

**Young Women's Childbearing & Maternal Healthcare Use Across Migration Streams:  
Evidence from sub-Saharan Africa**

**Cassandra Cotton  
Department of Sociology, McGill University  
February 3, 2016**

**\*\*Draft – Please do not cite without permission of the author.\*\***

**Abstract**

Young adulthood is a vulnerable life-stage where changes in environment and family support resulting from migration may put youth at increased likelihood of early transitions to adulthood, including early childbearing. Pregnant youth have increased risk of poor maternal health outcomes, and frequently have lower rates of maternal healthcare utilization, including less frequent and later prenatal care and childbirth without skilled assistance. Migrant youth may be even more vulnerable given stresses of migration and potential difficulties in obtaining care in a new community. Using data from 27 Demographic and Health Surveys across sub-Saharan Africa, I determine odds of skilled prenatal care and delivery assistance by migrant stream – non-migrant, lateral (urban-urban, rural-rural) and non-lateral (urban-rural, rural-urban) migrant. Preliminary results suggest certain streams of migrants, namely rural-rural migrants, are more vulnerable to inadequate maternal healthcare while lateral and non-lateral migrants to urban areas benefit from an urban advantage in accessing skilled maternal healthcare.

## Introduction

Young adulthood is a particularly vulnerable period, where migration and the associated changes in environment and family structure can put young women at increased likelihood of early transitions to adulthood and potentially negative outcomes. Young migrants in sub-Saharan Africa have been found to experience earlier sexual debut (Luke et al., 2012; Mberu & White 2011), earlier marriage (Chalasanani et al. 2013; Clark & Cotton 2013), and early childbearing compared to non-migrants (Clark & Cotton 2013; Xu et al. 2013). Young women who give birth in adolescence and early adulthood are often at risk of poor health outcomes (World Health Organization 2015), which may be aggravated by the experience of migration, particularly when migration involves significant disruption or stress. While previous research on adolescent migrants emphasizes how migration brings significant change in the lives of young women, the implications of migration on young women's health as they make certain transitions – like pregnancy – are unclear.

Each year, more than seven million girls under the age of 18 give birth in developing countries (UNFPA 2013). Childbearing among young women is highest in sub-Saharan Africa, with more than 50% of girls giving birth by age 20 (UNFPA 2007). Pregnancy and childbearing in young adulthood have significant health implications for both mothers and infants. Pregnant adolescents are at increased risk of morbidity and are twice as likely to die in childbirth compared to older mothers in many African countries (World Health Organization 2015). The children of young mothers are more likely to be premature and have low birth weight, and have a significantly increased risk of mortality compared to babies born to older mothers – deaths within one month of birth are 50 to 100% more common among babies born to adolescent mothers compared to older mothers (World Health Organization 2015). Skilled maternal healthcare, including prenatal care by a doctor, nurse, or midwife, and skilled delivery assistance, can help reduce morbidity and mortality for mothers and infants, and can improve the likelihood of positive birth outcomes (World Health Organization 2011; Abou-Zahr & Wardlaw 2003; de Bernis et al. 2003).

In recent decades, female migration has increased in many African countries (Beguy et al. 2010; Roig et al. 2008). While migration in sub-Saharan Africa is often conceptualized primarily as rural migrants moving to big cities, a variety of migration streams are common depending on a country's level of urbanization (Bilsborrow 1993; Oucho & Gould 1993). Migrants might move laterally (urban-urban or rural-rural) or non-laterally (urban-rural or rural-urban), or they may become international migrants by crossing their country's borders. Different streams of migration may result in diverse patterns of maternal healthcare utilization among young women based on the different experiences and consequences of migration. For some, migration may be a positive change, increasing access to employment, education, and improved services, especially in urban areas. For others, migration may be driven by poverty and migrants may find themselves at a disadvantage following migration as they struggle to adapt to their destination community. Where migrants move from and migrate to may significantly impact whether they access maternal healthcare following migration in young adulthood.

In this paper, I use data from 27 Demographic and Health Surveys across sub-Saharan Africa to determine how different streams of internal migration are associated with the use of skilled maternal healthcare among migrant youth. I focus on young migrants aged 15 to 24 as rates of migration among women in sub-Saharan Africa typically peak in adolescence and early

adulthood, with young women migrating at higher rates than young men from age 15 to 24 (Beguy et al. 2010; National Research Council and Institute of Medicine 2005). I examine the use of two key maternal health services – skilled prenatal care and skilled delivery assistance – following migration for both lateral (urban-urban, rural-rural) and non-lateral (urban-rural, rural-urban) migrants, seeking to answer the central question: Are there significant differences in skilled maternal healthcare utilization by mother’s migration stream? I explore differences first by migrant stream, then by controlling for potential migrant selectivity, and finally by investigating the role of duration of residence and adaptation in increasing or decreasing use of maternal health services by migrant stream. By examining the relationship between migration stream and use of maternal healthcare, I offer new insights into how migration affects young women’s health-seeking behaviors as they transition to adulthood in sub-Saharan Africa.

### **Determinants of Maternal Healthcare Utilization in sub-Saharan Africa**

In much of sub-Saharan Africa, fewer pregnant young women seek prenatal care and far fewer give birth in a hospital or under the supervision of a trained medical professional compared to older mothers (Guliani et al. 2014; UNFPA 2013; Magadi et al 2007). In some African countries, fewer than half of pregnant adolescents receive prenatal care from skilled healthcare providers and in many countries less than one-third of young women deliver in the care of a skilled attendant (Kothari et al. 2012). In Kenya, a sizeable proportion of young mothers do not initiate prenatal care in their first trimester and subsequently have lower likelihood of using a skilled birth assistant than older mothers (Ochako et al. 2011). Across sub-Saharan Africa, adolescent mothers are more likely to begin prenatal care later in pregnancy and to receive inadequate care – less than four visits throughout pregnancy (Magadi et al. 2007). Throughout the sub-continent, more educated, wealthier adolescents living in urban areas report increased use of maternal health services (Rai et al. 2014; Ochako et al. 2011; Magadi et al. 2007).

Young women may have lower rates of maternal health service utilization for a variety of reasons, including lack of financial resources, less awareness of the importance of prenatal care for maternal and child health, late discovery of pregnancy (due to denial of pregnancy risk or failure to recognize symptoms of pregnancy), or hiding pregnancy from parents or community members. Young women, especially unmarried adolescents, frequently report that their pregnancies are unintended or unwanted (Mumah et al. 2014), and those with mistimed or unwanted pregnancies may be less likely to seek timely prenatal care (Pell et al. 2013). Migration, given the associated changes in family structure, support systems, and environment that occur as part of the process, is likely to complicate the use of skilled maternal care (Kusumu et al. 2013; Subaiya 2007), particularly among young mothers. While a number of studies have examined factors promoting or inhibiting use of maternal healthcare among women in sub-Saharan Africa (Ochako et al. 2011; Gage 2007; Magadi et al. 2007), none have thus far looked at the role migration may play in increasing or decreasing use of skilled maternal care.

