Maternal education and childbirth care in Uganda

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Abstract

Background

Globally, over 500,000 females die of complications related to pregnancy and childbirth each year, and of these, over 99% of deaths occur in developing countries such as Uganda. Utilisation of modern and professional care during delivery is important in lowering maternal mortality. This paper sets out to investigate the factors associated with the utilisation of modern and professional childbirth care so as to inform policy makers on the pertinent factors that need to be influenced by policy.

Method

A nationally representative Uganda Demographic and Health Survey (UDHS) (2006) was used. Sampling was done in two stages. In the first stage 321 clusters were selected from a list of clusters sampled in the 2005/06 Uganda National Household Survey (UNHS), 17 clusters from the 2002 Census frame from Karamoja, and 30 internally displaced camps (IDPs). In the second stage, the households in each cluster were selected as per the UNHS listing. In addition an additional 20 households were randomly selected in each cluster. Questionnaires were used during data collection. During the analysis, a maximum likelihood probit technique was employed. Prior to this, a bivariate approach was used to generate average percentages of mothers using the childbirth care services by background characteristics.

Results

It is found that maternal education is the strongest predictor, especially at post-secondary level (highest marginal effect of 33% and p<0.01), associated with the utilisation of childbirth care. Whereas partner's education at all levels is important, maternal education is observed to exert a much stronger association. Other factors significantly associated with the utilisation of professional childbirth care include community infrastructure, occupation, location, and regional differences, wealth status, religion, and age cohorts.

Conclusion

These findings suggest that whereas all levels of education are important, the effects of post-secondary education are more pronounced. Therefore, efforts to improve professional childbirth care utilisation need to focus on female education beyond secondary level. In addition, measures are needed to improve agricultural productivity which might improve earnings and childbirth care utilisation. Government should also undertake to improve community infrastructure across all regions and locations. Both government and donors can ensure universal access to professional childbirth care irrespective of the ability to pay.

Key Words

Maternal education, childbirth care, Uganda

What this study adds:

1. Despite a global debate on maternal education and healthcare utilisation, a literature survey failed to identify a

paper, using a nationally representative survey, analysing the issue for the case of Uganda.

2. Occupation type of the woman and her partner do matter for healthcare utilisation.

3. Community infrastructure, like electricity, is associated with healthcare utilisation.

Background

The utilisation of modern and professional care during delivery with the aim of achieving positive health outcomes for both mother and baby is unambiguously useful. There is usually a strong synergy between modern and professional childbirth care utilisation on the one hand and favourable health outcomes (low neonatal and maternal mortality and morbidity) on the other.[1,2] The participation of a qualified childbirth attendant in appropriate case management, referral, and effective emergency care is important in averting deaths arising from pregnancy-related complications.[1] This is particularly important since the majority of maternal deaths occur during childbirth and up to 48 hours after delivery.[3] Indeed, improving maternal and child health is in line with the Millennium Development Goals (MDGs) 4 and 5 to be achieved by the year 2015.

However, recent global statistics[4] articulate the vulnerability of mothers to maternal mortality and morbidity. Over 500,000 females die of complications related to pregnancy and childbirth each year and of these, over 99% occur in developing countries such as Uganda.[4] The maternal health indicators for Uganda have ominously remained poor in the last two decades.[5] Over the period 1995–2000, maternal mortality stagnated at about 505 deaths per 100,000 live births.[5] More recently, the estimated maternal mortality from the UDHS (2006)[6] is 435 deaths per 100,000 live births. Additionally, another 130,000 to 405,000 females suffer from disabilities caused by complications during pregnancy and childbirth each year. The under-five and infant mortality rates are still high at 137 and 78 per 1,000 live births respectively.[7] Considering that Uganda needs to reduce its maternal mortality rate from 505 to 131 deaths per 100,000 live births to meet the MDG target by 2015 this

represents a very big challenge to government and stakeholders.[5] This is compounded by the fact that only 5% of women giving birth are assisted by a doctor and only 37% are assisted by other trained personnel.[6] There is a growing interest by policy makers and other stakeholders (especially donors) into understanding the possible factors influencing the utilisation of modern and professional childbirth care services.

