

Determinants of the Disparities in Antenatal Care and Delivery Care Services in Uganda

H. Bariagaber¹, M.F. Towongo² and N. Ayiga^{3*}

^{1,2}*Department of Population Studies, University of Botswana Private Bag 00705, Gaborone, Botswana*

^{3*}*Department of Demography and Population Studies, North West University, Mafikeng Campus, Private Bag X2046, Mmabatho, South Africa*
E-mail : ¹<hadgub84@gmail.com>, ²<mtowongo@yahoo.com>, ³<nayiga1962@gmail.com>, ³<Natal.Ayiga@nwu.ac.za >

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ABSTRACT Disparities in the Antenatal Care (ANC) attendance and Delivery in a Health Facility (DHF) were examined in Uganda where the maternal and the new-born mortality are high. Cross-sectional data on 4818 women were obtained from the 2011 Uganda Demographic Health Survey and was used. Over half and three-fifth of the women attended the recommended 4 or more ANC visits and DHF respectively. Tertiary and secondary education, currently married status, belonging to the richer wealth index group and having daily access to the media significantly increased the attendance of the 4 or more ANC visits and DHF. Attending the 4 or more ANC visits also significantly increased DHF. The researchers conclude that increasing the demand for the continuum of care services through education, information, access to health facilities and lower costs is required to increase the attendance of the recommended number of ANC visits and delivery in health facilities.

INTRODUCTION

Attending antenatal care (ANC) and delivering in a health facility are two of the three initiatives on the continuum of care for reducing maternal and new-born mortality. The third is post-natal care. However, many women in low income countries fail to attend the 4 World Health Organization (WHO) recommended antenatal care visits and deliver in a health facility to ensure good maternal outcomes (Larsen et al. 2016). As a result, in many of these settings, the failure to attend the recommended number of ANC visits and deliver in a health facility, remain major obstacles in reducing child mortality and improving maternal health (Bohren et al. 2014). It is for these reasons that efforts to combat poor maternal and child health have received renewed global attention (Ganchimeg et al. 2014).

Antenatal care can reduce the maternal and the new-born mortality by preventing maternal and new-born tetanus (MNT) infection by anti-tetanus immunization (Blencowe et al. 2010; Wilson et al. 2015); prevent maternal anaemia and

the risks of birth defects in new-borns by folic acid supplementation (Peña-Rosas et al. 2015; Sullivan et al. 2015); and prevent maternal malnutrition and the risk of underweight new-borns through appropriate nutrition supplementation and counselling (Bhutta et al. 2013). Routine ANC also helps in the screening for and management of infections such as HIV and AIDS and chronic conditions such as hypertensive disorders and diabetes which could increase the risk of complications during pregnancy (Gross 2012; Kersten et al. 2014; Newman et al. 2013); improve maternal and new-born survival by inculcating healthy lifestyles such as avoidance of alcohol and smoking during pregnancy (Fifer et al. 2009); and familiarize mothers with health facilities and help them in making appropriate delivery plans in health facilities (Gross 2012; Moindi et al. 2015; Samson 2012).

On the other hand, delivering in a health facility reduces maternal mortality by preventing and managing delivery complications such as obstructed labour, haemorrhage and retained placenta (Adusi-Poku et al. 2015; Iyengar et al. 2014); and reduces new-born mortality among pre-maturely born babies, those who get intrauterine or other infections during delivery and new-borns affected by asphyxia (Allanson et al. 2016; Dhaded et al. 2015) among other causes. However, despite the increasing number of wom-

*Address for correspondence:

N. Ayiga
Department of Demography and Population Studies,
North-West University, Mafikeng Campus,
Private Bag X2046, Mmabatho, 2735, South Africa
E-mail: Natal.Ayiga@nwu.ac.za;
nayiga1962@gmail.com

en who are attending ANC and improved access to health facilities, many deliveries in sub-Saharan Africa continue to take place at home (Chinkhumba et al. 2014). For example, a recent research revealed that only one-third of the births in Nigeria (Fagbamigbe and Idemudia 2015), less than 5 in 10 in Ethiopia (Shiferaw et al. 2016), just about 4 in 10 in Zambia (Gabrysch et al. 2016; Zambia Ministry of Health 2016), over half in Tanzania (Mageda and Mmbaga 2015) and just over two-fifths in Kenya (Kinuthia et al. 2015; Ochako et al. 2015) took place in health facilities, which can explain the slow progress in reducing newborn and the maternal mortality in these countries.

