

Health Insurance Coverage, Socioeconomic Status of Women, and Antenatal Care Utilization in Ghana

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Abstract

Promoting antenatal care (ANC) utilization is one of the key drivers of the Safe Motherhood Initiative aimed at improving maternal health in low-income countries. The study sought to examine the effects of health insurance coverage and socioeconomic status of women on antenatal care utilization in Ghana. The study used cross-sectional data from the 2014 Ghana Demographic and Health Survey (GDHS). Negative binomial and binary logistic regression models were applied. The results showed that women covered with national health insurance were more likely to have more antenatal care visits and adequate and timely antenatal care. The results showed that having an advanced age, attaining secondary or higher-level education, being employed, being in the richest wealth quintile, and having an active national health insurance subscription during pregnancy significantly predicted ANC utilization. The study suggests that if interventions aimed at reducing the burden of prenatal care are not implemented, coupled with women's economic empowerment to cater to the cost of prenatal care, the benefits of the ANC associated with early and adequate ANC services may not optimally be achieved. That aside, ANC services in Ghana are technically 'free' through the user-fee exemption policy under the NHIS. However, socioeconomic factors still largely determine women's decisions to utilize maternal health services.

Keywords

Antenatal care; Ghana; health insurance; socioeconomic status

Introduction

Globally, access to maternal health care services is highly recognized as essential in formulating public policies. This belief emanates from the fact that good health is necessary for economic development (Ganle, Kombet, et al., 2019; Ganle, Mahama, et al., 2019). Although maternal health outcomes in advanced countries have improved, most low- and middle-income countries are far below global expectations (Ganle, Mahama, et al., 2019; Sumankuuro et al., 2019). Nearly all maternal deaths occur in sub-Saharan Africa, with an estimated 66% of maternal deaths occurring in the Sahel region (Ganle, Mahama, et al., 2019). In 2015, an estimated 303,000 maternal deaths were recorded in South Asia and sub-Saharan Africa (SSA) (World Health Organization, 2019). The Ghana Maternal Health Survey indicated that about 350,000 maternal deaths occurred in 2017 alone (Ghana Statistical Service et al., 2018). The survey further showed that over 70% of such deaths could be averted if the mothers used skilled antenatal care during pregnancy (Sumankuuro et al., 2019; World Health Organization, 2019).

In an effort to avert pregnancy-related maternal mortalities and morbidities, the Government of Ghana introduced numerous policy interventions in the health delivery system. One such policy was the user-fee exemption policy under the national health insurance scheme (NHIS) launched in 2003. The aim was to address inequities to access to skilled maternal health care. Specifically, women under the low socioeconomic strata were critical targets of the policy (Witter et al., 2013). A key recommendation in the policy was to reduce inequalities in access to health care and utilization of maternal health care services and promote skilled delivery. The policy comprised, among others, free delivery care, two postnatal visits, additional free health care services, and six free antenatal visits (Nketiah-Amponsah et al., 2013; Witter et al., 2013).

Recently, the World Health Organization (WHO) considered all pregnancies in low-middle income settings as high risks of maternal mortality and recommended eight or more antenatal care visits for pregnant women in these countries (Aseweh Abor et al., 2011; Ndyomugenyi & Katamanywa, 2010; Vogel et al., 2013). Recent studies showed that effective antenatal care (ANC) use has the potential to reduce avoidable maternal deaths through; intermittent preventive treatment for malaria during pregnancy (IPTp), early identification and management of obstetric complications such as pre-eclampsia, tetanus toxoid immunization, and detection and management of infections including HIV, syphilis, and other sexually transmitted diseases (STDs) (Ndyomugenyi & Katamanywa, 2010; Sumankuuro et al., 2017; Vogel et al., 2013). Notwithstanding these interventions, the high rate of stillbirth, premature deliveries, ANC 4+ visits coverage, and low birth weight are still subjects of concern (Dickson et al., 2017; Sumankuuro et al., 2019).

Globally, every pregnant woman makes at least one antenatal care (ANC) visit, with only half (52%) completing the recommended eight visits during pregnancy (World Health Organization, 2019; 2022). In Ghana, access to quality maternal healthcare services such as antenatal care (ANC) is critical to ensuring improved health for the mother and the unborn child. Therefore, adequate and timely ANC can promote healthy maternal and neonatal outcomes.

According to the 2017 Ghana Maternal Health Survey (GMHS), 89% of all women completed at least four or more antenatal care (ANC) visits. The study also showed that women's

education and wealth positively affect the use of maternal health services (Ghana Statistical Service et al., 2018). They, however, found wide disparities in the utilization of maternal health services between the urban and rural residences. Roughly 93% of pregnant women in urban areas in Ghana had four or more ANC visits during pregnancy compared with 85.7% in rural areas (Dickson et al., 2017; Ghana Statistical Service et al., 2018). The 2017 GMHS reported that 83.8% of women with no education attended at least four or more ANC visits compared with 98.6% of women with secondary or higher education (Dickson et al., 2017; Ghana Statistical Service et al., 2018). The report showed that 98.7% of women with secondary or higher education were more likely to utilize skilled birth attendance (SBA) during childbirth than women without education. Additionally, it was reported that 80.1% of women in the lowest wealth quintile had at least ANC 4+ visits compared to 98.2% of women in the highest wealth quintile (Ghana Statistical Service et al., 2018).

In response, the Ghana Health Services has initiated a number of programs to improve maternal health service utilization, such as the implementation of the safe motherhood initiatives, focused antenatal care (FANC), the national health insurance scheme with the free maternal healthcare policy, the community-based health planning and service (CHPS) initiative skill upgrade of community health officers (CHOs) into midwives, other lifesaving services (Abejirinde et al., 2019; Russell, 2008; Sakeah et al., 2014; Sumankuuro et al., 2018). Despite these interventions, antenatal care services and skilled birth attendance are increasingly below global standards (World Health Organization, 2022). A key objective of the free antenatal care policy is to eliminate the cost of health care as a barrier to access and use of maternal health care services. The policy also targeted increasing access to skilled birth attendance. While extensive studies exist on the factors influencing skilled maternal service utilization in Ghana, this study focuses on the effect of health insurance coverage and socioeconomic status of women on antenatal care utilization in Ghana using population-level data.

