Count down to Millennium Development Goal Five: Maternal Health Seeking Behavior in Ghana

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As we countdown to the fifth Millennium Development Goal in 2015, progress towards reducing maternal mortality in sub-Saharan Africa still lacks far behind other developing regions of the world. Skilled attendance at birth has been shown to be effective in reducing maternal mortality and morbidity. Yet, in Ghana, although 96 percent of pregnant women receive antenatal care, just over half of births are attended to by a skilled health provider. Using multinomial logistic regression models drawn from the 2007 Ghana Maternal Mortality Study, we find that although household and bio-demographic factors are significant predictors of assistance at delivery, the number of antenatal visits, the timing of first visit and the quality of care received during antenatal visits have an independent effect on skilled assistance at delivery. We situate these findings within the broader context of conceptual frameworks for analyzing the determinants of maternal mortality and morbidity in resource constrained settings such as sub-Saharan Africa.

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Introduction

As we count down to the fifth United Nations Millennium Development Goal (MDGS) to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio, sub-Saharan Africa (SSA) lacks far behind other developing and developed regions of the world in terms of progress to reduce maternal mortality. As of 2008, 640 maternal deaths per 100,000 live births occur in SSA compared to 280 in South Asia and 80 in Latin America (UNMDG Report 2011). As a vivid indicator of health disparities between richer and poorer nations, maternal causes of death account for only 17 deaths per 100,000 live births in developed regions compared to 290 deaths per 100,000 live births in developing regions.

Measuring maternal mortality in SSA remains one of the most intractable issues in maternal health and yet without accurate depiction of the scope of the problem, efforts to address it may not yield the desirable results. In Ghana, available estimates put the number of maternal deaths per 100,000 live births somewhere between 214-580 depending on the source and technique of determining maternal mortality (Ghana Maternal Health Survey 2007). Although previous studies have identified several direct and indirect causes of maternal deaths in developing settings, trends in antenatal, delivery and postnatal care have been shown to effectively reduce maternal mortality and morbidity (Chandrasekhar et al. 2011). Yet, in Ghana, although antenatal care is nearly universal (96%), only 55% of births are attended to by a skilled health provider.

In this study, we draw from conceptual frameworks to understand the determinants of maternal mortality by focusing on factors that affect maternal health care seeking behavior in

Ghana using the Ghana Maternal Health Survey of 2007, the first nationally representative survey to collect comprehensive data on maternal mortality in Ghana. We estimate a multinomial logistic regression model to understand the factors that determine choices available to women at childbirth- delivery by a doctor, delivery by a nurse midwife and delivery at home by a trained or untrained midwife or family member. Our study extends previous models by considering access, quality of care and timing of antenatal services received during pregnancy while paying special heed to urban and rural differences in residence and policies and programs launched by government and international partners to improve safe motherhood.

Conceptual Framework and Research Hypotheses

Our conceptual model rests on three main assumptions. First, we assume that in resource constrained settings, access to health services impede women's health, particularly the risk of maternal mortality and morbidity. However, basic quality of care is of concern in many health facilities that manage complications during pregnancy, labor, delivery and post-delivery. Thus poor quality or inadequate services will contribute inversely to maternal health outcomes. Second, we assume that the timing and number of times women access care in pregnancy management is crucial to positive maternal health outcomes. Thus early timing of antenatal care will contribute positively to maternal health outcomes. Third, we assume that because the availability and quality of health care varies widely between rural and urban areas and in regions with more targeted interventions and policies to improve safe motherhood, place of residence and government interventions will impact on maternal health outcomes. In addition to these key assumptions we include and test the effect of distal socio-economic and household characteristics and bio-demographic risk factors that determine maternal health outcomes.

Guided by these conceptual premises, we expect that women whose first antenatal visit occurs in the first three months of pregnancy will have better odds of being attended to by a doctor and nurse midwife compared to a home delivery without professional assistance. In the same vein, women who access antenatal services four or more time, as recommended by the WHO, will have better odds of being assisted in delivery by a doctor or nurse wife than a delivery without professional assistance. Lastly, pregnant women who receive basic and required services such as weight and blood pressure monitoring, blood test for illnesses that aggravate pregnancy and health education on the complications of pregnancy and what to do when complications set in will have better odds of delivery by a doctor and nurse midwife than a home delivery without professional assistance.

These hypothesized associations are likely to vary between urban and rural areas and within regions with programs geared towards reducing maternal mortality. Thus we expect women in urban areas compared to rural areas and in Greater Accra, Ashanti and Eastern regions, where there are targeted programs to reduce maternal mortality to have better odds of delivery assistance by a doctor and a nurse midwife compared to a home delivery without professional assistance.

These expected associations will diminish after controlling for bio-demographic and socio-economic factors that we are able to measure, but because of unmeasured but implied socio-economic disparities in health, most of the associations will persist after the addition of bio-demographic controls.

