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Rural-urban disparity and Antenatal Care Utilization in Ghana

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Abstract

Antenatal care has proven to be one of the most effective maternal healthcare interventions, however, most pregnant women in Ghana are not able to get eight or more ANC visit recommended by the World Health Organization. There also exist a disparity in antenatal utilization between rural and urban areas. The disparity in ANC utilization raises the debate as to whether locational policy interventions are required. This study examined rural-urban differences in the determinants of antennal care (ANC) utilization in Ghana. Using the 2014 Ghana Demographic Health Survey (GDHS) data and Poisson estimation technique, the study result showed a disparity in ANC utilization between rural and urban localities. Pregnant women in urban localities were found to do better for eight or more ANC visits than their counterparts in rural localities. The study also found that, the dichotomy in rural-urban in terms of ANC utilization was influenced by insurance ownership, primary education, wealth quintile and frequency of watching television. The study suggests an increased use of health insurance and massive pregnancy education through the media to promote the use of ANC utilization in rural areas while at the same time looking at access to females in attaining formal education.

Keywords: determinants, antenatal utilization, poisson regression, rural-urban disparity

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1. Introduction

Maternal mortality, deaths of women during pregnancy or within 42 days of pregnancy, remain a major global health concern. (Yaya, Anjorin & Adedini, 2021; Musarandega, Machekano, Munjanja & Pattinson, 2022). Over four decades, maternal mortality has been at the top of global health agenda with Safe Motherhood initiative in 1980s, Goal 5 of UN Millennium Development Goals in 1990 and Goal 3.1 of Sustainable Development Goals (SDGs) in 2017. All aimed at reducing maternal deaths, yet Maternal mortality remains a major challenge worldwide, with approximately 810 women dying from pregnancy-related complications per day (World Health Organization [WHO], 2019). It is also reported that in 2017 alone, 295,000 maternal deaths were recorded globally out of which 94% was recorded in low and middle-income economies, with Africa and South Asia accounting for 86%. Africa alone accounts for 68% of total maternal deaths each year globally. There is therefore an urgent need for policy intervention if Goal 3.1 of SDGs which seeks to reduce maternal mortality ratio to less than 70 per 100,000 live births by 2030 is to be met.

In Ghana, maternal mortality is still a challenge despite the implementation of some pro-poor health policy initiatives such as the free maternal health care policy (FMHP) and the community-based health planning and services (CHPS) initiatives which aims at removing financial and geographical barriers to maternal health care

utilization. Ghana's maternal mortality ratio though improved from 760 per 100,000 live births in 1990 to 319 per 100,000 live births in 2015, failed to achieve the Millennium Development Goal target of 190 per 100,000 live births in 2015. As at 2017, MMR was 308 per 100,000 live births, which is far above the SDG target of less 70 per 100,000 live births by 2030 (WHO, 2019). This calls for a more drastic measures to achieve the Sustainable Development Goal 3.1 (Hassani et al., 2021).

Antenatal Care (ANC) services are one of the maternal health interventions that has attracted global attention, particularly, among planning institutions, policy makers, academics and research bodies, as well as non-governmental organizations (NGOs) as a possible driver towards attainment of Goal 3.1 of SDGs (Hassani et al., 2021). This is because ANC is potentially one of the effective maternal health services needed to prevent and reduce maternal morbidity and mortality (Ali et al., 2020). It offers the opportunity to provide important maternal health information and services that can promote the health of mother and child.

It also allows expectant mothers to make use of proper health facilities and provides the necessary links to skilled birth attendants, a practice that is proven to reduce maternal death across the world (Kiross et al., 2021; Namatovu & Oyana, 2021; Yadav et al., 2021). Thus, quality ANC services improve the survival and health of mothers and their unborn babies (Tekelab et al., 2019). In order to receive an effective maternal health care intervention, the World Health Organization recommends a minimum of eight (8) ANC visits during the entire period of pregnancy (Fagbamigbe et al., 2021). In spite of the WHO recommendations on ANC visits, 69% of pregnant women in Africa receives at most one ANC visit. This indicates a sluggish progress in meeting the WHO recommended ANC visit in Africa.

In Ghana, although there have been some improvements in ANC visits in recent decades, the data show slow progress in meeting the WHO recommended baseline of eight or more visits. The Ghana Demographic and Health Survey (GDHS) reports show that the ANC visit in the first trimester among the sampled respondents increased from 55% in 2008 to 64% in 2014. However, only about 29% of pregnant women in Ghana made eight or more visits to the ANC. This threatens the agenda of Ghana achieving the SDG goal 3.1 by 2030.

The disparity between urban and rural mothers in ANC visits in Ghana also needs to be emphasized. Despite ANC been freely offered through the free maternal health care policy (FMHP) initiative, the percentage of pregnant women who made a minimum of eight visits to health centers to access ANC services constitute 38 percent for urban dwellers, while their rural counterparts' is estimated at 22 percent, and thus showing a gap of 16 percentage points in ANC utilization between urban and rural pregnant women. Aside the ANC visits, there is high facility birth in the urban areas, estimated at 90 percent compared to the 59 percent facility birth in the rural areas in 2014. This shows a gap of 31 percentage points in facility birth (Delivery) between urban and rural pregnant women. The poor utilization of ANC (i.e. fewer ANC visits) in the rural areas may account for the large number of home births (41 percent) in the rural areas. Furthermore, the regional differences in ANC visits are also evident. The GDHS (2014) findings show that 92 percent of women who deliver in the Greater Accra region (a predominantly urban region) receive assistance from skilled providers meanwhile just 36 percent of their counterparts in the Northern region (a predominantly rural region) receive skilled assistance at birth.