Previous studies attributed the low number of ANC attendance and failure to deliver in a health facility in sub-Saharan African countries to the individual attributes of the women such as age of the women at birth, high parity (Khowaja et al. 2016), low level of education, religious affiliation and cultural perceptions regarding pregnancy and delivery (Bernstein and Merkatz 2010; Oladokun et al. 2010). Other factors, mostly structural in nature that are associated with the low attendance of ANC and delivering in a health facility are the low wealth status (Asamoah et al. 2014; Nair et al. 2012), rural residence (Hagey et al. 2014), lack of access to health information and poor quality of health services (Joshi et al. 2014), and delays in going to and in receiving appropriate care in health facilities (Awoke and Seleshi 2013; Nansubuga and Ayiga 2015).

Uganda has strengthened its health system and increased access to the continuum of care services. Every district in the country has a district hospital, every sub-county has a health facility level (III) and every parish has a health facility level (II). These health facilities have reduced the time taken to travel to seek care and have helped in increasing attendance of the ANC services, but the number of women attending the recommended 4 or more ANC visits and delivering in health facilities has remained low, especially in rural areas (Ediau et al. 2013). A nationally representative survey found that less than 5 in 10 women attend the 4 or more ANC visits and only 47 percent of women delivered in health facilities in Uganda, which can explain the high national maternal mortality ratio and new-born mortality rate, estimated at 483 and 27 respectively (UBOS and ICF Inc 2012). The caus-

es of maternal and new-born mortality in Uganda that are directly associated with complications during the pregnancy and delivery are known (Mbonye et al. 2012) and could be easily prevented by a full course of ANC and delivering in a health facilities. However, the predisposing and enabling factors impeding attendance of the recommended 4 or more ANC visits and delivering in a health facilities in Uganda remain poorly understood.

The researchers used the Andersen's Behavioural Model of Health Services Use (Andersen 2008) to identify the predictors of attending the recommended 4 or more ANC visits during the most recent pregnancy and deliveries of child birth in a health facility. In the research, researchers proposed that attending the 4 or more ANC visits and delivering in a health facility is predicted by the combination of predisposing and enabling factors. The predisposing factors are those that operate at an individual level including age, parity, marital status, religion, level of education and the employment status of the women, which influence the woman's actual or the perceived need for the ANC and a health facility delivery. On the other hand, enabling factors are structural in nature and they facilitate the attendance of ANC visits and delivery in a health facility including attendance of ANC visits during the most recent pregnancy, sex of the household head, place of residence, region of residence, wealth index group and access to the mass media. To the best of our knowledge, the use of the Anderson's Behavioural Model of Health Service Use has not been used to identify the predictors of ANC visits and delivering in a health facility in Uganda.

Objectives of the Study

The objectives of the research are two-fold. Firstly, to assess the prevalence of attending the recommended 4 or more ANC visits during the most recent pregnancy and delivering it in a health facility. Secondly, to identify the significant predictors of attending the 4 or more ANC visits during the most recent pregnancy and delivering it in a health facility. In this regard, the researchers hypothesized that "women having tertiary and secondary education are more likely to attend the 4 or more ANC visits than women having no/primary education even when demographic and other socio-economic conditions are the same for all women"; and "women

who attend the 4 or more ANC visits are more likely to deliver in a health facility than women who attend ANC any other number of times even when demographic and other socio-economic conditions are the same for all the women.”

MATERIAL AND METHODS

Setting

Uganda is a multi-cultural country in Eastern Africa. The population of the country was estimated at 34.6 million with a fertility rate of 5.8 in 2014. Nearly 80 percent and 69 percent of the population reside in rural areas and depend on subsistence farming as the main source of income respectively (UBOS 2016). The per capita income of Uganda increased modestly from US\$ 665 in 2008 to US\$ 788 in 2014, which is lower than the US\$1,025 threshold required to become a lower middle income country. Over 19 percent of the population lives in chronic poverty; HIV prevalence is 7.2, implying that the infection is a generalized epidemic; and the quality of the public sector health service, characterized by low staffing, aging infrastructure, lack of or dysfunctional equipment and frequent drug stock outs at all the health facilities across the country, is poor (Uganda Planning Authority 2015). Uganda also has a vibrant privately funded and faith based health service system, but this is not easily accessible to the majority of the population in rural areas.

Source of Data

The research used cross-sectional data from 8740 women aged 15-49 years. The data were obtained from the Uganda Demographic and Health Surveys (UDHS) which was conducted by Uganda Bureau of Statistics (UBOS) and ICF international in 2011. The survey collected data on socio-economic characteristics, fertility, family planning, reproductive health, mortality, HIV and AIDS, and gender based violence. A standard and structured Demographic Health Survey questionnaire for women was used to collect the data.

