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ABSTRACT

Antenatal care utilization is a success story in Uganda (at least 90% of expectant mothers received ANC); however, accessing the first antenatal within the first three months of pregnancy is vital, a period for essential interventions like identification and management of obstetric complications. This study aimed at establishing factors contributing to early antenatal care service utilization in Uganda.

We used a sample of 10,152 women of reproductive ages (15-49), who had given birth in the five years preceding the Uganda Demographic and Health Survey. Andersen's Behavioral Model of Health Services Utilization guided the selection of covariates in the model. In contrast, binary logistic model used to analyze the relationship between early antenatal care on age, highest maternal education level, marital status, wealth quintile, distance to a health facility, cost of service, availability of health worker in the community, exposure to media, nature of pregnancy and parity.

Keywords: antenatal care, likelihood, timely accessibility, education completion.

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Factors Determining Early Antenatal Care Utilization in Uganda

Ruth Atuhaire^a, Will Kaberuka^a, Leonard.K. Atuhaire^b & R.Wamala^b

ABSTRACT

Antenatal care utilization is a success story in Uganda (at least 90% of expectant mothers received ANC); however, accessing the first antenatal within the first three months of pregnancy is vital, a period for essential interventions like identification and management of obstetric complications. This study aimed at establishing factors contributing to early antenatal care service utilization in Uganda.

We used a sample of 10,152 women of reproductive ages (15-49), who had given birth in the five years preceding the Uganda Demographic and Health Survey. Andersen's Behavioral Model of Health Services Utilization guided the selection of covariates in the model. In contrast, binary logistic model was used to analyze the relationship between early antenatal care on age, highest maternal education level, marital status, wealth quintile, distance to a health facility, cost of service, availability of health worker in the community, exposure to media, nature of pregnancy and parity.

Predictors that had relatively increased odds of early antenatal care utilization include mothers who are age 19-35, completed primary seven, distance is not a problem, readily available community health workers, and no complicated pregnancy. Furthermore, mothers aged 15-18, did not complete secondary level, not married, travel a long distance to a health facility, with the cost of service being problematic and parity were associated with reduced odds of early antenatal care utilization.

The study recommends that government should promote female education to primary seven

completion hence delaying child marriages, reduce on costs of utilizing antenatal care by enacting the insurance bill and encouraging pregnancy centering and sensitizing the public on benefits of early utilization leading to improved maternal and newborn outcome during pregnancy.

Keywords: antenatal care, likelihood, timely accessibility, education completion.

I. INTRODUCTION

Maternal health care comprises dimensions of antenatal/prenatal, childbirth delivery/intranasal, postnatal and neonatal care to reduce maternal morbidity and mortality (Rice, 2019; UBOS, 2017; UNICEF, 2019). Utilization includes ensuring comprehensive antenatal care (ANC) coverage for all pregnant women, the first ANC within the first three months of pregnancy (Rutaremw, Wandera, Jhamba, Akiror, & Kiconco, 2015; Srivastava, Mahmood, Mishra, & Shrotriya, 2014; Wang & Hong, 2015). WHO (2015) defines antenatal care (ANC) as monthly visits during the first two trimesters (from week 1–28), fortnight visits from 28th week to 36th week of pregnancy and weekly visits after 36th week until delivery (delivery at week 38–42) at a health facility. Early ANC implies the utilization of antenatal care and services within the first trimester (Mamba, Muula, & Stones, 2017; Say et al., 2014; Tunçalp, Souza, & Gülmezoglu, 2013).

Even though the government has prioritized measures for improvement of maternal health services, most women access antenatal services late (Finlayson & Downe, 2013; Kawungezi et al., 2015; Kisuule et al., 2013; Mamba et al., 2017). According to UDHS 2016 survey, the median

gestational age when women make their first antenatal visit is approximately 4.7 months. Though studies have focused on the utilization of antenatal care leading to a success story in Uganda (Kawungezi et al., 2015; Mugarura, Kaberuka, Atuhaire, Atuhaire, & Abaho, 2017; Wiluna et al., 2015), hardly any information is available on the causes of early antenatal care utilization.

We carried out the study to establish factors contributing to early antenatal care service in Uganda. Andersen's Behavioral Model of Health Services Utilization guided the selection of covariates in the model. The exogenous variables selected as determinants of early antenatal care services that are predisposing and enabling factors included mother's wealth quintile, marital status, parity, maternal age at last birth, maternal highest education level, exposure to mass media,

distance to a health facility, cost of service, if either the pregnancy was wanted or not, and if the pregnancy was complicated or not.