The rural-urban disparity raises the debate as to whether different policy interventions are required in these areas to bridge the ANC utilization gap. The disparities in ANC utilization also raises inequality issues which call for urgent attention if SDG goal 10 is to be achieved by 2030. Knowledge on the determinants of the rural-urban disparity on ANC utilization will help come up with area specific policies necessary to bridge the gap in ANC utilization between the rural and urban areas. The key question is whether different health interventions are required in rural and urban areas. The answer to these questions demand an understanding of the main determinants of rural-urban disparities in ANC utilization. Existing studies have identified copious determinants of ANC utilization in general (Ahinkorah et al., 2021; Bain et al., 2022; Dadjo et al., 2022; Sui et al., 2021; Tessema et al., 2021; Yehualashet et al., 2022), however, much is not said about the determinants that brings about the disparity in ANC utilization.

This study extends the literature by examining the disparity in the determinants of ANC utilization for rural and urban areas to allow for pragmatic policy interventions tailored to solve area specific issues concerning ANC utilization in Ghana. Finally, on the methodology side, previous studies have either used logit or probit model to explain the determinants of ANC visits, however this study employs Poisson estimation technique which is more suitable for the raw dataset of the GDHS which comes as a count data. Therefore, the current study applied the Poisson estimation technique to determine the factors that influence the utilization of antenatal care in Ghana.

2. Methods

This section presents the methods used for this study. It presents the type and sources of data, the models and how data was analyzed.

2.1. Source of Data, Study Design and Sampling Procedure

The study analyzed secondary data. The women file of the Ghana Demographic Health Survey (GDHS) 2014 was used to investigate the determinants of ANC utilization in Ghana. GDHS (2014) is a cross-sectional survey conducted by the Ghana statistical service in collaboration with the Ghana Health Service (GHS) and the National Public Health Reference Laboratory (NPHRL) of GHS. Funding and technical support was provided by United Nations International Children's Emergency Fund (UNICEF), United State Agency for International Development (USAID) and other international donors. GDHS is a national survey conducted for women aged 15 to 49 years with a live birth five years prior to the survey. The questionnaire consists of questions on demographic indicators, health status, illnesses, visits to a doctor, and lifestyle related questions bothering on smoking, drinking alcohol, physical activity, and eating habits.

The 2014 GDHS dataset used in this study is the sixth wave conducted by the Ghana Statistical Service. The first wave was carried out in 1988, followed by the second wave in 1993. The 5-year interval between waves continued in 1998 (third wave), 2003 (fourth wave), and 2008 (fifth wave). However, the sixth wave was conducted in 2014, six years after the fifth wave. To provide rich data sets for the purpose of planning and policy decision making, the findings of the GDHS data sets have served as a complement to other sources of data sets (GSS, 2016)

Multistage stratified cluster sampling approach was employed to collect the data by engaging trained field personal. The approach was used to sample women from urban and rural areas from the ten administrative regions in Ghana. Based on the 2010 population and housing census in Ghana, the first stage of data collection involved selecting enumeration areas which became the primary sampling units. A total of 427 clusters were selected, 216 in urban areas and 211 in rural areas. The second stage of data collection involve listing household using systematic random sampling technique. 12,831 households were sampled. Questionnaire which is based on standard demographic and Health Survey was used as instrument for data collection. The questionnaire was pretested for four days in both rural and urban areas to allow for suggestions and modifications before the main data collection period.

2.2. Statistical model

Since the dependent variable (i.e. number of ANC visits) is a count data, the study employed the Poisson model, which is suitable for count datasets. The Poisson model expresses the dependent variable as a linear function of a set of covariates. This suggests that the event (i.e. number of ANC visits) follows a Poisson probability distribution expressed as

$\Pr(Y = y) = \frac{e^{-\vartheta}\vartheta^{y}}{y!}$, where y takes integer values such as 0, 1, 2,…

In this case the mean is expressed as $E(y) = \vartheta$ and the variance expressed as $Var(y) = \vartheta$. This implies that any factor that affects one will affect the other also. The Poisson model is intrinsically heteroskedastic (Terefe & Gelaw, 2019) and may perform poorly in situations where the conditional variance is larger than the conditional mean (i.e. overdispersion). Therefore, the study employed the negative binomial model (reported in the Appendix) to serve as a robustness check since it controls for overdispersion by including a term for the unobserved heterogeneity.