Methods

The study was a cross-sectional analysis of the 2014 Ghana Demographic and Health Survey data (Ghana Statistical Service et al., 2015). This quantitative study used empirical and theoretical models to predict antenatal care services utilization in Ghana.

Theoretical model specification

The analytical framework followed the Grossman (1999) specification of the health production function. In this model, we assume that individuals maximize their utility over their health (commodity) and the consumption of all other goods subject to market and non-market factors. Health is viewed as one of the several commodities over which individuals have well-defined preferences. The market factors include the availability of health inputs, prices, household income, and insurance. In contrast, the non-market factors include individual/household characteristics such as place of residence, age, education, health status, and the perception they have about the quality of health services.

Following the specification of the consumer problem by Ruhara (2016), we can formulate the consumer maximization problem as in Equations 1 and 2.

$$\text{Max } U = u (H, Z, Y, X) \dots \dots \dots \text{Equation 1}$$

Given the health production function

$$H = H (Z, HH, W, C) \dots \dots \dots \text{Equation 2}$$

Subject to the household budget constraints given as in Equation 3

$$B = P_x X + P_y Y + P_z Z \dots \dots \dots \text{Equation 3}$$

Where U is the utility the individual derived from the consumption of different goods; H defines the health production function; Z stands for health inputs such as health care; Y is the health-related goods used in the production of good health; while X represents all other goods and services; HH is household characteristics including health insurance status; W is the women socio-demographic characteristics such as age, place of residence and education; C is community characteristics including distance to a health facility.

From Equation 3, B is a vector of exogenous household income, P_x , P_y , and P_z , are the prices of neutral health goods such as clothing, Z is a vector of health-related consumer goods such as health care, and Y is a vector of health investment goods such as exercising. The consumer's underlying problem is, therefore, to maximize a composite utility function as in Equation 4 (Combination of Equations 1 and 2) such that;

$$\text{Max } U = u (HH, W, C, Z, Y, X) \dots \dots \dots \text{Equation 4}$$

Subject to the household budget constraint expressed in Equation 3 above. The Lagrange function can be expressed as in Equation 5.

$$L = U (HH, W, C, Z, Y, X) + \lambda (B - P_x X - P_y Y, - P_z Z) \dots \dots \dots \text{Equation 5}$$

Solutions to the first-order conditions (FOCs) from the maximization problem yield a derived demand function for healthcare specified as Equation 6.

$$D^h = f (P_h, HH, B, W, C) \dots \dots \dots \text{Equation 6}$$

Specifically, D^h is the demand for antenatal care services utilization; HH is household health insurance status, B is exogenous household income, W is women’s socioeconomic characteristics such as age and education, and C represents the community characteristics such as distance to a health facility.

Empirical model specification

Three proxies are used for antenatal care utilization in this study. The first measure was the number of antenatal care visits a woman had during pregnancy. This was an observed count of ANC visits with possible values as non-negative integers. We assumed this distribution followed a Poisson distribution or Poisson-gamma mixed distribution rather than a normal one. One major limitation of the Poisson distribution is the conditional mean and variance equality. The balance of mean and variance in count data processes may not necessarily be a reasonable assumption. In most of these cases, the conditional variance is more significant than the conditional mean, thus, over-dispersion. This renders the assumption of a Poisson

distribution inappropriate. In the presence of over-dispersion, it is reasonable to assume that the error process follows the negative binomial distribution. Thus, we estimated the negative binomial regression model that allows the variance of the distribution to differ from the mean. This permitted the modeling of Poisson heterogeneity using a gamma distribution (Cameron & Trivedi, 2013; Hilbe, 2016). The regression coefficients in this model were estimated using the maximum likelihood estimation (MLE) technique in Stata 13.0.

The second and third measures of antenatal care use were binary outcomes; Adequate ANC and Timely ANC. The World Health Organization (WHO) recommended at least four antenatal care visits as adequate or inadequate, with no less than four visits to a healthcare provider. This allows us to code as adequate ANC 4+ visits = 1 and Inadequate ANC = 0. Thirdly, we classified ANC visits as Timely if the pregnant woman attended antenatal care within the first four months of pregnancy; otherwise, untimely ANC if the woman did not attend antenatal care within the first four months of pregnancy. We coded Timely ANC = 1 and untimely ANC = 0. Since the two outcomes are binary, we estimated both models using logistic regression.

Data sources and variable definitions

The study used secondary data from the 2014 Ghana Demographic and Health Survey (GDHS) (Ghana Statistical Service et al., 2015). This is the sixth wave of surveys to provide updated demographic and health information on women between the reproductive ages of 15 and 49. The GDHS is a series of nationally representative data on population and health surveys conducted in Ghana as part of a larger project in the global Demographic and Health Surveys (DHS) program. Earlier surveys were conducted in 1988, 1993, 1998, 2003, and 2008.

Study sample

Two Staged sampling method was adopted. In the first stage, the survey divided all enumeration areas in Ghana into 427 clusters with approximately 30 households each, 216 urban areas, and 211 rural areas. In the second stage, 4,262 women were drawn from the birth record questionnaire (BR), only women with at least one birth. This enabled us to capture only women who have at least given birth.

Variable definition

Dependent variable

The dependent variable is “antenatal care use” of the most recent pregnancy among women of reproductive age (15–49) in the past five years preceding the 2014 survey. The outcome was defined as; the number of antenatal care visits (counts), adequate antenatal care use (Binary), and timely antenatal care use (binary).

Independent variables

The independent variables were the age of the women, educational attainment, marital status, wealth quintile, health insurance coverage, religious affiliation, employment status,

place of residence, experience the death of a child, and attendant during delivery. The age of women was continuous years with its squared. This was to enable us to measure the age-specific need of the woman for antenatal care services. Educational attainment of women was into three categories: no education, primary/JHS, and secondary or higher education.

The other independent variables include the wealth index, categorized as poor (poorest and poorer), middle, and rich (richer and richest). Health insurance coverage is a dummy; yes or no. Marital status has three categories; never married, married or in a union, and ever married (divorced/separated/widowed). Religious affiliations has three categories' Christians (Catholics, Methodist, Anglicans, Presbyterian, and Pentecostal), Islamic, and Traditional/Spiritual religions. Employment status was coded "not employed" or "employed." The number of living children was continuous. The type of place of residence, which describes the residential location of the woman, was classified as urban or rural. This was used as a proxy for accessibility. Women's experience of the death of a son and/or daughter was coded "yes" or "no." Skilled delivery was coded as "yes" or "no." In the data set, women's subscription under the NHIS was classified as binary "yes" and "no," in the data set. The independent variables were selected based on their theoretical and empirical relevance.

