

Association of Household Savings and Expected Future Means with Delivery Using a Skilled Birth Attendant in Ghana and Nigeria: A Cross-Sectional Analysis

Larissa Jennings¹ · Fan Yang¹ · Easmon Otupiri² · Ambrose Akinlo^{3,4} · Michael Okunlola⁵ · Michelle Hindin⁶

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Abstract *Objectives* This study examined the association between household savings and related economic measures with utilization of skilled birth attendants (SBAs) at last birth among women living in peri-urban households ($n = 381$) in Ghana and Nigeria. *Methods* Data were drawn from the 2011–2014 Family Health and Wealth Study. Multivariable logistic regression models were used to estimate the odds of delivery with an SBA for individual and composite measures of household savings, expected financial means, debt, lending, and receipt of financial assistance, adjusting for demographic and reproductive characteristics. *Results* Seventy-three percent (73 %) of women delivered with an SBA during their last birth (89 %, Ghana; 63 %, Nigeria), and roughly one third (34 %) of households reported having any in-cash or in-

kind savings. In adjusted analyses, women living in households with savings were significantly more likely to deliver with an SBA compared to women in households without any savings (aOR = 2.02, 95 % CI 1.09–3.73). There was also a consistent downward trend, although non-significant, in SBA utilization with worsening financial expectations in the coming year (somewhat vs. much better: aOR = 0.70, 95 % CI 0.40–1.22 and no change/worse vs. much better: aOR = 0.46, 95 % CI 0.12–1.83). Findings were null for measures relating to debt, lending, and financial assistance. *Conclusion* Coupling birth preparedness and complication readiness strategies with savings-led initiatives may improve SBA utilization in conjunction with targeting non-economic barriers to skilled care use.

✉ Larissa Jennings
ljennin6@jhu.edu

Fan Yang
fan.yang@jhu.edu

Easmon Otupiri
easmono@yahoo.com

Ambrose Akinlo
akinlo@gmail.com

Michael Okunlola
biolaokunlola@gmail.com

Michelle Hindin
mhindin@jhu.edu

³ Department of Demography and Social Statistics, Faculty of Social Sciences, Obafemi Awolowo University, Ife, Nigeria

⁴ School of Research and Postgraduate Studies, Faculty of Human and Social Sciences, North West University (Mafikeng Campus), Mmabatho, South Africa

⁵ Fertility Research and Endocrinology Unit, Department of Obstetrics and Gynecology, University College Hospital, Ibadan, Oyo State, Nigeria

⁶ Department of Population, Family, and Reproductive Health, Bill & Melinda Gates Institute for Population and Reproductive Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

¹ Program in Social and Behavioral Interventions, Department of International Health, Johns Hopkins Bloomberg School of Public Health, 615 N. Wolfe Street, Room E5038, Baltimore, MD 21205, USA

² School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Keywords Skilled birth attendance · Institutional delivery · Birth preparedness · Savings · Economic · Obstetric

Abbreviations

AOR	Adjusted odds ratio
ANC	Antenatal care
BPCR	Birth preparedness and complication readiness
CI	Confidence interval
SBA	Skilled birth attendant
OR	Odds ratio

Significance

Encouraging pregnant women and families to put money aside is an important component of birth preparedness and complication readiness programs to reduce financial barriers to using skilled birth care.

Introduction

Delivery assistance by skilled birth attendants (SBA) is one of the most important strategies of safe motherhood programs to prevent maternal morbidity and mortality in low-income countries (World Health Organization 2004; Karkee et al. 2013). In 2013, an estimated 289,000 women died as a result of complications during pregnancy and childbirth, and another 18 million women experienced severe and long-term complications before or after birth (WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. World Health Organization 2014). Many causes of maternal death and severe maternal morbidity, such as hemorrhage, infection, obstructed labor, unsafe abortion, and eclampsia, are preventable if births are assisted by SBAs (World Health Organization 2004; WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. World Health Organization 2014)—doctors, nurses, or midwives who have undergone accredited training to manage normal deliveries and recognize, refer, or manage obstetric complications (World Health Organization 2004). Ensuring that all births are assisted by an SBA has been shown to reduce maternal morbidity and mortality (De Brouwere et al. 1998; Koblinsky et al. 1999; Pathmanathan et al. 2003). Yet, in sub-Saharan Africa, where the highest ratio of maternal deaths occur (WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. World Health Organization 2014), half of births on average take place in the absence of a clinically-trained doctor, nurse, or midwife (UNICEF Data. Monitoring the Situation of Women and Children 2014).

