTS) whereby the client swallows the drug in the health facility under the observation of the nurse to ensure it is actually taken in almost all the facilities. Compliance in malaria prophylaxis is in line with Abuja declaration 2000 which had set a target of above 60% coverage of pregnant women with IPT and ITNs by 2005 and beyond[27]. Insecticide treated bed nets were given by a vast majority of the study participants and equally, iron and folic acid supplementation as well as deworming tablets were issued by majority of the study participants. Moreover antiretroviral drugs were available in all the clinics and all study participants were able to give those who were HIV positive. HIV care was observed to be well complied with courtesy of development partners.

Health teaching

An alarming finding of the current study is that health education was not given or partially given to clients by a vast majority of the study participants. Furthermore in some clinics student nurses gave group teaching to the clients without supervision before start of clinic while in others the nurses reported that health education is given to the clients by community health volunteers when they visit them in their homes.

Provision of information on danger signs should be mandatory at every antenatal clinic visit because complications like hemorrhage and puerperal sepsis cannot be predicted through antenatal screening. Women should be made aware of the symptoms and advised on what to do in case of such occurrences[28]. However, the current study reveals that just above one tenth of the study participants had good compliance on education about danger signs in pregnancy.

Several previous studies have come up with similar findings that indicate that health teaching during antenatal clinics is not adequate. These include Kearns Annie et al (2014)[29]. On the same line Conrad et al (2012)[21] observed that very few health workers talked to the clients about danger signs in pregnancy and likewise Sarker et al (2010)[22] concluded that linking danger signs to clinical examination and laboratory results with effective client follow-up is crucial for success of antenatal care services.

Birth preparedness was not covered by more than half of the study participants. The same findings have been documented in other researches where health education was noted as a major gap existing between actual performance and ideal performance in FANC by Von Both(2006)[30], Omari(2016)[31] and Mutiso (2008)[32].

Given that development of an individual birth plan and birth preparedness are major components of focused antenatal care, this gap is likely to be the explanation behind suboptimal achievement of aims of antenatal care as has been indicated in other researches in the past that health education is ignored in most antenatal care clinics. This observation was made in the same regard of inadequate health teaching given to clients by Nikiema et al 2009[35] to emphasize on unmet needs in provision of information in pregnancy in Sub Saharan Africa and she reported that pregnant women are not routinely given information especially on danger signs of pregnancy, likewise Harriet Birungi et al (2006)[13]shared the same sentiments.

Regarding health teaching on nutrition and infant feeding, the current study revealed that majority of the study participants did not give nutritional advice to the clients nor tell them about infant feeding, a finding supported by Mekonnenet al (2017)[20]who stated that nutritional advice was rarely given to women. Likewise, prevention of mother to child transmission of HIV was talked about by minority of the study participants despite the high prevalence of HIV in the county. Moreover, information on sexually transmitted infections as well as health teaching on family planning was given by a very small percentage of the study participants.

Current study findings reveal that nurses are not utilizing information, education and counseling (IEC) which is an important component of focused antenatal care[33]. This coupled with the fact that feedback from the client at the end of the session to confirm understanding of the content was rarely elicited, raises the question as to whether health teaching during the antenatal clinics has been given the importance it deserves by the nurses.

Most of the health information required during antenatal clinic visits is outlined in the mother and baby booklet so some study participants were observed telling the clients that the book had so much information and they should read it at their own time. The finding is consistent with Schellenberg et al (2011)[16] who noted that the nurses relied much on what was indicated in the antenatal cards or books for service provision other than FANC guidelines. On the other hand Magoma et al (2010)[34] attributed low skilled birth attendance despite high antenatal clinic attendance to lack of health education especially on birth preparedness during antenatal clinic which includes information on hospital delivery. To stress on this as unmet educational need, Nikiema et al (2009)[35] reiterated that receiving information on birth preparedness and danger signs in pregnancy increases the chances of having skilled attendant at birth as well as chances of making the minimum four visits required by focused antenatal care. Moreover this represents a missed opportunity and is basically a result of little time spent with the clients during a session as the health care provider rush to clear the queue.

Determinants of nurses' compliance with focused antenatal care

The current study revealed that compliance of nurses with focused antenatal care had statistically significant relationship with their working experience in years, how long they had worked in their current unit, availability of supplies, time of starting to offer services at the clinic and the amount of time the nurse spent with their client. However, there was no statistical significance with their age, marital status, gender, level of education, previous training in antenatal care or the level of facility they worked in whether it is a dispensary, health centre, sub county or county hospital. Moreover no statistical significance was shown in compliance with number of nurses working in the clinic, number of clients seen per day, challenges met during service provision and other activities or services the nurse gave alongside antenatal care.

The current study revealed that nurses with more years of experience demonstrated better compliance than the ones who had worked for fewer years as evidenced by more of them having good compliance scores. This finding contradict Choudhry et al (2005)[36] where health care providers who had been in practice for more years were less likely to give good quality of care as they had less factual knowledge and less likely to comply with standards. On the same line of argument was Cabana et al (1999)[11]who stated that familiarity and inability to overcome inertia of previous practice made it difficult for staff who had worked in an area for long to comply with new guidelines. This deference could be attributed to the fact that procedures in the focused antenatal care guideline do not involve application of new knowledge so old knowledge was still valuable.