2.3. Dependent and Independent Variables and their Measurements

The number of antenatal care (ANC) visits was used as the outcome variable. Women who had life-births were asked about the number of ANC visits during pregnancy. World Health Organization has recommended a minimum of eight (8) antenatal visits for a safe delivery. The independent variables included are educational level of women (coded as: no education=0, primary education=1, secondary education=2 and post-secondary=3), religion (no religion =0, Christian=1, Islamic = 2 and traditional=3), the wealth quintile of woman (poorest=1, poorer=2, middle=3, richer=4 and richest=5), insurance status of woman which describes the ownership of health insurance (no insurance=0 and insurance=1), locality (rural=0 and urban =1), age of woman measured in complete years, frequency of listening to radio (not at all =0, at most once a week=1 and more than once a week=2) marital status (single=0 and married=1), region describes the region a mother identifies herself (Western =0, Central=1, Greater Accra=2, Volta=3, Eastern=4, Ashanti=5, Brong Ahafo=6, Northern=7, Upper East=8 and Upper West=9) , frequency of watching television (not at all =0, at most once a week=1 and more

than once a week=2), the employment status (employed =0 and not employed=1) Childr_Number which describes the number of living children a mother has. These variables were chosen based on previous studies conducted in sub-Saharan African countries (Adu et al., 2018; Ahinkorah et al., 2021; Atnafu et al., 2020).

2.4: Data Analysis

The study used the Poisson regression model (PRM) to analyze the determinants of ANC utilization in Ghana. Poisson regression model was used because the outcome variable (ANC) which measures the number of ANC visits during pregnancy is a count data. Descriptive statistics was used to describe the basic features of the data under study. Tables and graphs were used to present a summary of the main variables used for analysis. Stata version 14 was used to analyze the data.

2.5: Ethical Approval and Data availability

This study used secondary data conducted by the Ghana statistical service in collaborated with international organizations such as UNICEF, USAID among others and Ghana Health Service. The ethical review board of Ghana health service, Ghana statistical service approved the study that collected the original survey data. Therefore, this study does not need ethical approval for the data since it is from a secondary and well accredited source. This data is in the public domain on the website of Ghana statistical service.

3. Results and discussion

The section is divided into three main parts. The first part presents the descriptive statistics while the second part presents the poison regression results showing the determinants of ANC utilization in Ghana. The third part presents the results of the poison regression on the determinants of the utilization of ANC in rural and urban locations. This is useful to identify factors peculiar to rural and urban areas.

3.1. Descriptive Statistic

This section presents the descriptive statistics of the outcome variable (ANC utilization) and compares the relationship between the outcome variable and some key predictor variables in the study. Table 1 shows the ANC utilization of in Ghana. As mentioned earlier, the World Health Organization (WHO) has recommended a minimum of eight (8) ANC visits for a pregnant woman to get safe and healthy delivery. Out of a total of 4,500 two hundred and seventy-two (4272) observations, 3.07 percent had no ANC utilization, 68.09 percent had one to seven ANC visits while 28.84 percent had eight or more visits. Arthur (2012) indicated that most Ghanaian women use ANC services during pregnancy. This is a result of the free maternal health care policy under the national health insurance scheme and other policies such as the safe motherhood program, where pregnant women are encouraged to use maternal health services.

Table 1: Antenatal Care Utilization in Ghana

Antenatal Care Visit	Freq.	Percent	Cum.
No ANC	131	3.07	3.07
ONE TO SEVEN	2909	68.09	71.16
EIGHT OR MORE	1232	28.84	100.00
TOTAL	4272	100	

Source: Computer from GDHS, (2014)

Figure 1. indicates that the locatilty of the woman during preganancy is an important factor that determines ANC uitlization in Ghana. The chart shows that most of the pregnant women who do not receive ANC are in rural areas (constituting 78.63 percent compared to their urban counterparts' 21.37 percent). For the category of visits of one to seven ANCs, 63.22% are from rural areas compared to 36.68% from urban areas. However, for eight or more ANC visits, pregnant women in urban areas recorded a higher percentage of 55.19% compared to 44.81% for women in rural areas. Simkhada et al. (2008) indicated in their study that the place of residence determines accessibility to health facilities in terms of distance and transport. This may explain why pregnant women in urban areas use more ANC facilities than their counterparts in the rural areas who face challenges of long distance, poor roads, and lack of transport.