Significant differences between use of maternal healthcare services in rural versus urban areas are noted in sub-Saharan Africa and other developing regions. Urban women are twice as likely to receive four or more prenatal visits (Abou-Zahr & Wardlaw 2003), and urban residents across wealth gradients are generally more likely to seek prenatal care compared to their rural counterparts (Guliani et al. 2014). Delivery in a health facility similarly varies across urban wealth quintiles, with rural mothers of all wealth quintiles much less likely to deliver in a facility

compared to urban counterparts (Guliani et al. 2012). In sub-Saharan Africa, the poorest urban residents are, however, significantly disadvantaged in maternal health outcomes compared to wealthier urban mothers (Magadi et al. 2003). In rural Mali, inadequate maternal healthcare use is linked in part to low access to health services as well as personal barriers such as distance to a facility (Gage 2007). Though studies in sub-Saharan Africa have highlighted urban-rural differentials in maternal healthcare utilization, few if any have included migrant status as a potential determinant, and none have explored how migrants of different streams use maternal health services following migration. As urban areas have a higher proportion of healthcare facilities and skilled medical personnel versus rural areas in much of sub-Saharan Africa, urban mothers are expected to have better access to skilled maternal healthcare, but access may be limited for new migrants, who are often poorer and reside in informal settlements where fewer health services exist (Fotso et al. 2008). Migrants to rural areas may also experience disadvantage in access to maternal healthcare, even if they have migrated from a location where skilled maternal care is the norm, as a result of fewer health facilities, greater distances to facilities, and other barriers.

### **Migration & Maternal Healthcare**

Research on women's migration and health in sub-Saharan Africa has primarily focused on the relationship between migration and child health, rather than maternal health. This body of research highlights some of the potential mechanisms concerning how migration affects health outcomes. Studies on maternal migration and child mortality in Africa and other low-income countries indicates, for example, that child mortality among children of rural-urban migrants is often higher compared to children of non-migrants in urban areas and lower compared to rural non-migrants (Omariba & Boyle 2010; Brockerhoff 1995, 1994, 1990). Similarly, evidence from Haiti suggests children of non-lateral migrants have elevated risk of mortality compared to children of non-migrants, while children of lateral migrants have decreased risks of mortality (Smith-Greenaway & Thomas 2014). Migration has a significant positive effect on child survival only for children of urban-urban migrant mothers in Uganda, likely due to selectivity in the migration process (Ssengonzi et al. 2002), while Bocquier and colleagues (2011) find that migration is advantageous particularly for children of urban-rural migrants whose risk of mortality decreases after migration in sub-Saharan Africa. Such findings may result from urban-rural differentials in availability of health services, suggesting those migrating to urban areas increase their access to better healthcare through migration, but are not able, at least initially, to match the mortality rates of urban natives due to disruption of the migration experience, while urban-rural migrants may benefit from leaving poor urban conditions that put their children at risk (Bocquier et al. 2011; Brockerhoff 1990).

Mother's migration within sub-Saharan Africa is also linked to child health outcomes beyond mortality, including immunization, which provides some evidence about how migration may impact health-seeking behaviors. In Benin, Smith-Greenaway and Madhavan (2015) find that children born after mothers migrate have significantly higher odds of vaccination compared to children of non-migrant mothers, while children born prior to migration are less likely to be immunized. Studies elsewhere in sub-Saharan Africa, however, suggest women's migrant status has a negative effect on health outcomes and health-seeking behavior after migration. The children of rural-rural migrants in Ethiopia are significantly less likely to be fully immunized compared to non-migrants, potentially resulting from mothers' disconnection from their host

community (Kiros & White 2004). Antai (2010) similarly finds that children of rural non-migrant mothers had significantly higher rates of full immunization compared to children of rural-urban migrants, suggesting migrants have difficulty accessing health services, even when moving to an area where such services are plentiful.

To my knowledge, no research has thus far examined maternal healthcare use among migrant women in sub-Saharan Africa. Work on maternal health of female migrants or women affected by migration in other developing countries suggests migration experience may improve levels of maternal healthcare use for some types of migrants while other migrants may experience disadvantage after migration (Zhao et al. 2012; Subaiya 2007; Lindstrom & Munoz-Franco 2006). Lindstrom and Munoz-Franco (2006) find that both urban migration experience, as well as ties to migrant family members, remove obstacles to accessing adequate maternal healthcare for rural women, largely through remittances and the diffusion of norms that emphasize the importance of skilled maternal care. A study of rural-urban migrants in Shanghai finds that less than half of migrant women giving birth in hospital received adequate prenatal care, and young mothers under age 25 are significantly less likely to have had at least five prenatal visits, though they make no comparisons to non-migrants (Zhao et al. 2012). Compared to married urban non-migrants and urban-urban migrants, rural-urban migrants in Peru are significantly less likely to receive sufficient prenatal care, indicating migration experience from rural areas may leave migrants unable to fully capitalize on available maternal health services in their destination, particularly if they are younger or poorer (Subaiya 2007). For rural-urban migrants in Delhi, India, use of antenatal care was low, but more settled migrants used maternal health services much more than recent migrants, suggesting an increased duration of residence improved access to maternal healthcare (Kusuma et al. 2013). Another study suggests the poorest migrants in urban India are significantly less likely to receive safe delivery care compared to wealthier non-migrant counterparts, suggesting that rural-urban migrants experiencing higher poverty and those new to their destination communities are at a disadvantage in accessing adequate skilled maternal care (Singh et al. 2012). While these studies demonstrate how migration may affect maternal health-seeking behaviors, none focus on the sub-Saharan African context, which may be quite different.

### **Migration Selection & Disruption**

Research on migration and other outcomes, such as migrant fertility, have highlighted the importance of considering both the selectivity of migrants as well as the potential disruption that migration may cause in the lives of migrants and the adaptation process that follows migration (White et al. 2008; Chattopadhyay et al. 2006). Such research suggests that migration is highly selective, meaning that migrants are often positively or negatively selected for migration based on their socio-demographic characteristics. Compared to their non-migrant peers, migrants tend to be positively selected on a number of characteristics, including having better health prior to migration, higher levels of education, increased wealth, and higher rates of employment or greater skills necessary to gain employment. This is particularly true for migrants to urban areas, who may rely on these positive socioeconomic characteristics to pursue new opportunities after migration. These positive socio-demographic characteristics more common among migrants are also often those characteristics associated with positive health behaviors and outcomes, hence why migrants may experience reduced fertility after migration (White et al. 2008; Chattopadhyay et al. 2006; Brockerhoff 1995) or better health outcomes for children (Ssengonzi et al. 2002).

Conversely, other streams of migrants such as those moving from urban to rural areas may be negatively selected on key characteristics, with lower socioeconomic status, poorer health, and lower educational achievement than other urban residents. Despite the disadvantaged status such migrants may experience in urban areas, they may find themselves with better socioeconomic status compared to their new rural counterparts after migration.