Infrastructure assessment revealed that some nurses had adequate supplies and equipment while others had inadequate supplies and equipment necessary for implementation of focused antenatal care. A highly positive statistical significance was found between availability of supplies and level of compliance with FANC whereby nurses who worked in better equipped facilities or those that had adequate supplies and equipment had better compliance than those whose facilities had inadequate supplies. This finding is supported by Wang W. et al (2017)[37]who indicated that available supplies used in service provision improved performance while lack of supplies compromised quality of care. Secondly, Sarker et al (2010)[22] attributed selective performance of procedures and lack of compliance to lack of supplies seen in infrastructure assessment. Similarly this view is supported by a systematic review by Simkhanda et al (2008)[38] where availability of supplies had a positive correlation with quality of care. Still on the same line Scribano et al (2011)[39] stated that better compliance was achieved when the equipment to be used was available and in good working order.

The current study further revealed that time of starting clinic services had significance in compliance. This confirms lack of punctuality as a possible barrier to compliance with focused antenatal care. The average amount of time spent with the client also had a positive correlation with compliance as nurses who spent more time with clients had better compliance than those who spent a very short time with clients. This finding echoes the outcome of a simulation study carried out in Tanzania which estimated time for each client to be 40 minutes for first visit and about twenty minutes for revisits in order to give quality care in focused antenatal care[30]. Similarly Anya et al (2008)[33] had corresponding findings where they found that time spent with the client was a barrier to effective health teaching as most health workers spent about three minutes with their clients and poor performance was the outcome.

Level of education and previous training however had no significance in nurses' compliance with focused antenatal care guideline in the current study which is contrary to the findings of Shih et al (2011)[40]where nurses with higher education and specialization conformed to guidelines more than those with lower qualifications. This difference could be attributed to the fact that at higher levels of nursing education in Kenya the nurses are not exposed to so much practical skills that is different from what the junior level nurses are exposed to unless they are specializing, thus their performance despite higher papers is not different from the ones with lower qualification. A different scenario is seen in the developed countries where the educational level could be equal to the skill acquired. Similarly further training in a particular field had also been observed by Burua et al (2014)[41]to improve compliance but the current study disapproves this by giving no relationship between previous training in antenatal care and compliance to the guideline. This difference could be attributed to the duration of these causes which is more of a five day seminar in a hotel which the nurses may take as a break from the routine and relax without learning much.

Burua et al (2014)[41]further observed that nurses who worked in lower health facilities were more likely to follow guidelines, a finding which contradicts the current study findings as the compliance scores did not have any difference at different levels of health facilities. This could be attributed to the uniformity in the characteristics of nurses working in these facilities.

The current study also revealed that the number of nurses working in a clinic, number of clients seen per day, challenges met during service provision and other activities performed by the nurse had no significant correlation with their compliance. As much as these are critical areas that in normal circumstances would be expected to affect the nurses' work, it could not come out clearly due to the nature of observation that was carried out. Individual nurse patient interaction for every antenatal client regardless of other activities going on was carried out. How much the nurse was able to perform on a particular client as far as FANC guideline is concerned was noted. This could be seen as a limitation to the findings of the current study since the same nurse involved in offering other services including curative services and child welfare clinic cannot have sufficient time for the antenatal client.

From the findings of the current study, it is evident that among all procedures stipulated in FANC guideline, health education is given the least consideration and this has a serious implication on the quality of antenatal care offered to mothers. Provision of information on danger signs should be made mandatory at every antenatal visit as this empowers the women to be able to make good decision in case of any problem. Furthermore a woman with knowledge is an asset to any community as far as decision making is concerned. So there is need for antenatal care nurses to prioritize the need for health teaching during clinic visits.

VI. Conclusion

Based on the findings of the present study it can be concluded that most of the study participants were not compliant FANC. The nurses failed to perform many crucial procedures which could have serious implication on women's' health and may directly influence maternal and neonatal mortality. This situation can be improved by ensuring availability of adequate supplies and equipment plus ensuring that the nurses have adequate time for every client.

VII. Recommendations

Based on the findings of the current study, the following recommendations are suggested:

- There is need to revisit the core procedures outlined in the FANC guideline and determine the necessity thus the limited time available be used for the procedures found to be beneficial during the specific visit especially health teaching.
- Periodic audits should be organized in the facilities to monitor the provision of antenatal care if it is in line with FANC especially following trainings as this study was done just after AMREF had concluded a training in the county on FANC yet the results are not impressive.
- Include FANC guideline in the continuous professional development (CPD) programs so that the nurses get regular updates.
- Conduct a similar study in other counties on a larger scale in order to be able to generalize the findings.
- Qualitative studies should be conducted to identify the real reasons behind low levels of compliance.

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