Women give birth without skilled assistance due to variety of reasons, such as the availability and accessibility of health facilities, the absence of perceived need for skilled care, and delays in symptom recognition, care-seeking, and receipt of care, including other socio-cultural norms (Kabakyenga et al. 2012; Wilunda et al. 2014; Navaneetham and Dharmalingam 2002). However, studies have repeatedly shown that lack of money in the form of cash is also a significant barrier to using skilled care for poor populations by delaying or preventing care-seeking (Karkee et al. 2013; Kabakyenga et al. 2012; Wilunda et al. 2014; Balaji et al. 2003; Mohanty and Srivastava 2013). At the national level, women in the lowest wealth quintiles are less likely to deliver with a skilled birth attendant than women with higher household economic status (Kruk et al. 2008; Kesterton et al. 2010). Within families, lack of financial resources can often result in delays to seek care, including arranging for transportation and obtaining birthing supplies needed for safe and clean delivery (Wilunda et al. 2014; Balaji et al. 2003; Mohanty and Srivastava 2013; Adewemimo et al. 2014). As a result, saving money to cover expenses related to accessing skilled obstetric care is an essential component of birth preparedness and complication readiness (BPCR)(JHPIEGO 2004; World Health Organization 2006). BPCR is a process promoted by safe motherhood programs to increase assistance by skilled birth attendants for normal births and for possible obstetric emergencies. In addition to putting money aside for delivery, BPCR encourages attending antenatal care, identifying a skilled health professional or health facility, organizing transportation, and making other arrangements such as preparing a clean delivery kit (Karkee et al. 2013; Mukhopadhyay et al. 2013; Markos and Bogale 2014).

Many countries in sub-Saharan Africa are increasingly utilizing BPCR approaches to reduce maternal morbidity and mortality through skilled birth attendance as a key component of focused antenatal care (Soubeiga et al. 2014; Miltenburg et al. 2013). While several studies have found that birth prepared women (i.e., those who implement three or more BPCR preparations) are more likely to deliver with a skilled health provider (Karkee et al. 2013; Kabakyenga et al. 2012; Nawal and Goli 2013; Agarwal et al. 2010; Tura et al. 2014), little is known about the relationship between saving money and use of skilled birth attendants. This is despite the fact that arranging alternative funds for service fees, materials, and transportation relating to birth is essential to BPCR and a commonly reported preparation among pregnant women in low-income countries (Mukhopadhyay et al. 2013; Markos and Bogale 2014; Agarwal et al. 2010; Moran et al. 2006; Asp et al. 2014; Bhatta 2013; Ekabua et al. 2011; Wiegers et al. 2010). Two studies found that Nepalese women who saved money were more likely to give birth in a health facility than women

who did not save (Karkee et al. 2013; Nawal and Goli 2013). In Burkina Faso, women who planned to save money were also more likely to deliver with an SBA than women who did not plan to save (Moran et al. 2006). However, the association of actual savings and skilled assistance at birth has not yet been studied in sub-Saharan Africa.

Understanding the relationship between savings behavior and skilled care use would provide important insights into the improvement of BPCR messaging among households with existing savings or those intending to set aside cash for a future birth. The objective of this study was to determine the association between availability of savings, including current and expected financial means, on use of skilled obstetric care. Specifically, we examined at a population-level whether women who report living in households with savings or expected future savings were more likely to deliver with an SBA compared to women who reported having no current or expected future savings in two sub-Saharan African countries. We also examined the association of other economic indicators, such as debt, lending history, and receipt of financial assistance, on SBA utilization.

Methods

Study Design

Data for this analysis were obtained from the Family Health and Wealth Study (FHWS), a multi-country longitudinal study of married and cohabiting couples assessing the effect of childbearing patterns on family health and economic outcomes. The FHWS was conducted in peri-urban settings in five countries: Ethiopia, Ghana, Malawi, Nigeria, and Uganda. We used the data from two countries: Ghana and Nigeria, collected by the Kwame Nkrumah University of Science and Technology (KNUST) of Ghana and the University of Ibadan and the Obafemi Awolowo University (OAU), both of Nigeria. Data from Ghana were collected from peri-urban households in Kumasi, the second largest city in Ghana. In Nigeria, two peri-urban sites participated in the study, both located in the southwestern region of the country: Ipetumodu in Osun State and Akiyele in Oyo State.