Quality control and data management

Several data management and quality control measures were implemented to ensure the integrity of the study findings. First, we downloaded data and extracted only the sections of the dataset that was relevant to the research objective. Extracted data were recoded and recategorized to fit into the analytical framework. Two authors independently conducted data extraction and cleaning to avoid errors in recoding. All incorrectly recoding were discussed and resolved. Frequencies were done as part of the cleaning after the recoding to compare with frequencies in the raw data set.

Data analysis

After the data were recoded and cleaned, it was imported into STATA. All the recoding was double-checked. Descriptive statistics were conducted to describe the essential characteristics of women in the study. Statistical models were performed to understand the relative effects of explanatory variables on the outcome variable. Statistical significance was set at 95% confidence intervals (CI).

Ethical consideration

The study did not directly deal with human participants whose views are contained in the study. However, we sought and were granted written permission by the DHS program of the USAID before using the data set for the study. All identifiable information of participants was removed from the data set DHS program. We likewise complied with the "terms of use" of the DHS data set.

Analytical approach

Two regression models were used to identify the factors associated with antenatal care service utilization among women in Ghana. In the first model, the dependent variable is the number of ANC visits. It was an observed count with possible values as the non-negative integers. Then, it was logical to assume that its distribution could follow a Poisson distribution or negative binomial distribution rather than a normal distribution. The study estimated a negative binomial regression instead of a Poisson regression. We adopted the negative binomial regression because it is a generalized Poisson regression that relaxes the Poisson assumption of the equality of the variance and the mean. This model assumes a Poisson-gamma mixture distribution. This formulation was assumed superior since it allows the modeling of Poisson heterogeneity using a gamma distribution. Negative binomial regression is also used to test for associations between predictor and confounding variables on a count outcome variable when the variance of the count is higher than the mean of the count. The second models were two binary logistic regressions on the adequacy and timeliness of antenatal care utilization.

Background characteristics of respondents

The background characteristics of 9,374 women whose socioeconomic/demographic and health insurance information vis-a-vis antenatal care utilization in Ghana were recorded (Table 1). The mean age of the women was 29.69 (range 15–49). Regarding women's educational attainment, it was found that 57.2% had secondary or higher education, 24.22% had no education, and 18.58% had primary or junior high education. We further detected that 89.28% and 90.98% of the women had never experienced the death of a son and daughter, respectively. In comparison, only 10.72% and 9.02% had experienced the death of a son and daughter, respectively. The data further indicated that 76.33% were Christians, and 18.38% and 5.29% were affiliated with the Islamic and traditional/spiritual religions, respectively.

The majority of the women (58.01%) were married or in a union, while 32.44% and 9.55% were never married and ever married, respectively. The mean number of living children stood at 3. The data was extracted from the birth record file of the woman. This enabled us to capture only women who have ever been pregnant. Regarding the location of the women, 50.97% and 49.03% of the women resided in urban and rural areas, respectively. The data further revealed that 72.44% of the women had skilled delivery at a health facility while only 27.56% delivered at home. The statistics showed a mean of 6 antenatal care visits to a health provider. The study also found that 86.49% and 84.5% of the women had adequate and timely antenatal care, respectively, while only 13.51% and 15.5% had inadequate and untimely antenatal care, respectively.

Socioeconomic and health insurance characteristics of respondents

It was also found that 43.51% of the women were within the poorest and poorer wealth index, while 36.25% and 20.24% were categorized within the richer and richest as well as the middle wealth index, respectively. The data showed that most of the women, 66.01%, were enrolled in the national health insurance scheme, with only 33.99% not covered. The study also showed that 74.82% of the women were employed while only 25.18% were not (Table 1).

Table 1: Descriptive Statistics of Key Socioeconomic and Demographic Variables

Variable	Mean	Range
Age	29.69	15-49
No. ANC Visit	6.26	0-20
Living Children	2	0-13
Variable	Freq.	Percent
Educational Attainment		
No	2,270	24.22
Primary	1,742	18.58
Secondary/higher	5,362	57.2
Total	9,374	100
Wealth Quintiles		
Poorest/poorer	4,079	43.51
Middle	1,897	20.24
Richest/Richer	3,398	36.25
Total	9,374	100
Health Insurance enrollment		
No	3,185	33.99
Yes	6,186	66.01
Total	9,371	100
Marital status		
Never married	3,041	32.44
Married	5,438	58.01
Ever married	895	9.55
Total	9,374	100
Employment status		
No	2,357	25.18
Employed	7,002	74.82
Total	9,359	100
Adequacy of Antenatal Care		
Less than four	577	13.51
Four or more	3,695	86.49
Total	4,272	100
Experience the death of a son		
No	8,369	89.28
Yes	1,005	10.72
Total	9,374	100
Experience the death of a daughter		
No	8,528	90.98
Yes	846	9.02
Total	9,374	100
Place of Residence		
Rural	4,596	49.03
Urban	4,776	50.97
Total	9,372	100
Religious Affiliation		
Christian	7,154	76.33
Islamic	1,723	18.38
Traditional	496	5.29
Total	9,373	100
Place of delivery		
Home	1,172	27.56
Hospital	3,094	72.44
Total	4,266	100
Timeliness of Antenatal care		

Variable	Mean	Range
No	642	15.5
Yes	3,499	84.5
Total	4,141	100

Note: Author's computations

Factors Influencing Antenatal Care Utilization in Ghana

Table 2 presents the results of negative binomial regression to determine any associations between independent variables ($n = 13$) and antenatal care use among women in Ghana. Six of the thirteen variables were significantly associated with ANC utilization in the study. Specifically, age of a mother ($p < .01$), education ($p < .05$), insurance status ($p < .01$), marital status ($p < .05$ & $p < .10$), employment status ($p < .05$), and women's residence ($p < .05$) were statistically significant on ANC utilization.

From the negative binomial regression model (Table 2), age was positively associated with the number of ANC visits completed during the period of gestation of the pregnancy. Therefore, women who were more advanced in age were 2.2% likely to complete the minimum of four ANC visits. The magnitude of age in the number of ANC visits was approximately 13.5% higher than any additions to a woman's age. However, their age was significantly associated with timely ANC than adequate ANC (Table 2). Thus, older women were 15.1% more likely to utilize early ANC than to complete four ANC visits (7.1%).