The sample for the survey was derived by the use of a two stage cluster sampling design. In stage one, 404 enumeration areas (EAs) were selected as clusters from a sample frame developed for the 2009/10 national household sur-

vey. From the selected EAs, 10086 households were selected in stage two and all women aged 15-49 years who were present in the households, including eligible visitor women who had spend the preceding night in the households, were interviewed. However, for the present research, 4818 women's records, that satisfied the criteria for the research which included belonging to the age group 15-49 and having the most recent birth in the five years preceding the survey, were included in the analysis.

Measures

The research assessed the status and predictors of the two dependent variables: These are the number of ANC visits attended during the most recent pregnancy, which was obtained by asking the women “how many times did you receive antenatal care for this pregnancy?” and delivery of the most recent birth in a health facility, which was obtained by asking “where did you give birth to name?” The number of ANC visits was categorized according to the WHO criterion which is attending antenatal care visits at least 4 times, or any other number of times (0-3 times). Type of place of delivery was categorized into delivery in a health facility and out of a health facility (home, traditional birth attendant or others).

The independent variables were divided into predisposing and structural variables. The predisposing variables are current age categorized as 15-24, 25-34 and 35 years or older; parity categorized as one, two, three and four or higher; and marital status categorized as never married, currently married (married or cohabiting) or formerly married (divorced or widowed). Also included as predisposing variables are religion categorized as Christian, Muslim or others (Traditionalists, Hindu, Baha'i); highest level of education categorized as no/primary, secondary or tertiary education; and employment status categorized as not working, working in the formal or an informal sector.

The structural variables in the analysis were sex of the head of household (male or female); place of usual residence (urban or rural); and region of usual residence (Kampala, Central, Eastern, Northern, Karamoja, West Nile or Western). Other variables were wealth index group categorized as low, middle or high; and access

to the mass media (radio) which was categorized as not at all, occasional or daily access.

Method of Analysis

Data were analysed using three methods. In the first method the researchers described the profile of the research population by demographic and socio-economic characteristics. In the second method, the researchers used the Pearson's Chi-square statistic to assess the association between the number of ANC visits attended and the place of delivery, and the demographic and the social characteristics of the women. In doing so, the chi-square formulae used was $\chi^2 = \sum(f_o - f_e)^2 / f_e$. Number of ANC visits attended and the place of delivery, and the women's demographic and socio-economic characteristics were significantly associated if the p value was <0.05 .

In the third method of the analysis, the researchers used the logistic regression model to identify the significant predictors of the number of ANC visits attended and the place of delivery. In the analysis, ANC was coded "1" if ANC attendance in the most recent pregnancy was 4 or more times and "0" if ANC attendance was any other number of times. The place of delivery was coded "1" if delivery of the most recent birth was in a health facility and "0" if it was anywhere else. Attending ANC visits any number of times and delivering anywhere else were the reference categories. The logistic regression model was chosen because the categories of both dependent variables satisfied the dichotomous condition for its use (Elisa and Wang 1992). In predicting the significant predictors, the formulae the researchers used was $y = \text{Log}_e \frac{P_i}{1-P_i}$ and the Odds Ratios (β^2) were used to interpret the results. A variable with a p of <0.05 was a significant predictor of either attending the 4 or more ANC visits or delivering in a health facility.

RESULTS

Socio-demographic Profile

The demographic and the socio-economic profile of the women is presented in Table 1. The table shows that the median age of the women was 28 years and most of them were in the 25-34 years age group. The mean parity of the women

Table 1: Percentage distribution of study population by selected demographic and socio-economic characteristics

Socio-demographic characteristics	%	Total
<i>Age Group of Women</i>		
<25	31.6	1524
25-34	45.6	2196
35+	22.8	1098
Median age	28 years (SD=7.12)	
<i>Parity</i>		
1	16.4	790
2	16.6	802
3	13.6	656
4+	53.3	2570
Mean parity	4.2 (SD=2.72)	
<i>Marital Status</i>		
Never married	4.4	216
Currently married	84.2	4053
Formerly married	11.4	249
<i>Religion</i>		
Christian	83.2	4007
Muslim	13.9	671
Other	2.9	140
<i>Level of Education</i>		
No/Primary	75.8	3652
Secondary	19.6	944
Post-secondary	4.6	222
<i>Occupation</i>		
No work	20.4	981
Formal sector	33.2	1599
Informal sector	46.4	2238
<i>Sex of Head of Household</i>		
Male	4.7	3598
Female	7 25.3	1220
<i>Region of Residence</i>		
Kampala	8.7	420
Central	17.4	838
Eastern	22.6	1091
Northern	9.9	479
Karamoja	8.9	428
West Nile	10.8	519
Western	1.6	1043
<i>Place of Residence</i>		
Urban	23.8	1152
Rural	76.1	3666
<i>Wealth Index Group</i>		
Poor	43.6	2100
Middle	17.3	832
Rich	439.1	1886
<i>Access to Mass Media</i>		
Not all	17.0	820
Occasional	29.9	1399
Daily	54.1	2595
<i>Number of Antenatal Care Attendance During Last Pregnancy</i>		
<4	48.8	2352
4+	51.2	2466
Mean number of ANC	3.65 (SD=1.71)	
<i>Place of Delivery of Last Birth</i>		
Home	38.7	1863
Health facility	61.3	2955
Total	100.0	4818

