



# Effect of Health Insurance on Utilisation of Maternal Health Care Services in Uganda

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## Abstract

### BACKGROUND

Although the maternal mortality ratio in Uganda declined from 505 to 336 maternal death per 100,000 live births between 2001 and 2016, it is still far above the Sustainable Development Goal target of 70 by 2030. This study sought to examine the effect of health insurance on the utilisation of maternal health care services in Uganda.

### MATERIALS AND METHODS

Using data from the 2016 Uganda Demographic Health Survey, the chi-square test and trivariate probit regression model were employed for analysis. The study used a descriptive design, and a sample of 20,291 households was selected using cluster sampling. Women aged between 15 and 49 years were then identified. Out of the 19,088 eligible women identified, 18,506 women were successfully interviewed, giving a response rate of 97%.

### RESULTS

Almost 60% of mothers had at least four antenatal care (ANC) visits, 75% of the mothers delivered at a health facility and 54% of the mothers received postnatal care within two days after delivery. Health insurance increased the probability of utilising ANC and delivering at a health facility by 0.30 and 0.28, respectively. Also, the level of education, birth order, wealth index, fertility risk, and region influenced the use of ANC and delivery at a health facility. In contrast, delivery at a health facility positively influenced the utilisation of early postnatal care.

### CONCLUSION

Even with low health insurance coverage, private health insurance had a significant positive effect on utilising maternal health care services. Therefore, establishing a national health insurance program is necessary to improve maternal healthcare utilisation.

*Keywords: Health Insurance, Maternal Healthcare, Trivariate Probit, Uganda*

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## Introduction

Improving maternal and child health care provision remains a significant focus for many developing countries, including Uganda. This is evidenced by the focus on various development agendas such as Sustainable Development Goals (SDGs), African Agenda 2063 and the third National Development Plan. For example, SDG three targets 3.1 and 3.2 relate to child and maternal health. In the last

two decades, the world has recorded a significant global decline in maternal mortality from 342 in 2000 to 211 per 100,000 live births in 2017 [1]. However, maternal health has not improved significantly in Sub-Saharan Africa. In 2017, 86% of maternal death globally were in Sub-Saharan Africa and Southern Asia [1].

In Uganda, maternal mortality declined from 505 in 2001 to 336 maternal death per 100,000 live births in 2016 [2]. This is still very high, far above the global average and the SDG



target of 70 per 100,000 live births by 2030 [1,3]. More than three-quarters of maternal deaths can be prevented by accessing and fully utilising quality maternal health care services [2,4].

Health care provided to a mother during pregnancy, delivery and after delivery is crucial for the well-being and survival of both the mother and the child. In Uganda, providing essential maternal health care services is a constitutional right [5]. Antenatal care (ANC) is an essential part of care required to ensure a healthy mother and child during pregnancy and after delivery. The minimum standards for acceptable use of ANC are met when a woman attends at least four ANC visits, with the first visit in the first trimester [6]. In Uganda, 60% of the women completed at least four ANC visits, while 29% had their first ANC visit in the first trimester [2].

Delivery at a health facility allows a mother to receive assistance from a skilled birth attendant. In Sub-Saharan Africa, only half of the live births benefited from professional care during delivery in 2016 [3]. In the case of Uganda, 73% of the women had their recent birth delivered at a health facility with a skilled birth attendant [2]. A check-up within the first 48 hours is essential for a mother and child. Nearly 54% of women and 56% of newborns in Uganda received postnatal care (PNC) within the first two days after delivery [2].

In the early 2000s, the government of Uganda endorsed the introduction of community-based insurance as an alternative financing mechanism that was expected to enhance access to quality health care. Empirical studies in Kenya [7] and Ghana [8] found health insurance's vivacious and significant effect on utilising maternal healthcare services. However, several studies conducted in Uganda [4,9–11] did not include health insurance and little is known regarding its effect on maternal healthcare utilisation in Uganda.