We also considered the educational attainment of women and ANC utilization. It was found that education had a significant influence on women's desire and willingness to participate in the ANC program. For example, attaining secondary or higher-level education increased the chances by 6.9% to commence ANC and complete four or more ANC visits than those with primary (6.6%) and no education. After considering the marginal effects, we observed that secondary or higher education on the number of ANC visits was 43% compared to primary level education (41%). However, gaining secondary or higher education was positively associated with adequate ANC visits (38.3%), but the reverse was found for utilizing timely ANC (5.3%). The impact of higher education on women's desire to complete the minimum number of ANC visits was 38% more for upper than lower or no educational attainment in this report.

Considering other sociodemographic variables, marriage was a significant predictor of ANC utilization in this study. Women who were married were 4.2% more likely to complete four or more ANC visits than those who were not married. The magnitude of marriage on ANC uptake was 26% higher. Also, married women were 43.4% and 46.2% more likely to complete adequate and timely ANC, respectively. From the binomial logistic regression model again, there were higher marginal effects of marital status on timely ANC (6.3%) than adequate ANC (4.7%) (Table 2).

Religion was not a significant predictor of women's participation in the ANC program. Comparing women who said they professed the three dominant religious beliefs in Ghana, women who practiced traditional African religion (TAR) were 14.2% less likely to complete the recommended number of visits. The marginal effects of TAR on the number of ANC visits were 83%. However, women who professed Islam were more positive about completing adequate ANC (48.5% more likely) but less likely to enroll on time, just like women who professed TAR. Comparing the belief of women for early ANC in the study, it was found that both Muslim and TAR women did not support timely ANC utilization.

Thus, TAR women were 43.2% less likely to take up early ANC than 0.7% of Muslim women. The marginal effects of one's faith on timely ANC were insignificant for Muslims and Traditionalists (Table 2).

We also sought to understand the impact of women's location on ANC service utilization in Ghana. Women's residence was a significant determinant of the number of ANC visits. Rural women, just as the urban ones, were positive about completing the recommended number of ANC visits. However, women who lived in rural communities were 39.5% more likely to commence ANC on time than those in urban areas.

The place of delivery in this study was not a significant predictor of ANC utilization. However, women who delivered at the hospital were 27.3% more likely to achieve increased ANC visits than those who gave birth at home. From the binomial logistic regression model, the marginal effects of hospital delivery on the number of ANC attendance were 159% higher than home delivery. Similar proportions were recorded for adequate ANC and timely ANC. Thus, those who gave in a hospital were more likely to take up ANC on time (62.9%) and complete the required visits (129%). The effect of hospital delivery on adequate ANC and timely ANC was 15% and 8.4%, respectively (Table 2).

Table 2: Results from the Negative Binomial Regression on the Number of Antenatal Care Visits

Variables	Equation 1 No. of antenatal care visits	Equation 2 Marginal Effects
Age	0.0215*** (0.00782)	0.135*** (0.0489)
Age Squared	-0.000187 (0.000122)	-0.00117 (0.000762)
Education (No)		
Primary	0.0662*** (0.0204)	0.409*** (0.126)
Secondary or Higher	0.0692*** (0.0185)	0.427*** (0.113)
Wealth Quintiles (Poorest)		
Middle	0.0857*** (0.0196)	0.519*** (0.120)
Richest	0.181*** (0.0201)	1.151*** (0.130)
Insurance (No)		
Yes	0.0519*** (0.0146)	0.322*** (0.0893)
Marital Status (No)		
Married	0.0424* (0.0256)	0.261* (0.155)
Ever married	0.0280 (0.0368)	0.171 (0.226)
Employed (No)		
Yes	0.0434** (0.0177)	0.268** (0.108)
Living Children	-0.0279*** (0.00540)	-0.175*** (0.0338)
Son who died (No)		
Yes	0.000319 (0.0192)	0.00200 (0.120)
Daughter who died (No)		
Yes	-0.0309 (0.0212)	-0.191 (0.130)
Religion (Christian)		
Islam	0.0119 (0.0165)	0.0757 (0.105)
Traditional	-0.142*** (0.0313)	-0.833*** (0.173)
Residence (Urban)		
Rural	0.0407** (0.0161)	0.255** (0.101)
Place of delivery (home)		
Hospital	0.273*** (0.0188)	1.594*** (0.101)
Constant	0.993*** (0.118)	
Observations	4,262	4,262

Note: Author's computation; Robust standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .10$

Socioeconomic and health insurance factors on ANC utilization among respondents

To identify the factors associated with prenatal healthcare services, namely, full antenatal care, adequate antenatal care, and timely antenatal care, we examined the binomial differential of the selected socioeconomic and demographic characteristics. Table 3 shows the weighted percentages and marginal effects of the socioeconomic and demographic variables on ANC utilization.

Wealth was found to be a significant predictor of ANC utilization. Although the wealth quintile of women did not significantly determine the number of ANC visits, making adequate ANC and timely ANC uptake was positively associated with the wealth quintile of women. For instance, the richest wealth category was 18.1% more likely to achieve increased ANC visits than those in the middle (8.6%) and poorest group. After adjusting for wealth categories among the respondents, we found that the marginal effects of being in the richest wealth quintile were highest at about 151% on the number of ANC visits completed and 52% for those in the middle wealth quintile. Similar proportions were recorded for both adequate and timely ANC, with women in the richest group more likely (115%) to complete four or more visits than those in the middle wealth category (18.1%) (Table 2). Enrolling in the ANC program on time is recommended to optimize the benefits of the package. Therefore, from the binomial regression model, we observed that using timely ANC was determined by the woman's wealth. For instance, women in the richest wealth were 83% more likely to enroll early in the program than those in the middle wealth quintile (18.7%). However, the effects of wealth on timely uptake of ANC were minimal for both the richest quintile (9.2%) and the middle wealth quintile (2.5%) (Table 3).