The study utilized data obtained from the 2016 Uganda Demographic Household and Health Survey (UDHS). The survey was a follow up to the previous UDHS carried out in 1988/89, 1995, 2000/2001, 2006, and 2011 and is implemented by the Uganda Bureau of Statistics. For all the years, the woman's questionnaire collected information from all eligible women aged 15-49 years (those aged 15-49 minus those who had no live birth in the five years preceding the survey). Respondents were asked questions about their demographic and household characteristics, maternal and child health indicators. Table 1 shows the measurements of the variables adopted for the study.

Table 1: Measurement of variables used in the study

Code	Variable	Description	Coding if any	Data type
Y ₁	Early Antenatal	Timing of the first antenatal visit	1. Accessed antenatal care within first trimester. 2. Accessed after first trimester	Binary
X ₁	Age of the women	Age of the woman at the time of the survey	1. 15-18 2. 19-35 3. 36-49	ordinal
X ₂	Parity	Children ever born by the woman		Count
X ₃	Highest maternal education level	Mother's highest level of education	1. some primary 2. completed primary seven 3. some secondary 4. completed secondary six	ordinal
X ₄	Income	Wealth quintile of the household	1. Poor 2. middle 3. Rich	ordinal
X ₅	Marital status	Marital status of the woman	1. Unmarried 2. Married	nominal
X ₆	Pregnancy wanted	If the mother wanted the last pregnancy	1. Yes 2. No	nominal
X ₇	Exposure to mass media	Women who listen to radio, read newspapers or watch television	1. Exposure 2. Non exposure	nominal
X ₈	Pregnancy complications	If the pregnancy was complicated or not	1. Yes 2. No	nominal
X ₉	Community factors	Availability of community health worker	1. Yes 2. No	nominal
X ₁₀	Distance to the health facility	If the distance from home to the health facility is a problem or not.	1. Big problem 2. not big problem	nominal
X ₁₁	Direct costs/fees	If cost paid while accessing a service is a problem or not	1. big problem 2. not	nominal

Data were analyzed using STATA 13.0. We performed a descriptive summary of the variables in the study in the form of frequency tables (see table 2). At the bivariate level, we ran differentials in antenatal care with each predictor using a binary logistic regression model to estimate the odd ratios unadjusted (see table 3). This stage helped us determine the significant variables which we used in the final analysis. Variables that had a relatively small probability value of 0.05 or

less were considered for inclusion in the final analysis to ascertain the predictors of early antenatal care utilization. At multivariate level, significant exogenous factors were included in the logit model, which allows each category of an unordered response variable compared to an arbitrary reference category.

The following equation expresses the relationship between early antenatal care and its predictors.

$$\ln\left(\frac{\text{pr}(y_1 = 1)}{1 - \text{pr}(y_1 = 1)}\right) = \beta_0 + \beta_i \hat{X}_j + U_i$$

Where; Y_1 represent the early ANC, β_0 represent the intercept of the model, β_i is the matrix of the slope coefficients and x_i is the matrix of independent variables (maternal education, marital status, age at last birth, parity, complications or not, whether the pregnancy was wanted or not, exposure to mass media, readily available community health workers, cost of services offered, and distance to a health facility), and, u_i is the error term.

The outcome variable considered in this study was early antenatal care and the predictors were; maternal age at birth, maternal education, parity, wealth quintile, marital status, costs incurred at health facility and distance to health facility. Community factors were availability of a worker and health facility in an area, while predisposing and need factors were exposure to media, pregnancy complications and if pregnancy wanted or not. Table 2 presents the frequencies of these study variables.

Table 2: Frequency distribution table of the study variables

Variable	Frequency	Percent (%)
Early Antenatal care		
Went within the first trimester	2897	28.5
Went after the first trimester	7255	71.5
Age		
15-18	2347	23.1
19-34	5154	50.8
35-49	2651	26.1
Highest Maternal education level		
Some Primary	4406	43.4
Completed primary seven	1827	18.0
Some secondary	3198	31.5
Completed secondary six	721	7.1
Marital status		
Married	3189	31.4
Unmarried	6963	68.6
Wealth quintile		
Poor	4128	40.7

Middle	1912	18.8
Rich	4112	40.5
Distance to health facility		
Big problem	3957	38.9
Not big problem	6195	61.1
Cost of service		
Big problem	4763	46.9
Not big problem	5389	53.1
Availability of a health worker in community		
Readily available	7258	71.5
Not readily available	2894	28.5
Exposure to media		
Exposed to media	8110	79.9
Not exposed to media	2042	20.1
Pregnancy wanted		
Yes	6185	60.9
No	3967	39.1
Complications		
Yes	660	6.5
No	9492	93.5

Results show that less than 3 out of 10 women accessed their first ANC within 3 months of pregnancy. Significant delays for first ANC visit have been observed in other countries including Rwanda where only 38% of women have an ANC visit in their first three months of pregnancy (Manzi et al., 2014) and Ethiopia where more than half of women had a delayed ANC (Wiluna et al., 2015; Yesuf & Calderon-Margalit, 2013).