Some studies show that female education leads to women's emancipation/autonomy within the household allowing them to take critical decisions as well as having an influence over the allocation of resources.[8-11] Additionally, maternal education leads to changes in attitudes, values, and knowledge towards modern healthcare practices leading to greater appreciation and utilisation.[8-11] Furthermore, the knowledge generated helps women to undertake treatment within the medically recommended doses and procedures.[8-11] It is argued that educated women are more likely to gain access to well-paying jobs or even marry highly-educated spouses, which enhances their wealth status and utilisation of modern health services.[10] While literature on this subject area asserts maternal education as the strongest predictor for maternal health-seeking behaviour,[1,12,13] there is still considerable debate on the extent and nature of this relationship.[14] It is argued that maternal education is simply a route for improving the general socioeconomic well-being of women. That is, its effect on healthcare utilisation dwindles once these factors are in play as well.[15] This paper contributes to this debate by applying Uganda-specific data and controlling for other socio-economic characteristics to assess the effect of maternal education on modern and professional maternal health seeking behaviour. In addition, the differential effects of different stages of education are assessed.

Method

With the approval from Macro International, the paper used the UDHS of 2006. The UDHS is a nationally representative survey of 8,531 women aged 15–49 and 2,503 men aged 15–54. The sample was designed to allow separate

estimates at national level and for rural and urban areas of the country. Three questionnaires were used, namely: a household questionnaire, women's questionnaire, and men's questionnaire which were previously pretested and validated. Sampling was done in two stages, in the first stage 321 clusters were selected from among a list of clusters sampled in the 2005–2006 UNHS to match samples that can allow for linking of 2006 UDHS health indicators to poverty data from the 2005–2006 UNHS. An additional 17 clusters were selected from the 2002 Census frame from Karamoja in order to increase the sample size to allow for reporting of Karamoja specific estimates in the UDHS. Finally, 30 IDPs were selected from a list of camps compiled by the United Nations Office for Coordination of Human Affairs completing a total of 368 primary sampling units.

In the second stage, households in each cluster were selected based on a complete listing of households as per the UNHS listing, however, in addition to the UNHS sampled households an additional 20 households were randomly selected in the each cluster. The data set recorded a response rate as high as 95% from the targeted sample and hence it is believed to be reliable. The UDHS provides a rich source of data on the demographic characteristics of the country. It contains information on household size, age and sex distribution, religious affiliation, occupation of household members, the number of children ever born by a woman, reproductive health, marital status, wealth status, and educational attainment of women and men.

The dependent variables used are: (a) *Delivery assistance utilisation:* In the UDHS, 2006 information was collected about who assisted a mother during childbirth. There are four main categories of child-delivery attendants or outcomes, coded thus: 1=Doctor; 2=nurse/midwife; 3=traditional birth attendant (TBA); and 4=none. We construct a discrete binary variable coded as =1 if a mother was assisted during childbirth by any formally trained person and =0 otherwise. (b) *Place of delivery:* Women were asked whether their babies born during the last five years were born at home or at any health institution (public hospitals, private hospitals or other health institutions). We define a binary dependent variable coded as =1 if a mother delivered from a health institution and =0 otherwise. (c) *Tetanus Toxoid injection (TT, hereafter) utilisation:* Two doses of TT vaccine, one month apart, are usually given during pregnancy to prevent nearly all tetanus infections in both the mother and the newborn We construct a binary dependent variable coded as =1 if a mother received TT at least twice and =0 otherwise.