On health financing, national health subscription status was a positive determinant of the number of ANC visits one could achieve. Thus, having an active NHIS subscription was 5.2% more likely to gain increased visits than those who did not. The marginal effects were significant, about 32% higher for active NHIS subscribers than non-subscribers. Similarly, women who had registered under the NHIS were 56.5% more likely to complete adequate ANC than those who did not; however, the effects of NHIS subscription on the adequacy of attendance (5.98%) and the time they enrolled in the program (1.4%) was not so significant compared to the number of ANC visits they would make. But women with active NHIS subscriptions were 11.2% more likely to take up timely ANC than those without active NHIS subscriptions (Table 3).

The employment status of a woman was a significant determinant of ANC utilization in this study. However, from the coefficients of regression, it was found that women with active employment were more likely to complete the recommended number of ANC visits (4.3%), adequate ANC (5.1%), and timely ANC (4.3%) than women without form of employment. However, employment status had a higher impact on the number of ANC visits a woman would complete (27%) than on adequate ANC (4.7%) and timely ANC (6.3%) (Tables 2 & 3).

Table 3: Binomial Logistic Regression on Adequacy and Timeliness of Antenatal Care Visits

Variables	Equation 3 Adequacy of ANC	Equation 4 Marginal Effects	Equation 5 Timely ANC	Equation 6 Marginal Effects
Age	0.0706 (0.0527)	0.00706 (0.00527)	0.151*** (0.0484)	0.0186*** (0.00594)
Age Squared	-0.000407 (0.000805)	-4.07e-05 (8.05e-05)	- 0.00174** (0.000743)	-0.000214** (9.12e-05)
Education (No)				
Primary	0.146 (0.131)	0.0156 (0.0139)	0.0885 (0.129)	0.0105 (0.0153)
Secondary or Higher	0.383*** (0.139)	0.0382*** (0.0138)	-0.0526 (0.126)	-0.00655 (0.0157)
Wealth Quintiles (Poorest)				
Middle	0.181 (0.140)	0.0201 (0.0152)	0.187 (0.127)	0.0254 (0.0170)
Richest	1.149*** (0.211)	0.0955*** (0.0145)	0.826*** (0.163)	0.0917*** (0.0166)
Insurance (No)				
Yes	0.565*** (0.1000)	0.0598*** (0.0111)	0.112 (0.0962)	0.0140 (0.0121)
Marital Status (No)				
Married	0.434** (0.184)	0.0472** (0.0217)	0.462*** (0.163)	0.0629** (0.0245)
Ever married	0.174 (0.241)	0.0202 (0.0279)	0.227 (0.223)	0.0331 (0.0323)
Employed (No)				
Yes	0.506*** (0.126)	0.0551*** (0.0147)	0.425*** (0.114)	0.0567*** (0.0163)
Living Children	-0.158*** (0.0391)	-0.0158*** (0.00389)	-0.206*** (0.0363)	-0.0253*** (0.00443)
Son who died (No)				
Yes	-0.0364 (0.142)	-0.00367 (0.0144)	0.0562 (0.136)	0.00681 (0.0163)
Daughter who died (No)				
Yes	-0.110 (0.145)	-0.0113 (0.0152)	0.00465 (0.143)	0.000570 (0.0175)
Religion (Christian)				
Islam	0.485*** (0.142)	0.0442*** (0.0119)	-0.00731 (0.120)	-0.000881 (0.0145)
Traditional	-0.328** (0.149)	-0.0374** (0.0181)	-0.432*** (0.154)	-0.0593** (0.0232)
Residence (Urban)				
Rural	0.220 (0.136)	0.0225 (0.0142)	0.395*** (0.120)	0.0500*** (0.0156)
Place of delivery (home)				
Hospital	1.288*** (0.107)	0.148*** (0.0137)	0.629*** (0.102)	0.0843*** (0.0148)
Constant	-1.844** (0.779)		-2.207*** (0.715)	
Observations	4,262	4,262	4,131	4,131

Note: Author's computation; Robust standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .10$

Discussion

The study identified several socioeconomic and demographic factors affecting ANC services utilization in the country. Factors such as the age of the woman, marital status, place of residence, educational attainment, wealth quintile, residence, and place of delivery were significantly associated with ANC utilization. While these determinants have repeatedly been reported in the literature, we must reiterate them, seeing as most studies have focused broadly on ANC uptake to the neglect of the time women commence the service and the number of visits they can complete before delivery (Dickson et al., 2017; Sumankuuro et al., 2017; Vogel et al., 2013; Witter et al., 2013). These socioeconomic and demographic factors identified were found to have high marginal effects on adequate and timely ANC services utilization in this study. The results show that approximately 86.49% and 84.50% of the women completed four or more visits and were on time throughout the gestation of the pregnancy. Thus, every pregnant woman completes at least one ANC visit before delivery.

Just as we found in this study, individual personal characteristics such as the age of women, education, and marital status were the significant determinant of ANC services utilization in previous studies (Afulani, 2015; August et al., 2016; Ghani et al., 2018; Singh et al., 2012).

A cross-sectional study in India involving adolescent women (ages 15–19) utilizing maternity services reported that early marriages were common, and women who may drop out of school due to early pregnancy felt shy to mingle with the broader community at the health facility. Our findings are commensurate with their conclusion. For instance, in this study, women who were ever married or not married were less likely to commence ANC on time or complete the minimum of four ANC visits before delivery.

In a study in Pakistan involving 700 pregnant women, Ghani et al. (2018) observed that ANC utilization was high, at about 86%. However, coercion and religious beliefs and practices which prevent home deliveries were the reason for enrolling in prenatal care. However, other reasons that contrast with this study's findings are that women who could not attend ANC reported additional cost-related, poor treatment by health personnel, receiving care from male staff, poor services at health facilities, and distances to ANC venues. The preference for the services of male staff was, however, contrary to the factors negatively affecting ANC uptake identified in this study. Therefore, while the majority achieved at least one ANC visit before delivery, there was no timeliness and adequacy of the care, which could defy the health benefits women and the unborn baby ought to derive from the services.

Assessing rural-urban differences in the use of ANC in Ghana, Afulani (2015) posited that women who cohabited or in a consensual union were less likely to utilize ANC. Given that maternity services are related to the life of more than one person, there is a timely need to encourage education and encourage to choose health over societal and cultural stigma. Although GDHS involves women who are less than the allowable constitutional age for marriage in Ghana and may convey controversies, it creates a window of opportunity for maternal health educators to map out strategies using the CHPS compounds to reach out to under-age pregnant women with messages that will boost their morale to utilize timely and adequate ANC services, in preparation for positive maternal outcomes.

