Effect of Behavior and Clinical Factors on Maternal Health

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Abstract

The health of a mother impacts the family and even the entire community. Her ability and access to receive necessary healthcare largely determines health outcomes for herself and her baby. Despite the national policy of promoting maternal health through promoting informed choice, service accessibility and improved quality of care through the national Safe Motherhood Programme (SMP), it remains a challenge to the Ugandan government as to how it would achieve its 2015 Millennium Development Goals of reducing maternal mortality rates. Like many developing countries, Uganda has high maternal mortality rates, which often reflects access to health care services for some reasons. Mistreatment from healthcare personnel as an additional reason to avoid seeking professional care during pregnancy and labor and lack of health literacy are some of the reasons. Hence, pregnant women and their unborn babies are particularly susceptible to complications during pregnancy. The behavior and clinical factors determine complications during pregnancy. The time one starts engaging in sexual act, the frequency, sexually transmitted infections/diseases, malaria incidence, other diseases like tuberculosis, asthma, heart disease and kidney disease are important for maternal health and mortality. These may work through the intermediate factors such as knowledge about complications in pregnancy, acceptability and accessibility of health services. This presentation will describe how ones behavior and clinical factors links to complication in pregnancy, employ statistical methods to identify important factors and determine their optimal levels. The factors identified are studied to determine their relative effect on complications during pregnancy using statistical methods.

Key words: behavior change and clinical matters are of paramount importance in order to improve maternal health and mortality.

1. Introduction

Maternal health refers to the health of women during pregnancy, childbirth, and the postpartum period. It encompasses the health care dimensions of family planning, preconception, prenatal and postnatal care in order to reduce maternal morbidity and mortality. Increasing maternal survival, along with life expectancy, is an important goal for the world health community, as they show the effectiveness of health system, policies and programmes. Improvement in this area indicates disease-specific improvements are also better able to positively impact populations.

In Uganda, the 2010 progress report of the MDGs shows that the maternal health indicators have generally remained poor in the last two decades. Between 1995 and 2000 maternal mortality stagnated at 505 deaths per 100,000 live births. In 2006, maternal mortality was estimated at 435 per 100,000 live births.

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Despite the efforts by the Government of Uganda and other stakeholders to improve maternal health and the unborn babies, complications during pregnancy still cause serious illnesses, disabilities and even death among mothers and children. An understanding of the factors that influence maternal health will serve as an important guide to the development of focused and evidence based health interventions to prevent further maternal deaths. This paper therefore, discusses the underlying factors associated with complications during pregnancy with specific emphasis on:

1. Identifying the common complications affecting maternal health in Uganda.
2. Establishing the effect of the demographic characteristics and clinical factors on the health of expecting mothers.
3. Establishing the causal relationship between complications in pregnancy and demographic and clinical factors.

2. What are the Complications?

The common complications in pregnancy include; ectopic pregnancy, premature labor, hemorrhage, blood clots, pregnancy induced hypertension, poor contractions during labor, placental abruptions, abortion or miscarriage, severe headache, blurred vision, shock, infection, tilted uterus, Hyperemesis gravidarum, amniotic acid in the bloodstream, pregnancy induced diabetes, genital cancer, Centre for Disease Control (CDC), 2004). The common complications in pregnancy in Uganda are obstracted labour (34.7%), pelvic bleeding (15.5%) and abnormal lie (10.4%), (see Appendix 1).

3. What is Associated with Maternal Health?

The choice to seek maternal health services and delivery care is influenced by the mother's social, economic and demographic characteristics. This paper focused on demographic factors such as age at first pregnancy, number of pregnancies and age of mothers at birth and the industry of employment the mothers were engaged in.

3.1 Demographic Characteristics

Maternal age is the age of the mother at time of birth. Historically, women who desired to become pregnant after the age of 35 years often were discouraged from considering pregnancy because of the increase in both maternal and prenatal morbidity and mortality. Teenage age is also singled out undesirable because of its association with higher morbidity and mortality for both the mother and the child according to UBOS (2006). Early marriage often leads to early pregnancy and thus harmful consequences (e.g. obstructed labour for both young mothers and infants) because the adolescent body has not yet fully developed according to ALARM International (2007). The best maternal age remains unknown. Although the mean age at first pregnancy was 19 years, girls indulged in sex as early at the age of 13 years. Consequently, they end up with high number of pregnancies. The maximum number of pregnancies at the time the mother visited the hospital was 11 and the mean number of pregnancies was about 3. In the period under study, the youngest expecting mother at birth was 14 years while the oldest was 45 years and the mean age at birth was 24 years. However, it must be noted that more pregnancies is associated with a small but consistent increase in the risk of coronary heart disease and cardiovascular disease due to cardiovascular dynamics in pregnancy (Bennett and Linda, 1999).