Table 2: Percentage distribution of women by number of antenatal care visits attended and place of delivery and selected demographic and socio-economic characteristics

<i>Socio-demographic characteristics</i>	<i>Antenatal care visits</i>		χ^2	<i>Place of delivery</i>		χ^2	<i>Total</i>
	<i>%</i>	<i>%</i>		<i>%</i>	<i>%</i>		
	<i><4</i>	<i>4+</i>		<i>Home</i>	<i>Health facility</i>		
<i>Age Group of Women</i>							
<25 years	49.1	50.9	5.9*	33.1	66.9	32.2****	1524
25-34	47.2	52.8		40.0	60.0		2196
35+	51.6	48.4		43.5	56.5		1098
<i>Parity</i>							
1	42.8	57.2	29.8****	23.4	76.6	152.2****	790
2	45.6	54.4		31.8	68.2		802
3	46.0	54.0		36.6	63.4		656
4+	52.4	47.6		46.0	54.0		2570
<i>Marital Status</i>							
Never in union	51.4	48.6	2.9	23.6	76.4	27.2****	216
Currently in union	48.3	51.7		40.0	60.0		4053
Formerly in union	51.7	48.3		34.6	65.4		548
<i>Religion</i>							
Christian	49.5	50.5	9.6**	41.0	59.0	57.8****	4007
Muslim	43.5	56.5		25.6	74.4		671
Other	53.6	46.4		35.0	65.0		140
<i>Level of Education</i>							
No/Primary	51.7	48.3	64.1****	46.4	53.6	391****	3652
Secondary	42.3	57.7		16.7	83.3		944
Post-secondary	28.8	71.2		4.5	95.5		222
<i>Occupation</i>							
No work	49.0	51.0	53.5****	30.9	69.1	275.0****	981
Formal sector	41.8	58.2		26.1	73.9		1599
Informal sector	53.8	46.2		51.0	49.0		2238
<i>Sex of Head of Household</i>							
Male	49.5	50.5	2.6	39.8	60.2	7.7**	3598
Female	46.8	53.2		35.3	64.7		1220
<i>Region of Residence</i>							
Kampala	32.6	67.4	141.6****	6.7	93.3	465.6****	420
Central	49.4	50.6		30.3	69.7		838
Eastern	58.7	41.3		38.4	61.6		1091
Northern	51.8	48.2		38.0	62.0		479
Karamoja	43.0	57.0		73.6	26.4		428
West Nile	34.7	65.3		33.1	66.9		519
Western	52.6	47.4		47.3	52.7		1043
<i>Place of Residence</i>							
Urban	40.2	59.8	45.1****	9.74	90.3	534.9****	1152
Rural	51.5	48.5		7.8	52.2		3666
<i>Wealth Index Group</i>							
Poor	52.5	47.5	55.1****	53.5	46.5	469.5****	2100
Middle	54.4	45.6		42.8	57.2		832
Rich	42.2	57.8		20.3	79.7		1886
<i>Access to Mass Media</i>							
Not all	56.2	43.8	25.4****	45.2	54.8	96.0****	820
Occasional	49.4	50.6		46.6	53.4		1399
Daily	46.2	53.8		32.3	67.7		2595
<i>Number of Antenatal Care Attendance</i>							
<4				46.4	53.6	115.4****	2352
4+				31.3	68.7		2466
Total	48.8	51.2		38.6	61.4		4818

**** Significant 0.0001 percent ; *** Significant 0.001 percent ; ** Significant 0.01 percent ; * Significant 0.05 percent

was 4.3 and more than half of them were of parity 4 or higher. The women were also predominantly currently married, Christian, had no/primary education and worked in the informal sector. Slightly more than 7 in 10 and nearly 8 in 10 of the women lived in male headed households and rural areas respectively. Distribution of the women by region show that slightly more than one-fifth each were from the Eastern and Western regions, nearly 2 in 10 were from Central, just over 1 in 10 was from West Nile, and Kampala and Karamoja regions each contributed less than 10 percent of the sample. Nearly two-fifths each of the women were in the low and high wealth index groups and the majority (54.1%) had daily access to the media. Table 1 also shows that just over half and three-fifths of the women attended at least 4 ANC visits during the most recent pregnancy and delivered in a health facility respectively.