The independent variables are: *Female and partner's education:* The UDHS collects information on education levels attended by a woman. Education is categorised into six classes of 0=no education, 1=primary education, 2=O level education, 3=A level education, 4=tertiary education and 5=university education. To simplify the analysis we merged the categories into only four outcomes as follows; 0=no education, 1=primary education, 2=Secondary education (O and A level), 3=Post-secondary education (tertiary and university education). Partner's education is treated in a similar way. *Maternal and partner's occupation:* we constructed dummy variables capturing different occupation types such as: white collar job, agriculture, services, and blue collar job. We treat partner's occupation in a similar way. *Age of the mother:* this was grouped into five-year age cohorts: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49. *Socioeconomic condition*: The UDHS 2006[7] constructed a wealth index by combining information on household assets, such as ownership of consumer items, type of dwelling, source of water, and availability of electricity into a single asset index. The sample is split into five equal groups (quintiles) from 1 (lowest, poorest) to 5 (highest, richest). In all our estimations, the poorest quintile is used as the base category. *Religion*: The behaviour of household members is, in many of the cases, influenced by the cultural and/or religious background. We introduced dummies for religious affiliation; Protestant, Catholic, Muslim, and "Others" which include Evangelicals, Adventists, Orthodox, and Traditionalists. *Location:* we constructed a dummy variable equal to 1 if a mother dwells in the rural area and zero otherwise. *Region:* Regional

dummy variables; central, east, north, and west, are included in the model to control for community peculiarities especially relating to availability and accessibility to healthcare facilities. Electricity development is used as the overall development of the community, due to a lack of other reliable data.

Both bivariate and multivariate analyses are applied. The bivariate analysis involved generating average percentages of women utilising childbirth care services by background characteristics. Under the multivariate approach, a maximum likelihood probit technique was used and we generated marginal effects to ascertain the probability of utilisation.

Results

In this study, 42% of women were assisted by a trained person during delivery, 44% delivered from a hospital or clinic and 51%, received a TT injection (Table 1). Maternal education is significantly associated with the utilisation of childbirth care services. The descriptive results in Table 1 and the quantitative results in Tables 2–4 show a similar picture. A mother with primary education is 6% (p<0.01) more likely to be assisted by a formally trained person during childbirth compared to their counterparts with no education at all. The role of maternal education is even more assertive at higher levels of education. The probability grows from 6% for those with primary education to 24% (p<0.01) for those with secondary education and to 33% (p<0.01) for those with post-secondary education (Table 2). Table 3 shows the same picture for the role of maternal education in influencing the probability of childbirth in a health institution. Women with primary education are 9% (p<0.01) more likely to give birth in a health institution compared to their counterparts with no education. The likelihood of childbirth in a health institution increases from 9% (p<0.01) for those with primary education to 28% (p<0.01) for those with secondary education and to 41% (p<0.01) for those with post-secondary education (Table 3). Table 4 shows that maternal education is also important in influencing the probability of receiving a TT injection before

childbirth. The probability of receiving a TT injection increases from 6% (p<0.01) for those with secondary education to 16% (p<0.01) for those with post-secondary education compared to their counterparts with no education.

There are also significant location and regional differences (Tables 1–4). Women living in rural areas are 21–25% (p<0.01) less likely to be assisted by a formally trained person during childbirth and to deliver in a health institution compared to their counterparts in urban areas. This could be attributed to problems related to availability and accessibility of healthcare services in rural areas. Additionally, women in the eastern region are 5–7% (p<0.01) more likely to be assisted by a formally trained person and to deliver in a health institution compared to their counterparts in the central region. This result is not as expected and as such is surprising because the central region is more advanced with a high concentration of modern hospitals/clinics and health professionals. On the other hand, women in the western and northern regions are 5–13% (p<0.01) less likely to be assisted by a formally trained person during childbirth and to deliver in a health institution compared to their counterparts in the central region (Tables 2 and 3). Additionally, women in the western region are 8% (p<0.01) less likely to receive a TT injection before childbirth compared to their counterparts in the central region (Table 4). Unexpectedly though, women in the northern region are 8–9% (p<0.01) more likely to receive a TT injection before childbirth compared to their counterparts in the central region (Table 4). The northern region is one of the poorest regions in the country and was devastated by political instability for over two decades (since 1986) which forced many people to live in camps. In such conditions, one expects very limited access and utilisation of healthcare services, especially to the disadvantaged group; women and children. However, the high concentration of Non Governmental Organizations and Development Partners interventions in the northern region can explain the high use of TT injections in the region.