Data Sample

Information on family health and wealth outcomes was measured using structured household interviews with married and cohabiting couples. Men and women were interviewed separately in a private household space. Eligible women for participation in the parent study (FHWS)

were those of reproductive age, 15–49 years who were cohabiting or married. Eligible men were those aged 20–60 years who were married or cohabiting with an eligible woman. Only one couple per household was selected to participate. Among polygamous households, only one wife, the eldest-married/cohabiting woman who met the eligibility criteria, was selected.

We selected the countries of Ghana and Nigeria for the analysis based on the available data at the time. Two of the study's three rounds of observation had been completed: round one (baseline) and round two (midline), although complete economic data were available only in round two. Data for rounds one and two were collected in 2011–12 and 2013–14, respectively. A total of 1384 married and cohabiting women, aged 15–49 years, were enrolled in the parent study at round two in Ghana ($n = 623$, 45.0 %) and Nigeria ($n = 761$, 55.0 %). Eligible women for inclusion in the current analysis were those who reported at least one birth in the last two years. Because household savings was measured at the time of study, and therefore after the time of delivery, the current analysis excluded women whose most recent birth occurred prior to the last study visit (approximately two years) in order to minimize potentially vast differences in household savings over time.

Country Settings

According to the Ghana Demographic and Health Survey (DHS), approximately 97 % of pregnant women attended antenatal care (ANC) during pregnancy at least once and about 87 % received ANC at least four times (Ghana Demographic et al. 2014). On average, 74 % of all births were assisted by a skilled birth attendant with 73 % delivering in a health facility (Ghana Demographic et al. 2014). This represents roughly 26 % of Ghanaian women delivering outside a health facility without any skilled obstetric care, despite nationwide introduction of a free delivery fee policy in 2003 in all public and mission healthcare facilities (Ganle et al. 2014). Health worker attitudes and inadequate facilities, including expensive and long traveling times have all been attributed to barriers to accessing skilled obstetric care (Ansong 2015). In addition, according to the World Bank, in 2012, 24.2 % of the population of Ghana lived below the national poverty line.

Based upon the Nigeria DHS, 63 % of all pregnant women attended ANC at least once, and 51 % received ANC four times. About 38 % of all women received delivery assistance by an SBA (36 % in a health facility) with rates generally being lower in the northern regions of the country (Nigeria Demographic and 2013). Despite free maternity care in public health facilities in Nigeria, the cost of skilled obstetric care, including travel and laboratory expenses, has been shown to be prohibitive for some

Nigerian families and to negatively impact SBA utilization (Okonofua et al. 2011; Sambo et al. 2013). Most recent data in 2009 estimated that 46.0 % of the Nigerian population was living below the national poverty line.

Measures

The study's primary outcome was delivery assistance by an SBA during the most recent child birth. Women were asked if they had ever given birth. If yes, they were then asked who assisted the delivery of their most recent birth. Women who reported assistance by at least one doctor, nurse, or midwife were categorized dichotomously as having delivered with an SBA versus women who reported delivery attendance in absence of an SBA by an individual or group of relatives, friends, or unskilled health providers, such as a clinical officer, medical assistant, nursing aid, or traditional birth attendant.

The main independent variables were household savings and expected future means. To measure household savings, the head of household was asked if his/her family had any savings, such as banked cash, stocks, jewelry, or any other, and if so, the approximate currency value at the time of the study. Given the low savings rates in both countries, women living in households reporting any savings (savings >0) were compared to those living in households who reported no savings in any form. We also asked whether households expected in one year's time that their family would live better than the current day, the same, or worse. Five pre-coded responses were possible: much better, somewhat better, no change, somewhat worse, much worse. Given the limited number of neutral and negative responses, we categorized women into three groups to represent expected future household means as: much better, somewhat better, and no change/worse.

Three additional economic variables were included in the analysis relating to debt, lending history, and receipt of financial assistance. The head of household was asked if his/her family had any debt or had previously lent money to others, and if so, how much. Women living in indebted households (debt amount >0) were compared to those whose families did not hold debt. Similar binary variables were used for women living in households who had versus had not previously lent money to other families. A final question related to whether the woman's family had received (or not received) any assistance in kind (food, clothing, or other items) in the last one month from persons who were not members of the household. To assess the cumulative effect of positive economic outcomes, a composite measure of all five economic variables was calculated where each favorable outcome received 1 point, resulting in a total possible score of 5.