Additionally, many studies address only one of the components of maternal health care and not all at once [9,11–14]. Moreover,

studies that have investigated the three components of maternal health care, namely good antenatal care use, delivery at a health facility, and utilisation of timely postnatal care, used univariate binary logit or probit, regression models. Nevertheless, the components are related and influence each other [7,8,15–19]. These models do not take into account the correlation among the components. This study, therefore, sought to examine the effect of health insurance on the utilisation of maternal health care services in Uganda.

## **Materials and Methods**

### ***Study design and data***

The study used data from the 2016 Uganda Demographic and Health Survey (UDHS) conducted by the Uganda Bureau of Statistics in collaboration with the Ministry of Health from June to December 2016 [2]. The survey employed a descriptive design and utilised the 2014 Population and Housing Census as the sampling frame. The population was stratified, and a sample was selected in two stages. The first stage involved selecting 697 enumeration areas using probability proportional to size. In the second stage, households were randomly selected from each enumeration area. A representative sample of 20,291 households was chosen to allow for separate estimates of key indicators for each of the sub-regions in Uganda [2]. A questionnaire was used to collect all information from women aged 15 to 49.

### ***Dependent variable***

In this study, maternal health care was the dependent variable with three outcome variables: Four or more antenatal care visits, delivery at a health facility, and timely postnatal care, as defined in Table 1.

### ***Independent variables***

Literature review and Anderson's behavioural model of health care utilisation were used to guide the selection of variables that may affect maternal health care utilisation [7–9,12,13,16,20–23]. According to the model,



the factors can be broken down into three: predisposing factors (such as age, gender, education, residence, and religion); enabling factors (such as health insurance and wealth); and need factors, mainly birth order and fertility risk. In addition, antenatal care use affects

delivery at a health facility and utilisation of postnatal care, while health facility delivery can influence utilisation of postnatal care. Table 2 presents the definition of independent variables used in this study.

**Table 1:**  
**Definition of Outcome Variables**

Variable	Definition	Measurement
<b>Antenatal care</b>	At least four antenatal care visits, including a visit in the first three months of pregnancy for the most recent pregnancy	=1 if a mother attends at least four antenatal visits and 0 otherwise
<b>Health facility delivery</b>	Delivery at a health facility for the most recent pregnancy	=1 for delivery at a health facility for the most recent pregnancy and 0 otherwise
<b>Timely postnatal care</b>	A mother or child received a postnatal care check-up within two days of delivery for the most recent birth	=1 if a mother or child received postnatal care within two days and 0 otherwise

**Table 2:**  
**Definition of Variables**

Variable	Definition	Expected sign
<b>Health insurance</b>	A dummy variable measured as: 1= has health insurance cover, 0 = otherwise.	+
<b>Age of the mother at birth</b>	A continuous variable measured by the age of the mother in years	+/-
<b>Education of the mother</b>	A discrete variable measured by the highest level of education as; 1= no formal education, 2= primary, 3= secondary, 4= post-secondary / Diploma and above	+
<b>Residence</b>	1=Rural and 0=Urban	-/+
<b>Region*</b>	A discrete variable measured by the four regions including Kampala as: 1= Kampala, 2= Central, 3= Eastern, 4= Northern, 5= Western	-/+
<b>Wealth quintile</b>	A dummy variable measured as: 1=Poorest, 2=Poor, 3=Middle, 4=Rich, 5=Richest	+
<b>Religion</b>	A dummy variable measured as: 1 = Pentecostal/ Born again and other religion, 2 = Anglican, 3 = Catholic 4 = Muslims	+/-
<b>Sex of the household head</b>	A dummy variable for the sex of the household head measured as: 1= male, 2 = female	+/-
<b>Birth order</b>	A continuous variable measured by the number of children a mother has	-
<b>Fertility risk</b>	=1 if a woman is either younger than 18; or 35 years or older at the time of birth; or has four or more birth prior to the index pregnancy, and 0 otherwise	-

\*Because Kampala, the Capital City, is different from other urban parts, residence in Kampala under the variable region was considered separately from the central region.