Women have shown not to access early ANC checkup, an essential time recommended for receiving medical information over maternal physiological and biological changes in pregnancy and prenatal nutrition, health personnel checking the mother's medical history, for example if a mother had a history of an ectopic pregnancy to avoid reoccurrence, test for HIV status, birth defects and blood pressure (Carroli, Rooney, & Villar, 2005; Chama-Chiliba & Koch, 2013; Chukwuma, Wosu, Mbachu, & Weze, 2017; Ebonwu, Mumbauer, Uys, Wainberg, & Medina-Marino, 2018; Mamba et al., 2017).

Half of the sampled women were of age 19-35, the most fertile period (Elster, 1984). More than 5 out of 10 women had completed primary seven (56.6%) though very few women had completed

(56.6%) though very few women had completed secondary six (7.1%). A good proportion of women were unmarried (68.59%). Women from a poor background were almost equal to those from the rich background (40.66% and 40.51% respectively), and women from an average background were the fewest (18.83%). Six in every ten women (61.02%) didn't point out distance to health facility as a big problem. There was a slight difference between women who thought cost of service was a big problem compared to those who thought it was not (46.92% and 53.08% respectively). Most health workers were readily available in the community (71.5%), and most women were exposed to at least one form of media (79.89%). Results in Table 2 further indicated that at least 6 in every 10 women wanted the pregnancy and a small proportion of women had complicated pregnancy (6.5%). On average, women had 3 children ever born with a standard deviation of 3 children.

Table 3: Differentials in Early ANC utilization

Factor	Unadjusted OR(95% CI)	Adjusted OR(95% CI)
Age		
15-18	1.890(1.756-1.99)*	1.0
19-34	0.980(0.881-1.023)	0.92(0.82-1.00)
35-49	1.200(0.990-1.245)*	1.18(1.08-1.26)*
Highest Maternal education level		
Some primary	1.321(1.001-1.456)	1.0
Completed primary seven	1.687(1.482-1.812)*	1.68(1.58-1.81)*
Some secondary	0.790(0.633-0.985)*	0.9(0.63-0.98)
Completed secondary six	1.126(0.833-1.511)	1.12(0.83-1.51)
Marital status		
Unmarried	0.845(0.750-0.987)*	1.0
Married	0.990(0.856-1.099)*	0.93(0.89-1.20)*
Wealth quintile		
Poor	0.932(0.876-1.007)	-
Middle	0.857(0.716-1.027)	-
Rich	0.863(0.734-1.011)	-
Distance to health facility		
Not Big problem	1.512(1.234-1.650)*	1.0
Big problem	0.974(0.859-1.103)*	0.97(0.85-1.10)*
Cost of service		
Not big problem	1.031(0.987-1.143)*	1.0
Big problem	0.605(0.472-0.822)*	0.50(0.37-0.82)*
Availability of a health worker in community		
Not readily available	1.021(0.954-1.170)*	1.0
Readily available	1.061(0.970-1.182)*	1.06(0.97-1.18)*
Exposure to media		
Exposure	0.923(0.876-1.100)	-
Non-exposure	1.077(0.927-1.251)	-
Pregnancy wanted		
No	0.823(0.765-0.987)*	1.0
Yes	1.170(1.033-1.367)*	1.15(1.03-1.36)*
Complications		
No	0.621(0.543-0.876)*	1.0
Yes	1.942(1.733-2.367)*	2.04(1.89-2.26)*
Parity		
	0.942(0.918-0.967)*	0.89(0.81-0.92)*

Note 1: (OR): Exponential coefficients; CI: confidence intervals; * indicates variables with $p < 0.05$ Note 2: estimates based on weighted data

Table 3 indicates that the factors associated with relatively increased odds of early ANC were women with age of 19-34 years, completing primary seven, distance to health not being a big problem, cost of service not being a big problem, a readily available health worker in a community compared to when a health worker is not readily available, women's desire for pregnancy and complications ($p < 0.05$).

The factors that were associated with relatively reduced odds of early ANC were women aged 15-18 years, not completing secondary, being married compared to unmarried, distance to a health facility as big problem, cost of service being a big problem, women who didn't want the pregnancy, without complications, and parity ($p < 0.05$).