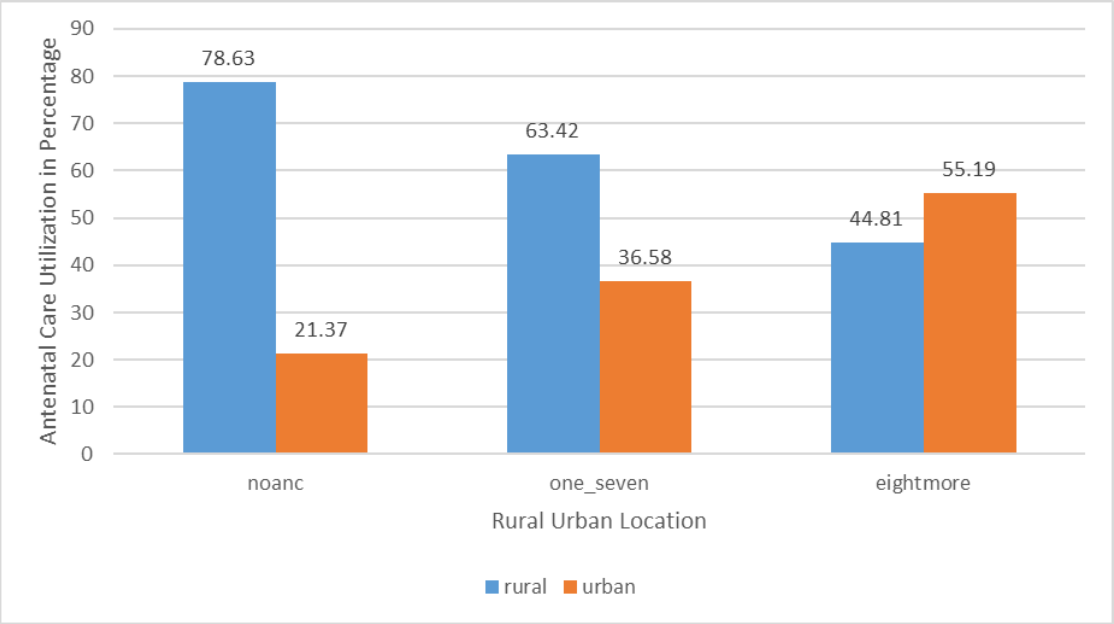

Figure 1: Antenatal Care Utilization by Rural-Urban Location
Source: Computer from GDHS, (2014)

Figure 2 presents the insurance status by rural-urban location in Ghana. The results indicated that 62. 43% of the uninsured members are in the rural location, while 37.57% are in the urban location. It is interesting to note that 56.8% of the insured respondents are in the rural location, while 43.2% are found in the urban location.

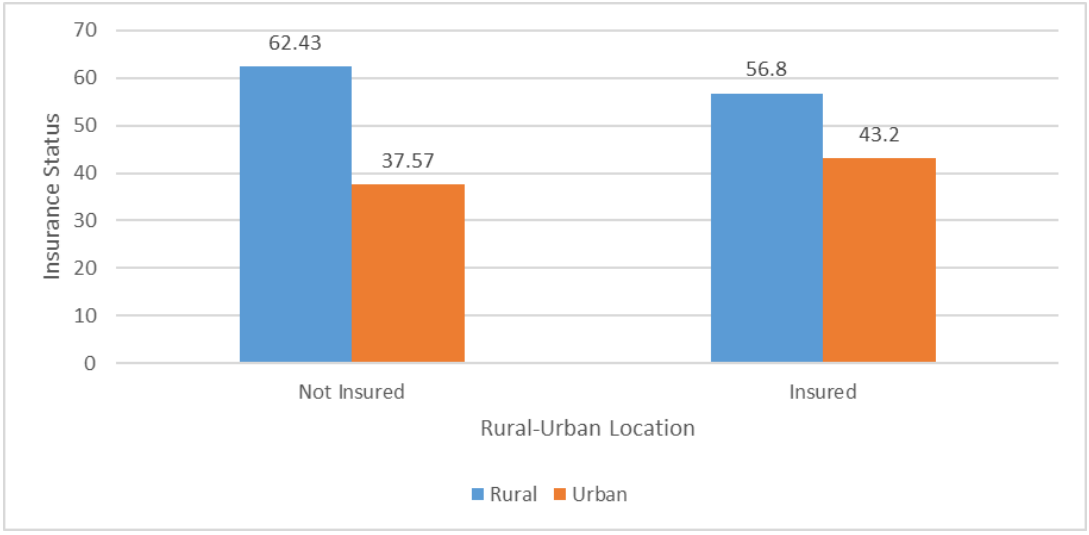

Figure 2: Insurance Status by Rural-Urban Location
Source: Computer from GDHS, (2014)

Table 2 also shows the use of antenatal care by administrative regions in Ghana. The results show some disparity in the level of usage. The Northern and Volta regions are predominatly rural regions took the top positions (i.e. the first and second positions, respectively) for the category "No ANC". In the case of the eight or more, Western, Greater Accra and Ashanti regions which predominantly urban regions recorded the highest, taking the first, second and third positions respectively, however, Northern region which is a more rural region recorded the lowest of 9.69 percent. Daniels et al. (2013) explains these variations to be the differences in area factors such as distances to health facility, bad roads, no transportation, and high transportation cost. Arthur (2012) also indicated that income differences between regions were a major factor that influenced maternal health care utilization in Ghana.

Table 2. Utilization of antenatal care of antenatal care by region

	No ANC	One to seven	Eight or more	Total
Western	1.16	50.58	48.26	100.00
Central	2.76	59.91	37.33	100.00
Greater Accra	1.42	56.66	41.93	100.00
Volta	7.25	64.64	28.12	100.00
Eastern	2.78	78.99	18.23	100.00
Ashanti	1.45	59.18	39.37	100.00
Brong Ahafo	1.03	69.20	29.77	100.00
Northern	7.75	82.55	9.69	100.00
Upper East	2.09	68.84	29.07	100.00
Upper West	1.37	84.34	14.29	100.00
Mean	3.07	68.09	28.84	100.00

Source: Computer from GDHS, (2014)

The educational level of women is a categorical variable ranging from no education to post-secondary level. The results presented in Figure 3 indicate that the level of education of pregnant women is an important factor that determines the level of usage of ANC services during pregnancy. The percentage drops for women in rural location as educational level increases but vice versa for women in the urban location. The result also showed that higher percentage of women in the rural areas had lower level of education compared to those in the urban location. This is also confirmed by Overbosch et al. (2004), who showed that in Ghana women's attitude to antenatal care seems to be influenced by their schooling, since more years of education of a pregnant woman are associated with a choice for adequate antenatal care.