Table 1: Maternal healthcare utilisation by key characteristics: mean percentages

Characteristic	Childbirth Assistance: Trained person	Childbirth Place: Hospital/clinic	Received TT (at least twice) before childbirth
Female education: No education	20	25.2	49.2
Primary	34.1	41	48
Secondary	70.2	78	63
Post-secondary	81.2	90	65.2
Partner's education: No education	28	32	46
Primary	29	36	48
Secondary	52.1	58.4	57
Post-secondary	62.3	69	61
Location: Rural	31	38	50
Urban	78.3	81.4	58.1
Region: Central	58	62.7	57.2
East	40	47.5	45
North	27.3	33	54
West	25	33	48.2
Religion: Catholic	32.2	40	53
Protestant	36	43	50
Muslim	57	60.4	54
Other	40	45.4	43
Female head of the household	42.4	48	53
Not female heads	35.3	42.3	50.3
Wealth status: Poorest quintile	20.2	28	52
Poorer quintile	25	32.1	45.3
Middle quintile	28	36	50
Richer quintile	44	51	49.1
Richest quintile	74	77.2	59.3
Marital status: Married	35.2	42.2	51
Not Married	46	51	53
Age cohorts: 15-19	52.2	58	57.2
20-24	40.4	50	54
25-29	38.1	45	53
30-34	35	43	47.1
35-39	29.3	32.4	47
40-44	28.1	32	46.1
45-49	28.5	30	49.2
Community infrastructure: Electricity	87.2	90	62
No electricity	32.7	40	50
Mother's occupation: White collar	64.3	71	54
Agriculture	27.4	34.2	49.3
Services	70.3	74	57.1
Blue collar	46	53	54
Partner's occupation: White collar	54	58.4	54
Agriculture	23.3	31	50
Services	49	58	50
Blue collar	54	61	50.1
Total	42	44	51
No. of Observations	1,877	2,183	2,578

Source: Author's own calculations from UDHS, 2006

There is an association of utilisation of childbirth care services and religion. Being a Muslim increases the probability of receiving assistance from a formally trained person and delivering in a health institution by 7–10% (p<0.01) compared to Catholics (Tables 2 and 3). Being in other religions (for example Evangelicals) reduces the probability of receiving a TT injection before childbirth by 6–7% (p<0.01) compared to Catholics (Table 4). The descriptive statistics reflected as average/mean percentages of women utilising TT in Table 1 confirm these quantitative results.

There is a relationship between the wealth status of the household and the utilisation of modern childbirth care services. The probability of being assisted by a formally trained person and giving birth in a health institution increases from about 5% (p<0.05) for those in the poorer quintile to about 30% (p<0.01) for those in the richest quintile compared to their counterparts in the poorest quintile (Tables 2 and 3). It is noteworthy that the importance of household wealth status is even more articulated for married women (model 2) compared to all women (model 1).

Women in the older age cohorts, compared to those in the 15–19 age cohort, are less likely to utilise modern maternal healthcare services. Women in the older age cohorts are 8–22% (p<0.01) less likely to be assisted by a formally trained

person and to deliver in a health institution compared to their counterparts in the 15–19 age cohort (Tables 2 and 3). A similar picture is observed in Table 4 for the effect of age cohorts on the probability of receiving TT injection before childbirth, although the effect of age is less assertive here. These findings on age cohorts may be attributed to the fact that younger women may be more modern and willing to seek maternal healthcare services, while older women have accumulated knowledge on maternal healthcare and childbirth and thus might not seek health assistance.[2,17]

The sectors in which women and their partners are employed exert important association with the utilisation of childbirth care services. Women and those whose partners are employed in the agricultural sector are 5–9% (p<0.01–p<0.1) less likely to be assisted by a formally trained person and to deliver in a health institution compared to their counterparts employed as white collar workers (Tables 2 and 3). The issue here is the productivity of the kind of jobs that women have reflected in the amount of money earned.