Additionally, the factors that significantly contributed to early ANC were: maternal age, maternal education, marital status, distance to health facility, cost of attaining service, availability of a health worker in the community, desire for pregnancy, complications and parity ($p < 0.05$).

Holding other factors constant, adult mothers age 35-49 had an 18% increased odds of utilizing early ANC as compared to teenage mothers age 15-19 ($OR = 1.18$). Women who completed primary seven had a 68% increased odds of utilizing ANC within the first trimester as compared to a woman who had incomplete primary education ($OR = 1.68$). A married woman had a 7% reduced odds to utilize early ANC as compared to an unmarried woman ($OR = 0.93$).

Women were distance to a health facility a big problem that had a 3% reduced odds to utilize early ANC as compared to women were distance to a health facility is not a big problem ($OR = 0.97$). Women with the cost of service problems were half as likely to utilize ANC within the first trimester as compared to women with no problems ($OR = 0.5$). Women in communities with readily available health workers had a 6% increased odds of utilizing early ANC as compared to women in communities with no readily available health workers ($OR = 1.06$).

Women who wanted the pregnancy had a 15% increased odds of utilizing ANC services within the first trimester as compared to women who did not ($OR = 1.15$). Women with complicated pregnancy were twice as likely to utilize early ANC compared to women with no complications ($OR = 2.04$). One more live child ever born in a household lowered the odds on average by 11%, holding other factors constant ($OR = 0.89$).

Results from this study are in agreement with most scholars who revealed that adult women and high education levels are associated with early utilization of antenatal care services (Ensor & Cooper, 2004; Mamba et al., 2017; Sacks et al., 2017; Wilunda et al., 2014), and in affirmation with studies in Kenya (Arunda, Emmelin, & Asamoah, 2017; Kitui, Lewis, & Davey, 2013; Magadi, Madise, & Rodrigues, 2000), Rwanda (Golooba-Mutebi, 2011; Hagey, Rulisa, & Perez-Escamilla, 2014; Manzi et al., 2014), India (Pallikadavath, Foss, & Stones, 2004; Singh, Rai, Alagarajan, & Singh, 2012; Srivastava et al., 2014), Zambia (Sacks et al., 2017) and in the USA (Yaya, Bishwajit, & Shah, 2016). However, some studies reported a strong association between teenage mothers and early use of ANC (Mosieur Rahman, Haque, & Sarwar Zahan, 2011; Ochako, Fotso, Ikamari, & Khasakhala, 2011).

Additionally, women delayed to attain early ANC services because of direct costs involved, overcrowding in hospital, staff attitude, and long distances to a health facility in Ethiopia (Abosse, Woldie, & Ololo, 2010; Wudineh, Nigusie, Gesese, Tesu, & Beyene, 2018), Rwanda (Golooba-Mutebi, 2011; Hagey et al., 2014), Benin (Dansou, Adekunle, & Arowojolu, 2017), India (Pallikadavath et al., 2004; Singh et al., 2012; Srivastava et al., 2014) and Tanzania (Mrisho et al., 2009).

A study by Finlayson and Downe (2013) reveal that barriers to early ANC utilization are driven by views that pregnancy is a healthy state, women's limited financial resources, and not getting it right the first time due to inadequate services for mother with other children.

In essence: The right timing of ANC leads to avoiding most of the maternal health conditions during pregnancy.

Pregnancy should be an enjoyable stage in every woman's life, and mothers should be mindful of the benefits of utilizing early antenatal healthcare service to reduce incidences of maternal and neonatal underlying conditions, especially abortions. Though maternal mortality was declining and increased proportionate of women attain antenatal care services, late timing will continue to pre-dispose women and newborns to the risk of morbidity and mortality.

The majority of women have not completed primary and secondary levels of education. This is because childbirth in Uganda starts as early as 13 years (UBOS, 2017) when the girls are supposed to be at school. To improve the utilization of early ANC, there is a need to formulate policies and design maternal health service programs that sensitize women about the benefits of comprehensive ANC visits. Mothers should be encouraged to give "first visit within three months of pregnancy" priority and avoid delayed access for better maternal and neonatal outcomes.

The government of Uganda and other stakeholders should reduce the costs of attaining health services by enacting the bill on insurance, encourage pregnancy centering, and strengthen the position of community health workers.

There is need for female child education completion, scholarship programs and legislation against early marriages promotions for young women to remain in school longer. Educated women are better positioned to acquire, understand, and utilize knowledge when exposed to media on maternal health information.

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