## Statistical analysis

Data were analysed using Stata version 14. The Chi-square test was applied to test the relationship between each variable and a given outcome variable. A trivariate probit regression model was then employed to examine the factors influencing the utilisation of antenatal care, delivery care and postnatal care among pregnant women. A trivariate probit was preferred because it allows joint estimation of all three outcome variables, permitting the error terms to correlate freely [24]. The trivariate probit model is specified as follows:

$$\begin{aligned}
 ANC &= \begin{cases} 1 & \text{if } X\beta + \varepsilon_1 > 0 \\ 0 & \text{Otherwise} \end{cases} \\
 HFD &= \begin{cases} 1 & \text{if } Z\gamma + \varepsilon_2 > 0 \\ 0 & \text{Otherwise} \end{cases} \\
 PNC &= \begin{cases} 1 & \text{if } W\theta + \varepsilon_3 > 0 \\ 0 & \text{Otherwise} \end{cases}
 \end{aligned}$$

$$\text{With } \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} \sim N_3(0, V)$$

Where *ANC*, *HFD*, and *PNC* are the binary outcome variables for antenatal care, delivery care, and postnatal care, respectively; *X*, *Z*, and *W* are matrices of independent variables consisting of both continuous and categorical variables such as the education level of the mother, income, residence, health insurance, age of the mother, region, and sex of the household head; and  $\beta$ ,  $\gamma$ , and  $\theta$  are matrices of unknown regression coefficients.  $\varepsilon_m \sim N_3(0, V)$ ,  $m = 1, 2, 3$  are error terms distributed as multivariate normal, each with a mean of zero and variance-covariance matrix *V*, where *V* has values of 1 on the leading diagonal and correlations  $\rho_{jk} = \rho_{kj}$  as off-diagonal elements.

To handle multicollinearity, the mother's age and the sex of the household head were dropped for antenatal care and health facility delivery because the mother's age was highly correlated with the birth order. Birth order and fertility risk were also dropped for postnatal care. The model employs maximum likelihood estimation, which helps address

some endogeneity problems [25,26]. The parameters are estimated simultaneously rather than using the two-stage estimation methods. Moreover, the outcome variables used in the study are sequential variables which reduce endogeneity arising from simultaneous determination.

## Results

### Descriptive analysis

The unit of analysis was women aged between 15 and 49 with a live birth in the five years that preceded the survey. Out of the 19,088 eligible women identified, 18,506 women were successfully interviewed, giving a response rate of 97%.

Table 3 presents the distribution of respondents by socio-demographic characteristics. About 60% of the mothers had at least four antenatal care visits, 75% of the mothers had their delivery at a health facility, and 54% of the mothers received postnatal care within two days after delivery. Only 2% of the mothers had health insurance, while 31% had a high fertility risk. Additionally, 80% of the mothers were residents in rural areas, and 33% lived in female-headed households. Furthermore, the average age of the mothers at birth was 29 years with a standard deviation of 7.16 years and the average birth order was 4 with a standard deviation of 2.64.

### Bivariate analysis

Table 4 shows the percentage of mothers utilising maternal health care services by socioeconomic characteristics. Results show that health insurance, residence, level of education, wealth index, region, and fertility risk were significantly associated with utilising maternal health care services. The utilisation of all three components was higher among mothers with health insurance. About 76%, 88% and 65% of the mothers who had health insurance utilised ANC, delivered in a health facility, and sought PNC early, respectively. Maternal health care services utilisation was higher for urban residents than rural ones. Also, mothers residing in Kampala utilised more



maternal health care services than those in other regions. The utilisation of ANC and delivery at a health facility increased with the increase in wealth quintile. Sixty-seven (67%) of mothers in the poorest wealth quintile delivered at a health facility compared to 77% and 93% from

the wealthiest quintiles. In addition, utilisation of adequate ANC, delivery at a health facility, and utilisation of PNC were higher among mothers without fertility risk than those with low fertility risk.