Table 2: Probability of childbirth assisted by a trained person (marginal effects after a probit estimation)

Characteristic	Model (1): All women	Model (2): Married Women
Maternal education: primary	0.06***	
	(0.00)	(0.00)
Secondary	0.23***	
	(0.00)	(0.00)
Post-secondary	0.33***	
	(0.00)	(0.00)
Location: Rural	-0.22***	-0.25***
	(0.00)	(0.00)
Region: East	(0.08)	0.04*
	(0.00)	(0.05)
North	(0.42)	-0.06**
	(0.01)	(0.02)
West	-(0.02)*	-0.13***
	(0.00)	(0.00)
Electricity	0.16***	0.17***
	(0.00)	(0.00)
Wealth quintiles: Poorer	0.05**	0.03
	(0.02)	(0.18)
Middle	0.10***	
	(0.00)	
Rich	0.22***	
	(0.00)	
Richest	0.28***	
	(0.00)	
Religion: Protestant	0.021	
	0.24	
Muslim	0.08***	
	(0.00)	
Other	-0.00	
	(0.83)	(0.31)
Age Cohorts: 20-24	-0.12***	-0.11***
	(0.00)	(0.00)
25-29	-0.14***	-0.13***
	(0.00)	(0.00)
30-34	-0.14***	-0.13***
	(0.00)	(0.00)
35-39	-0.18***	-0.17***
	(0.00)	(0.00)
40-44	-0.17***	-0.18***
	(0.00)	(0.00)
45-49	-0.12***	-0.11**
	(0.00)	(0.03)
Mother occupation: Agriculture	-0.05*	
	(0.08)	
Services		
Blue collar		
Partner's education: Primary		0.04*
		(0.07)
Secondary		0.14***
		(0.00)
Postsecondary		0.14***
		(0.00)
Partner's occupation: Agriculture		-0.09***
		(0.00)
Services		0.04
		(0.35)
Blue collar		0.01
		(0.66)
Observations	4,40	3,38

p-values in parentheses; ***p<0.01, ** p<0.05, *p<0.1; the dependent variable is probability of a woman being assisted by a trained person during childbirth coded as: =1 if assisted by a trained personnel and =0 otherwise. Maximum likelihood probit was used during estimation.

Whereas women in agriculture may work for more hours and undertake more physically challenging tasks, the earnings received are quite low. The low income translates into low affordability of maternal healthcare services.

Having access to electricity increases the probability of utilising modern maternal healthcare services by 9–20% (p<0.01–p<0.05) compared to counterparts having no access (Tables 2, 3, and 4). It may be the case that the development of other community infrastructure attracts the development of health infrastructure in the area, hence improving access and utilisation of childbirth care services. Besides, health facilities work more effectively with the presence of electricity.

Table 3: Probability of childbirth in a hospital/clinic/health centre (marginal effects after a probit estimation)