3.1.1 Mother's Employment Status by Industry

A lot has been said on employment status of the mothers so, this paper focused on the employment status expectant mothers by industry. Industry refers to the main activity

carried out at a place of work. The engagement of mothers in heavy duty economic activities/ industry of employment hence, compromising maternal health. Table 2 indicate that agriculture, indeed most the expecting mothers (89.8%) were engaged agriculture, 4% were engaged in business in form of Small and Medium Enterprises (SMEs). The few (3.3%) mothers were working in modern jobs, such as teaching.

Evidence has shown that expecting mothers engaged in agriculture are at high risk of developing complications such as spontaneous abortion and stillbirth. The risk arises from their exposure to chemical like pesticide. Although there is significant relationship between complications in pregnancy and the employment industry of mothers (*p-value* = 0.097) at 10% level of significance, the result is marred by insufficient number of expecting mothers who are teachers and health workers. Over 80% of the expecting mothers were peasant farmers of which almost half (49.6%) developed complications in pregnancy.

3.2 Clinical Characteristics

The clinical factors causing complications in pregnancy are mostly sexually transmitted infections/disease (STI/Ds). However, some complications are caused by malaria infections. The malaria caused complications include; anemia, acute pulmonary oedema, hypoglycemia and immunosuppression.

3.2.1 Sexually Transmitted Infections/Diseases

STI/Ds are a big threat to maternal health and their unborn babies. The common STI/Ds among expecting mothers were syphilis (9.9%), candidiasis (9.6%) and Pelvic Inflammatory Disease (8.0%). Other STI/Ds include genital infection caused by Human Papilloma Virus (HPV) contribute up to 26.2%. Some of the HPV are "high-risk", while others are "low-risk" and they may cause mild pap test abnormalities or genital warts (i.e. single or multiple growths or bumps that appear in the genital area, and sometimes are cauliflower shaped). Expectant mothers can pass HPV to their baby though rarely during normal delivery.

STI/Ds have great association with maternal health with 87% of expecting mothers with Pelvic Inflammatory Disease (PID) likely to have complications in pregnancy. The figure for syphilis, candidiasis and other STI/Ds were 70%, 58% and 59% respectively. There is significant relationship between STI/Ds and complications during pregnancy ($p = 0.002$). About 19% of complications in pregnancy were attributed to STI/Ds. Of this, about 9% of the complications due to STI/Ds were attributed to candidiasis, 21% to syphilis, 39% to PID and 10% to other STI/Ds. PID was the main contributor to complications due to STI/Ds and complications in pregnancy due to STI/Ds is expected to reduce by about 80% if PID is eliminated in among expecting mothers. Similarly, complications among expecting mothers is expected to reduce by about 44%, 21% and 18% if syphilis, other STI/Ds and candidiasis were eliminated among pregnant mothers.

3.2.2 Complications due to Malaria Infection

Malaria cases among expecting women was the highest with 46.3% of expecting mothers women suffered from malaria during pregnancy. Malaria in pregnancy causes several complications. Some of the prevalent complications include Anemia, Acute pulmonary oedema, Hypoglycemia and immune-suppression. Anemia is a condition of blood deficiency in the body. Anemia is a critical public health problem in Uganda with 49% of the women being anemic, Uganda Bureau of Statistics (UBOS) (2006). Six in a hundred (6.0%) of the expectant mothers were anemic during the period 2005 – 2007. Anemia due to malaria is more common and severe in

16 – 29 weeks of pregnancy. Anemia increases perinatal mortality and maternal morbidity and mortality. It also increases the risk of post-partum haemorrhage.

The clinical characteristics and maternal health were found to be associated. Of the expecting mothers who suffered from malaria, 70.2% developed complications. There is significant relationship and complications in pregnancy (*p-value* = 0.000). About sixteen in a hundred complications during pregnancy was attributed to malaria. Therefore, malaria in pregnancy may compromises the health of the mother and the fetus. Maternal health is expected to improve by 31% if every expecting mothers do not suffer from malaria. Expecting mothers are encouraged to sleep under treated insecticide treated mosquito net and take-up malaria preventive measure (i.e. taking of fansider at the 3rd and 6th months of pregnancy) during pregnancy.

4. What Determines Maternal Health?

There is a mixed result on the dependency of maternal health on demographic and clinical factors. The effect of the demographic and clinical factors was examined by fitting complementary log-log model.

$$Log\big(-Log(1-p)\big) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon_i$$

4.1. Demographic Characteristics

The demographic characteristics of the mothers have mixed effect (some significant while others not) on maternal health. Older women are less likely to develop complications in pregnancy compared to younger ones. A year increase in maternal age reduces the risk of developing complications in pregnancy by 4.8%. This is in agreement with UBOS (2006), which associates teenage pregnancy with increase in complications. However, this association is weak (*p-value* = 0.197) which is not statistically significant even at 10% level of significance. This means that maternal health may not solely dependent on maternal age. This may be due development of body organs such as pelvic bones, uterus to cope with the changes in pregnancy and during labor among the teenagers. In addition, older women already have experience and can easily seek for medical care early enough to reduce the complications.

