Factors Contributing to Maternal Mortality in Uganda

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Abstract

The study aimed at establishing the factors affecting maternal mortality in Uganda. It was guided by the following objectives; to investigating whether the number of antenatal Care visits, maternal education, age, area and region of residence had any effect on maternal mortality in Uganda. Descriptive statistics are used to summarize characteristics of the respondents, and the results presented in frequencies and percentages. Cross tabulations on the number of antenatal care visits, maternal education, region where mother comes from, age and area of residence to maternal mortality were run to establish the association between them. The Binary Logistic model was used to analyze the relationship between maternal mortality on the number of antenatal care visits, maternal education, age, area and region of residence. All the variables apart from area of residence were found to be significant at bivariate level. The study found mothers who make fewer or no ANC visits had a higher likelihood of death, both for themselves and their babies, than those who had more visits. It was also found that, mothers living in rural areas, compared to those in urban areas, are more likely to die due to pregnancy or related conditions. Maternal education, especially at secondary and tertiary levels increases the likelihood of using and attending ANC hence reducing maternal mortality. The study recommends that the government of Uganda and other stakeholders should increase efforts to enhance female education to attain favorable maternal health outcomes in the future and also to sensitize families more on the effectiveness of attending at least 3 ANC so as to reduce the scourge of maternal mortality.

Key words: Antenatal care, Likelihood, maternal health care, maternal mortality rate.

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1   Introduction

In 2000, world leaders while at the United Nations established the global Millennium Development Goals (MDGs) – eight time-bound targets for meeting the needs of the world′s poorest people by 2015. The fifth goal aims at achieving universal access to reproductive health with a specific target of reducing maternal mortality by 75% between 1990 and 2015, (UNICEF, UNFPA, World Bank: 1990-2010).

Maternal Mortality Rate (MMR) is the number of women who die out of 100,000 live births in a given year from causes related to or aggravated by pregnancy or its management (excluding accidental or incidental causes). It includes deaths during pregnancy, childbirth, or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy (CIA, world fact book, 2010).

Uganda's MMR figure was at 438 in 2011, from 506 in 1995, but this lower MMR does not correlate with other indicators of improved maternal health such as increased antenatal visits, skilled attendants at birth or hospital deliveries. Given these facts, the UDHS 2011 could not state with confidence that maternal health has improved across the country, and certainly not as much as The Lancet's figures would suggest - MMR of 560, 461 and 274 in 1990, 2000 and 2011 respectively.

The current MMR translates to about 6,000 women dying every year due to pregnancy- related causes (Mary et al, 2010). Despite the fact that Government has set measures for the improvement of maternal health in the country including strategies to: increase comprehensive and basic Emergency Obstetric Care (EMOC) services, avail skilled health workers, and increase focused antenatal care including Prevention of Mother to Child Transmission of HIV. It is upon this background that this study was carried out to establish the reasons for the persistently high MMR in Uganda. The study was guided by the following hypotheses; the maternal mortality is not associated with the following factors; antenatal Care visits, maternal education, region where mother comes from, age and area of residence of an individual mother.

2.   Literature Review

This section focused on the literature on related studies, theoretical perspectives, and current trends on maternal mortality. The major purpose of reviewing the literature was to try and establish what other studies have found out in as far as the variables under study have affected maternal mortality.

Key facts on maternal mortality; Every day, approximately 800 women die from preventable causes related to pregnancy and childbirth, 99% of all maternal deaths occur in developing countries, and maternal mortality is higher in women living in rural areas and among poorer communities. Between 1990 and 2010, maternal mortality worldwide dropped by almost 50% though young adolescents face a higher risk of complications and death as a result of pregnancy than older women, and also skilled care before, during and after childbirth can save the lives of women and newborn babies. Between 1990 and 2010, maternal mortality worldwide dropped by almost 50%.