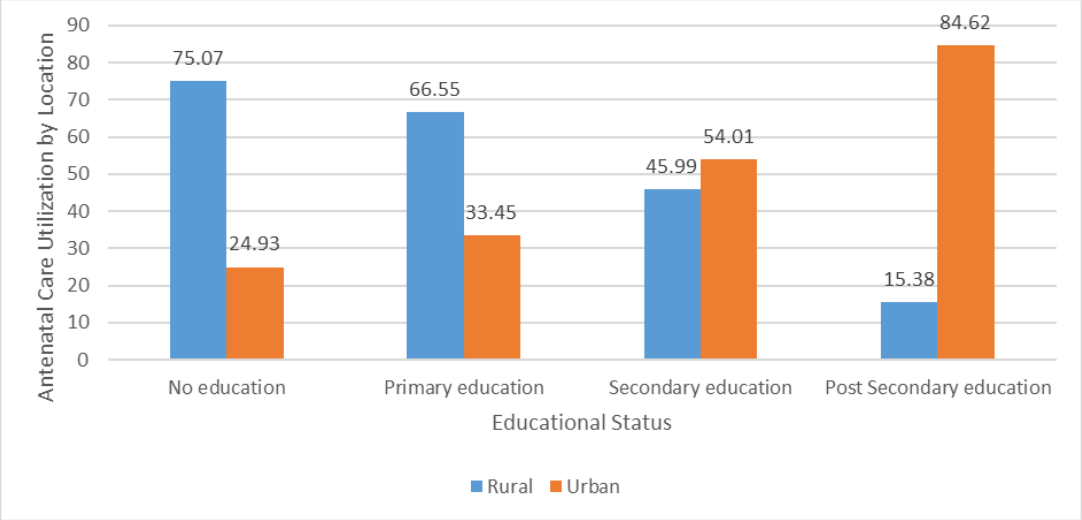

Figure 3. Rural-Urban Differences in ANC Utilization by Educational Status
Source: Computer from GDHS, (2014)

3.2 Determinants of Antenatal Care Utilization in Ghana

Table 3 presents the Poisson regression results showing the determinants of Antenatal Care Utilization (ANC) in Ghana. The outcome variable is the ANC utilization (Number of visits). In addition to Ruralurban, all the predictor variables were found to have a significant positive relationship with ANC utilization.

For the age of the woman, the results show that if the age of a woman increases by one year, her rate ratio for the utilization of ANC is expected to increase by a factor of 1.010222, while keeping all other variables constant in the model. According to the Grossman model (1972) age increases the rate of depreciation of the health of the individual; therefore, it may be possible that the older women may patronize health services more than the

younger ones, and ANC services will not be different.

The results further show a positive significant relationship between the number of children a woman has and the number of ANC visits. Children number shows the estimated rate ratio for an additional child born by a woman, given the other variables are held constant in the model. If a woman give birth to an additional child, her rate ratio for ANC utilization is expected to decrease by a factor 0.9650177, while holding all other variables in the model constant. Overbosch et al. (2004) indicated that "Pregnancy is a natural process and women with some experience might consider antenatal care less necessary".
Employment status is an estimated rate ratio that compares women who are employed with those who are not employed, since the other variables are kept constant in the model. Employment status is found to have a positive association with ANC utilization at 5% alpha level. Women who are employed (compared to their unemployed counterparts) are expected to have a rate 1.039574 times higher for ANC utilization. The observed positive relationship is expected because other things being equal, women who are employed earn more income than their unemployed counterparts and are therefore more able to afford out-of-pocket payments associated with ANC utilization including transportation cost and certain medications/services not covered by the free maternal health care system.

The study found a positive significant relationship between insurance ownership and ANC utilization. Insurance ownership shows the estimated rate ratio for women with health insurance compared to those without health insurance, given the other variables are held constant in the model. Insurance ownership compared to women without health insurance is expected to have a rate 1.089367 times greater for ANC utilization at 1% alpha level all other things being constant. Agbanyo and Peprah (2021) also reported a positive significant relationship between health insurance and utilization of health services. This shows the importance of health insurance as a major determinant of ANC utilization in Ghana. Also, marital status was found to have a significant positive association with ANC utilization. Marital status shows the estimated rate ratio for women who are married as compared to singles, all other things being equal. Marital status compared to singles is expected to have a rate 1.032247 times greater for ANC utilization at 5% alpha level, all other things being constant.

In terms of educational level, this is the estimated rate ratio that compares women who have some level of formal education to those who are uneducated, as the other variables are kept constant in the model. Women with primary education compared to the uneducated are expected to have a rate 1.042847 times higher for ANC utilization at 5% alpha level. A woman with secondary education compared to an uneducated woman is expected to have a rate 1.056629 times higher for ANC utilization at the 1% alpha level, while a woman with post-secondary education compared to a woman without education is expected to have a rate 1.096681 greater for ANC utilization at the 1% alpha level, all other things being constant.