Disparities in Antenatal Care Visits

Table 2 presents disparities in the number of ANC visits during the most recent pregnancy showing that more than half (51.2%) of the women, most of them (52.8%) in the 25-34 years age group, attended at least 4 ANC visits. Attendance of the 4 or more ANC visits was more prevalent among the women with parity one (57.4%) followed by those with parity two (54.4%). Attending the 4 or more ANC visits was also more prevalent among Muslims, women having tertiary and secondary education and women working in the formal sector. Regarding the structural variables, attending the 4 or more ANC visits was more prevalent among women in urban areas (59.5%), Kampala (67.4%) and West Nile (65.3%) regions and least prevalent in the Eastern region (41.3%), women in the higher wealth index group (57.8%) and women having a daily access to the media (53.8%). All the above variables were significantly associated with the number of ANC visits during the most recent pregnancy at $p < 0.05$.

Disparities in the Place of Delivery

Table 2 shows that 61.3 percent of the women delivered the most recent birth in a health facility. Delivering in a health facility was more prevalent among the <25 years age group (66.9%), women with parity one (76.6%) and two

(68.2) and never married women (76.4%). Delivering in a health facility was also more prevalent among Muslims, women having tertiary (95.5%) and secondary education (83.3%), and women working in the formal sector (7 in 10) and those with no work (69.1%). Furthermore, about two-thirds of the women in female and male headed households, 9 in 10 in the urban areas, and nearly four-fifth and three-fifths in the richer and the middle wealth index groups respectively, delivered in a health facility. Regarding disparities by structural variables, delivering in a health facility was more prevalent among the women in Kampala, followed by Central and West Nile regions, and least prevalent in the Karamoja region; prevalent among women having daily access to the media; and among women who attended the 4 or more ANC visits. The above variables were significantly associated with delivering in a health facility at $p < 0.05$.

Predictors of Attending the 4 or more Antenatal Care Visits

Table 3 presents the unadjusted Odds Ratios (OR) testing the hypothesis that "women having tertiary and secondary education are more likely than women having no/primary education to have attended the 4 or more antenatal care visits during the most recent pregnancy even when demographic and other socio-economic conditions are the same for all women." The model shows that the women were significantly more likely to have attended the 4 or more ANC visits if they had a post-secondary (OR=2.65) or a secondary education (OR=1.46). The adjusted model also shows that having tertiary and secondary education were 1.70 and 1.19 times respectively significantly more likely to have attended the 4 or more ANC visits than having no/primary education after controlling for the other demographic and socio-economic variables simultaneously. However, the other socio-demographic variables attenuated the effects of post-secondary and secondary education on attending the 4 or more ANC visits by 95 percent and 27 percent respectively.

Among the control variables, belonging to the age group 25-34 and 35 years or older significantly increased attendance of the 4 or more ANC visits by 1.27 and 1.26 times respectively. Currently married women were 1.59 times significantly more likely to have attended the 4 or more

Table 3: Logistic regression results showing the unadjusted and adjusted effects of selected demographic and socio-economic variables on attending the recommended 4 or more antenatal care visits and delivering in a health facility

Socio-demographic characteristics	Antenatal care			Health facility delivery		
	Unadjusted		Adjusted	Unadjusted		Adjusted
	OR	CI		OR	CI	
Level of Education						
No/Primary	1.00					
Secondary	1.46****	1.26-1.59	1.00	1.00		1.56-2.39
Post-secondary	2.15****	1.96-3.56	1.70****	1.19*	1.00-1.41	1.94****
Number of Antenatal Care Attendance						
<4						3.25-12.55
4+				1.00		1.00****
				1.89****	1.68-2.12	1.74*
Age Group of Women						
15-24						
25-34				1.00		1.00
35+				1.27***	1.07-1.54	1.06
Parity				1.26*	1.01-1.59	1.22
1				1.00		1.00
2				0.82	0.66-1.02	0.70***
3				0.77*	0.61-0.98	1.12-1.83
4				0.62	0.49-0.79	0.93-1.47
Marital Status						
Never married				1.00	1.16-2.19	1.00
Currently married				1.59***	0.94-1.87	1.31
Formerly married				1.32		1.29
Religion						
Christian				1.00		1.00
Muslim				1.17	0.97-1.41	1.20
Other				0.93	0.66-1.33	1.47*
Occupation						
No work				1.00		1.00
Formal sector				1.06	0.89-1.28	1.00
Informal sector				0.98	0.83-1.16	0.79**
Sex of Head of Household						
Male				1.00		
Female				1.12	0.97-1.31	1.00
Region of Residence						
Kampala				1.00		1.15
Central				0.61***	0.46-0.81	1.00
Eastern				0.48****	0.34-0.65	0.75
						1.05

Table 3: Contd...

