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**Research Article**

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## Acceptance of the new World Health Organisation antenatal care model among women in urban health facilities in Chipata district of Eastern Zambia: A cross sectional study

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**Abstract**

**Background:** Zambia adopted the recommended new World Health Organisation (WHO) antenatal care (ANC) model which requires a minimum of eight contacts; one contact in the first trimester, two contacts in the second trimester and five contacts in the third trimester. The aim of this study was to investigate the predictors of acceptability of the new WHO ANC model among women in selected urban health facilities of Chipata District.

**Methods:** The study used a cross-sectional study design, which was conducted in urban selected health facilities (Kapata and Mchini clinic) of Chipata District with a total sample of 300 postnatal women. A structured questionnaire was used as data collection tool and the data was analysed using STATA version 14.2. Statistical tests that were generated included ranksum test, chi square test, and Logistic regression analysis.

**Results:** 66.3% of postnatal women accepted the new WHO ANC model. The reported median age of women who accepted the new ANC visits was 27 (IQR = 23 – 31) compared to 26 (IQR = 23 – 30) years among women who did not accept the new model. 158/199 (79.40%) women who initiated ANC in 1 - 3 months of pregnancy accepted the new ANC model compared to 41/199 (20.60%) who initiated 4 – 6 months of ANC. The proportion of women who accepted 107/199 (53.77%) had 4-6 number of visits compared to those who did not accepted (44/101 (43.56%)) number of visits. Further, the findings suggest that number of ANC visits, adequate learning, inconvenience, and Good and effective sessions were predicting acceptance of new ANC model ( $p < 0.05$ ).

**Conclusion:** In line with government policy on health service delivery, there is need to continue strengthening community involvement to promote antenatal care attendance in all the trimesters and ensuring that health facility staff intensify outreach services through community health workers and community health assistant by offering monthly outreach antenatal care services.

## Introduction

Globally, it was estimated that 303,000 women died from pregnancy and childbirth-related complications in 2015. Almost 99% maternal deaths occurred in developing countries. Sub-Saharan accounts for about two thirds (66%) of all maternal deaths per year worldwide [1]. In Zambia Maternal Mortality rate has been fluctuating with no steady decrease since 1990 at 577 per 100,000 to 596 per 100,000. In 2001 it was at 729 per 100,000 however it decreased to 398 per 100,000 live births in 2013-14 [2].

Focused Antenatal Care (FANC) played a very important role in reducing perinatal and maternal mortality but not at a desired rate and increase in the number of visits may increase maternal satisfaction. These findings informed the development of WHO 2016 ANC recommendations [3]. The WHO 2016 recommendations for routine ANC care were intended to complement existing guidelines on the management of pregnancy-related complications. A study in Bangladesh showed that 79% of the mothers with a birth in the three years preceding the survey had at least one ANC visits; 31.3% had at least four ANC visits, only 6% had updated WHO recommended at least eight ANC visits. About one-fifth (21%) of the mothers did not receive any ANC visits [4].

The problem in Zambia is that focused antenatal care (FANC) only had 29% of mothers who received good quality ANC and maternal mortality remains high. The Sustainable Development Goals target a global maternal mortality ratio not greater than 70 maternal deaths per 100,000 live births by 2030, yet maternal mortality is estimated at 252 deaths per 100,000 live births in Zambia, it is this high maternal mortality among women in Zambia that stimulated the adoption of the WHO New model of ANC [5].

In 2018, Zambia adopted the new antenatal care model recommended by the WHO (2016) with increased visits to eight. The model was implemented and tested in Eastern province of Zambia. Despite the well-documented benefits of the model and the huge investment by the government and the donors, there was limited evidence about how the new WHO ANCM was accepted by women in Zambia. Lack of acceptability has been reported as a major hindrance to the successful adoption and implementation of any given intervention and program [6]. The Social, economic, demographic factors such as education level, income, employment status, age, and parity as well as the social and traditional norms, timing of visits, attitude of women and decision making, were assumed to influence acceptability of the new WHO ANC model among women in Chipata. Therefore, this study aimed to determine the acceptance of new WHO ANC model with associated factors among women in selected health facilities of urban setting of Chipata district in Eastern province of Zambia.

## Methods

### Study design, setting and population

A cross-sectional study design was applied in Eastern Province of Zambia in two Health Facilities that is Kapata Clinic and Mcini Clinic. Data collection commenced on the on the 16<sup>th</sup> of

March 2020 up to 17<sup>th</sup> of April 2020. A face to face structured questionnaire was used to collect data. The questionnaire had three sections: social, economic and demographic characteristics, acceptability of the new World Health Organization (WHO) Antenatal Care Model (ANC) model, ANC Timing, number of visit and cultural practices and perception of women towards the new WHO ANC model. A total of three hundred (300) questionnaires were administered.