Those mothers who produce many children are 1.15 times more likely to develop complications during pregnancy ($RR = 1.15$). An additional pregnancy increases the chances of developing complications in pregnancy by 15.8%. Nonetheless, this was not significant at 5% significance level (*p-value* = 0.067). This may be due to depletion of nutrient stores in the body and exhaustion of body organs as relaxed abdominal muscles due to several pregnancies result into abnormal lie presentation of the fetus. Secondly, many pregnancies overstrain the uterus, which may result into premature deliveries and miscarriages. This is coupled by low immunity of expecting mothers which exposes them to diseases like malaria causing severe complications. Thirdly, it is worth noting that more than a third of the births in Uganda are attended to by TBAs, which exposes mothers to the risks of encountering bacterial infection since the hygiene and expertise of these traditional birth attendants (TBAs) is questionable. Poor hygiene and care during childbirth influences a woman's capacity to survive complications UNICEF (1999).

Women who delay the first pregnancy were more susceptible to developing complications. Delay of first pregnancy by a year increases the risk of complications in pregnancy by 8.4%. This in line with the existing literature that women who desired to have their first born after the age of 35 often are discouraged from considering pregnancy because of the increase in both maternal and prenatal

morbidity and mortality. This may be due to calcification of pelvic bones, which makes it difficult for the pelvic to expand during delivery. In addition, these women are so anxious to have a precious baby and this may affect the hormone levels in the body that may affect the pregnancy.

4.2. Clinical Characteristics

The clinical characteristics of the mothers as well have a mixed effect (some significant while others not) on maternal health. Malaria had significant effect on maternal health (*p-value* = 0.000). Expecting mothers who suffered from malaria during pregnancy were found to be 1.74 times more likely to develop complications compared to those who never suffered from malaria. This may be due to the complications caused malaria parasites to several organs in the body. For example, anemia that is due to the destruction of infected red blood cells (RBCs) by plasmodia. This compromises the transportation of oxygen for both the mother and the fetus.

The results of STI/Ds on maternal health was a mixed up with some significantly affecting maternal health. Pelvic Inflammatory Disease had significant effect on complications in pregnancy (*p-value* = 0.000). Expecting mothers with PID were found to be 2.801 times more likely to develop complications in pregnancy compared to their counterparts who never had any STI/D. The association between PID and ectopic pregnancies, which relates to complications (Bennett and Linda, 2001) could explain the effect. Syphilis also had significant effect on complications in pregnancy (*p-value* = 0.027). Expecting mothers who had syphilis were 1.74 times more likely to encounter complications compared to those who had no STI/D. Syphilis is the common sexually transmitted infection often associated with still births Karugaba et al (1995). Mothers with syphilis were 1.73 times more likely to develop complications in pregnancy than their counterparts without STI/D. Although not significant even at 10% level of significance, expecting mothers who had candidiasis were 1.356 times at risk of developing complications compared to their counterpart without STI/D. Expecting mothers with other STI/Ds were also 1.25 times at a risk of developing complications during pregnancy compared to those without STI/D.

5. Conclusion and Recommendations

In conclusion, malaria and sexually transmitted infections/diseases have a significant relationship with complications in pregnancy. Pelvic inflammatory disease and syphilis were strongly associated with increase in complications in pregnancy. It was also revealed that the number of pregnancies per mother and age at first pregnancy might increase the risk of complications in pregnancy.

5.2. Recommendations

Based upon the finding, it is now incumbent upon the ministry of health and other health organizations to control the spread of malaria. Despite the existence of treated mosquito nets, the mosquito nets easily accessible to people in rural areas. Therefore, there is need for affirmative action to support the disadvantaged people and sensitize about the control of mosquito breeding. It is also recommended that proper and timely treatment of malaria especially in pregnant women should be encouraged and adhered to.

During antenatal care (ANC) services, mothers are usually tested of HIV to advise the mothers in prevention mother-to-child infection under prevention of mother-to-child transmission (PMTCT). This has significantly reduced HIV infection in Uganda. Similarly, it is recommended that comprehensive examination be conducted rather

than just HIV test and counseling to reduce complications that may arise pre-existing condition.

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Appendix 1: **Percentage distribution of Pregnant Women by Complication**

Complication	Percentage	Complication	Percentage
Obstructed labor	34.7	Placenta abruption	1.3
Abnormal lie	10.4	Gastritis in pregnancy	3.5
Retained placenta	5.4	Intra uterine fetal	0.3
Pre-eclampsia	1.6	Premature	0.6
Anemia	6.0	Molar pregnancy	0.3
Hypertension	2.2	Still birth	1.6
Ectopic pregnancy	0.6	Heart failure	0.6
Abortion	9.8	Placenta previa	0.6
Pelvic bleeding	15.5	Diabetes mellitus	5.0