Thus, two important observations emerge: first, education increases the use of ANC in Ghana. Second, the higher the level of education of women, the higher their utilization of ANC. Studies such as Ayele et al. (2019), Mezmur et al. (2017) and Yaya et al. (2019) also identified a strong positive relationship between mother's education and the utilization of maternal health care in developing countries. Education is found to increase a woman's income since they can easily secure a job. This will help them overcome some environmental factors such as transportation cost and other auxiliary cost associated with accessing ANC services (Dapaah & Nachinaab, 2019). Higher education also exposes women to health care issues that may be an influencing factor in using more ANC services (Gebresilassie et al., 2019; Mezmur et al., 2017). Educated women are found to be highly receptive to new health promotion ideas which in turn influences their demand for health care services.

The wealth quintile was found to have a significant positive association with ANC utilization for all categories. This is the estimated rate ratio of women at different wealth levels compared to the base category (i.e. poorest). A woman in the poorer wealth quintile compared to the poorest is expected to have a rate 1.046807 times greater for ANC utilization at 5% alpha level while those in the middle wealth quintile compared to the poorest is expected to have a rate 1.099764 times greater for ANC utilization at 1% alpha level. For those in the richer group, their rate for ANC utilization is expected to increase by a factor of 1.199831 relative to the base category, while women in the richest wealth quintile compared to the poorest is expected to have a rate 1.237986 times greater for ANC utilization at 1% alpha, all other things being constant.

The results shows that wealth is an important determinant of ANC utilization in Ghana. Similar to the level of education variable, the wealth variable shows that wealth increases the use of ANC services among women in Ghana. The association of higher incidence rate ratios with higher wealth quintile also shows that a woman in a higher wealth quintile is expected to have more ANC visits than those in a lower wealth quintile. Studies such as

Celik and Hotchkiss (2000), Gage (2007a) and Abor and Abekah-Nkrumah (2009) also showed a positive relationship between wealth and maternal health care utilization.

In the case of radio listening frequency, only the "more than once a week" category shows significant relationship. This is the estimated rate ratio comparing the radio listening frequency of women to those who do not listen to radio at all within a week, given the other variables are held constant in the model. A woman who listens to radio more than once a week compared to her counterpart who does not listen to radio at all is expected to have a rate of 1.038299 times higher for ANC utilization at 5% alpha level, all other things being constant. Television watching frequency is also found to have a positive significant association with ANC utilization for all categories in this study. This means that radio and television play a role in the utilization of ANC in Ghana, since they serve as a means of education to the people.

Religion is also found to play important role in ANC utilization in Ghana. The study found Christian and traditional religions to have a positive significant relationship with ANC utilization. This is the estimated rate ratio comparing women of various religions to those of no religion, given that other variables are kept constant in the model. A Christian woman compared to a woman without religion is expected to have a rate 1.134306 times greater for ANC utilization at 1% alpha level, while an Islamic woman compared to her counterpart with no religion is expected to have a rate 1.174097 times greater for ANC utilization at 1% alpha level, all other things being equal.

Region shows the estimated incidence rate ratio of the regions in Ghana with western region as the base category, all other things being constant. Compared to a woman in the western region, those in the other regions are expected to have a decrease in their ANC utilization, all other things being equal. The eastern region was found to have the lowest incidence rate ratio, suggesting that women in the eastern region are expected to have the lowest utilization of ANC.

3.3. Rural-Urban Differences in the Determinants of Antenatal Care Utilization in Ghana

Table 4 presents the Poisson regression results showing the rural-urban differences in the determinants of the utilization of ANC in Ghana. Two separate models were estimated for women in urban and rural areas to identify the determinants of the utilization of ANC. The first model (Rural model) identifies the determinants of ANC utilization for rural women while the second model (Urban Model) shows the key determinants of ANC utilization for women living in urban areas.

The result identified factors such as age of woman, wealth quintile (richer), radio listening frequency (at most once a week) religion (Christian and Islamic) and the regional dummies to be a common factor both in the rural and urban locations. The study also identified factors such as insurance ownership, marital status, primary education, poorer and middle for wealth quintile, television viewing frequency as unique factors that influence the utilization of ANC in rural areas of Ghana, while factors such as the number of children, secondary and tertiary education, and richest category in the wealth quintile were identified as unique factors for the use of ANC in urban areas of Ghana.