Given that migration is typically viewed as a disruptive phenomenon, it is often argued that migration may interfere with migrants' knowledge of and access to healthcare services, at least in the period following migration (Smith-Greenaway & Thomas 2014; Ssengonzi et al. 2006). Migrants may be socially and economically disadvantaged in their place of destination, and may not have the resources to find and use healthcare services when necessary. Migration is likely to affect young women's family support and social networks (Clark & Cotton 2013; Brockerhoff & Biddlecom 1999). Young migrants may be isolated in their new community, especially if they are not in close contact with those who may advise them on the importance of maternal healthcare such as family and female friends. Even when young women know of the need for pregnancy care and the location of such services, the disruption of migration may interfere with her health-seeking behaviors. Young women separated from traditional sources of support may have difficulty affording skilled care if they cannot rely on family to assist with the financial costs. In addition, the destination may alter migrants' access to healthcare services if the new community lacks healthcare facilities, as may be the case in rural areas with high levels of poverty or in particularly disadvantaged urban areas such as slum settlements (Fotso et al. 2008; Magadi et al. 2003). In the case of those who become pregnant shortly before or after migration, the disruption of migration may decrease their likelihood of accessing prenatal healthcare.

Migration stream is also likely to affect use of maternal healthcare as a result of different adaptation processes. Migrating laterally may not be as disruptive to migrants, as the destination environment will likely be more familiar to the migrant's place of origin. The process of adapting to a new community may thus take place quickly for those moving to similar environments. Lateral migrants may even experience an advantage to non-migrants or non-lateral migrants as they may be positively selected for migration in terms of key characteristics (age, education, wealth, etc) that also affect their likelihood of using healthcare. Migration to dissimilar environments, however, may place non-lateral migrants at a disadvantage with regard to healthcare use, as they may move to an area without maternal health services (as is likely for urban-rural migrants) or they may not initially have access to health facilities as they adjust to their new community. The change in environment, with the associated potential changes in family support and economic status, may lead to a long adaptation process for non-lateral migrants. Unlike their lateral counterparts, non-lateral migrants may be worse off, in terms of socioeconomic characteristics, compared to non-migrants, putting them at a disadvantage when they arrive in the destination. In particular, young rural-urban migrants entering a new labor market, potentially with fewer skills and a smaller network, may face unemployment or low-paying jobs which would negatively affect their economic status.

While migration may be stressful and disruptive for young migrants, it also presents enormous opportunities and potential benefits for mobile youth. Young women who migrate into urban areas, whether their origins are rural or urban, are likely to increase their access to maternal health services, including skilled doctors or midwives to assist both with pregnancy care and delivery. Some pregnant young women may migrate to cities expressly to access better

healthcare for themselves and their babies. Those migrating from rural areas where skilled maternal care is not widely used are likely to encounter new norms and behaviors through their interactions with non-migrants in their new community, and over time may adopt these practices themselves (Lindstrom & Munoz-Franco 2006). Urban-rural migrants may bring these norms for pregnancy care as they move to rural areas, and may place importance on seeking this care to a greater extent than young women who have always lived in rural areas, though their use may be limited by a dearth of health facilities in their destination.

## **Data & Methods**

In this paper, I use data from Demographic and Health Surveys (DHS) from 27 countries in sub-Saharan Africa. Data were collected between 2003 and 2009; these are the most recent surveys collecting information on respondents' childhood or previous residence and duration of stay in current location. Demographic and Health Surveys are household-based surveys which use two-stage probability sampling to provide nationally-representative samples of women of reproductive age (ages 15 to 49). I draw from these larger samples to create samples of young women aged 15 to 24 in each country. Due to relatively small sample sizes for several countries, I pool data and examine differences by approximate region: East Africa (Ethiopia, Kenya, Madagascar, Tanzania, and Uganda); West Africa (Benin, Burkina Faso, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal and Sierra Leone); Central Africa (Cameroon, Congo, Democratic Republic of Congo, Rwanda, and Sao Tome & Principe), and Southern Africa (Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia, and Zimbabwe).

I rely on maternal health utilization data for mothers' most recent birth in the previous five years to create two separate dependent variables. The first dependent variable, skilled prenatal care, codes those who received prenatal care from a health professional as "1" and those who received no care or whose care was provided only by traditional birth attendants coded as "0." The second dependant variables measures determines the odds of having a skilled birth attendant at delivery, with those indicating their birth was attended by a doctor, nurse, midwife, or community health-worker coded as "1" and those whose birth was attended by a traditional birth attendant, relative, friend, or who had no assistance coded as "0."

The independent variable for all models is migrant stream – that is, a categorical variable with rural non-migrants as the reference group, comparing urban non-migrants, urban-urban, rural-rural, and urban-rural migrants. The DHS does not specifically collect migration histories, but data is collected on current residence, childhood or previous residence, and duration at current residence which allows for the reconstruction of a basic indicator of migrant status.

First, using duration of residence, I create a dichotomous variable with those who indicate they have "always" lived in their current residence as non-migrants and those indicating any other duration of residence as migrants. Those who migrated prior to age 10 are coded as non-migrants, as I want to capture the effect of migrating during adolescence and young adulthood. In addition, as I want to ensure I am capturing maternal health use for births occurring after migration, I categorize women who migrated after or in the same year as their child's birth as "non-migrants." Second, I create a categorical variable to indicate different streams of migration – lateral or non-lateral – using data from a variable on type of childhood or previous place of

residence (capital/large city, city/town, or countryside) and type of current place of residence (urban, rural).<sup>1</sup> Rural non-migrants are those indicate they have always lived in their current rural place of residence, coded as “0”. Urban non-migrants, who have always lived in the same urban area, are coded as “1.” I code those migrants born in urban areas and currently living in urban areas as “urban-urban migrants,” those born in rural areas and currently living in rural areas as “rural-rural migrants,” those born in urban areas and currently living in rural areas as “urban-rural migrants,” those born in rural areas and currently living urban areas as “rural-urban migrants.” This variable allows me to measure the effect of different migrant streams on maternal health, potentially accounting for the disruption of the migration experience when moving to and from either similar or dissimilar environments.

As a final measure of migration status, I use the data collected on duration of residence in current location to categorize all lateral and non-lateral migrants as either “recent migrants,” those who have lived in their destination for three years or less prior to giving birth, or “settled migrants,” those who have resided in their destination for more than three years before becoming pregnant. Thus, this variable allows a measure both of migrant stream as well as duration of residence, which helps capture the experience of adaptation following migration by migrant stream.

To measure selection among migrants, I control for mother’s age (15-19 years versus 20-24 years), mother’s education (no education, primary, or secondary or more), her current marital status (ever married versus never married), and the DHS wealth index, which calculates wealth quintiles based on resources and assets and scores women’s households as very poor, poor, average, rich, and richest. All models also control for country of residence (results not shown).