Analysis

Data were analyzed using STATA (SE), Version 14. We first examined the distribution of women's demographic, reproductive, and economic characteristics by country and by total sample. Two-sample *t* tests and Chi-square statistics were used to examine differences in the distribution of these characteristics by country for continuous and categorical measures, respectively. Exploratory analyses were also used to examine the presence of outlier values and missingness within the sample. To retain all data, we used multiple imputation by chained equations to simulate missing values for 9 % of observations, and compared analyses using non-missing versus imputed values. We then used bivariate logistic regressions to obtain the crude odds ratio of skilled birth attendance for each of the economic variables of interest, including women with a total economic score >3. As a final step, we selected adjustment variables known to be or which demonstrated in bivariate analyses moderate to strong association with the primary outcome and independent variable. Adjusting for demographic and prior reproductive characteristics, multivariable logistic regressions were then used to obtain adjusted odds ratios for each model. All analyses were considered statistically significant at $p < 0.05$.

Ethics Approval

Ethics approval for the Family Health and Wealth Study was obtained from the institutional review boards of each of the universities, including KNUST's Committee on Human Research Publication and Ethics, and OAU's Ethics and Research Committee. The de-identified data were provided to the researchers for secondary data analysis.

Results

Demographic Characteristics

Based on the number of women who met the inclusion criteria, the final analytic sample was a total of 381 married or cohabiting women, aged 15–49 years, in Ghana ($n = 158$, 42 %) and Nigeria ($n = 223$, 59 %) (Table 1). The total sample mean age of included women was 30.3 years (± 0.3). The majority of women had completed primary education or higher (95 %, $n = 363$). On average, women in Nigeria were younger (29.7 vs. 31.2 years, $p < 0.01$), more likely to have completed primary education or higher (98 vs. 91 %, $p < 0.01$) and less likely to be married (83 vs. 92 %, $p < 0.05$). The most common religious affiliations were Christian (54 and 48 %, $p < 0.01$) in Nigeria and Ghana, respectively.

Reproductive and Economic Characteristics

Seventy-three percent (73 %, $n = 280$) of women reported delivering with a skilled birth attendant during their most recent birth (Table 1). Nearly one third of women (29 %, $n = 112$) were primiparous, and 81 % ($n = 309$) had received the recommended four ANC visits. Skilled birth attendance was more common in Ghana as compared with Nigeria (89 vs. 63 %, $p < 0.001$). The proportion of women who had received four ANC visits was also higher in Ghana (88 vs. 76%, $p < 0.01$) as compared to Nigeria.

Thirty-four percent (34 %, $n = 131$) of women lived in households that had any savings, such as in a bank, stocks, jewelry, or any other savings (Table 1). Half (50 %, $n = 191$) of women lived in households expecting in one year's time that their family would live much better than the current day, compared to 45 % ($n = 171$) expecting to live somewhat better, and 3 % ($n = 13$) expecting no change or worse financial means in one year's time. Over a third of women lived in households who had any debt (43 %, $n = 162$) or had lent money to others (38 %, $n = 145$). Fewer women (12 %, $n = 45$) lived in households that had received any in kind or in cash financial assistance. Ghanaian women were more likely to live in households having any savings when compared to Nigerian women (43 vs. 28 %, $p < 0.01$). However, Nigerian women more often reported having lent money to others (52 vs. 18 %, $p < 0.001$) and expecting their household's future financial means in one year to be much better (61 %) when compared to women living in Ghana (35 %, $p < 0.001$). A higher proportion of Nigerian women also lived in households with debt (55 vs. 25 %, $p < 0.001$). The average number of positive economic characteristics was 2.7 (± 0.1) with similar findings in Nigeria (2.8 ± 0.1) and Ghana (2.6 ± 0.1 , $p > 0.05$).