This finding corroborates the previous conclusions in Ghana and the 2017 Ghana Maternal and Health Survey report (Ghana Statistical Service et al., 2018). However, given that many health interventions such as the NHIS, CHPS initiative, and upgrade of community health nurses to midwives and community health officers (Sakeah et al., 2014; Witter et al., 2013), among others, have been implemented in Ghana to increase ANC and allied maternal healthcare services utilization, the proportions on ANC uptake are unacceptably low. Our finding challenges the tendency for ANC to be focused on the number of ANC visits one can complete. Therefore, identifying and treating potential or actual pathology without paying to maintain and promote positive health and wellbeing of mothers, which is potentially achievable through adequate and timely ANC, defeats the primary aim of the ANC program (Agarwal et al., 2015).

The educational status of women exerts a significant influence on the women's utilization of maternal healthcare services after controlling for no education. In this study, for example, attaining secondary level education or higher was positively associated with increased ANC visits and on time. We also found significant disparities between primary and secondary education and those who did not have formal education. Despite the differences, from the binomial model, there was an enormous net effect of education on ANC services use.

However, there was variability in the overall impact in the educational levels for adequate and timely ANC services. Many studies conducted in other low and middle-income countries have found that women's education is one of the most critical determinants of ANC services utilization (Afulani, 2015; Agarwal et al., 2015; Aseweh Abor et al., 2011; Kongnyuy et al., 2009).

In the case of Malawi, uneven distribution of health facilities and distances from women's residences accounted for inadequate ANC. However, the authors found a significant association between ANC uptake and utilization of basic and comprehensive emergency obstetric and newborn care (Kongnyuy et al., 2009). Afulani (2015) observed that women in Ghana with some education attainment, regardless of location and socioeconomic status, were more likely to utilize quality ANC. They also demonstrated that women with higher educational attainment were more likely to receive timely, adequate, and quality ANC services from higher order health facilities (Afulani, 2015). The findings suggest that increased education for women just as men has a more significant net effect on skilled prenatal care utilization in Ghana. Therefore, the educational level of women and age at pregnancy is significantly interlinked and has a net introspective impact on ANC services use and should vigorously be pursued if achieving the SDGs is a priority in Ghana and similar countries.

Further, the results demonstrate women's interest in skilled prenatal health care. This was the prerogative of the user-fee exemption policy under the national health insurance scheme. Yet the findings show that women in the richest wealth quintile and insurance status were more likely to utilize adequate and timely ANC than those in the middle and poorest wealth categories. In this way, a woman's income and health insurance subscription status was a significant determinant of ANC service use. Similarly, the marginal effect on women's employment status and ANC service utilization was substantial. This suggests that all the socioeconomic factors considered in this study posed a barrier to access to timely and adequate ANC services. However, similar findings pertain in many studies in low and middle-income countries.

In an investigation in Ghana involving pregnant women, the authors noted that essential medicines were unavailable in most study district facilities, including the vital medicines given at ANC. Therefore, most pregnant women were compelled to obtain these medicines from the open market (Sumankuuro et al., 2017). Similar results were reported in Pakistan and India (Ghani et al., 2018; Singh et al., 2012). The barriers to maternity services posed by challenges associated with women's income and employment necessitated the introduction of the fee-exemption component of the NIHS was introduced in Ghana. However, as reported in previous research, systemic failures and policy gaps in the NHIS have created vast inequities in access, thereby causing the general maternity services to favor those who can afford out-of-pocket payment for services or join private health insurance.

Women in the poorest wealth group and unemployed would be deprived of access to using ANC on time and adequately. Previous findings have suggested that the inclusion of formal and informal charges in maternal health services such as medicines and unnecessary referrals to private laboratories for prenatal screening contributed to starkly low uptake of ANC services in many developing countries (August et al., 2016; Dickson et al., 2017; Ghani et al., 2018; Singh et al., 2012). A study by Jowett et al. (2004) showed that individuals in Vietnam with national health insurance coverage were more likely to seek health care services compared with those who did not have health insurance. This was linked to the fact that holding health insurance increases health service users' chances of accessing proper

health care (Jowett et al., 2004). Some studies also reported that health insurance positively influences health care service utilization (Kavosi et al., 2012; Kirby & Kaneda, 2005; Rashidian et al., 2011). They concluded that individuals with health insurance would seek more health care services than those without health insurance since health insurance cover lowers the cost of assessing healthcare services. Similar findings have been reported from Indonesia, where health insurance coverage has been found to positively influence health care services utilization (Hidayat et al., 2004).

Considering previous studies, Nketiah-Amponsah et al. (2013) examined “the determinants of utilization of antenatal care services in Ghana.” The study found that wealth status, age, ownership of health insurance (especially for rural women), educational attainment, birth order, religion, and administrative region of residence are significant predictors of the intensity of antenatal care services utilization. Aseweh Abor et al. (2011) also explored the factors determining the usage of maternal health services using GDHS 2003 data using both probit and ordered probit models. The study found that income, age, ethnicity, and education significantly influence the use of maternal health services, mainly, antenatal care and tetanus toxoid vaccines.

Quansah et al. (2016) revealed that the significant determinants of child healthcare services were family income, place of residence, maternal education, and high while Fosu-Brefo and Arthur (2015) showed that early breastfeeding immensely impacts child health. Besides, they found that the ages of the child and mother, the mother’s education, the wealth of the household, and the child’s size at birth significantly influenced child health in Ghana. Further, if ANC utilization is influenced by wealth quintile, only approximately 44% of the women were poor, and slightly above a third were in the richest wealth quintile. Therefore, considering the high proportion (86.49%) of women who had used ANC services in this study, it suffices to say that there may be other rippling adverse effects of individual, family, and community level factors operating at the personal scale or in combination, to affect women’s use of ANC services in Ghana than anticipated.

Empirically, most studies on maternal health care service utilization examine their determinants based on the microeconomic theory of consumer behavior. These determinants include factors related to individuals, household, and community characteristics such as health insurance coverage, age, education, and religion (Buchmueller et al., 2011; Moreira & Barros, 2010). That aside, we found that the location of women had a significant influence on ANC service use. However, there was a positive attitude towards increased ANC visits and timely uptake among women in both locations. The introduction of the CHPS initiative, which engages community health workers in-home visitations to identify pregnant women early in their pregnancy, may potentially explain the non-existent differentials in ANC utilization for both rural and urban dwellers in this study compared to previous findings in the country (Afulani, 2015; Ganle, Kombet, et al., 2019).