In creating a sample for analysis, I exclude those who report that they are visitors as I lack information on migration status, and those born abroad due to small sample sizes, as well as those missing data on any of the dependent and independent variables. Thus I restrict the sample to 39,880 young women aged 15 to 24 who have given birth in the last five years, using maternal healthcare data related to their most recent birth. I use multivariate logistic regression to analyze each of the two outcomes separately by region. I first test the association between migrant stream and the outcome net of controls to explore whether migrant women of all streams are more or less likely to use maternal healthcare. In a second model, I then add measures of migrant selection, and finally in a third model I add a measure of adaption, measured by whether migrants are recent arrivals or are settled in the destination. All analyses account for sampling weights, reweighted for analyses as recommended by the DHS.

## **Results**

### *Descriptive Characteristics*

Descriptive characteristics of the sample are reported in Table 1. Across all regions, about 46% of young women are migrants, though patterns differ between regions. Lateral migration – specifically rural-rural migration – is more common than non-lateral migration in all regions, with the majority of migrants moving from rural to rural areas. Urban-urban and urban-rural

---

<sup>1</sup> When available, I use the indicator for childhood residence to construct migrant stream. In the 13 countries where childhood residence is not collected, I use previous residence.



migration are relatively less frequent in each region, though more common in West and Southern Africa. While migration in sub-Saharan Africa is often conceptualized as rural villagers migrating to urban areas, levels of rural-urban migration among young mothers are fairly low, ranging from 3.6% in East Africa to 7.1% in Central Africa. A large proportion of young women are rural non-migrants, while the proportion of urban non-migrants ranges from 6.5% in East Africa to 26.4% in Central Africa.

Just under two-thirds of young mothers across all regions report using skilled prenatal care during their most recent pregnancy, but prenatal care use varies significantly between different regions. Only about half of young mothers in West Africa report skilled antenatal care, compared to more than 82% in Central Africa. Use of skilled delivery assistance is, on average, much lower across the four regions, with an average of 37.2% of young mothers reporting skilled assistance at birth. As with prenatal care, use of delivery assistance is very different across regions, from a low of 29.5% of young women in East Africa to a high of 62.4% in Central Africa.

Young women's socio-demographic characteristics vary significantly by migration stream in all regions, suggesting that migrant selection may lead to differences in the likelihood of using maternal health services (Table 2). Migrants of all streams are generally older than non-migrants and as likely or more likely to be ever-married than non-migrants. Rural-rural migrants are least likely to be never-married of all streams. Urban-urban and rural-urban migrants, as well as urban non-migrants, are advantaged in socioeconomic terms in all regions, being both wealthier and having higher education compared to rural residents. Urban-rural migrants, however, are less-educated than others from urban communities and tend to live in less wealthy households than their always-urban counterparts. From the perspective of migrant selection, those moving into urban areas across sub-Saharan Africa may be positively selected, more likely to use skilled maternal care during pregnancy due to higher education and greater resources. Conversely, urban-rural migrants as well as rural-rural migrants may be negatively selected, less likely to access care during pregnancy and delivery.

### *Bivariate Results*

The bivariate associations between migrant stream and each outcome variable appear to be strong (Table 3). In Central, Southern, and East Africa, rural non-migrants have lowest use of skilled prenatal care while in West Africa fewer rural-rural migrants use skilled care. More current urban-dwellers seek prenatal care with a medical professional, with higher use among urban-urban migrants in all areas except East Africa, where more urban non-migrants use skilled care. A larger proportion of rural-urban migrants in both Central and Southern Africa use skilled prenatal care compared to urban non-migrants, though they have lower levels of use in East and West Africa.

Significant differences in the proportion receiving skilled delivery assistance are also noted across migration streams. Those always residing in rural areas, whether non-migrants or migrants, have much lower use of skilled birth assistance compared to urban residents regardless of region. In Central and West Africa, fewer rural-rural migrants report skilled assistance while the proportion using delivery assistance is lower among rural non-migrants in East and Southern

Africa. Far more rural-urban migrants, however, use skilled prenatal and delivery care compared to others with rural origins, though they generally report less utilization of these services than other urban residents, except in Southern Africa. For both maternal health outcomes, urban-rural migrants demonstrate greater use of skilled care for pregnancy and delivery than always-rural mothers, but lower levels of use than those currently living in urban areas, regardless of migration status.

*Are there significant differences in prenatal care utilization by young mother's migration stream?*

In Table 4, I present the results of the multivariate logistic analyses of the relationship between mothers' migrant stream and the odds of receiving skilled prenatal care. Model 1 shows the association net of controls (except country of residence, not shown), while Model 2 incorporates socio-demographic characteristics related to migrant selectivity. In Southern and East Africa, there are strong, positive associations between urban-urban, rural-urban, and urban-rural migration and skilled prenatal care; a similar effect is noted for urban non-migrants. In both regions, urban-rural migrants have the lowest odds of using skilled care, though they are still twice as likely as rural non-migrants, while odds are highest among urban-urban migrants in Southern Africa and among urban non-migrants in East Africa. In Central Africa, all current urban residents, regardless of migrant stream, are significantly more likely to initiate skilled prenatal care, with highest odds among urban-urban migrants who are more than 6 times as likely versus rural non-migrants net of controls. There is no significant effect, positive or negative, for rural-rural migrants in any of the three regions. In West Africa, however, there is an effect for all migrant streams. While urban non-migrants, as well as both non-lateral streams and urban-urban migrants, are more likely to use skilled care, rural-rural migrants are more than 20% less likely to report skilled prenatal care than rural non-migrants.

Controlling for socio-demographic characteristics in Model 2 reduces but does not remove the effects of migrant stream in two of four regions. In Southern Africa, the odds of using prenatal care are still increased for all groups except rural-rural migrants, though the magnitude of the effects are reduced by inclusion of women's characteristics. Similarly, in Central Africa, urban non-migrants, urban-urban migrants, and rural-urban migrants are more likely to use skilled care than rural non-migrants, but controlling for socio-demographic variables reduces the size of the effect, particularly for urban-urban migrants whose odds are reduced by more than half. Within East Africa, only urban non-migrants and rural-urban migrants remain more likely to use skilled care in pregnancy; after controlling for the selection variables, urban-urban and urban-rural migrants do not significantly differ from rural non-migrants with regard to prenatal care utilization. As in the other regions, migrants to and from urban areas in West Africa remain more likely to report prenatal care use, but the addition of socio-demographic characteristics such as education and wealth removes the effect of migration among rural-rural migrants, suggesting there is no independent effect of migration, positive or negative, for this group.

Wealthier young women and those with any education are significantly more likely to receive skilled care than poorer women and mothers with no education. There is no effect of mothers' marital status in Central and Southern Africa, while in East and West Africa the odds of receiving skilled prenatal care are decreased by 37% and 23%, respectively, among never-

married versus ever-married mothers. Interestingly, there is no effect of mother's age on likelihood of receiving skilled prenatal care in any region.