The proportion of maternal mortality attributable to the various causes of maternal death varies worldwide. Because of the sensitivity of the subject, there are a lot of difficulties in collecting the information. Maternal mortality data should also be interpreted with caution because of the various events that can lead to the death of each individual mother. Women mostly die as a result of complications during and following pregnancy and childbirth. Nearly all of these complications develop during pregnancy. Other complications may exist before pregnancy but are worsened during pregnancy. The major complications that account for 80% of all maternal deaths are: severe bleeding (mostly bleeding after childbirth), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia) and unsafe abortion.

Direct causes of maternal mortality are estimated to be responsible for 75 to 80 percent of all maternal deaths and are direct results from complications of pregnancy. Although the exact proportion due to each individual cause may vary depending on the specific location, data sources (e.g. hospital-based data vs population survey data), and other circumstances, a recent summary of maternal cause of death data available from a large number of low and middle income countries included hemorrhage (25%), infection/sepsis (15%), eclampsia/high blood pressure (12%) , unsafe abortion (13%), obstructed and/or prolonged labor (8%), and others (8%) (Rahman & Menken, 2012).

The others are caused by or associated with diseases such as malaria and AIDS during pregnancy. Also, women in remote areas are the least likely to receive adequate health care. This is especially true because of low numbers of skilled health workers in developing countries including Uganda. While levels of antenatal care have increased in many parts of the world during the past decade, only 46% of women in low-income countries benefit from skilled care during childbirth. This means that millions of births are not assisted by a midwife, a doctor or a trained nurse. In low-income countries, just over a third of all pregnant women have the recommended four antenatal care visits, (CIA, World Factbook, 2013)

Some factors that prevent women from receiving or seeking care during pregnancy and childbirth are: Poverty, distance to health facilities, lack of information about reproductive health services and where to get them, inadequate services and equipment in the existing health facilities, and cultural practices and beliefs. In 2010, the countries with highest maternal mortality in the world were Chad (1,100), Somalia (1,000), Central African Republic, (890), Sierra Leone (890) and Burundi (800). (Hogan et al, 2010). These are much higher than the figures for Uganda, but still Uganda has to work harder towards the desired target. Below, we review some of the factors which have been identified by the existing litelature as the major causes of maternal mortality:

Antenatal Care visits and maternal mortality; A number of researchers argue that most women do not have access to antenatal services through established medical systems and hence most deliveries take place at home (Pandit, 1992). For some, it is a matter of choice influenced by cultural beliefs. According to Barton and Gimono (1994) one of the most important factors that affects women's willingness to attend a health facility for delivery is preference for delivery in a squatting position and fear or shame at having to expose their bodies to strangers (Lynch and

Derveeuw, 1991). Other reasons for under- utilization of health units include lack of attention by medical staff, long distances from home to the health facility, and high costs both in terms of money and waiting times (Barton and Gimono, 1994).

Maternal Education; Education promotes utilization of health services, better hygienic practices and enhances mother's ability to access adequate health care and challenging the traditional notions of diseases. Education has been referred to as a medication against fatalism (Caldwell 1981), because mothers break with tradition and adopt many of the alternatives of modern medicine. Differences are found in the utilization of maternal health services in relation to the educational status of women. Women with no formal education are more likely to confine their attendance to health facility level, while educated women tend to use hospitals relatively more (Caldwell 1979).

Region where mother comes from; The maternal mortality rate remains high due to inadequate action in addressing physical, social, cultural and financial obstacles to maternal health services. MMR remains a challenge in Sub-Saharan Africa where more than 350,000 women die annually from complications, during pregnancy or child birth. The ratio is 1 in 30 in developing countries compared to 1 in 5600 in developed regions. During the 15th session of the African Union on Maternal, Infant And Child Health and Development in Africa held in Kampala in July 2012, President Yoweri Museveni blamed slow progress on corrupt health workers, insufficient funding which has hindered the accessibility of health services such as antenatal and postnatal care, family planning, leaving most pregnant women to resort to traditional birth attendants (TBAs). The TBAs happen to be cheap, but in the long run maternal deaths occur due to failure to accessing proper medical care (Kagumire 2010:E685).