Socio-demographic characteristics	Antenatal care			Health facility delivery		
	Unadjusted		Adjusted	Unadjusted		Adjusted
	OR	CI		OR	CI	
Northern						
Karamoja	0.81	0.34-1.87		0.76	0.27-2.13	
West Nile	1.05	0.69-1.60		0.30****	40.17-0.5	
Western	1.49	0.67-3.31		1.15	0.43-3.07	
Place of Residence	0.57**	0.36-0.89		1.33	0.71-2.50	
Urban	1.00	0.90-1.13		1.00*	0.22	
Rural	1.10			0.29****	-0.37	
Wealth Index Group						
Poor	1.00			1.00		
Middle	1.03	0.86-1.23		1.26**	1.04-1.52	
Rich	1.38***	1.16-1.66		1.65****	1.36-2.01	
Access to Mass Media						
Not all	1.00	0.95-1.37		1.00	0.85-1.28	
Occasional	1.14			1.04	1.00-1.45	
Daily	1.37****	1.16-1.63		1.21*		

(R)= reference category; **** Significant 0.0001 percent ; *** Significant 0.001 percent ; ** Significant 0.01 percent ; * Significant 0.05 percent

ANC visits than the never married women. Additionally, women in the female headed households (OR=1.12), women in the higher wealth index group (OR=1.38) and women having a daily access to the Media (OR=1.37) were significantly more likely than women in the male headed households, low wealth index group and having no access to the media respectively to have attended the 4 or more ANC visits.

Predictors of Delivering in a Health Facility

Table 3 also presents the unadjusted OR testing the hypothesis that “women who attended the 4 or more ANC visits are more likely than women who attended any other number of ANC visits to have delivered in a health facility even when socio-demographic conditions are the same for all women.” The unadjusted model shows that delivering in a health facility was significantly higher by 89 percent if a woman attended the 4 or more ANC visits. After adjusting for the effects of other covariates simultaneously, the effect of attending the 4 or more ANC visits on health facility delivery was attenuated by 15 percent, but remained a significant predictor of delivering in a health facility.

Among the control variables however, delivering in a health facility was significantly higher among the women having secondary (OR=1.94) and tertiary education (OR=6.38), belonging to religious groups other than Christian or Muslim (OR=1.47) and living in a female headed household (OR=1.15). Belonging to the middle (OR=1.26) and high wealth index group (OR=1.65); and having daily access to the media (OR=1.21) also significantly increased delivery in a health facility. Conversely, delivering in a health facility was significantly less likely if the women were of parity two (OR=0.70), parity three (OR=0.57) and parity four or higher (OR=0.48), worked in the informal sector (OR=0.79) and lived in Karamoja region (OR=0.30).

DISCUSSION

Attending ANC and delivering in a health facility are important in reducing maternal and new-born mortality. Despite the improvements in Uganda's health care system, maternal mortality ratio and new-born mortality rate remain high, which has been partly attributed to the failure of the women to attending a full course of

ANC and delivering in health facilities (Nansubuga and Ayiga 2015). This suggests that availability of health facilities may be a necessary, but not a sufficient condition for attending the recommended 4 or more ANC visits and delivering in health facilities in low income countries. In the current research, the researchers assessed the prevalence of and identified the predictors of attending the 4 or more ANC visits during the most recent pregnancy and delivering of the most recent birth in a health facility.

The research found that 5 in 10 and 6 in 10 of the women attended the 4 or more ANC visits during the most recent pregnancy and delivered the most recent birth in a health facility respectively. Consistent with the previous studies in sub-Saharan Africa (Asamoah et al. 2014; Larsen et al. 2016; Mason et al. 2015), the researchers found that women having tertiary and secondary education were significantly more likely to have attended the 4 or more antenatal care visits during the most recent pregnancy and delivered the most recent birth in a health facility, which confirmed the research hypotheses. Apart from the increasing knowledge of risks in pregnancy and child birth, having tertiary and secondary education erodes cultural beliefs, values and practices about pregnancy and delivery that impede routine antenatal care visits and delivery in a health facility respectively. Fagbamigbe and Idemudia (2015), also found that women having a tertiary and a secondary education are more autonomous in the decision making and financially more capable than women having no/primary education and therefore they do not have to obtain permission or depend on husbands/partners for money to seek routine antenatal care or deliver in a health facility.