The study population consisted of women who delivered from public health facilities in the past one year and attended antenatal care services during their pregnancy status. The total number of women interviewed from each health facility was determined by using proportionate to size random sampling of women attending post-natal care and the study sampled the women using a systematic random sampling picking every 7<sup>th</sup> attending postnatal clinic. The first respondent who was attended to by the health providers on the day of face to face interviews was picked. The University of Zambia Biomedical Research Ethics Committee (UNZABREC) ref number 439-2019 and National Health Research Authority (NHRA) approved this study.

### Data analysis

For descriptive purposes, frequencies and percent were computed for categorical variables whereas; the continuous variables (age) was not normally distributed with a P-value of 0.003 using Shapiro Wilk test, therefore median and interquartile range was reported in the descriptive statistics. To avoid inflating the type I error, age was not categorized. The ranksum test was used to measure association between age and acceptability to the new ANC sessions proposed by WHO, whereas Chi-square or Fisher's exact tests were used to determine association between the categorical variable.

A logistic regression model was carried out to investigate the effects of predictors on acceptability of newly introduced ANC sessions. Possible confounders were controlled using an investigator led multivariable logistic regression model. The study explored the likelihood ratio test, Pseudo R squared, Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC). All tests used the two tailed, which was conducted at a 5% significance level.

## Results

### Baseline Characteristics of Acceptance of new WHO ANC Model

The study investigated a total number of 300 observations in Chapata District of Eastern province from two health facilities (Kapata and Mchini). The median age among women who accepted the new ANC model was 27 (IQR, 23 – 31) compared to 26 (IQR, 23 – 30) who did not accept. The median number of children did not differ among those who accepted the new ANC model (median, 2; IQR, 1 – 3) and those who did not accept (median, 2; IQR, 1.5 – 4). The study reported a median of 2 (IQR, 2 – 3) months of pregnancy at first initiation of ANC by those who accepted the new ANC model compared to 3 (IQR, 3 – 4) months of pregnancy at first initiation of ANC for women did not accept. The median number of ANC visits was 5 (IQR, 4 – 6) and 3 (IQR, 2 – 4) for those who accepted the model and those

who did not respectively (Table 1).

The proportion of women who accepted the new ANC model was 195/199 (97.99%) among those who agreed to have had adequate learning during ANC compared to 4/101 (2.01%) who did not agree. Similarly, 188/199 (94.47%) women who agreed to be familiar with Health providers during new ANC accepted it compared to 56/101 (55.45%) who did not. 195/199 (97.99%) of women who agreed to having good and effective ANC also accepted the new proposed ANC visits by WHO compared to 51/101 who did not. The study also found that 158/199 (79.40%) women who initiated ANC in 1 -3 months of pregnancy accepted the new ANC proposal compared to 41/199 (20.60%) who initiated 4 – 6 months of ANC. The proportion of women who accepted 107/199 (53.77%) had 4-6 number of visits compared those who did not accept had 44/101 (43.56%) number of visits.

Number months of pregnancy at first initiation, number of ANC visits, adequate learning during ANC, familiarisation with health providers during ANC, ANC inconveniences, good and effective sessions and ANC timing was associated with acceptance of new ANC model proposed by WHO ( $p < 0.05$ ).

### Univariate and multivariable logistic regression of acceptance of New ANC Model

The study investigated factors predicting acceptance of new ANC model proposed by WHO. The results in table 2 below show that controlling for other factors, a year increase in age increased the odds of accepting the new ANC mode albeit there

was no sufficient evidence of association (AOR, 1.02; 95% CI, 0.96 – 1.09). Similarly, one unit increase in number of ANC visits increases the odds of accepting the new ANC Model (AOR, 1.80; 95% CI, 1.37 – 2.35,  $p < 0.0001$ ), this was statistically significant. Women who felt inconvenienced by ANC visits had a reduced chance of accepting the New ANC Model (AOR, 0.17; 95% CI, 0.007 – 42;  $p < 0.0001$ ), there was sufficient evidence of an association. On the hand women who reported that ANC sessions were good and effective had an increased chance of accepting the new ANC model (AOR, 10.48; 95% CI, 2.42 – 45.38;  $p = 0.002$ ).