In Table 5, I control not only for selection variables but also for mother's duration of residence prior to her birth. In Southern Africa, both recent and settled urban-urban migrants are more likely to use prenatal care, but odds are lower for recent migrants (OR 2.6) versus settled migrants (O.R. 3.7), suggesting the advantage of moving from city to city increases after migrants adapt. Similarly, rural-urban movers who become pregnant more than three years after migration are nearly twice as likely to use skilled care, while more recent migrants of this stream are not significantly more likely. For recent urban-rural migrants, the odds of skilled prenatal care are increased by more than 2.3, but this effect disappears for migrants who give birth more than three years after migration to rural areas. In East Africa, only settled rural-urban migrants are more likely to use prenatal care compared to rural non-migrants. Among Central African migrants, both streams of migrants to urban areas have greater odds of prenatal care if they have lived in the destination for more than three years before pregnancy, though odds are much higher for urban-urban migrants (OR 5.3) versus rural-urban migrants (OR 2.7). The effects of migrant stream and duration of residence on use of prenatal care in West Africa are strong across all migrant streams, though effects differ depending on where migrants move to and from and how long they have lived there. Recent urban-urban and urban-rural migrants are 2.7 and 1.9 times more likely, respectively, than rural non-migrants; more settled migrants of these streams are also more likely but the magnitude of the effect is smaller than for recent arrivals. Like in the other three regions, settled rural-urban migrants have significantly higher odds of prenatal care use while their more recent counterparts do not. Only in West Africa is there any effect for rural-rural migrants, and it is in the opposite direction versus other migrant streams. Compared to their non-migrant peers, rural-rural movers who became pregnant more than three years after migration are about 17% less likely to use prenatal care.

***Are there significant differences in skilled delivery assistance by young mother's migration stream?***

In Table 6, I examine the association between delivery assistance by mother's migrant stream. As with prenatal care, migrant stream significantly increases the odds of using delivery assistance in Southern Africa, from odds of 2.6 for urban-rural migrants to 10.4 for urban lateral migrants. Likewise in East Africa, urban-urban migrants are much more likely to have assistance at birth – 12.3 times – versus rural non-migrants, while rural-urban migrants are nearly five times as likely and urban-rural movers are about 79% more likely. Within Central Africa, only migrants to urban areas, whether lateral or nonlateral, are significantly more likely to report delivery assistance. The results for West Africa closely mimic results in this region for prenatal care use, with migrants with any urban experience much more likely to have a skilled birth assistant while rural-rural migrants are more than 20% less likely to do so.

Controlling for potential migrant selectivity variables reduces, but does not fully explain, the effect of migration across most migrant streams in all regions. In Southern Africa, mothers moving laterally to urban areas and non-laterally in both streams remain at least twice as likely to receive skilled delivery care than rural non-migrants. The effect of migration for urban-rural movers in East Africa disappears after the addition of selection variables, but remains strong and

positive for those migrating to urban areas. In Central African countries, urban-urban and rural-urban migrants continue to experience a higher likelihood of skilled delivery care, though the effect decreases to about 2.5 times and 2 times, respectively after I control for women's characteristics. For West African mothers, the effect for rural-rural migrants disappears after controlling for selectivity, but is only reduced for migrants of other streams. Urban-rural migrants have the lowest odds of skilled assistance, about 80% higher than non-migrants, while migrants to urban areas are more than twice as likely to have a skilled birth assistant.

In all regions, those of average, richer, or richest wealth quintiles are much more likely to have skilled delivery assistance, with odds increased by 3.4 in Southern Africa 7.2 times in West Africa for the richest young mothers. A strong significant effect of education is apparent, with mothers with any level of education much more likely to access skilled delivery assistance compared to mothers with no education. In both Southern and Central Africa, young never-married mothers are more likely than ever-married women to have skilled delivery assistance. There is largely no effect of mother's age, except in West Africa where mothers older than 20 years are somewhat less likely to have a skilled birth attendant.

In Table 7, I examine disparities in skilled delivery assistance by the timing of mother's migration with relation to her pregnancy. Southern African mothers across all migrant streams, whether recent or settled, have higher odds of delivery assistance, ranging from about 26% more likely for recent rural-rural migrants to 3.8 times as likely for recent urban-urban migrants. The exception is long-term rural-rural movers, who are no more or less likely to have skilled assistance than their non-migrant counterparts. For urban-urban, rural-rural, and urban-rural migrants, odds are higher for recent arrivals and lower among more settled residents, suggesting maternal care use may decrease over time. Among rural-urban migrants, however, use increases as duration of residence increases. In East Africa, results are significant only for recent and settled urban lateral migrants and for rural-urban long-term migrants, with odds decreasing between recent and settled urban-urban migrants. Settled rural-urban migrants are about as likely to use delivery care as recent urban-urban migrants. Among Central African migrants, the advantage of urban-urban migration is only significant for women who become pregnant within three years of arrival, but the opposite is true for rural-urban mothers, who are more likely to have skilled assistance at birth only if they give birth more than three years after migration. There are positive and significant effects of timing of migration for all migrant streams in West Africa, except settled rural-rural migrants, who are significantly less likely to have skilled birth assistance. In all migrant streams, recent arrivals have higher odds of delivery assistance versus their settled counterparts, suggesting the initial advantage of migration may decline over time.

## **Discussion**

Internal migration is an important part of young women's transitions to adulthood in much of sub-Saharan Africa (Beegle & Poulin 2013; Chalasani et al. 2013; Clark & Cotton 2013; Xu et al. 2013). Though previous research has demonstrated the salience of migration experiences in young women's lives, the implications for migration on women's health outcomes and health-seeking behaviors as they make key transitions, such as childbearing, are unclear. This paper aims to clarify the relationship between migrant status and use of maternal healthcare for young women by examining the potential disruption of migrating laterally (urban-urban or rural-rural)

or non-laterally (urban-rural or rural-urban), the role of selectivity across migrant streams, and the importance of considering the timing of migration in relation to pregnancy among migrants. I argue that migration may improve use of maternal healthcare for certain streams of migrants – namely those moving between similar environments, those positively selected for migration by key socio-demographic characteristics, and those who become pregnant after a longer duration of residence following migration – while migration may reduce use of maternal health services for those moving to dissimilar environments, those who are negatively selected for migration, and those who become pregnant shortly after migration.

The findings suggest that the relationship between young women's migration and positive maternal health outcomes varies across migrant streams as well as across regions of sub-Saharan Africa. On the whole, migrants to urban areas have much better maternal health use than rural residents, regardless of whether they are lateral or non-lateral migrants. In general, urban-urban migrants have the best maternal health use for both prenatal and delivery care, typically followed by urban non-migrants and rural-urban migrants. Despite the disruption of moving to dissimilar environments, rural-urban migrants are largely able to take advantage of the 'urban advantage' of more (and often better quality) maternal health facilities, though not to the same extent as other urban residents. Interestingly, urban-rural migrants have lower use compared to current urban dwellers but higher than other rural residents except in Central Africa. While they migrate to rural areas with overall lower use and potentially fewer health facilities (Gage 2007), urban-rural movers are able to bring the urban norms of maternal healthcare but are unable to fully benefit due to a dearth of skilled care-providers in their destination.