Despite these findings, the study had some limitations. One, the study relied on national health survey data collected at the individual level, which is limited in its ability to capture information regarding, individual integration into social networks, availability of social and family support given to mothers, community-level attitudes and sociocultural norms, beliefs and practices hampering timely and adequate ANC use, and decision-making patterns within families. Unmarried women may also have limitations in terms of financial access to care. However, clustered results for income by wealth quintile were collected during the survey, which limits our ability to assess socioeconomic status against marital status. Our variables were guided by data availability rather than a theoretical framework. This study

was strengthened by the inclusion of variables related to socioeconomic and demographic characteristics of women and ANC utilization; by adjusting for these variables, we could be confident that cluster-level variables were not a byproduct of absent or present ANC services.

Recommendations

The article provides profound revelations into population-level determinants of ANC utilization in Ghana. The analysis suggests that if interventions aimed at reducing the burden of maternal health services, especially prenatal care, are not implemented, coupled with women's economic empowerment to cater to the cost of prenatal care, the benefits of the ANC associated with early and adequate ANC services may not optimally be achieved. That aside, ANC services in Ghana are technically 'free' through the user-fee exemption policy under the NHIS, the sociodemographic and economic factors still largely determine women's decisions to utilize maternal health services. These socioeconomic and demographic factors suggest maternal education during ANC service delivery and pregnancy classes should target mothers.

Aside from increased maternal education, there should be innovative ways of ensuring women register and commence ANC on time to ensure the benefits of early screening, detection, and treatment of potential infections and complications that affect maternal outcomes. With the increased cost burden of ANC essential medicines on women, encouraging spouses to provide financial support to women may relieve and motivate them to commence ANC on time and continue until they deliver. This is particularly important since Ghana and other low-and middle-income countries are classified under high-risk countries for obstetric complications. Financial support and intensified maternal education have yielded increased and timely ANC service utilization in some locations.

References

- Abejirinde, I. O. O., De Brouwere, V., van Roosmalen, J., van der Heiden, M., Apentibadek, N., Bardaji, A., & Zweekhorst, M. (2019). Viability of diagnostic decision support for antenatal care in rural settings: Findings from the Bliss4Midwives intervention in Northern Ghana. *Journal of Global Health, 9*(1), Article 010420. <https://doi.org/10.7189/jogh.09.010420>
- Afulani, P. A. (2015). Rural/urban and socioeconomic differentials in quality of antenatal care in Ghana. *PLoS One, 10*(2), Article e0117996. <https://doi.org/10.1371/journal.pone.0117996>
- Agarwal, K., Alonso, P., Chico, R. M., Coleman, J., Dellicour, S., Hill, J., Majeres-Lugand, M., Mangiaterra, V., Menendez, C., Mitchell, K., Roman, E., Sicuri, E., Tagbor, H., van Eijk, A. M., & Webster, J. (2015). Global call to action to scale-up coverage of intermittent preventive treatment of malaria in pregnancy: Seminar report. *Malaria Journal, 14*(1), Article 206. <https://doi.org/10.1186/s12936-015-0730-3>
- Aseweh Abor, P., Abekah-Nkrumah, G., Sakyi, K., Adjasi, C. K., & Abor, J. (2011). The socio-economic determinants of maternal health care utilization in Ghana. *International Journal of Social Economics, 38*(7), 628–648. <https://doi.org/10.1108/03068291111139258>
- August, F., Pembe, A. B., Mpmembeni, R., Axemo, P., & Darj, E. (2016). Effectiveness of the Home Based Life Saving Skills training by community health workers on knowledge of danger signs, birth preparedness, complication readiness and facility delivery, among women in rural Tanzania. *BMC Pregnancy and Childbirth, 16*(1), Article 129. <https://doi.org/10.1186/s12884-016-0916-x>

- Buchmueller, T. C., DiNardo, J., & Valletta, R. G. (2011). The effect of an employer health insurance mandate on health insurance coverage and the demand for labor: Evidence from Hawaii. *American Economic Journal: Economic Policy*, 3(4), 25–51. <https://www.jstor.org/stable/41330440>
- Cameron, A. C., & Trivedi, P. K. (2013). *Regression analysis of count data* (Vol. 53). Cambridge University Press.
- Dickson, K. S., Darteh, E. K. M., & Kumi-Kyereme, A. (2017). Providers of antenatal care services in Ghana: Evidence from Ghana demographic and health surveys 1988–2014. *BMC Health Services Research*, 17(1), Article 203. <https://doi.org/10.1186/s12913-017-2145-z>
- Fosu-Brefo, R., & Arthur, E. (2015). Effect of timely initiation of breastfeeding on child health in Ghana. *Health Economics Review*, 5(1), Article 8. <https://doi.org/10.1186/s13561-015-0044-8>
- Ganle, J. K., Kombet, M. L., & Baatiema, L. (2019). Factors influencing the use of supervised delivery services in Garu-Tempene District, Ghana. *BMC Pregnancy and Childbirth*, 19(1), Article 141. <https://doi.org/10.1186/s12884-019-2295-6>
- Ganle, J. K., Mahama, M. S., Maya, E., Manu, A., Torpey, K., & Adanu, R. (2019). Understanding factors influencing home delivery in the context of user-fee abolition in Northern Ghana: Evidence from 2014 DHS. *The International Journal of Health Planning and Management*, 34(2), 727–743. <https://doi.org/10.1002/hpm.2731>
- Ghana Statistical Service, Ghana Health Service, & ICF International. (2015, October). *Ghana Demographic and Health Survey 2014*. GSS; GHS; and ICF International. <https://dhsprogram.com/pubs/pdf/FR307/FR307.pdf>
- Ghana Statistical Service, Ghana Health Service, & ICF International. (2018, February). *Ghana Maternal Health Survey 2017: Key Indicators Report*. GSS; GHS; & ICF. <https://www2.statsghana.gov.gh/docfiles/PR95.pdf>
- Ghani, U., Crowther, S., Kamal, Y., & Wahab, M. (2018). The significance of interfamilial relationships on birth preparedness and complication readiness in Pakistan. *Women and Birth*, 32(1), e49–e56. <https://doi.org/10.1016/j.wombi.2018.03.005>
- Grossman, M. (1999, April). *The human capital model of the demand for health* (Working Paper 7078). National Bureau of Economic Research. <https://doi.org/10.3386/w7078>
- Hidayat, B., Thabrany, H., Dong, H., & Sauerborn, R. (2004). The effects of mandatory health insurance on equity in access to outpatient care in Indonesia. *Health Policy and Planning*, 19(5), 322–335. <https://doi.org/10.1093/heapol/czh037>
- Hilbe, J. M. (2016). *Practical guide to logistic regression*. Chapman and Hall/CRC.
- Jowett, M., Deolalikar, A., & Martinsson, P. (2004). Health insurance and treatment seeking behaviour: Evidence from a low-income country. *Health Economics*, 13(9), 845–857. <https://doi.org/10.1002/hec.862>
- Kavosi, Z., Rashidian, A., Pourreza, A., Majdzadeh, R., Pourmalek, F., Hosseinpour, A. R., Mohammad, K., & Arab, M. (2012). Inequality in household catastrophic health care expenditure in a low-income society of Iran. *Health Policy and Planning*, 27(7), 613–623. <https://doi.org/10.1093/heapol/czs001>
- Kirby, J. B., & Kaneda, T. (2005). Neighborhood socioeconomic disadvantage and access to health care. *Journal of Health and Social Behavior*, 46(1), 15–31. <https://doi.org/10.1177/002214650504600103>
- Kongnyuy, E. J., Hofman, J., Mlava, G., Mhango, C., & van den Broek, N. (2009). Availability, utilisation and quality of basic and comprehensive emergency obstetric care services in Malawi. *Maternal and Child Health Journal*, 13(5), 687–694. <https://doi.org/10.1007/s10995-008-0380-y>
- Moreira, S., & Barros, P. P. (2010). Double health insurance coverage and health care utilisation: Evidence from quantile regression. *Health Economics*, 19(9), 1075–1092. <https://doi.org/10.1002/hec.1641>
- Ndyomugenyi, R., & Katamanywa, J. (2010). Intermittent preventive treatment of malaria in pregnancy (IPTp): Do frequent antenatal care visits ensure access and compliance to IPTp in Ugandan rural communities? *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 104(8), 536–540. <https://doi.org/10.1016/j.trstmh.2010.02.003>