The variance in the best-fit model using the mixed effect logistic regression was 0.097 (95% CI, 0.013 – 2.998) with standard error of 0.169. The reported likelihood-ratio test ( $p = 0.157$ ) shows that, there was not enough evidence of variability between clusters to favour a mixed-effects logistic regression over a standard logistic regression. The log likelihood ratio test ( $p < 0.00001$ ) suggested that the model with variables was better than the null model. We arrived at the best-fit model using the AIC and BIC.

### Margins plot

From the graph (Figure 1), we can see that with increase in age, the probability of women accepting the new number of ANC visits proposed by WHO increases, similarly the probability of accepting the new number of ANC visits increases with an increase in the number of visits attended. The results further show evidence that these margins probabilities are different from zero ( $p < 0.0001^*$ ).

## Appendices

**Table 1:** Baseline Characteristics of Acceptance of New WHO ANC Model

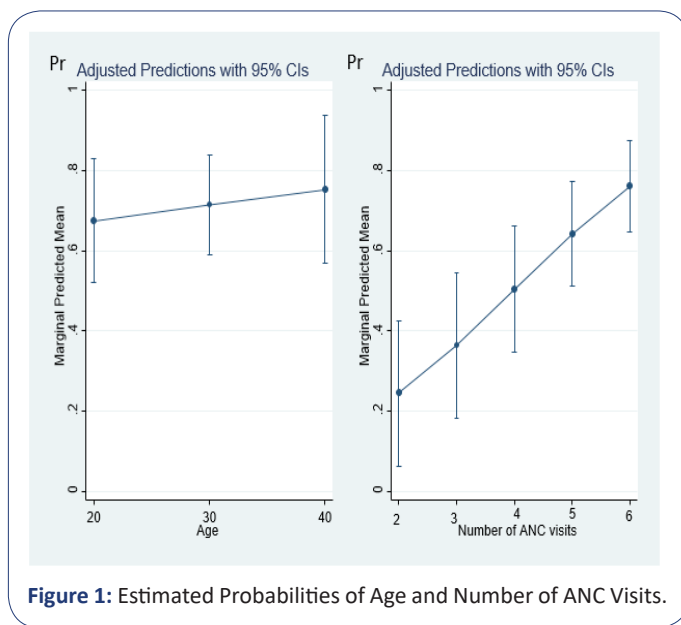
Characteristics	Acceptance of New ANC Model (N=300)		P-value
	Accept (N=199)	Do not Accept (N= 101)	
<b>Age</b>	27 (23 – 31)	26 (23 – 30)	0.64 <sup>R</sup>
<b>Parity</b>	2 (1 – 3)	2 (1.5 – 4)	0.20 <sup>R</sup>
<b>Pregnancy duration</b>	2 (2 – 3)	3 (3 – 4)	<0.0001 <sup>R</sup>
<b>Number of ANC visits</b>	5 (4 – 6)	3 (2 – 4)	<0.0001 <sup>R</sup>
<b>Education Level</b>			0.14 <sup>C</sup>
Primary	60 (30.15%)	42 (41.58%)	
Secondary	119 (59.80%)	51 (50.50%)	
Tertiary	20 (10.05%)	8 (7.92%)	
<b>Employment Status</b>			0.15 <sup>C</sup>
Formal employment	6 (5.94%)	32 (10.67%)	
Informal employment	43 (42.57%)	117 (39.00%)	
Not employed	52 (51.49%)	151 (50.33%)	
<b>Marital Status</b>			0.25 <sup>2</sup>
Married	158 (79.40%)	76 (75.25%)	
Not married	41 (20.60%)	25 (24.75%)	
<b>Adequate Learning</b>			<0.0001 <sup>C</sup>
Disagree	4 (2.01%)	41 (40.59%)	
Agree	195 (97.99%)	60 (59.41%)	
<b>Familiarisation</b>			<0.0001 <sup>C</sup>
Disagree	11 (5.53%)	45 (44.55%)	
Agree	188 (94.47%)	56 (55.45%)	
<b>Good and Effective</b>			<0.0001 <sup>C</sup>
Disagree	4 (2.01%)	50 (49.50%)	
Agree	195 (97.99%)	51 (50.50%)	
<b>ANC timing</b>			0.001 <sup>C</sup>
1 – 3 Months	158 (79.40%)	62 (61.39%)	
4 – 6 Months	41 (20.60%)	39 (38.61%)	

<b>Number of Visits</b>			
1 – 3 times	46 (23.12%)	54 (53.47%)	<0.0001 <sup>c</sup>
4 – 6 times	107 (53.77%)	44 (43.56%)	
7 + times	46 (23.12%)	3 (2.97%)	
<b>Inconveniences</b>			
Disagree	178 (89.45%)	51 (50.50%)	<0.0001 <sup>c</sup>
Agree	21 (10.55%)	50 (49.50%)	

R: Ranksum Test; C: Chi Square Test.