**Table 3:**

***Distribution of Mothers who had at least a Live Birth by Socio-Demographic Characteristics***

<b>Variable</b>	<b>Frequency (N=10,263)</b>	<b>Per cent (%)</b>
<b>Antenatal care</b>		
No	4,076	39.7
Yes	6,187	60.3
<b>Health facility delivery</b>		
No	2,643	25.8
Yes	7,620	74.7
<b>Postnatal care</b>		
No	4,702	45.8
Yes	5,561	54.2
<b>Residence</b>		
Urban	2,045	19.9
Rural	8,218	80.1
<b>Health insurance</b>		
No	10,143	98.8
Yes	120	1.2
<b>Education level</b>		
None	1,281	12.5
Primary	6,290	61.3
Secondary	2,078	20.2
Post-secondary	614	6.0
<b>Region</b>		
Kampala	533	5.2
Central	1,670	16.3
Eastern	2,843	27.7
Northern	2,560	24.9
Western	2,657	25.9
<b>Religion</b>		
Anglican	3,188	31.0
Catholic	4,194	40.9
Muslim	1,281	12.5
Pentecostal and others	1,600	15.6
<b>Wealth index</b>		
Poorest	2,536	24.7
Poor	2,199	21.4
Middle	1,947	19.0
Rich	1,772	17.3
Richest	1,809	17.6
<b>Sex of the household head</b>		
Male	7,500	73.1
Female	2,763	26.9
<b>Fertility risk</b>		
No	7,102	69.2
Yes	3,162	30.8



Furthermore, the mother's age was positively correlated with birth order but negatively correlated with ANC use and health facility delivery. Birth order was negatively associated

with ANC use and health facility delivery. Also, health facility was positively correlated with ANC use and PNC utilisation.

**Table 4:**  
**Percentage of Mothers who Utilised Maternal Health Care by Socioeconomic Characteristics**

Variable	Antenatal care	Health facility delivery	Postnatal care
Health insurance	(12.3)***	(12.6)***	(5.)**
No	60.1	74.1	54.1
Yes	75.8	88.3	65.0
Residence	(46.6)***	(318.2)***	(161.1)***
Urban	66.9	89.6	66.7
Rural	58.6	70.4	51.1
Education level	(116.7)***	(490.4)***	(303.3)***
None	55.2	63.5	51.1
Primary	57.9	69.9	49.1
Secondary	66.2	87.5	64.3
Post-secondary	75.2	96.6	78.5
Region	(40.7)***	(192.9)***	(399.3)***
Kampala	69.0	94.6	74.9
Central	62.7	77.7	59.3
Eastern	56.6	70.2	55.3
Northern	61.8	77.2	60.9
Western	59.5	69.5	39.1
Religion	(6.2)	(37.1)***	(59.1)***
Anglican	59.7	72.9	50.8
Catholic	60.1	73.6	55.7
Muslim	63.4	81.0	61.2
Pentecostal	59.3	73.9	53.5
Others	60.4	69.9	39.1
Wealth index	(108.3)***	(508.4)***	(287.9)***
Poorest	55.1	66.9	53.0
Poorer	57.1	66.3	47.3
Middle	59.2	71.3	48.5
Richer	63.9	78.6	53.0
Richest	69.2	93.2	71.5
Sex of the household head	(0.00)	(3.6)*	(11.5)***
Male	60.3	73.6	53.2
Female	60.3	75.6	56.9
Fertility risk	(60.9)***	(162.8)***	(44.1)***
No	62.8	77.9	56.4
Yes	54.6	66.0	49.3
Antenatal care		(285.6)***	(127.2)***
No		65.3	47.4
Yes		80.2	58.7
Health facility delivery			(2,000)***
No			17.3
Yes			67.0

Note. Figures in brackets are the chi-square test statistics applied for each variable; N=10,263  
Level of significance: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Although most correlation coefficients were significant, they were all deficient, with a magnitude of less than 0.50, except for the correlation between the mother's age and birth order.

### Regression analysis

Table 5 presents the results of a trivariate probit model. The likelihood ratio test rejected the null hypothesis of zero correlation at a 5% significance level suggesting a significant interdependence between the three health outcomes. This rejects the restrictions implied by separate probit models for the three outcomes. Therefore, the use of the trivariate probit model was justified instead of single equation probit models. The correlation coefficients among the equations were significant for health facility delivery and postnatal care.