The strong effects of migration remain after controlling for potential measures of selectivity – in particular education and wealth – suggesting that migrant selection is not the main force driving the different levels of maternal healthcare use across migrant streams. There are clear differences in maternal healthcare use across mothers' socio-demographic characteristics, especially for indicators of socio-economic status, but these differences do not fully explain the distinct patterns of healthcare use across streams of migration. These results indicate that migration to and from urban areas has an independent effect on use of services like prenatal care and delivery assistance regardless of whether migrants are positively or negatively selected. Furthermore, in analyzing how the timing of young women's migration in relation to her pregnancy, I find that time between migration and pregnancy is often an important factor in maternal healthcare use. With regard to prenatal care, in some regions more recent migrants to urban areas may not yet have adapted to their destination, suggesting it takes time for young women to begin accessing maternal health services. The process of adaptation, as measured by timing of migration versus pregnancy, appears to be easier for urban-urban migrants, likely as they are moving to similar environments and may be able to adapt more quickly. Rural-urban migrants, however, seem to require a longer duration of residence before they begin using maternal healthcare at the same or similar rates as other urban residents. Interestingly, recent urban-rural migrants in two regions (Southern and West Africa) are similar to recent rural-urban movers in their prenatal care use, but as their duration of residence in rural destinations increase, their odds of using prenatal care decline to much lower levels than others with urban exposure.

For delivery assistance, a similar result is apparent for urban-rural and urban-urban migrants, as well as rural-rural migrants in West Africa, whose use of delivery assistance is lower if pregnancy occurs later versus earlier after migration. In three of four regions, an opposite effect

emerges for rural-urban migrants; as with prenatal care, odds of using delivery assistance become higher when these migrants have a longer duration of stay. With greater exposure to urban environments, non-lateral migrants achieve better maternal care outcomes. Overall, rural-rural migrants have no advantage in migrating while those with urban experience often do better. Migration to a new rural area does not generally disadvantage rural-rural migrants in most contexts, however, rural migrants appear to have more difficulty accessing maternal health services after a longer duration of residence.

Together, these results suggest an urban advantage with regard to access and use of formal maternal health services. This benefit is perhaps more easily taken advantage of by those who have always lived in urban areas and are most familiar with such environments, while those moving from rural areas to cities may not fully capitalize on this advantage until they have adapted. Those moving away from urban contexts may 'hold on' to their advantage in the time period immediately following migration but may eventually be unable to maintain the same maternal care use as others with urban experience. While other research has suggested an urban advantage in maternal healthcare utilization in sub-Saharan Africa (Rai et al. 2014; Ochako et al. 2011; Magadi et al. 2007), this is the first study to explore differences in the migration status of urban residents. This research suggests that incorporating measures of migrant stream, as well as duration of residence and timing of migration, suggests within-urban differences not otherwise found in previous work.

There are a number of limitations that must be addressed. Firstly, the DHS data is cross-sectional, which restricts the potential for exploring migration to a one-time episode, rather than incorporating an understanding of circular migration which is common in many parts of sub-Saharan Africa (Beguy et al. 2010). In addition, the cross-sectional nature precludes a formal testing of migrant selectivity, disruption, and adaptation processes. It is impossible to determine women's characteristics prior to migration, meaning that a selection argument cannot be completely discarded, nor can a full understanding of the disruption that migration may cause be ascertained. Secondly, the DHS program collects few details on migration experience, thus the study lacks any additional variables surrounding young women's migration experiences, such as their motivation for migration, who they migrated with, etc. As well, because the DHS does not ask for month and year of migration, it is not possible to correctly order events such as migration, pregnancy, and birth, resulting in the exclusion of about 6% of mothers with children born in the same year they migrated. Given that many transitions to adulthood occur in a short time-frame, and often overlap, data that would allow for a better analysis of timing and frequency of migration experiences with regard to young women's pregnancies would improve our understanding of these transitions. Thirdly, DHS birth histories do not collect data on the place of birth for women's children. Thus while I count a pregnancy/birth as occurring to a migrant only if this birth occurs after migration, it is not possible to be certain that births for rural-urban or urban-rural mothers actually occur in the destination. This means that while I make the assumption that an infant born after migration is born in the mother's destination, it is possible that some of these births in fact take place in rural areas, as some migrants may choose to return to their place of origin to give birth.

Despite these limitations, this study extends previous research on maternal healthcare utilization as well as research on youth migration in sub-Saharan Africa, two areas of research which have not previously been combined into one analysis. This research demonstrates the necessity of

considering migrant stream and timing of migration when exploring the relationship between migration and health-seeking behaviors, particularly among young women who may be particularly vulnerable to low use of maternal healthcare. Further research should examine whether these differences in maternal health utilization by migrant stream hold in other contexts and among older migrant mothers.

## References

- Abou-Zahr, C. and T. Wardlaw. 2003. "Antenatal care in developing countries: promises, achievements and missed opportunities: an analysis of trends, levels and differentials, 1990–2001.". Geneva: World Health Organization.
- Antai, D. 2010. "Migration and child immunization in Nigeria: Individual and community-level contexts." *BMC Public Health* 10:116-128.
- Beegle, K. and M. Poulin. 2013. "Migration and the transition to adulthood in contemporary Malawi." *The ANNALS of the American Academy of Political and Social Science* 648(1):38-51.
- Beguy, D., P. Bocquier, and E.M. Zulu. 2010. "Circular migration patterns and determinants in Nairobi slum settlements." *Demographic Research* 23(20):549-586.
- Bilsborrow, R. 1993. "Internal female migration and development: An overview." Pp. 1-17 in *Internal Migration of Women in Developing Countries*. New York: United Nations.
- Bocquier, P., N. Madise, and E. Zulu. 2011. "Is there an urban advantage in child survival in sub-Saharan Africa? Evidence from 18 countries in the 1990s." *Demography* 48(531-558).
- Brockerhoff, M. 1990. "Rural to urban migration and child survival in Senegal." *Demography* 27(4):601-616.
- . 1994. "The impact of rural-urban migration on child survival." *Health Transition Review* 4(2):127-149.
- . 1995a. "Child survival in big cities: The disadvantages of migrants." *Social Science & Medicine* 40(10):1371-1383.
- . 1995b. "Fertility and family planning in African cities: The impact of female migration." *Journal of Biosocial Science* 27(3):347-358.
- Brockerhoff, M. and A. Biddlecom. 1999. "Migration, sexual behavior, and the risk of HIV in Kenya." *International Migration Review* 33(4):833-856.
- Chalasanani, S., B. Mensch, and P. Hewlett. 2013. "Migration Among Adolescents in Rural Malawi." in *Annual Meeting of the Population Association of America*. New Orleans, LA.
- Chattopadhyay, A., M.J. White, and C. Debpuur. 2006. "Migrant fertility in Ghana: Selection versus adaptation and disruption as causal mechanisms." *Population Studies* 60(2):189-203.
- Clark, S. and C. Cotton. 2013. "Transitions to adulthood in Urban Kenya: a focus on adolescent migrants." *Demographic Research*:1053-1092.
- de Bernis, L., D.R. Sherratt, C. AbouZahr, and W. Van Lerberghe. 2003. "Skilled attendants for pregnancy, childbirth and postnatal care." *British Medical Bulletin* 67(1):39-57.
- Fotso, J.C., A. Ezeh, and R. Oronje. 2008. "Provision and use of maternal health services among urban poor women in Kenya: what do we know and what can we do?" *Journal of Urban Health* 85(3):428-442.
- Gage, A.J. 2007. "Barriers to the utilization of maternal health care in rural Mali." *Social Science & Medicine* 65(8):1666-1682.
- Guliani, H., A. Sepehri, and J. Serieux. 2012. "What impact does contact with the prenatal care system have on women's use of facility delivery? Evidence from low-income countries." *Social Science & Medicine* 74(12):1882-1890.
- . 2014. "Determinants of prenatal care use: Evidence from 32 low-income countries