**Table 2:** Univariate and Multivariable Logistic Regression of Acceptability of New ANC Model.

Variable	COR (95% CI)	P-value	AOR (95% CI)	P-value
<b>Age</b>	1.01 (0.97 – 1.06)	0.547	1.02 (0.96 – 1.09)	0.476
<b>Pregnancy duration</b>	0.63 (0.51 – 0.77)	<0.0001	0.98 (0.73 – 1.38)	0.930
<b>Number of ANC visits</b>	1.75 (1.49 – 2.06)	<0.0001	1.72 (1.33 – 2.23)	<0.0001
<b>Education level</b>	Ref (1)		Ref (1)	
Primary	1.63 (0.98 – 2.73)	0.061	1.47 (0.72 – 3.04)	0.293
Secondary	1.75 (0.70 – 4.35)	0.228	1.12 (0.31 – 4.03)	0.864
<b>Adequate learning</b>	Ref (1)		Ref (1)	
Disagree	33.31 (11.46 – 96.80)	<0.0001	4.29 (1.01 – 18.33)	0.049
<b>Familiarisation</b>	Ref (1)		Ref (1)	
Disagree	13.73 (6.66 – 28.32)	<0.0001	1.13 (0.29 – 4.34)	0.864
<b>Inconveniences</b>	Ref (1)		Ref (1)	
Disagree	0.12 (0.07 – 0.28)	<0.0001	0.21 (0.29 – 0.47)	<0.0001
<b>Good and effective</b>	Ref (1)		Ref (1)	
Disagree	47.79 (16.49 – 138.51)	<0.0001	10.48 (2.42 – 45.38)	0.002



**Figure 1:** Estimated Probabilities of Age and Number of ANC Visits.

## Discussion

The study investigated the acceptance of the new World Health Organization (WHO) Antenatal Care (ANC) model among women in urban health facilities of Chipata district. More than half of postnatal women who participated in this study accepted the new ANC model. A study in Enugu State, south-east region of Nigeria similarly showed that a lower percentage of women (20.3%) accepted reduced visits [7].

Majority of women having accepted the new ANC model,

79% started ANC early (first trimester). To meet international standards, the timing and number of ANC visits are vital in the detection and management of pregnancy complications. WHO recommended that women should start ANC early, at first trimester to have at least four ANC visits [8]. Globally, there is a substantially lower proportion of pregnant women initiated on ANC during the first trimester. Reasons associated with delayed ANC initiation include financial constraints, distance to health facilities, cultural and religious beliefs around disclosure of pregnancy status, gender norms, lack of awareness of pregnancy signs and antenatal care schedules, pregnancy wanted ness, perceptions on the need to start ANC early, and quality of care received [9].

The results in this study revealed that a high number of women-initiated ANC in the first three months of pregnancy. This clearly show that most women who started ANC in first trimester of pregnancy accepted the new ANC. In other words, women who started ANC early accepted the new ANC model compared to those who started late. Contrary to our findings, a study done in Bangladesh suggest that the uptake of first ANC is substantially delayed, only one-fifth of the women availed their first ANC in the 1st trimester (within 12 weeks and more than one-fourth of the women received their 1st ANC during 13–16 gestational weeks) [10]. In Nigeria the prevalence of early first-time antenatal care visits was lower 46.8% compared to this study [11]. In Ethiopia Debre Berhan town, 40.6% of pregnant women had their first ANC booking within the first trimester [13]. In Malawi, only 29% of women were initiated ANC by 16 weeks of pregnancy [14].



Studies reveal that mothers who have had knowledgeable on the timing of ANC were more likely to early initiate the ANC services than those not knowledgeable [11,12] on the other hand, culturally, women delay to disclose about their pregnancies even to their family members and relatives. They delay to seek first ANC for few weeks thinking that pregnancy may terminate at an earlier stage, so they wait until the pregnancy is big (4-5 months) to report or visit healthcare centre [10]. In a study done by Jiwani et al less than half of the women-initiated ANC within the first trimester of pregnancy as recommended by WHO [15].

Early commencement of ANC makes women to have sufficient number of visits and adequate services to know probable complications during pregnancy and introduce suitable treatment [9]. In this study, most women 53.77% who accepted the new model had 4-6 number of visits and number of visits is the predictor of acceptability. This indicates that women accept the new WHO ANC model with increase in the number of visits. For instance, 23% women who had 7+ number of visits in this study accepted the new ANC model by WHO compared to 3% women who did not accept. Furthermore, the margin plot analysis shows that probability of accepting the new number of ANC visits increases with an increase in the number of visits attended. 87.1% of women receive at least four ANC visits in Jamaica [16].