Characteristic	Model (1): All women	Model (2): Married women
Maternal education: primary	0.08***	
	(0.00)	
Secondary	0.28***	
	(0.00)	
Post-secondary	0.40***	
	(0.00)	
Location: Rural	-0.21***	-0.23***
	(0.00)	(0.00)
Region: East	0.06**	0.05*
	(0.01)	(0.05)
North	-0.04*	-0.08***
	(0.09)	(0.00)
West	-0.10***	-0.12***
	(0.00)	(0.00)
Wealth quintiles: Poorer	0.04*	0.02
	(0.05)	(0.36)
Middle	0.09***	0.06**
	(0.00)	(0.03)
Rich	0.17***	0.16***
	(0.00)	(0.00)
Richest	0.23***	0.26***
	(0.00)	(0.00)
Religion: Protestant	0.01	0.00
	(0.32)	(0.81)
Muslim	0.06**	0.078***
	(0.01)	(0.00)
Other	-0.02	-0.00
	(0.39)	(0.86)
Age Cohorts: 20-24	-0.07**	-0.09***
	(0.02)	(0.00)
25-29	-0.13***	-0.14***
	(0.00)	(0.00)
30-34	-0.13***	-0.14***
	(0.00)	(0.00)
35-39	-0.20***	-0.22***
	(0.00)	(0.00)
40-44	-0.19***	-0.21***
	(0.00)	(0.00)
45-49	-0.14***	-0.16***
	(0.00)	(0.00)
Mother occupation: Agriculture	-0.068**	
	(0.02)	
Services	0.02	
	(0.67)	
Blue collar	-0.03	
	(0.41)	
Electricity	0.15***	0.20***
	(0.00)	(0.00)
Partner's education: Primary		0.07***
		(0.00)
Secondary		0.15***
		(0.00)
Postsecondary		0.18***
		(0.00)
Partner's occupation: Agriculture		-0.09***
		(0.00)
Services		-0.00
		(0.9)
Blue collar		0.02
		(0.46)
Observations	4,405	3,98

P-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1; the dependent variable is the probability of a woman giving birth in a health institution coded as =1 if childbirth took place in a hospital/clinic and =0 otherwise. Maximum likelihood probit was used during estimation

Discussion

Using the UDHS 2006, the relationship between maternal education and childbirth care utilisation in Uganda is examined. Maximum likelihood probit technique is used

during the estimation. The findings show that maternal education is the strongest predictor, especially at post-secondary level, that is associated with maternal healthcare utilisation. Exposing mothers to the same socioeconomic conditions does not deter education from generating significant differences in childbirth care utilisation. Maternal education is even more assertive at higher levels of education. The probability of being assisted by a trained person grows from 6% for those with primary education to 24% for those with secondary education and to 33% for those with post-secondary education (Table 2). In addition, the likelihood of childbirth in a health institution increases from 9% for those with primary education to 28% for those with secondary education and to 41% for those with postsecondary education (Table 3). The probability of receiving a TT injection increases from 6% for those with secondary education to 16% for those with post-secondary education compared to their counterparts with no education at all.

These findings are in line with earlier empirical evidence.[8-11, 16-18,20,21] Maternal education is an important factor in the utilisation of professional care during delivery. Although the same picture is drawn by partner's level of education, maternal education has the strongest association with the utilisation of maternal healthcare services (Tables 2, 3 and 4). There is a need to facilitate and encourage girls' education beyond secondary level in order to achieve desirable maternal health outcomes. In Uganda, provision of free secondary education in government institutions is a good start and needs to be strengthened.

The findings further show that mothers and those with partners employed in agriculture are less likely to use modern childbirth services compared to counterparts with white collar jobs. The role of occupation or employment of women in creating an association with the utilisation of healthcare services has been underscored in the previous literature.[22] Therefore, government effort is required to improve the productivity of workers in agriculture, say, by providing improved seeds, fertilisers, credit facilities, and

assigning of land rights in order to increase investment and incomes.

Being in the rural area, compared to an urban setting, reduces the probability of being assisted by a trained person and delivering in a hospital or clinic. This is attributed to low concentration of health facilities and professionals in the rural compared to the urban areas. Studies from other parts of the world have also found location significant in influencing maternal health-seeking behaviour.[16-20] Connected to this, there are also regional disparities in the utilisation of maternal healthcare services. This corroborates the findings in the previous literature.[18,20,21] This implies that, government efforts and that of other stakeholders (especially donors) should be directed towards regions that are at an extreme disadvantage compared to others. Maternal healthcare services should be made more accessible and affordable to rural areas/regions as is the case in urban areas.

Socioeconomic status of women is significantly associated with maternal health seeking-behaviour. This specifically underscores the importance of the ability to pay for healthcare in influencing maternal accessibility. Similar findings have been observed in earlier studies.[16,20,21] Government efforts to eradicate poverty contained in the recently launched National Development Plan (2010–2015) and the commitment to MDGs will go a long way to increasing childbirth care utilisation and mitigate maternal-child mortality and morbidity.