Association of Economic Characteristics and SBA

Adjusting for women's demographic and prior reproductive characteristics, household savings in the combined analysis was significantly associated with SBA utilization (Table 2). Women living in households with savings were nearly twice as likely to deliver with an SBA compared to women in households without any savings (aOR = 2.02, 95 % CI 1.09–3.73). Women living in households that expected only somewhat better financial means (aOR = 0.70, 95 % CI 0.40–1.22) or no change/worse financial means (aOR = 0.46, 95 % CI 0.12–1.83) were less likely to deliver with an SBA compared to women in households expecting much better financial means in one year, although these trends were not statistically significant. In addition, in adjusted models, household debt

(aOR = 0.91, 95 % CI 0.53–1.57), prior lending to others (aOR = 1.04, 95 % CI 0.59–1.84), and receipt of in cash or in kind financial assistance (aOR = 1.18, 95 % CI 0.52–2.71) were not significantly associated with SBA use. However, in sum, having >3 positive economic characteristics was significantly associated with SBA use (aOR = 2.35, 95 % CI 1.15–4.84).

Different trends were observed by country. Nigerian women in households with savings (aOR = 2.81, 95 % CI 1.25–6.33) and >3 positive economic characteristics (aOR = 2.69, 95 % CI 1.21–5.99) were significantly more likely to deliver with an SBA (Table 3). In Ghana, household savings was not associated with skilled attendance at birth (aOR = 0.79, 95 % CI 0.25–2.48) (Table 3). For both countries, no inferential differences were observed between non-missing and imputed results.

Discussion

Lack of money is a significant hindrance to using skilled obstetric care (Karkee et al. 2013; Kabakyenga et al. 2012; Wilunda et al. 2014; Balaji et al. 2003; Mohanty and Srivastava 2013). For this reason, BPCR recommends couples begin setting aside money early in pregnancy in preparation for birth (JHPIEGO 2004; World Health Organization 2006; Mukhopadhyay et al. 2013; Markos and Bogale 2014). Our findings indicate that household availability of savings, whether set aside specifically for birth or not, is associated with higher odds of delivering with skilled assistance after adjusting for demographic and reproductive characteristics. The observed association between household savings and skilled birth attendance could mean that available savings enable women and families to better seek skilled services at birth compared to women in families without savings. Studies in Nepal have also shown that saving money is positively associated with skilled attendance at birth, as measured by delivery at a health facility (Karkee et al. 2013; Nawal and Goli 2013). However, our study found that fewer than half of households reported having any savings, despite saving money being the most commonly reported birth preparation in several African countries (65–88 %)(Markos and Bogale 2014; Moran et al. 2006; Asp et al. 2014). We also found that SBA use was not universal. Over a quarter of women reported giving birth without an SBA, slightly lower than unskilled birth rates in similar African studies in Burkina Faso, Ethiopia, Kenya, and Uganda, ranging from 31 to 57 % (Kabakyenga et al. 2012; Tura et al. 2014). In addition, only a third of women had received the recommended minimum of four ANC visits, which may have represented a missed opportunity for giving birth preparedness information on putting money aside.

Table 1 Demographic, reproductive and economic characteristics by country and total

Number of women with reported response (%) ^a	Nigeria	Ghana	<i>p</i> value	Total
Survey sample	223	158	–	381
<i>Demographic characteristics</i>				
Mean age in years (\pm SE)	29.7 (\pm 0.3)	31.2 (\pm 0.4)	<0.01	30.3 (\pm 0.3)
Education				
Primary education or higher	219 (98 %)	144 (91 %)	<0.01	363 (95 %)
Less than primary education	4 (2 %)	14 (9 %)		18 (5 %)
Religion				
Christian	121 (54 %)	91 (58 %)	<0.01	212 (56 %)
Muslim	77 (35 %)	63 (40 %)		140 (37 %)
Traditional/other ^b	25 (11 %)	3 (2 %)		28 (7 %)
Marital status				
Married	184 (83 %)	145 (92 %)	<0.05	329 (86 %)
Cohabiting	38 (17 %)	13 (8 %)		51 (13 %)
Separated	1 (0 %)	0 (0 %)		1 (0 %)
<i>Reproductive characteristics</i>				
Birth attendance				
Skilled	140 (63 %)	140 (89 %)	<0.001	280 (73 %)
Unskilled	83 (37 %)	18 (11 %)		101 (27 %)
Parity				
Primiparous (first birth)	64 (29 %)	48 (30 %)	>0.05	112 (29 %)
Multiparous (subsequent birth)	159 (71 %)	110 (70 %)		269 (71 %)
Number of ANC visits				
Four or more	170 (76 %)	139 (88 %)	<0.01	309 (81 %)
Less than four	53 (24 %)	19 (12 %)		72 (19 %)
<i>Household economic characteristics</i>				
Has any savings				
Yes	63 (28 %)	68 (43 %)	<0.01	131 (34 %)
No	140 (63 %)	76 (48 %)		216 (57 %)
Missing ^c	20 (9 %)	14 (9 %)		34 (9 %)
Expected financial means in one year				
No change/worse	9 (4 %)	4 (3 %)	<0.001	13 (3 %)
Somewhat better	74 (33 %)	97 (61 %)		171 (45 %)
Much better	136 (61 %)	55 (35 %)		191 (50 %)
Missing ^c	4 (2 %)	2 (1 %)		6 (2 %)
Has any debt				
Yes	122 (55 %)	40 (25 %)	<0.001	162 (43 %)
No	96 (43 %)	114 (72 %)		210 (55 %)
Missing ^c	5 (2 %)	4 (3 %)		9 (2 %)
Lent any money to others				
Yes	117 (52 %)	28 (18 %)	<0.001	145 (38 %)
No	100 (45 %)	126 (80 %)		226 (59 %)
Missing ^c	6 (3 %)	4 (3 %)		10 (3 %)
Received any financial assistance				
Yes	27 (12 %)	18 (11 %)	>0.05	45 (12 %)