The research also found that women who attended the 4 or more antenatal care visits during the most recent pregnancy were significantly more likely to have delivered in a health facility. The finding is consistent with previous studies (Agha and Williams 2016; Berhan and Berhan 2014; Shiferaw et al. 2016), which found that attending a full course of antenatal care visits familiarises women with health facilities and prepares them for a health facility delivery through supportive counselling. Agha and Williams (2016) also found that routine quality antenatal care visits enable women at risk of pregnancy and delivery complications gain access to health facilities timeously for an appropriate delivery

management. Previous studies (Asamoah et al. 2014; Dahiru and Oche 2015) also found that women who attend the 4 or more antenatal care visits deliver in a health facility, indicating that they understand the benefits that ANC offers which encourages them to deliver in health facilities. However, the researchers results contradict the finding of another research (Choe et al. 2015), which found that attending antenatal care did not always increase delivery in a health facility. The researchers attributed their finding to long distances to health facility which could impede the access to health facilities for delivery. Some of the women may also have not been motivated to deliver in a health facility because they did not see the need to do so as no abnormalities or complications were detected during the antenatal care visits.

Although in the research the researchers found that rural-urban differences were not the significant predictors of antenatal care, it confirmed the disparities in the health facility delivery between urban and rural areas observed in the previous studies (Hagey et al. 2014; Nansubuga and Ayiga 2015; Ochako and Gichuhi 2016). However, the research found that women in rural areas were significantly less likely to have delivered the most recent birth in a health facility, which is consistent with the findings of the previous studies (Amoakoh-Coleman et al. 2015; Dahiru and Oche 2015; Munguambe et al. 2016). The studies attributed the lower rate of health facility delivery in the rural areas to a number of factors including poor access due to long distances to health facilities, high transport costs and lack of trained staff, and frequent stock outs of essential medicines in the rural based health facilities. Although Uganda's health facility infrastructure has improved, public health facilities in rural areas are characterized by lack of trained delivery care workers, poor attitude of health workers, high costs of services and frequent stock outs of essential medicines, which often lead to poor maternal outcomes which discourage women from going to health facilities for delivery.

The current research found that compared to the women aged <25 years, women aged 25-34 and 35 years or older were significantly more likely to have attended the 4 or more antenatal care visits. The finding echoes with that of a previous research (Vecino-Ortiz 2008). This could be explained by the experiences of complications

during the previous pregnancies by the older women. Additionally, 35 years or older multiparous women are generally considered to be a high risk for pregnancy. However, the finding is inconsistent with previous research which found that older multiparous women were less inclined to attend routine antenatal care (Andrew et al. 2014; Ochako and Gichuhi 2016; Yeoh et al. 2016) because of the various factors ranging from the previous experiences of delays during antenatal care, experience of poor health worker attitudes and perceptions of risks during pregnancy based on previous safe pregnancy experiences. On the other hand, other researches (Kawungezi et al. 2015; Wablembo and Doctor 2013) found that younger primigravide women are more likely to attend the routine antenatal care because the health system target them for attention due to the higher risk of complications associated with young age and first pregnancy.

The researchers finding on the effects of parity on delivering the most recent birth in a health facility shows that older women were less likely to have delivered the most recent birth in a health facility, which is consistent with other studies (Choe et al. 2015; Ediau et al. 2013). Older multiparous women who have not experienced previous pregnancy or delivery complications are less likely to attend the antenatal care visits and to deliver in a health facility. These women are likely to attend a few antenatal care visits just to obtain an antenatal card to allow them to access health facilities for the delivery if needed, which has also been observed by a previous research in Uganda (Kawungezi et al. 2015). Older women are more likely to be less educated, belong to the lower socio-economic groups, having strong cultural and traditional values and have low autonomy, which could impeded the attendance of full antenatal care visits (Deo et al. 2015). This finding suggests that efforts to promote full attendance of antenatal care and ensure a health facility delivery must address the knowledge gaps of the women, lack of access to health facilities, poor health worker attitudes and perceptions of young primigravide women. The complacency of the older multiparous women as a result of the previous incident fee pregnancies and deliveries should also be addressed by continuous sensitization.