Maternal Age; Teenage marriage and adolescent births are a crucial factor contributing to maternal mortality because of the risks associated with giving birth before becoming fully developed physically, emotionally and psychologically. In developing countries, 40% of women give birth before reaching age 20 and adolescent girls have a higher risk of dying from pregnancy related causes than adult women; the younger the girl, the higher the risk (World Bank, 1995). Moreover, early child-bearing continues to inhibit advances in women's education and economic status, continuing the cycle of disadvantaged mothers passing on their vulnerability to their daughters, and their daughters to their grand children. In many underdeveloped societies, there is a general lack of provision for women's special needs in the design of health services for teenage mothers in case of complications in pregnancy and child birth.

Maternal age and the number of previous pregnancies or children ever born (parity) are the most easily recognized and universally significant demographic factors that influence utilization of health services. Becker et al, (1993) found that young mothers are less knowledgeable about taking care of a pregnancy, the foods to be eaten during pregnancy, and are usually more reluctant to attend antenatal clinics for fear of other people knowing that they are pregnant. According to the Nairobi Birth survey (1981), it was found that teenagers almost exclusively did not use hospitals for ANC (87.5 percent) and only 11.7 percent went to a hospital for delivery. The reasons for this bias towards "peripheral" care are related to the fear of teenagers to be found

out as being pregnant (Becker et al, 1993). Their reluctance leads to an increase in the maternal mortality levels.

Area of residence; Many maternal deaths are avoidable if trained personnel attend to births. In developed countries attended delivery is almost universal unlike in the developing world, like Uganda where about 80% of rural women still prefer to be attended to by Traditional Birth Attendants (TBAs) (Kabayambi, J 2010). TBAs are a pregnancy and childbirth care providers who provide basic health care, support and advice during and after pregnancy and childbirth, based primarily on experience and knowledge acquired informally through the traditions and practices of the communities where they live. Officially, TBAs in Uganda are not allowed to carry out deliveries. Instead, they are supposed to direct all expectant mothers to formal health facilities because their role has done little to reduce the rates of maternal and infant mortality in the country. They were banned by the government in 2010, but continue to work across Uganda because they are cheap, approachable and accessible. However the mothers remain at risk because the TBAs cannot handle complications that require emergency procedures, which have led to the death of many mothers and the babies. The babies delivered under the TBAs also miss out on immunization against the killer diseases like polio, tetanus and measles.

Maternal Mortality and the three delays; Maternal mortality in developing countries has been attributed to the "3 delays": delay in deciding to seek care, delay in reaching care in time, and delay in receiving adequate treatment (Kyomuhendo, 2003). The first delay is on the part of the mother, family, or community not recognizing a life-threatening condition because most deaths occur during labor or in the first 24 hours after birth. Delivering alone at home, surviving the battle of pregnancy and childbirth and having multiple children are perceived to contribute to a woman's increased social status in some parts of the country. As a result, death during childbirth can also be viewed as her failing even when lack of transport or supplies can explain why she did not seek medical help. This is in the context of women's acute socio-economic vulnerability in developing countries like Uganda which denies them access to timely and appropriate health care. Women are usually powerless to control their sexual and reproductive lives and to decide on their own healthcare; lack of education and child birth amidst poverty makes it difficult to attain medical care, (MoFPED, 2011).These expectations and pressures can affect how communities respond to medical problems during pregnancy, and help to explain why Uganda's MMR continues to be a pressing health challenge for both the mothers and policy makers.