Table 1 continued

Number of women with reported response (%) ^a	Nigeria	Ghana	<i>p</i> value	Total
No	195 (87 %)	138 (87 %)		333 (87 %)
Missing ^c	1 (0 %)	2 (1 %)		3 (1 %)
Mean (± SE) composite economic score (0–5)	2.8 (± 0.1)	2.6 (± 0.1)	>0.05	2.7 (± 0.1)

^a The sum of percentages may not equal to 100 % due to rounding or missing data

^b Does not include women with no reported religious affiliation

^c Represents missing or non-response values

Table 2 Crude and adjusted odds ratios for skilled birth attendance and selected economic characteristics by total

Number of women with reported response (%)	Total <i>N</i> (%)	Birth attended by SBA <i>n</i> (%)	Birth not attended by SBA <i>n</i> (%)	Crude OR ^b	95 % CI	Adjusted OR ^{b,c}	95 % CI
Total	381	280 (73 %)	101 (27 %)	–	–	–	–
Has any savings							
Yes	131	107 (82 %)	24 (18 %)	1.84*	1.10–3.11	2.02*	1.09–3.73
No	216	148 (69 %)	68 (31 %)	1.00	–	1.00	–
Missing ^a	34	25 (74 %)	9 (26 %)				
Expected financial means in one year							
No change/worse	13	7 (54 %)	6 (46 %)	0.46	0.15–1.45	0.46	0.12–1.83
Somewhat better	171	130 (76 %)	41 (24 %)	1.18	0.73–1.89	0.70	0.40–1.22
Much better	191	139 (73 %)	52 (27 %)	1.00	–	1.00	–
Missing ^a	6	4 (67 %)	2 (33 %)				
Has any debt							
Yes	162	112 (69 %)	50 (31 %)	0.66	0.41–1.06	0.91	0.53–1.57
No	210	163 (78 %)	47 (22 %)	1.00	–	1.00	–
Missing ^a	9	5 (56 %)	4 (44 %)				
Lent any money to others							
Yes	145	95 (66 %)	50 (34 %)	0.55*	0.34–0.88	1.04	0.59–1.84
No	226	176 (78 %)	50 (22 %)	1.00	–	1.00	–
Missing ^a	10	9 (90 %)	1 (10 %)				
Received any financial assistance							
Yes	45	33 (73 %)	12 (27 %)	1.00	0.50–2.03	1.18	0.52–2.71
No	333	245 (74 %)	88 (26 %)	1.00	–	1.00	–
Missing ^a	3	2 (67 %)	1 (33 %)				
Composite economic score >3							
Yes	76	61 (80 %)	15 (20 %)	1.50	0.78–2.89	2.35*	1.15–4.84
No	261	187 (72 %)	74 (28 %)	1.00	–	1.00	–
Missing ^a	44	32 (73 %)	12 (27 %)				

Bold values are statistically significant at * *p* < 0.05; ** *p* < 0.01; *** *p* < 0.001