- Nketiah-Amponsah, E., Senadza, B., & Arthur, E. (2013). Determinants of utilization of antenatal care services in developing countries: Recent evidence from Ghana. *African Journal of Economic and Management Studies*, 4(1), 58–73. <https://doi.org/10.1108/20400701311303159>
- Quansah, E., Ohene, L. A., Norman, L., Mireku, M. O., & Karikari, T. K. (2016). Social factors influencing child health in Ghana. *PLoS One*, 11(1), Article e0145401. <https://doi.org/10.1371/journal.pone.0145401>
- Rashidian, A., Kavosi, Z., Majdzadeh, R., Pourreza, A., Pourmalek, F., Arab, M., & Mohammad, K. (2011). Assessing health system responsiveness: A household survey in 17th district of Tehran. *Iranian Red Crescent Medical Journal*, 13(5), 302–308. <https://archive.ircmj.com/article/13/5/71188-pdf.pdf>
- Ruhara, M. C. (2016). Effect of health insurance on demand for outpatient medical care in Rwanda: An application of the control function approach. *Rwanda Journal*, 3(1), 77–100. <https://doi.org/10.4314/rj.v3i1.6B>
- Russell, S. (2008). Community-based health and planning services: Decentralizing Ghana's health system. *GU Journal of Health Sciences*, 5(1). <https://blogs.commons.georgetown.edu/journal-of-health-sciences/issues-2/previous-volumes/vol-5-no-1-april-2008/community-based-health-and-planning-services-decentralizing-ghana-s-health-system/>
- Sakeah, E., McCloskey, L., Bernstein, J., Yeboah-Antwi, K., Mills, S., & Doctor, H. V. (2014). Can community health officer-midwives effectively integrate skilled birth attendance in the community-based health planning and services program in rural Ghana? *Reproductive Health*, 11(1), Article 90. <https://doi.org/10.1186/1742-4755-11-90>
- Singh, P. K., Rai, R. K., Alagarajan, M., & Singh, L. (2012). Determinants of maternity care services utilization among married adolescents in rural India. *PLoS One*, 7(2), Article e31666. <https://doi.org/10.1371/journal.pone.0031666>
- Sumankuuro, J., Crockett, J., & Wang, S. (2017). The use of antenatal care in two rural districts of Upper West Region, Ghana. *PLoS One*, 12(9), Article e0185537. <https://doi.org/10.1371/journal.pone.0185537>
- Sumankuuro, J., Crockett, J., & Wang, S. (2018). Perceived barriers to maternal and newborn health services delivery: A qualitative study of health workers and community members in low and middle-income settings. *BMJ Open*, 8(11), Article e021223. <https://doi.org/10.1136/bmjopen-2017-021223>
- Sumankuuro, J., Mahama, M. Y., Crockett, J., Wang, S., & Young, J. (2019). Narratives on why pregnant women delay seeking maternal health care during delivery and obstetric complications in rural Ghana. *BMC Pregnancy and Childbirth*, 19(1), Article 260. <https://doi.org/10.1186/s12884-019-2414-4>
- Vogel, J. P., Habib, N. A., Souza, J. P., Gülmezoglu, A. M., Dowswell, T., Carroli, G., Baaqeel, H. S., Lumbiganon, P., Piaggio, G., & Oladapo, O. T. (2013). Antenatal care packages with reduced visits and perinatal mortality: A secondary analysis of the WHO Antenatal Care Trial. *Reproductive Health*, 10(1), Article 19. <https://doi.org/10.1186/1742-4755-10-19>
- Witter, S., Garshong, B., & Ridde, V. (2013). An exploratory study of the policy process and early implementation of the free NHIS coverage for pregnant women in Ghana. *International Journal for Equity in Health*, 12(1), Article 16. <https://doi.org/10.1186/1475-9276-12-16>
- World Health Organization. (2019, September 19). *Maternal mortality: Key facts*. <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
- World Health Organization. (2022, May 9). *Global Health Observatory data repository* (Births attended by skilled health personnel) [Data by country]. <https://apps.who.int/gho/data/node.main.SKILLEDBIRTHATTENDANTS?lang=en>