The second delay is in reaching a health-care facility, compounded by poor road conditions in rural areas. Many villages do not have access to paved roads and many families do not have access to vehicles. The only means of transport left is use of bicycles, motor cycles and even animals like donkeys. This means that it may take hours or days to reach a health-care facility especially in the rainy season when the roads tend to become impassable. Delays are also brought about by failure of women at an individual level to make timely decisions to access health services which should be in line with the means of transport to be used. For instance mountainous remote areas of Kabale and Bundibugyo have poor roads, which imply that decisions are supposed to be taken early enough so that the pregnant mother can access timely antenatal and post natal care so as to reduce complications.

The third delay occurs at the healthcare facility. Developing countries have fragile health-care facilities that are characterized by serious shortage of medical supplies and equipment, theater space, and trained personnel. These factors further undermine the timeliness and quality of the care that pregnant women receive, (MoFPED, 2011). Inadequate technological advances, poor health services delivery and inadequate qualified staff imply that pregnant women at health facilities tend to receive inadequate care or inefficient treatment. This also includes lack of supplies like contraceptives, whose access rate is 57% in Africa, leading to unwanted pregnancies, increased demand for abortions, and deaths related to unsafe abortions all of which increase the rate of maternal mortality.

Gender stratification and maternal mortality; Gender stratification is an economic theory attempts to explain a society's unequal distribution of wealth, power and privilege between men and women.Gender stratification theory argues that societies in which women have higher status and more autonomy will generally be societies in which maternal mortality is lower. It is believed that a nation's industrialization and modernization will enhance women's status in general by providing more labor participation opportunities and increase women's access to and control over resources including health services. However, this assumption has been challenged since a large number of women in developing countries have been victims of development because the products and services that they provided previously have been replaced by new alternatives through technology. Most of the women have been relegated to jobs in the backward sectors of the economy (Boserup, 1970). Some studies conclude that the global division of labor actually limits work opportunities for women in the third world. The type of employment available to them often pushes women into low paying, informal activities, where they do not earn enough income to sustain their lives.

In most African societies women participate in economic activities such as agriculture, trading and mining but surprisingly they do not receive the expected financial benefits, limiting their access to health services and contributing to maternal mortality rate (Marshall et al., 1988). Evidence from the Newly Industrialized Countries (NICs) shows that sustained economic growth and industrialization in those areas over the past few decades has not resulted in a significant reduction of gender wage differentials. To the contrary, in some cases the gap has widened (Seguino, 1997). Many studies have examined the intricately entwined relationship between women's status and health based on the understanding that any serious attempt to improve the health of women must deal with those ways in which a woman's health is harmed by social customs and cultural traditions (Lyons, 1985). In societies where the status of women is low; women have too many children, start childbearing too early and the children are too close together thus hindering the women from participating in economic production. This is commonly experienced in sub Saharan countries where women on average bear more than seven children, which increases dependence ratio for countries, the governments cannot cope with the growing population, the health budget is poorly funded, skilled man power is inadequate and service provision is at a minimum level which leads to high maternal mortality rate (Royston and Armstrong, 1989).

In Uganda, most of the women's economic activities take place in the non- wage subsistence economy. Women are at the heart of development; they control most of the non money economy (subsistence agriculture, bearing and raising children, domestic labor) and also take part in the

money economy (trading, informal sector, wage employment). They have two key jobs – around the home and outside it. Much of this work is unrecognized and unpaid. Their health and children suffer and their social and economic development is held back as a result. In most societies, women are expected to juggle several roles at once and are subjected to a great deal of stress when conflict arises between these different roles. With poor socio-economic conditions, women are vulnerable to the health risks caused by childbearing, yielding high mortality. However, with greater access to education, employment and contraception, women choose to have fewer children (United Nations, 1995). Thus, fertility decreases with the increase in women's status. With increasing status, women have more say with respect to the number of children they want to have, greater access to health care and better nutrition during pregnancy. In turn, these factors have a slow down effect on maternal mortality rate.