- across Asia, Sub-Saharan Africa and Latin America." *Health policy and planning* 29(5):589-602.
- Kiros, G.E. and M.J. White. 2004. "Migration, community context, and child immunization in Ethiopia." *Social Science & Medicine* 59(12):2603-2616.
- Kothari, M.T., S. Wang, S.K. Head, N.K.M. Abderrahim. 2012. "Trends in adolescent reproductive and sexual behaviors." in *DHS Comparative Reports*. Calverton, Maryland: ICF International and MEASURE-DHS.
- Kusuma, Y.S., R. Kumari, and S. Kaushal. 2013. "Migration and access to maternal healthcare: determinants of adequate antenatal care and institutional delivery among socio-economically disadvantaged migrants in Delhi, India." *Tropical Medicine & International Health* 18(10):1202-1210.
- Lindstrom, D.P. and E. Munoz-Franco. 2006. "Migration and maternal health services utilization in rural Guatemala." *Social Science & Medicine* 63(3):706-721.
- Luke, N., H. Xu, B.U. Mberu, and R.E. Goldberg. 2012. "Migration experience and premarital sexual initiation in urban Kenya: An event history analysis." *Studies in Family Planning* 43(2):115-126.
- Magadi, M.A., A.O. Agwanda, and F.O. Obare. 2007. "A comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa: Evidence from Demographic and Health Surveys." *Social Science & Medicine* 64(6):1311-1325.
- Magadi, M.A., E.M. Zulu, and M. Brockerhoff. 2003. "The inequality of maternal health care in urban sub-Saharan Africa in the 1990s." *Population Studies* 57(3):347-366.
- Mberu, B.U. and M. White. 2011. "Internal migration and health: Premarital sexual initiation in Nigeria." *Social Science & Medicine* 72(8):1284-1293.
- National Research Council & Institute of Medicine. 2005. "The transition to work." Pp. 265-341 in *Growing up Global: the changing transitions to adulthood in developing countries: Panel on Transitions to Adulthood in Developing Countries*, edited by C. Lloyd. Washington, D.C.: The National Academies Press.
- Mumah, J., C. Kabiru, C. Izugbara, and C. Mukiira. 2014. "Coping with Unintended Pregnancy: Narratives from Adolescents in Nairobi's Slums." in *STEP UP Research Report*. Nairobi: APHRC.
- Ochako, R., J.C. Fotso, L. Ikamari, and A. Khasakhala. "Utilization of maternal health services among young women in Kenya: insights from the Kenya Demographic and Health Survey, 2003." *BMC Pregnancy & Childbirth* 11(1).
- Omariba, D. and M. Boyle. 2010. "Rural-urban migration and cross-national variation in infant mortality in less developed countries." *Population Research and Policy Review* 29(3):275-296.
- World Health Organization. 2011. "WHO Statement on Antenatal Care." Geneva: World Health Organization.
- . 2015. "Adolescent Pregnancy." Online at ([www.who.int/maternal\\_child\\_adolescent/topics/maternal/adolescent\\_pregnancy/en](http://www.who.int/maternal_child_adolescent/topics/maternal/adolescent_pregnancy/en)). Accessed February 2016.
- Oucho, J. and W.T.S. Gould. 1993. "Internal migration, urbanization, and population distribution." Pp. 256-296 in *Demographic change in sub-Saharan Africa*, edited by K. Foote, K. Hill, and L. Martin. Washington, DC: National Research Council.
- Pell, C., A. Meñaca, F. Were, N.A. Afrah, S. Chatio, Manda-Taylor, L., M.J. Hamel, A.

- Hodgson, H. Tagbor, L. Kalilani, and P. Ouma. 2013. "Factors affecting antenatal care attendance: results from qualitative studies in Ghana, Kenya and Malawi." *PLoS one* 8(1).
- Rai, R.K., P.K. Singh, L. Singh, and C. Kumar. 2014. "Individual characteristics and use of maternal and child health services by adolescent mothers in Niger." *Maternal and Child Health Journal* 18(3):592-603.
- Roig, M., K. Osaki, and J. Singelman. 2008. "Internal migration in developing countries: Evidence from Demographic and Health Survey." UNDP.
- Singh, P.K., R.K. Rai, and L. Singh. 2012. "Examining the effect of household wealth and migration status on safe delivery care in urban India, 1992–2006." *PLoS One* 7(9).
- Smith-Greenaway, E. and S. Madhavan. 2015. "Maternal Migration and Child Health: An Analysis of Disruption and Adaptation Processes in Benin." *Social Science Research* 54:146-158.
- Smith-Greenaway, E. and K. Thomas. 2014. "Exploring Child Mortality Risks Associated with Diverse Patterns of Maternal Migration in Haiti." *Population Research and Policy Review* 33(6):873-895.
- Ssengonzi, R., G. De Jong, and C.S. Stokes. 2002. "The effect of female migration on infant and child survival in Uganda." *Population Research and Policy Review* 21(5):403-431.
- Subaiya, L. 2007. "Internal migration and use of reproductive and child health services in Peru." in *DHS Working Papers*. Calverton, Maryland: ICF International & MEASURE-DHS.
- UNFPA. 2007. "Adolescent Pregnancy: Delivering on Global Promises of Hope." New York: UNFPA.
- . 2013. *Motherhood in Childhood: Facing the Challenge of Adolescent Pregnancy.* New York: UNFPA.
- White, M.J., S. Muhidin, C. Andrzejewski, E. Tagoe, R. Knight, and H. Reed. 2008. "Urbanization and fertility: An event-history analysis of coastal Ghana." *Demography* 45(4):803-816.
- Xu, H., B.U. Mberu, R.E. Goldberg, and N. Luke. 2013. "Dimensions of rural-to-urban migration and premarital pregnancy in Kenya." *The ANNALS of the American Academy of Political and Social Science* 648(1):104-119.