^a Represents missing or non-response values

^b ORs are calculated with imputed values for missing data

^c Adjusted for maternal age, education, religion, marital status, country, primiparity, and antenatal care use for most recent birth with imputed values for missing data

These findings point to two implications regarding BPCR messaging in low-income countries. One, efforts are still needed to improve SBA uptake given the moderate proportions of women seeking skilled care. BPCR messaging outside of antenatal settings may also promote birth savings and the importance of skilled assistance to women

with low ANC attendance and to household members who may not accompany them to ANC. Secondly, BPCR counseling on saving for birth may further encourage households to save for postnatal care needs and subsequent pregnancies. The low savings rate in this study relative to generally higher reported rates of birth savings in the

Table 3 Crude and adjusted odds ratios for skilled birth attendance and selected economic characteristics by country

Number of women with reported response (%)	Total N (%)	Birth attended by SBA n (%)	Birth not attended by SBA n (%)	Crude OR ^b	95 % CI	Adjusted OR ^{b,c}	95 % CI
<i>Nigeria</i>							
Has any savings							
Yes	63	48 (76 %)	15 (24 %)	2.28*	1.17–4.48	2.81*	1.25–6.33
No	140	80 (57 %)	60 (43 %)	1	–	1	–
Missing ^a	20	12 (60 %)	8 (40 %)				
Expected financial means in one year							
No change/worse	9	5 (56 %)	4 (44 %)	0.67	0.17–2.60	1.18	0.25–5.60
Somewhat better	74	44 (59 %)	30 (41 %)	0.79	0.44–1.42	0.67	0.35–1.27
Much better	136	89 (65 %)	47 (35 %)	1	–	1	–
Missing ^a	4	2 (50 %)	2 (50 %)				
Has any debt							
Yes	122	74 (61 %)	48 (39 %)	0.75	0.43–1.32	0.71	0.38–1.30
No	96	64 (67 %)	32 (33 %)	1	–	1	–
Missing ^a	5	2 (40 %)	3 (60 %)				
Lent any money to others							
Yes	117	69 (59 %)	48 (41 %)	0.75	0.43–1.30	0.94	0.51–1.73
No	100	66 (66 %)	34 (34 %)	1	–	1	–
Missing ^a	6	5 (83 %)	1 (17 %)				
Received any financial assistance							
Yes	27	16 (59 %)	11 (41 %)	0.84	0.37–1.92	1.09	0.43–2.77
No	195	124 (64 %)	71 (36 %)	1	–	1	–
Missing ^a	1	0 (0 %)	1 (100 %)				
Composite economic score >3							
Yes	49	36 (73 %)	13 (27 %)	1.93	0.95–3.92	2.69*	
No	146	86 (59 %)	60 (41 %)	1	–	1	1.21–5.99
Missing ^a	28	18 (64 %)	10 (36 %)				–
<i>Ghana</i>							
Has any savings							
Yes	68	59 (87 %)	9 (13 %)	0.78	0.29–2.15	0.79	0.25–2.48
No	76	68 (89 %)	8 (11 %)	1	–	1	–
Missing ^a	14	13 (93 %)	1 (7 %)				
Expected financial means in a year							
No change/worse	4	2 (50 %)	2 (50 %)	0.10*	0.01–0.85	0.04**	0.00–0.46
Somewhat better	97	86 (89 %)	11 (11 %)	0.78	0.25–2.36	0.56	0.15–2.12
Much better	55	50 (91 %)	5 (9 %)	1	–	1	–
Missing ^a	2	2 (100 %)	0 (0 %)				
Has any debt							
Yes	40	38 (95 %)	2 (5 %)	2.52	0.54–11.8	2.33	0.46–11.8
No	114	99 (87 %)	15 (13 %)	1	–	1	–
Missing ^a	4	3 (75 %)	1 (25 %)				
Lent money to others							
Yes	28	26 (93 %)	2 (7 %)	1.96	0.42–9.08	1.82	0.34–9.79
No	126	110 (87 %)	16 (13 %)	1	–	1	–
Missing ^a	4	4 (100 %)	0 (0 %)				
Received any financial assistance							
Yes	18	17 (94 %)	1 (6 %)	2.41	0.30–19.3	3.11	0.34–28.2
No	138	121 (88 %)	17 (12 %)	1	–	1	–
Missing ^a	2	2 (100 %)	0 (0 %)				