Another factor that influenced the attendance of the 4 or more antenatal care visits and

delivery in health facilities identified by this research is the regional disparities. The finding shows that women from Karamoja and the Eastern regions were significantly less likely to have attended the 4 or more antenatal care visits during the most recent pregnancy and to have delivered the most recent birth in a health facility. Compared to the other regions, Karamoja has the lowest scores of all key health and development indicators in Uganda (UBOS and ICF Inc 2012); is affected by perennial drought, chronic food insecurity, and chronic poverty; and until recently widespread insecurity caused by cattle rustling (Knighton 2010), making Karamoja region the most underserved by all social services including health services. In addition, negative attitude towards health facilities due to the lack of health workers, high cost of services, widespread stock outs of medicines and proximity to traditional birth attendants could make Karamojong women prefer the traditional birth attendants for antenatal care and delivery assistance. Other factors such as cultural sensitivities of pregnancy and delivery; lack of or inadequate awareness of the risks associated with pregnancy and delivery, and lack of male involvement as the key decision makers and source of resources (Davis et al. 2016) could also explain the low attendance of the 4 or more antenatal care visits during the most recent pregnancy and a low prevalence of the health facility delivery in Karamoja and the Eastern regions.

The current research also found that attending the 4 or more antenatal care visits and delivering in a health facility are significantly more likely among women in the higher wealth index group. The wealth index is an important structural factor because it can either increase or impede access to health facilities for antenatal care and delivery assistance. The researchers finding on the effect of wealth index is consistent with research findings elsewhere (Davis et al. 2016), which attributed the increased attendance of the 4 or more antenatal care visits and health facility delivery by women in the higher wealth index group to their ability to afford the numerous costs women are required to incur in order to receive a routine antenatal care and delivery assistance from health workers. These costs include cost of transportation to a health facility, costs of medical tests, medicines and daily subsistence while at the health facility and the costs of the maternity kit which is a requirement to

deliver at the health facilities in Uganda. To ensure that women are able to attend the 4 or more antenatal care visits and deliver at health facilities, access to health facilities must be improved by providing free referral services, free medical services including tests, medicines, maternity kit and subsistence while at health facilities.

The research found that having a daily access to the media increased the attendance of the 4 or more antenatal care visits during the most recent pregnancy and delivery of the most recent birth in a health facility. This findings are consistent with a previous research (Acharya et al. 2015) which showed that the mass media, especially the radio, is an effective channel of communicating health messages in the developing countries. For example studies in Kenya and Uganda found that the mass media has helped to increase the utilization of maternal health care services (Bbaale 2011; Munguambe et al. 2016; Ochako et al. 2015). Uganda's liberalized mass media industry has a great potential for increasing access to antenatal care and health facility delivery because most districts in Uganda have at least one radio station that could be effectively used to broadcast health information and improve health seeking behaviour as messages can be broadcast easily in the local languages. This is possible because the majority of Ugandans have access to the radio (UBOS and ICF Inc 2012).

CONCLUSION

The prevalence of attending the 4 or more antenatal care visits and delivering in a health facility in Uganda have increased, but is still lower than the level recommended by the WHO. As a result, Uganda continues to lag behind in reducing maternal and the new-born mortality. Both individual predisposing and structural variables contribute in determining the attendance of the 4 or more antenatal care visits and a health facility delivery. The factors associated with the increased attendance of the 4 or more antenatal care visits and delivering in a health facility in Uganda were: having tertiary or secondary education, belonging to the 25-34 and 35 years or older age groups, being currently married, belonging to the richer wealth index group and having daily access to the media. Additionally, attending the 4 or more antenatal care visits, belonging to the other minority religious groups

and the middle wealth index group also significantly increased delivery in a health facility. Conversely, having parity two, three and four; living in rural areas, and in Karamoja and the Eastern regions, impeded attending the 4 or more antenatal care visits and delivering in a health facility. Addressing the disparities in perception of the need for a full course of the ANC and delivery in a health facility and disparities in having access to health services capable of providing ANC and delivery care cheaply, which are affected by the individual predisposing and enabling structural factors are required to ensure the attendance of the recommended 4 or more antenatal care visits and delivery in health facility in Uganda.

LIMITATIONS

This research has some potential limitations. Firstly, the data was self-reported by the respondents and this could have been affected by social desirability bias in reporting the number of antenatal care visits and place of delivery by the women. Secondly, the data could not be verified for validity of reporting by a health record from the women or any other source as this was not required during the interview. Thirdly, the research used data obtained from a cross-sectional survey and data collected were on events that occurred during the pregnancy and birth that took place sometime back which could have been misreported or misclassified. Additionally data based on the cross-sectional surveys cannot account for changes in the antenatal and child bearing behaviours of the women. Fourthly, there are a number of variables relating to health facilities such as distance, staffing, facilities and equipment and cultural beliefs and practices that could confound the results obtained in the analysis as the data set used did not collect them. However, the researchers believe that since the questionnaire used has already been validated in previous research internationally, the above limitations did not adversely affect the results of the research.

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