3. Data type and Analysis

This study used secondary data which was obtained from the UDHS 2011. Descriptive statistics were used to summarize characteristics of the respondents. The bivariate analysis involved the cross tabulation of independent variables to maternal mortality so as to establish the association between them using a chi-square test. The independent variables included the number of antenatal care visits, maternal education, region where mother comes from, age and area of residence.

At multivariate level, the Binary Logistic Regression method was used to analyze the relationship between the dependent variable and independent variables which were found to be significant at bivariate level. The following formula was used;

$$Y = \beta_O + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_i$$

Where Y is the dependent variable which is, 0 if the mother died due to pregnancy related conditions, or else 1 if she did not die due to pregnancy related conditions. X_i for i=1, 2, 3 and 4 are the independent variables which were significant at bivariate level. β_0 is the maternal mortality without the impact of the number of antenatal visits, maternal education, area of residence, region or age. β_i for i=1,2,3 and 4 the regression coefficients or average change induced in Y by each X. ε_i is the error term.

4.   Presentation and discussion of results.
4.1   Distribution of Mothers by their characteristics

Table 1 Demographics of the respondents

Number of antenatal visits during pregnancy	Frequency	Percentage
No antenatal visits	201	4
1-3 visits	2292	47
4 & more visits	2341	48
Don't Know	74	2
Total	**4907**	**100**

Highest level of Education of the expectant mother	Frequency	Percentage
No education	309	6
Primary level	2061	42
Secondary level	2341	48
Tertiary level	196	4
Total	**4907**	**100**

Region	Frequency	Percentage
Kampala	438	9
Central1	415	8
Central2	462	9
East Central	527	11
Eastern	575	12
North	480	10
Karamoja	436	9
West Nile	526	11
Western	554	11
Southwest	494	10
Total	**4907**	**100**

Residence	Frequency	Percentage
Urban	1865	38

Age of the mother	Frequency	Percentage
<15	245	5
15-22	1816	37
23-30	1423	28
31-38	1080	22
39-46	294	6
>47	49	2
Total	**4907**	**100**
Rural	3042	62
Total	**4907**	**100**

Majority of mothers made 1 - 3 visits and 4 & more ANC visits with 47% and 48% respectively. 90% of the women had attained primary education level and above. Mother's education attainment is also expected to increase age at first marriage, reduce the number of pregnancies one is expected to have, enhance utilization of maternity services and consequently reduce MMR. The respondents were equally distributed amongst region (spread between 415 and 575) as shown in table 1. The study had 5% of the respondents below 15years of age and 8% above 38 years of age. Therefore, the majority of the mothers were between 15 years and 38 years old, the period considered to be the most productive years of a woman; and 62% of the respondents resided in rural areas.

4.2   Relationship between maternal mortality and the independent variables.
The Pearsons' Chi-square test was used to test for the relationship between maternal mortality on number of antenatal visits, maternal education, age, area and region of residence at 5% level of significance.

4.2.1 Maternal mortality in relation to the number of antenatal visits during pregnancy.

Ho: There is no association between maternal mortality and the number of antenatal visits during pregnancy.

Table 2: The association between number of antenatal visits and maternal mortality.

Did the mother die during pregnancy or pregnancy related condition?	Number of antenatal visits during pregnancy				
	No antenatal visits	1-3 visits	4 & above visits	Don't know	Total
Yes	76	103	98	36	313
No	125	2189	2243	38	4594
Total	201	2292	2341	74	4907

Pearson chi2 (2) =0.0225   pr=0.049

The Pearson chi-square test value (0.0225) was significant since its p-value < 0.05 implying that we reject the null hypothesis and conclude that there is an association between the number of antenatal visits and maternal mortality

4.2.2 The relationship between maternal mortality and maternal education.

Ho: There is no association between maternal mortality and maternal education.