Table 3 continued

Number of women with reported response (%)	Total N (%)	Birth attended by SBA n (%)	Birth not attended by SBA n (%)	Crude OR ^b	95 % CI	Adjusted OR ^{b,c}	95 % CI
Composite economic score >3							
Yes	27	25 (93 %)	2 (7 %)	1.56	0.35–7.01	2.36	0.42–13.1
No	115	101 (88 %)	14 (12 %)	1	–	1	–
Missing ^a	16	14 (87.50 %)	2 (12.50 %)				

Bold values are statistically significant at * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^a Represents missing or non-response values

^b ORs are calculated with imputed values for missing data

^c Adjusted for maternal age, education, religion, marital status (Nigeria only given perfect prediction with SBA use in Ghana), primiparity, and antenatal care use for most recent birth using imputed values for missing data

literature may reflect a common practice of households needing to acquire savings for birth in absence of any prior cash reserves. Research has shown that lack of money for birth travel, referral, supplies, and subsistence costs, even when the cost of care itself is free, considerably hinders access to skilled care (Wilunda et al. 2014; Balaji et al. 2003; Tura et al. 2014). Birth expenses can also exceed available subsidies and short-term savings. Our results indicate that women in families with general household savings were more likely to deliver with an SBA. However, it is possible likewise that the association between savings and SBA use reflected decisions to save for future births based on prior prohibitive debt incurred from using skilled care, rather than savings used for a previous SBA. More research is needed to understand the interplay between incurred maternal expenses, savings, and decisions to save or seek skilled care for future births. Increasing long-term household savings promotion may have positive influences on the continued use of skilled care across the maternal care continuum, especially among families hindered by the financial costs of care. While current BPCR strategies encourage birth savings, a savings-led approach in which women and families are incentivized and equipped to save through matched savings, microfinance schemes, or financial management training may prove beneficial. Such efforts would also need to ensure that women and families have timely access to monies saved during normal and emergency deliveries.

In contrast, the finding of non-significance implies that household expected future means, presence of debt, and receipt of financial assistance are not important determinants of SBA use, and that addressing non-economic barriers should remain a priority for birth preparedness interventions. Yet, it is interesting to note that expecting less positive financial means in the coming year was associated with consistent downward trends in SBA use, although this was not statistically significant. In addition, the non-significant findings relating to savings and SBA

use in the Ghana-only analysis may have reflected the model's smaller sample size in conjunction with higher rates of SBA use. Further research is needed to elucidate this pattern in understanding how household resources are allocated for maternal care and how household financial expectations impact intentions to incur real or perceived skilled care costs. The lack of statistical significance in having money to lend to others and receiving financial assistance may also mean that households with additional resources, in the context of competing needs, do not allocate those resources to skilled care-seeking. Studies have shown that money intended to be used for birth is often reallocated to other essential and non-essential priorities (Karkee et al. 2013; Agarwal et al. 2010). Future BPCR interventions may be needed to assist women and households in birth financial planning over the long-term, particularly in contexts where debt or lending money to others is a barrier to saving.

Strengths and Limitations

The study's strengths include analysis of two sub-Saharan African countries for which there are limited data on the relationship between skilled birth attendance, savings, and related economic measures. However, while household savings was assessed at the time of the study, SBA use was based on a woman's most recent birth up to two years prior. Our findings are thus limited by an assumption that household savings status at the time of study was comparable to the level of savings at the time of delivery. Because this may not always have been the case, no causal inferences can be made. We excluded women whose most recent birth exceeded two years to keep the timing of economic measures as close to the time of delivery as possible. Our sensitivity analyses suggested that economic measures between excluded and included women varied slightly, in addition to slight variations in analyses using only non-missing versus imputed data, although overall

inferences between samples were comparable. Finally, the study also did not take into account the liquidity of savings or whether savings were spent on maternal health care; and some measures may have been subject to recall bias. To minimize such biases, only a woman's most recent birth was assessed, and all economic measures were analyzed as present or not present, rather than in absolute monetary values.

Conclusion

Encouraging pregnant women and families to put money aside is an important component of BPCR to reduce financial barriers to skilled care-seeking. Our findings suggest that household savings are significantly associated with SBA use and that expecting less positive future financial means potentially deters SBA use. Coupling BPCR strategies with savings-led initiatives may improve SBA use, along with non-economic strategies. Future studies should examine the interaction over time of incurred maternal costs and decisions to save or seek skilled care for future births.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

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