This is almost the same with results in an Indicator Cluster Surveys (MICS) of various countries since 2012, were 49.3% pregnant women received 4-7 contacts, and 11.3% achieved eight or more contacts during pregnancy [15]. Despite having 79% of women who initiated and accepted ANC in the first three months of pregnancy in our data, only 28% women managed to attain all the eight contacts, at least some women were able to attend all the eight contacts proposed by WHO. This also an indication that the new number of visits is achievable if good strategies are put in place and implemented. The newly set WHO recommendation of a minimum of eight ANC contacts, with higher frequency of contacts almost every two weeks in the third trimester, suggests need to identify effective strategies to ensure women attain all the eight contacts. Achieving such target will be a steep climb for Zambia, thus there is a need to put in place policy and programs that will tackle both service demand and strengthening of the health system, including the delivery mechanisms of services, infrastructures and commodities, and the monitoring of these services [15,16].

Generally, women have positive perception towards the new ANC model of eight contacts. Almost all women accepted that there was adequate learning during ANC with eight contacts. Similarly, 94.47% women accepted to be more familiar with Health providers during new ANC proposed by WHO. Women also accepted to have good and effective ANC during pregnancy [17]. Perception of women towards the new ANC model significantly influence acceptability. This could be an indication that community health workers especially saving mothers action groups (SMAGs) are implementing their role to inform or sensitize pregnant women on the importance of antenatal care. Therefore, there is need to continue supporting community health workers so that they keep on with informing pregnant women on the importance of antenatal care services which will in turn influence their perception positively. One of the reasons women are accepting the new ANC model is that it is good for regular monitoring of pregnancy to ensure the wellbeing of both the mother and baby.

Women who did not accept the new model thought it was

tiring to attend all the eight contacts. Similarly, women in Nigeria did not accept increased number of visits in order to save time. Age, parity, education level and employment status are not predictors the acceptability of the new ANC model among women. Similarly, a study conducted among Arab women did not find any association between socio-demographic factors, except education, and determinants of focused antenatal care uptake among women in tharaka nithi county, Kenya. ANC initiation [18]. This is contrary to findings in Ethiopia were Women's educational level, marital status and employment status of women were the strong predictor of the utilization of ANC services. The highest proportion of Women who accepted the new ANC model attained secondary education compared to those with primary education. Similarly, in Kenya, Women with higher level of education were more likely to attend more antenatal care visits and earlier in their pregnancy. Married women were more likely to accept the targeted visits as recommended compared to the unmarried. Other studies found that an increase in parity decreases the likelihood of uptake of ANC [19]. Some limitations of this study may include, interviewer's bias, respondent bias and recall bias. However, the strength is that the data used in this study is primary.

## Conclusion

Acceptance of the new WHO ANC model was influenced by number of ANC visits, ANC timing, and antenatal care is inconvenience, ANC is good and effective. In line with government policy on health service delivery, there is need to continue strengthening community involvement to promote antenatal care attendance in all the trimesters and ensuring that health facility staff intensify outreach services through community health workers and community health assistant by offering monthly outreach antenatal care services. Efforts to bring antenatal care services closer to people may continue improving antenatal initiation and number of visits as it lowers the costs associated with accessing these services at distant health facilities.

## Limitations

The study considered only one stakeholder, women who came for postnatal within six weeks of delivery, thus the study did not get information from providers and other relevant stakeholders. Secondly, the study is quantitative, making it difficult to get in-depth information on how and why users accept or do not accept the new antenatal care model.

## What is known about this topic

- Antenatal care remains important in reducing maternal mortality
- Sub-Saharan Africa continue to record the highest numbers of maternal mortality
- Zambia has adopted the new ANC model proposed by WHO to improve ANC services

## What this study adds

- Majority of the participants expressed acceptance of the new ANC model
- Only 28% women managed to attain all the eight contacts
- Acceptance of the new ANC model was significantly influenced by perception, good and effective sessions, adequate learning and familiarisation.

**Competing interest:** The authors declare no competing interests.

**Authors' contributions:** Womba Samudimu, Choolwe Jacobs and Rosemary Ndonyo Likwa came up with the conception and design. Womba Samudimu acquired the data. Analysis and interpretation of data was done by Samson Shumba, Womba Samudimu and Rosemary Ndonyo Likwa. All authors were involved in drafting the article and revising it critically for important intellectual content. All authors equally read and approved the final version to be published.

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