The results indicated that the probability that a mother utilised antenatal care, delivered at a health facility and received a postnatal care check-up within two days of delivery was 60%, 72%, and 55%, respectively. The joint probability of utilising all three maternal health care services (success) was

23% and the joint probability of utilising none of the three services (failure) was only 4%. The probability of delivering at a health facility given that a mother had achieved the minimum requirement of antenatal care visits was 53%, while the probability of utilising postnatal care given a mother delivered at a health facility and had minimum antenatal care was 73%.

Analysis within and across outcome variables indicate that health insurance, birth order, fertility risk and secondary education significantly influenced the use of ANC and delivery at a health facility. Mothers with health insurance were more likely to utilise ANC and deliver at a health facility than those without health insurance. In contrast, mothers with a higher birth order were less likely to use ANC and deliver at a health facility.

On the other hand, married mothers were more likely to deliver at a health facility and utilise early PNC. Likewise, post-secondary education, wealth index, and region were significant in all three maternal healthcare outcomes. Post-secondary education and wealth index positively influenced the utilisation of maternal health care services.

**Table 5:**  
**Trivariate Probit Regression Results Showing Marginal Effects for Antenatal Care Use, Health Facility Delivery and Postnatal Care Utilization**

Variables	Antenatal care use	Health facility delivery	Postnatal Care
Health insurance	0.2979** (0.1297)	0.2643 (0.1682)	0.0329 (0.1272)
Age of the mother			0.0042** (0.0021)
Residence	-0.0475 (0.0404)	-0.2780*** (0.0486)	0.0082 (0.0424)
<b>Education level</b>			
Primary	0.0188 (0.0409)	0.0844** (0.0426)	-0.1402*** (0.0431)
Secondary	0.1323** (0.0521)	0.4271*** (0.0582)	-0.0642 (0.0563)
Post-secondary	0.3092*** (0.0740)	0.7088*** (0.1063)	0.1436* (0.0819)
<b>Marital status</b>			
Married	0.1339*** (0.0335)	0.0004 (0.0405)	0.1201*** (0.0391)



**Table 5:**  
**Trivariate Probit Regression Results Showing Marginal Effects for Antenatal Care Use, Health Facility Delivery and Postnatal Care Utilization, cont'd**

<b>Variables</b>	<b>Antenatal care use</b>	<b>Health facility delivery</b>	<b>Postnatal Care</b>
<b>Region</b>			
Central	0.0144 (0.0728)	-0.0894 (0.1104)	-0.0235 (0.0748)
Eastern	-0.0272 (0.0745)	-0.0147 (0.1111)	0.0317 (0.0773)
Northern	0.1830** (0.0768)	0.3500*** (0.1142)	-0.0106 (0.0826)
Western	0.0111 (0.0739)	-0.1262 (0.1103)	-0.4100*** (0.0768)
<b>Religion</b>			
Anglican	0.0124 (0.0392)	0.0043 (0.0433)	0.0117 (0.0405)
Catholic	0.0094 (0.0383)	-0.0073 (0.0424)	0.1070*** (0.0397)
Muslim	0.0607 (0.0486)	0.0983* (0.0562)	0.0505 (0.0501)
<b>Wealth index</b>			
Poorer	0.0898** (0.0388)	0.0673 (0.0421)	-0.0425 (0.0418)
Middle	0.1583*** (0.0421)	0.2536*** (0.0474)	-0.0494 (0.0471)
Richer	0.2389*** (0.0447)	0.3663*** (0.0546)	-0.0937* (0.0536)
Richest	0.2695*** (0.0559)	0.7264*** (0.0701)	0.0276 (0.0656)
Birth order	-0.0207*** (0.0075)	-0.0773*** (0.0081)	0.0000
Fertility risk	-0.0672* (0.0409)	0.1073** (0.0447)	
Sex of household head			0.0857*** (0.0315)
Antenatal care		0.2101 (0.2583)	-0.2871 (0.2605)
Health facility delivery			2.0437*** (0.1060)
Observations	10,263		
<b>Correlations</b>			
rho12	0.090		
rho13	0.185		
rho23	-0.500***		
Predicted probabilities	0.603	0.720	0.552
Joint probability (success)			0.232
Joint probability (failure)			0.037
Number of simulations			7
Wald chi2(66); $p > \chi^2$		3232	0.000
LR test of $\rho_{ij} = 0$ ; $p > \chi^2(3)$		15.046	0.002