Table 3: Maternal mortality and maternal education:

Did the mother die during pregnancy or pregnancy related condition?	Highest level of education of the mother				
	No Education	Primary	Secondary	Tertiary	Total
Yes	34	142	127	10	313
No	275	1919	2214	186	4594
Total	309	2061	2341	196	4907

Pearson chi2 (2) =1.0865   pr=0.0263

The results in table 3 indicate that mothers who attained a higher level of education had higher chances of surviving pregnancy and related conditions as compared to mothers who had no education or a lower level of education (P- value < 0.05). Therefore, the null hypothesis was rejected and this shows that there is a significant association between maternal education attainment and maternal mortality.

4.2.3 Maternal mortality in relation to the region of the mother.
Ho: **There is no association between maternal mortality and the region of residence.**

Table 4: The relationship between maternal mortality and region of residence.

Did the mother die during pregnancy or pregnancy related condition?											Region of the mother
	Kampala	Central1	Central2	East central	Eastern	North	Karamoja	West Nile	Western	South west	Total
Yes	21	27	28	30	31	37	37	39	33	30	313
No	417	388	434	497	544	443	399	487	521	464	4594
Total	438	415	462	527	575	480	436	526	554	494	4907

Pearson chi2 (2) =1.6632 pr=0.435

The relationship between region of residence and maternal mortality was insignificant (P- value >5%) hence we fail to reject the null hypothesis at 5% level of significance. The likely justification is that all the regions had more awareness and appreciation of the need to attend ANC services, hence reduced maternal mortality.

4.2.4 Maternal mortality and the age of the mother.
Ho: There is no association between maternal mortality and age of the mother.

Table 5: The relationship between maternal mortality.

Did the mother die during pregnancy or pregnancy related condition?	Age of the mother						
	<15	15-22	23-30	31-38	39-46	>47	Total
Yes	63	107	79	30	27	7	313
No	182	1709	1344	1050	267	42	4594
Total	245	1816	1423	1080	294	49	4907

Pearson chi2 (2) =1.005 pr=0.003

The P- value being less than 0.05 , we reject the null hypothesis and conclude that there is associated between maternal mortality and the age of the mother.

Table 6: The relationship between maternal mortalty and the area of residence.
Ho: There is no association between maternal mortality and the area of residence

Did the mother die during pregnancy or pregnancy related condition?	Area of residence of the mother		
	Urban	Rural	Total
Yes	247	392	313
No	1618	2653	4594
Total	1865	3045	4907

Pearson chi2 (2) =2.006   pr=0.032

The results in table 6, show that there is an association between maternal mortality and the area of residence of the mother (p-value < 0.05).

4.3   Analysis of factors affecting maternal mortality in Uganda.
The binary logistic regression was carried out using the variables that were found to be significant at bivariate level (the number of antenatal visits made, maternal education, area of residence and age). Dummies were created since all variables were categorical in nature. The results were presented in Table 7.

Table 7: Factors affecting maternal mortality

Independent Variables	Coefficient (β)	Standard error	Sig.	Exp (β)/Odds Ratio
Constant	-2.478	1.366	0.070	0.083911
Primary Educ	-0.098	1.988	0.006	0.906649
Secondary Educ	-0.002	2.076	0.032	0.998002
Tertiary Educ	0.356	0.883	0.068	1.427608
Urban	-0.590	0.905	0.041	0.554327
1-3 visits	-0.234	1.148	0.036	0.791362
4&above visits	-0.001	0.678	0.000	0.999
Don't know	0.846	1.275	0.015	2.330307
15-22 years	-0.011	0.004	0.044	0.98906
23-30 years	-0.13	0.027	-0.078	0.878095
31-38 years	-0.001	0.001	-0.008	0.999
39-46 years	1.044	1.148	0.021	2.840557
Above 47 years	0.055	0.009	0.098	1.056541
M Fadden R-Squared =0.686		**LR statistical = 16.1510**		