Table 3: Antenatal care utilization in Ghana

	Dependent variable: Number of visits		
	Incidence rate ratio	Std. Err.	z-statistic
Age of woman	1.010222***	0.0013	7.66
Children Number	0.9650177***	0.0051	-6.78
Employment Status (employed=1, otherwise=0)	1.039574**	0.0178	2.27
Insurance ownership (Yes=1, otherwise=0)	1.089367***	0.0156	5.98
Marital status (married=1, otherwise=0)	1.032247**	0.0152	2.16
Educational level (base category = no education)			
Primary education	1.042847**	0.0204	2.14
Secondary education	1.056629***	0.0200	2.91
Post-Secondary education	1.096681***	0.0381	2.66
Wealth quintile (base category = Poorest)			
Poorer	1.046807**	0.0227	2.11
Middle	1.099764***	0.0276	3.79
Richer	1.199831***	0.0349	6.27
Richest	1.237986***	0.0424	6.23
Radio listening frequency			
At most once a week	0.9927157	0.0197	-0.37
More than once a week	1.038299**	0.0192	2.03
Television watching frequency			
At most once a week	1.039825**	0.0206	1.97
More than once a week	1.048273**	0.0199	2.48
Religion (base category = no religion)			
Christian religion	1.134306***	0.0415	3.44
Islamic religion	1.174097***	0.0456	4.13
Traditional religion	0.9571251	0.0512	-0.82
Region (base category = Western)			
Central	0.9442622**	0.0246	-2.2
Greater Accra	0.8886362***	0.0250	-4.2
Volta	0.843557***	0.0248	-5.79
Eastern	0.7769193***	0.0222	-8.85
Ashanti	0.9386033**	0.0247	-2.41
Brong Ahafo	0.9237138***	0.0242	-3.03
Northern	0.7449544***	0.0229	-9.59
Upper east	0.9728971	0.0292	-0.91
Upper west	0.8319865***	0.0263	-5.81
Urban (Rural=1, Urban=0)	0.989702	0.0172	-0.6
Constant	3.854113***	0.2082	24.97
Observations	4,227		

*****Significance at 1%, **significance at 5%, and *significance at 10%.**
Source: Computer from GDHS, (2014)

Table 4: Determinants of rural-urban differences of antenatal care utilization in Ghana

	Rural		Urban	
	IRR	z-stat	IRR	z-stat
Age of woman	1.011***	6	1.0094***	4.79
Children Number	0.9579	-6.13	0.9744***	-3.19
Employment Status (employed=1, otherwise=0)	1.0446	1.8	1.0362	1.45
Insurance ownership (Yes=1, otherwise=0)	1.1523***	7.38	1.0088	0.41
Marital status (married=1, otherwise=0)	1.0361*	1.79	1.0319	1.41
Educational level (base category = no education)				
Primary education	1.0498**	2	1.0208	0.6
Secondary education	1.0213	0.85	1.0908***	2.86
Post-Secondary education	1.0758	0.91	1.1307***	2.81
Wealth quintile (base category = Poorest)				
Poorer	1.046*	1.76	1.0173	0.35
Middle	1.1444***	4.17	1.0123	0.27
Richer	1.1878***	3.93	1.1725***	3.48
Richest	1.1494	1.34	1.2186***	3.98
Radio listening frequency				
At most once a week	1.0447*	1.72	0.9242**	-2.47
More than once a week	1.0731***	2.94	0.9811	-0.65
Television watching frequency				
At most once a week	1.0421*	1.7	1.0183	0.5
More than once a week	1.0584**	2.37	1.0199	0.59
Religion (base category = no religion)				
Christian religion	1.1277***	2.76	1.1271*	1.75
Islamic religion	1.1609***	3.16	1.1582**	2.06
Traditional religion	0.9834	-0.28	0.8497	-1.21
Region (base category = Western)				
Central	0.9479	-1.57	0.9374	-1.57
Greater Accra	0.829***	-3.19	0.8858***	-3.29
Volta	0.8087***	-5.59	0.8928**	-2.41
Eastern	0.7792***	-6.69	0.7787***	-5.59
Ashanti	1.0318	0.83	0.8702***	-3.65
Brong Ahafo	0.9396*	-1.81	0.918**	-2.08
Northern	0.7167***	-8.34	0.8102***	-4.22
Upper east	0.9843	-0.4	0.9575	-0.92
Upper west	0.8484***	-4.08	0.794***	-4.19
Constant	3.5828	18.54	4.4865***	15.39
Observations	2,481		1,746	

***Significance at 1%, **significance at 5%, and *significance at 10%. IRR is the incidence rate ratio while z-stat refers to z-statistic

Source: Computer from GDHS, (2014)

5. Conclusion

Maternal deaths that occur due to factors related to pregnancy and childbirth in developing countries such as Ghana need serious attention. Implementing and ensuring the utilization of antenatal care is potentially one of the most effective health interventions to prevent maternal morbidity and mortality. The study used a Poisson regression model to examine the rural-urban heterogeneity in the determinants of the utilization of antenatal care in Ghana. The results of the study identified a clear disparity in ANC utilization between urban and rural areas. The study also identified education of mother, wealth, age of the mother, number of children, locality and insurance status as important factors the influence ANC utilization in Ghana. Religion and regional dummies were also found to be important factors influencing ANC utilization in Ghana.

The study also identified some disparities in the factors in terms of localities (Rural and Urban). Factors such as insurance status, frequency of listening to radio and watching television, occupation of woman, primary education were found to have a positive significant relationship with ANC utilization in the rural locality. Policy makers should consider making health insurance free for pregnant women in the rural areas as well as spending on maternal health sensitization through community radios in the rural areas.

The study recommends that the Ministry of Health and the the Ghana Health service should provide support services, such as adding antenatal care services to the Child Welfare Clinic (CWC),, where community health personnel routinely visit the community to provide postnatal care services to new born babies. This will help reduce the cost involved in transportation which can hinder the mother's use of the maternal health services.
Government should resource the National Commission for Civic Education in Ghana (NCCE) to intensify the education on the use of maternal health care services probably through the mass media (radio and television) and the community announcements, especially in the rural centers where the use of mass media may not be very effective. Thus, it is necessary to continue to educate expectant mothers and women in general on the use of ANC services and to increase awareness in communities.