Note. Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$



Wealthy women were more likely to utilise maternal health care services. Being in a higher wealth quintile increased the utilisation of maternal healthcare services in all three services except for the poor quintile, negatively influenced the utilisation of PNC.

### ***Factors associated with antenatal care use***

Table 5 shows that health insurance, education, marital status, region, wealth index, birth order and fertility risk were each significantly associated with antenatal care use. Holding other factors constant, having health insurance increased the probability of utilising ANC by 0.300. A secondary education increased the probability of utilising ANC by 0.132, while a post-secondary education increased the probability of utilising ANC by 0.309 for those without formal education. Being married increased the probability of utilising ANC by 0.134, while residents in the northern region increased the probability of utilising ANC by 0.183 to those residing in Kampala. Furthermore, being in the affluent wealth quintile increased the probability of utilising ANC by 0.239, while being in the richest wealth quintile increased the probability of ANC use by 0.300. Also, an additional birth reduced the probability of utilising ANC by 0.021, while having a higher fertility risk reduced the probability of ANC use by 0.067.

### ***Factors influencing health facility delivery***

Table 5 further shows that residence, health insurance, level of education, wealth index, birth order, and fertility risk were significantly associated with health facility delivery. Holding other factors constant, having health insurance increased the probability of a mother delivering from a health facility by 0.264. At the same time, residence in a rural area reduced the probability of delivering from a health facility by 0.278. Residence in the northern region increased the probability of health facility delivery by 0.350 to those residing in Kampala. Also, having secondary

education increased the probability of delivering at a health facility by 0.427, while having a post-secondary education increased the probability of delivering at a health facility by 0.710 relative to no formal education.

Being in the affluent wealth quintile increased the probability of delivering at a health facility by 0.366, while being in the richest wealth quintile increased the probability of delivering at a health facility by 0.726. Holding other factors constant, an additional birth reduced the probability of delivering at a health facility by 0.077, while having a fertility risk increased the probability of delivering at a health facility by 0.107.

### ***Factors influencing postnatal care utilisation***

The results show that the mother's age at birth, education level, marital status, religion, sex of the household head, and health facility delivery were significantly associated with the utilisation of early postnatal care. Contrary to the expectation that having health insurance was statistically insignificant. A slight increase in the mother's age at birth increased the probability of utilising PNC by 0.004, holding other factors constant, while being married increased the probability of utilising early PNC by 0.120. A post-secondary education increased the probability of utilising PNC by 0.144 for those without formal education. Residence in the western region reduced the probability of utilising PNC by 0.410 relative to those in Kampala. Additionally, delivering at a health facility increased the probability of utilising postnatal care by 2.04.

## **Discussion**

The findings showed that 60% of women had at least four ANC visits, 75% of the women delivered at a health facility, and 54% of the women received postnatal care within two days. This is still lower than expected targets [27]. Health insurance strongly and positively influenced the utilisation of antenatal care and health facility delivery but not postnatal care. Women with health insurance



were more likely to utilise antenatal care and deliver at a health facility. This result was consistent with the findings of other studies in Ghana [8] and Kenya [7]. The positive effect of health insurance on the utilisation of maternal health services was also reported in Rwanda and Ethiopia [13,14]. Having health insurance cover reduces the out-of-pocket expenditure at the point of utilising maternal health care services.