The findings in Table 7 indicate that mothers who had attained primary education and secondary education were less likely to die due to pregnancy or pregnancy related conditions compared to those who had no formal education, since their odds ratio (0.906649 and 0.998002 respectively)

is less than one, and significant at 95% level of confidence (P value < 0.05). Educational attainment affects the rate of maternal death as a result of the association between mother's education and the likelihood of employment that has a bearing on the income at the disposal of the mother, which is likely to promote the mother's welfare during pregnancy and child birth. This is in agreement with Mosley, (1983) who found out that mother's education increases survival chances for her and the infant, and Caldwell, (1979) who concluded that women with no formal education are more likely to confine their attendance to healthy facility level, while educated women tend to use the hospitals relatively more. The study further showed that mothers who had attained tertiary education were more likely to die due to pregnancy or pregnancy related conditions as compared to those who had no formal education, since their odds ratio (1.427608) is greater than one though it is insignificant (p-value > 0.05).

This study showed that the area of residence of the expecting mother does influence maternal mortality and is significant at 5% (p-value < 0.05). The study further showed that mothers who resided in urban areas were less likely to die from pregnancy or pregnancy related conditions than those who resided in rural areas, since their odds ratio (0.554327) is less than one. This is in agreement with Kabayambi J (2010) who found out that about 80% of rural women still prefer to be attended to by Traditional Birth Attendants which put rural women at more risk as compared to urban women. Mothers who had gone for antenatal visits were less likely to die from pregnancy or pregnancy related conditions as compared to those who never attended antenatal services. This was in agreement with Pandit, (1992) who found that women who do not access antenatal services have a higher risk than those who do. These results could be explained by the government's efforts to promote universal access to maternal health services in Uganda, by constructing health facilities in each and every county. This endeavor has enhanced expecting mothers' access to ANC services which has reduced the incidents of maternal death.

The study showed that mothers in the age groups 15-22, 23-30, 31-38 were less likely to die from pregnancy or pregnancy related conditions as compared to mothers who were less than 15 years old, (0.98906, 0.878095, 0.999 respectively) are all less than one, and are all statistically significant(p-value < 0.05. Mothers in the age group 39-46 are three times more likely to die due to pregnancy or pregnancy related conditions as compared to those who are less than 15 years old. Furthermore, mothers above 47 years old are also more likely to die as compared to those who are less than 15 years old, since their odds ratio is greater than one (1.056541). These findings agree with the World Bank's (1995) study, which points out that 40% of women who give birth before reaching 20 years and adolescent girls have a higher risk of dying from pregnancy related causes than adult women. The younger the mother, the higher the risk of dying due to pregnancy related deaths.

The coefficient of determination R-squared of 68.6% shows the variations in maternal mortality which are explained by the number of antenatal visits, maternal education, area of residence and the age of the mother at the time of giving birth. This high percentage shows that the model was well specified.

5.   Conclusions and Recommendations

5.1   Conclusions

The study found that ANC visits affect maternal mortality. Mothers who make fewer or no ANC visits had a higher likelihood of death than those who had more visits. Educational attainment affects maternal mortality because mother's education and the likelihood of employment have a bearing on the income at the disposal of the mother, which is likely to promote the mother's welfare during pregnancy and child birth. Maternal education, especially at secondary and tertiary levels increases the likelihood of using and attending ANC hence reducing maternal mortality.

5.2   Recommendations

The study therefore recommends that expectant mothers should be encouraged to visit health centres quite regularly, Skilled health workers such as gynecologists, midwives, nurses and medical officers should be available at all times to provide pregnancy care services including delivery at the health facilities. Quality services must be accessible, available and as close as possible to where women live for safety and effectiveness. In addition, these services must be acceptable to women by being responsive to local cultural and social norms

The government of Uganda and other stakeholders should increase their efforts in enhancing female education to attain favorable maternal health outcomes in the future. Interventions aimed at keeping girls in school for longer should be part of this effort. Scholarship programmes can be used to target girls from poor families and government legislation against early marriages may help girls to remain in school for more years.

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