Methods

Since the main objective of this study is to analyze the choices available to women during delivery of their last born child five years preceding the survey in 2007, we estimate a

multinomial logit model where women have one of three choices (delivery by a Doctor, delivery by a Nurse Midwife/Auxiliary Midwife and delivery at home by a Trained/Untrained Traditional Birth Attendant or by Friends and family members/or without assistance). This is model is appropriate given that we consider several categories that are not inherently ordinal (have no known natural ordering) and are more suitable for a maximum likelihood estimation rather than ordinary least squares. We also assume that the relative ratios of the categories do not depend on other choices, following from the independence of irrelevant alternative assumption (IIA).

Results

Table 1 presents row coefficients from full models (with controls) of multinomial logit regression. We observe from the table that the odds of a doctor assisted delivery versus home delivery by non-professional providers for women who attend four or more antenatal care visits is nearly three times (exponent of (coefficient: 1.09)) than that of those who made fewer (1-3) visits, controlling for other factors. Similar odds are observed for a nurse midwife assisted delivery versus deliveries at home. Both relationships are statistically significant at $p< 0.01$ level.

The timing of first antenatal care visit is also marginally associated ($p<0.1$) with nurse assisted versus home delivery, controlling for other factors. This did not however, have any significant effect on doctor assisted deliveries (although it was highly significant in the baseline model (results not shown)). Similarly, women who received weight, blood pressure monitoring, urine and blood test during antenatal visits have marginal odds of doctor assisted delivery than home delivery. This was not statistically significant for nurse midwife assisted delivery.

Also, women who were educated on the complications of pregnancy were marginally likely to have births assisted in delivery by a doctor versus a home delivery than women who

were not exposed to such education. The coefficient for nurse assisted delivery versus home deliveries was positive and significant at $p<.05$.

On bio-demographic characteristics, age, number of living children, ethnicity, religion, education, wealth status, urbanization and residence in a maternal mortality intervention program region all had various independent effects on assistance at delivery. Urban residence, which is a key assumption of this study, for instance, had a positive and strong statistically significant impact on both doctor assisted delivery versus home delivery and nurse assisted delivery versus home delivery than rural residence.

Next Steps

Pursuing our hypotheses further, we intend to examine interactions between place of residence and key predictors of interest to test the hypotheses contained in our conceptual framework. We also intend to include other crucial predictors such as birth order, women's employment, sex of the last birth within the last five years etc. to illuminate further the preliminary findings described in this proposal. Lastly, we will calculate estimated probabilities to ascertain how changes in the independent variables will affect the estimated probabilities of choices given in these models. This is important to examine as odds ratios and predicted probabilities may not change in a similar direction and may add to understanding maternal mortality in Ghana.

Table 1 Coefficients from Multinomial Logistic Regression Assistance During Delivery in Ghana, 2007

	Person Providing Assistance During Delivery			
	Doctor		Nurse Midwife/Auxiliary Midwife	
	Coefficient	S.E	Coefficient	S.E
Health Access and Quality of Care				
Antenatal Care Visits (1-3)				
4+	1.09***	0.20	1.03***	0.10
Timing of First Antenatal Visit (1st trimester)				
2nd trimester	-0.18	0.12	-0.14*	0.08
3rd trimester	0.07	0.40	0.01	0.21
Quality of Antenatal Care				
Antenatal services received (None)				
Weighed, BP, urine & blood	0.40*	0.22	0.16	0.11
Pregnancy Complications				
Informed of signs of pregnancy complications (Not informed)	0.24*	0.14	0.16**	0.08
Socio-demographic characteristics				
Age in groups	0.12***	0.04	0.02	0.03
Married (not married)	0.22	0.14	0.10	0.09
Number of live births in last five years	-0.43***	0.10	-0.15***	0.06
Ethnicity (Akan)				
Ga/Adangme/Guan	0.13	0.18	-0.32**	0.13
Ewe	-0.28	0.18	-0.4396***	0.12
Northern tribes	-0.29	0.21	-0.22*	0.12
Other	-0.01	0.27	0.17	0.15
Religion (Muslim/Other)				
Mainline Christianity	0.37*	0.19	0.35***	0.11
Zionist/protestant	0.24	0.19	0.37***	0.11
Education in levels	0.48***	0.07	0.36***	0.05
Wealth index (Poorest)				
Poorer	0.32	0.21	0.30***	0.10
Poor	0.55***	0.19	0.44***	0.10
Less Poor	1.30***	0.21	1.04***	0.13
Least Poor	1.95***	0.25	1.32***	0.19
Urban (Rural)	1.3784***	0.15	1.35***	0.10
Intervention Region: Greater Accra, Ashanti and Eastern Region-R3M (Non intervention Regions)	0.70***	0.13	0.17**	0.09
N=4850				
Reference groups in parentheses				
Level of Significance: *p<0.1; **p<0.05; ***p<0.01				