The findings show that religion is another factor significantly associated with maternal healthcare utilisation. This can be attributed to the importance of religion in shaping the traits and beliefs of the people. Similar findings have been observed in the previous literature.[18,19,21] The government should encourage religious leaders to pass on best practice information to their congregations. In addition, religious groups should be encouraged to establish religious-based health centres where childbirth care services are offered.

Women-age cohorts are significantly associated with the utilisation of childbirth care services. Women in the later age cohorts are less likely to seek childbirth care services probably because of the experience they accumulated from earlier births helps them in later births even without professional assistance. Other studies have also underlined the importance of maternal age.[16,19,22] Sensitisation campaigns are needed to make sure that all women utilise maternal healthcare services irrespective of age group. Community infrastructure is also revealed to be importantly associated with the utilisation of childbirth care services. This can probably be attributed to the fact that the development of such infrastructure like electricity attracts the development of health infrastructure and easy use of health machinery and appliances.

Table 4: Probability of receiving TT injection before childbirth (marginal effects after a probit estimation)

Characteristic	Model (1): All women	Model (2): Married women
Maternal education: primary	0.02	
	(0.13)	
Secondary	0.05**	
	(0.02)	
Post-secondary	0.15***	
	(0.00)	
Location: Rural	-0.04	-0.03
	(0.11)	(0.28)
Region: East	0.01	0.02
	(0.37)	(0.24)
North	0.08***	0.08***
	(0.00)	(0.00)
West	-0.07***	-0.08***
	(0.00)	(0.00)
Wealth quintiles: Poorer	-0.02	-0.03
	(0.24)	(0.14)
Middle	0.00	0.00
	(0.94)	(0.78)
Rich	-0.01	-0.03
	(0.39)	(0.22)
Richest	0.02	0.02
	(0.45)	(0.46)
Religion: Protestant	-0.02	-0.02
	(0.15)	(0.19)
Muslim	-0.02	-0.03
	(0.30)	(0.15)
Other	-0.06***	-0.06***
	(0.00)	(0.00)
Age Cohorts: 20-24	-0.02	0.01
	(0.38)	(0.60)
25-29	-0.04	0.00
	(0.15)	(0.98)
30-34	-0.08***	-0.06*
	(0.00)	(0.06)
35-39	-0.13***	-0.10***
	(0.00)	(0.00)
40-44	-0.10***	-0.06*
	(0.00)	(0.08)
45-49	-0.10**	-0.08
	(0.03)	(0.13)
Mother occupation: Agriculture	0.01	
	(0.46)	
Services	0.01	
	(0.62)	
Blue collar	0.00	
	(0.95)	
Electricity	0.05	0.08**
	(0.11)	(0.01)
Partner's education: Primary		0.02
		(0.28)
Secondary		0.06**
		(0.01)
Post-secondary		0.08***
		(0.00)
Partner's occupation: Agriculture		-0.00
		(0.81)
Services		-0.01
		(0.62)
Blue collar		-0.01
		(0.68)
Observations	4,40	3,98

P-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1; the dependent variable is the probability of a woman receiving TT at least twice before childbirth coded as =1 if received TT at least twice and =0 otherwise. Maximum likelihood probit was used during estimation

Conclusion

The paper set out to investigate the relationship between maternal education and childbirth care in Uganda. The main hypothesis was largely confirmed by the results. These

findings suggest that whereas all levels of education are important, post-secondary education is more pronounced. Therefore, efforts to improve professional childbirth care utilisation need to focus on female education beyond secondary level. The government of Uganda's Universal Secondary Education Programme is a springboard that requires further efforts focused on higher education. Therefore, other stakeholders in the MDGs, especially donors, should embrace the need for higher female education.

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We declare that there are no conflicts of interest.

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Accessibility and use of data was approved by Macro International, the custodian of Demographic and Health Surveys.