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Appendix

Table 5. Determinants of Antenatal Care Utilization in Ghana

	Dependent variable: Number of visits		
	Incidence rate ratio	Std. Err.	z-statistic
Age of woman	1.010225***	0.001353	7.6
Children Number	0.9649893***	0.00511	-6.73
Employment Status (employed=1, otherwise=0)	1.039532**	0.017945	2.25
Insurance ownership (Yes=1, otherwise=0)	1.089633***	0.01574	5.94
Marital status (married=1, otherwise=0)	1.032308**	0.015326	2.14
Educational level (base category = no education)			
Primary education	1.042877**	0.020608	2.12
Secondary education	1.056709***	0.020138	2.89
Post-Secondary education	1.096766***	0.038463	2.63
Wealth quintile (base category = Poorest)			
Poorer	1.046834**	0.022857	2.1
Middle	1.099736***	0.027847	3.75
Richer	1.199733***	0.035168	6.21
Richest	1.237853***	0.042779	6.17
Radio listening frequency			
At most once a week	0.9928595	0.019824	-0.36
More than once a week	1.038493**	0.019348	2.03
Television watching frequency			
At most once a week	1.03972*	0.020763	1.95
More than once a week	1.048239**	0.020072	2.46
Religion (base category = no religion)			
Christian religion	1.134255***	0.041791	3.42
Islamic religion	1.174149***	0.045898	4.11
Traditional religion	0.9570052	0.051525	-0.82
Region (base category = Western)			
Central	0.9442076**	0.024869	-2.18
Greater Accra	0.8884885***	0.025257	-4.16
Volta	0.8433369***	0.025016	-5.74
Eastern	0.7768073***	0.022349	-8.78
Ashanti	0.9387852**	0.024926	-2.38
Brong Ahafo	0.9236564***	0.024406	-3.01
Northern	0.7448098***	0.023066	-9.51
Upper east	0.9729447	0.029498	-0.9
Upper west	0.8320499***	0.026576	-5.76
Urban (Rural=1, Urban=0)	0.9898104	0.017343	-0.58
Constant	3.853005***	0.209798	24.77
/lnalpha		1.255966	
Alpha		0.003397	
Observations	4,227		

***Significance at 1%, **significance at 5%, and *significance at 10%. LR test of alpha=0, Prob >= chibar2 = 0.210

Table 6. Rural-Urban Differences in the Determinants of Antenatal Care Utilization in Ghana

	Rural		Urban	
	IRR	z-stat	IRR	z-stat
Age of woman	1.011***	5.72	1.0094***	4.79
Children Number	0.9579***	-5.87	0.9744***	-3.19
Employment Status (employed=1, otherwise=0)	1.0442	1.71	1.0362	1.45
Insurance ownership (Yes=1, otherwise=0)	1.1536	7.13	1.0088	0.41
Marital status (married=1, otherwise=0)	1.0365	1.73	1.0319	1.41
Educational level (base category = no education)				
Primary education	1.0501	1.92	1.0208	0.6
Secondary education	1.022***	0.84	1.0908***	2.86
Post-Secondary education	1.0757***	0.85	1.1307***	2.81
Wealth quintile (base category = Poorest)				
Poorer	1.046	1.68	1.0173	0.35
Middle	1.1444	3.99	1.0123	0.27
Richer	1.1882***	3.74	1.1725***	3.48
Richest	1.1506***	1.27	1.2186***	3.98
Radio listening frequency				
At most once a week	1.0452**	1.67	0.9242**	-2.47
More than once a week	1.0746	2.88	0.9811	-0.65
Television watching frequency				
At most once a week	1.0414	1.6	1.0183	0.5
More than once a week	1.0589	2.29	1.0199	0.59
Religion (base category = no religion)				
Christian religion	1.1274*	2.66	1.1271*	1.75
Islamic religion	1.1613**	3.05	1.1582**	2.06
Traditional religion	0.9825	-0.29	0.8497	-1.21
Region (base category = Western)				
Central	0.9478	-1.49	0.9374	-1.57
Greater Accra	0.8286***	-3.05	0.8858***	-3.29
Volta	0.8079**	-5.36	0.8928**	-2.41
Eastern	0.7792***	-6.39	0.7787***	-5.59
Ashanti	1.0325***	0.8	0.8702***	-3.65
Brong Ahafo	0.9403**	-1.71	0.918**	-2.08
Northern	0.7163***	-8.01	0.8102***	-4.22
Upper east	0.9854	-0.35	0.9575	-0.92
Upper west	0.849***	-3.88	0.794***	-4.19
Constant	3.5773***	17.75	4.4865***	15.39
/lnalpha	-4.1502		-21.6999	
Alpha	0.0158		3.77e-10	
Observations	2,481		1,746	

***Significance at 1%, **significance at 5%, and *significance at 10%. IRR is the incidence rate ratio while z-stat refers to z-statistic. Rural: LR test of alpha=0, Prob >= chibar2 = 0.001. Urban: LR test of alpha=0, Prob >= chibar2 = 1.000