Mother's education strongly predicted ANC use, health facility delivery, and PNC utilisation. Mothers with secondary education and above were more likely to utilise ANC and deliver at the health facility than those without formal education, except for postnatal care, where having primary education negatively influenced postnatal care utilisation. Education was also a significant determinant in previous studies in Kenya, Ethiopia and Eritrea [7,13,15]. Mother's education positively influenced the frequency and content of ANC, facility delivery, and postnatal care utilisation [9,20]. Educated women are more likely to be knowledgeable about the benefits of maternal health care, understand and follow a recommendation by health workers, and empower women to make independent decisions about their health [7,9,13,15,16,20].

Household welfare, wealthy mothers were more likely to utilise adequate antenatal care and deliver at a health facility. This result was consistent with the findings of other studies in Ethiopia [12], India [28], Kenya [18] and China [29]. Women with higher income levels were more likely to utilise the ideal maternal health services package. Travel and medicine costs as barriers to health facility visits may explain why poor individuals and households are less likely to access care [30,31]. Marital status significantly influenced ANC use, and early PNC utilisation and married mothers had more ANC and early PNC than their single counterparts. This result was consistent with previous empirical studies in Afghanistan and Uganda [11,17].

Residence in rural areas reduced the probability that a woman delivered at a health facility. This may be attributed to limited access to health facilities, awareness of modern technology and economic conditions such as poverty. This result was consistent with other empirical studies in Kenya, Ethiopia, Nigeria, and China [7,12,16,29,32,33]. In addition, regional differences significantly influenced the utilisation of ANC and health facility delivery. Residence in the northern region increased the probability that a mother utilised ANC and delivered at a health facility.

In contrast, residence in the western region reduced the probability of utilising timely postnatal care. This is because different regions in Uganda are inhabited by different communities, each with unique cultural beliefs. This was consistent with the previous findings in Nigeria and Uganda [4,9,33,34]. A study by Dantas et al. (2020) found that cultural and community patterns of behaviour had the most substantial effect on delivery options [35].

Regarding the need factors, fertility risk was a significant determinant of the utilisation of ANC and health facility delivery, holding other factors constant. Women with high fertility risk were consistently less likely to utilise adequate ANC but more likely to have health facility delivery than women with low fertility risk. This was inconsistent with the Anderson model, which indicates that women with high fertility levels and, therefore, greater need are more likely to utilise maternal healthcare services. The findings also agreed with the results of previous studies in Kenya and India [7,18,28]. Also, mothers with a higher birth order were less likely to utilise ANC, deliver at a health facility and utilise timely postnatal care. This result was inconsistent with studies in India, Eritrea, and Kenya [7,18,28,36].

Furthermore, the results showed a direct relationship between the health facility and utilisation of timely postnatal care, ANC use and health facility delivery and PNC utilisation. Health facility delivery firmly and



positively influenced PNC utilisation within two days after delivery. This result was confirmed by other studies in Kenya and Uganda [7,11,18,37].

## Study limitations

The study was based on a cross-sectional survey; therefore, the results could not establish causality, making it difficult to draw causal inferences. The UDHS data may not be independent of particular issues from self-reporting and reports of women of reproductive ages. For instance, only information from women alive at the time of the survey was obtained, and women might report receiving content of ANC components due to social desirability. The trivariate probit model used could not provide conditional probabilities. The options for predicting joint and conditional probabilities are restricted to all successes and all failures. Despite the above limitations, the study used the most recent data and provided an in-depth analysis of maternal healthcare utilisation using a unique methodology.

## Conclusion

Although utilisation of maternal care in Uganda has been increasing, it remains below the desired levels. This study investigated the effect of health insurance on utilising maternal health care services using a trivariate probit regression model. The findings showed that health insurance and wealth index strongly and positively influenced antenatal care use and health facility delivery but not postnatal care utilisation. A comprehensive national health insurance program will likely help in contracting the extent to which cost acts as a barrier to maternal healthcare utilisation.

In addition, education and region were strong predictors of maternal health care services utilisation and were significant for all three outcomes. Therefore, there is a need for health promotion and education interventions in all regions, mainly rural areas where literacy levels are low. This would address specific regional needs and inequalities in health service infrastructure across regions and ensure

universal access to health care services within communities.

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