**Table 1. Descriptive Characteristics of Young Women by Region**

	<b>Southern Africa</b>	<b>East Africa</b>	<b>Central Africa</b>	<b>West Africa</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>Independent Variable</b>				
Migrant Stream				
Rural Non-Migrants	46.10	57.60	40.23	35.73
Urban Non-Migrants	14.73	6.48	26.38	10.71
Urban-Urban Migrants	6.03	3.01	5.24	9.25
Rural-Rural Migrants	20.83	35.16	17.22	31.48
Rural-Urban Migrants	5.29	3.56	7.07	3.76
Urban-Rural Migrants	7.03	4.21	3.87	9.07
<b>Dependent Variable</b>				
Used Skilled Prenatal Care	79.16	64.93	82.46	51.57
Used Skilled Delivery Assistance	46.53	29.45	62.35	30.58
N	<b>9,626</b>	<b>7,788</b>	<b>5,479</b>	<b>16,987</b>

**Table 2. Characteristics of Young Women by Migration Stream**

	Wealth Index					Education			Marital Status			Age				
	Poorest	Poorer	Average	Richer	Richest	Sig.	None	Primary	Secondary or Higher	Sig.	Ever Married	Never Married	Sig.	15-19 Years	20-24 Years	Sig.
<b>Region</b>																
<b>East Africa</b>						***				***			***			***
Rural Non-Migrants	27.20	25.33	23.29	18.46	5.72		47.98	44.95	7.07		86.51	13.49		26.62	73.38	
Urban Non-Migrants	1.96	4.27	7.73	17.11	68.92		14.29	49.77	35.94		77.75	22.25		24.36	75.64	
Urban-Urban Migrants	0.23	1.02	3.92	12.08	82.76		6.11	45.96	47.93		92.42	7.58		13.55	86.45	
Rural-Rural Migrants	24.72	27.54	24.00	17.22	6.52		42.16	51.60	6.24		98.64	1.36		17.54	82.46	
Rural-Urban Migrants	1.16	1.94	6.59	22.23	68.08		21.31	57.32	21.37		93.86	6.14		19.70	80.30	
Urban-Rural Migrants	16.96	18.90	21.73	20.61	21.79		18.40	59.65	21.95		88.09	11.91		25.13	74.87	
<b>West Africa</b>						***				***			***			***
Rural Non-Migrants	28.86	29.71	24.15	15.00	2.28		66.47	16.16	17.37		90.17	9.83		28.78	71.22	
Urban Non-Migrants	3.13	8.48	17.43	30.83	40.12		36.40	27.25	36.34		82.43	17.57		26.72	73.28	
Urban-Urban Migrants	2.26	3.97	15.60	37.54	40.64		31.09	23.65	45.27		90.89	9.11		17.56	82.44	
Rural-Rural Migrants	38.28	31.54	18.89	9.32	1.97		76.62	14.42	8.96		98.90	1.11		27.32	72.68	
Rural-Urban Migrants	8.09	10.59	19.29	26.75	35.29		53.12	20.14	26.74		95.98	4.02		17.78	82.22	
Urban-Rural Migrants	19.24	26.59	23.83	21.60	8.74		50.16	22.88	26.96		94.64	5.36		21.80	78.20	
<b>Southern Africa</b>						***				***			***			***
Rural Non-Migrants	33.60	28.00	24.80	11.89	1.71		26.06	54.82	19.12		85.49	14.51		27.48	72.52	
Urban Non-Migrants	3.01	4.03	9.11	36.49	47.36		10.25	46.41	43.34		73.51	26.49		31.87	68.13	
Urban-Urban Migrants	1.18	2.04	3.17	33.82	59.80		6.10	45.72	48.18		84.79	15.21		20.93	79.07	
Rural-Rural Migrants	28.44	27.97	26.25	13.92	3.42		19.28	63.84	16.89		95.79	4.21		19.38	80.62	
Rural-Urban Migrants	2.57	3.40	10.57	42.58	40.88		9.14	46.00	44.86		91.54	8.46		18.01	81.99	
Urban-Rural Migrants	20.60	21.55	25.50	24.95	7.40		12.66	57.25	30.08		89.92	10.08		22.40	77.60	
<b>Central Africa</b>						***				***			***			***
Rural Non-Migrants	31.41	32.09	23.04	12.92	0.55		33.43	48.80	17.76		89.38	10.62		22.32	77.68	
Urban Non-Migrants	5.31	6.87	17.39	35.04	35.39		7.75	35.53	56.72		87.17	12.83		28.17	71.83	
Urban-Urban Migrants	2.02	5.61	13.51	44.79	34.08		4.49	37.11	58.40		89.04	10.96		19.22	80.78	
Rural-Rural Migrants	34.76	32.44	20.67	10.16	1.96		30.04	54.79	15.17		97.52	2.48		15.03	84.97	
Rural-Urban Migrants	8.87	4.58	23.32	40.45	22.78		19.42	40.72	39.86		91.17	8.83		13.10	86.90	
Urban-Rural Migrants	17.83	31.52	33.16	15.81	1.68		9.72	54.64	35.64		93.03	6.97		15.99	84.01	

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Chi-squared tests were used to test for statistically significant differences among categorical variables.

**Table 3. Skilled Maternal Healthcare Utilization by Migration Stream**

Region	Skilled Prenatal	Skilled Delivery
	Care	Assistance
<b>East Africa</b>		
		Sig.
		Sig.
Rural Non-Migrants	57.19	20.73
Urban Non-Migrants	87.78	64.53
Urban-Urban Migrants	84.25	75.64
Rural-Rural Migrants	65.16	25.67
Rural-Urban Migrants	86.58	63.64
Urban-Rural Migrants	83.34	43.52
<b>West Africa</b>		
		Sig.
		Sig.
Rural Non-Migrants	45.67	21.82
Urban Non-Migrants	79.71	61.91
Urban-Urban Migrants	80.39	61.51
Rural-Rural Migrants	35.47	15.98
Rural-Urban Migrants	66.39	50.33
Urban-Rural Migrants	61.92	38.67
<b>Southern Africa</b>		
		Sig.
		Sig.
Rural Non-Migrants	71.23	35.18
Urban Non-Migrants	87.99	65.35
Urban-Urban Migrants	92.07	70.92
Rural-Rural Migrants	82.1	41.69
Rural-Urban Migrants	88.5	70.54
Urban-Rural Migrants	85.84	56.02
<b>Central Africa</b>		
		Sig.
		Sig.
Rural Non-Migrants	75.73	51.43
Urban Non-Migrants	90.65	84.68
Urban-Urban Migrants	95.22	82.02
Rural-Rural Migrants	78.31	44.19
Rural-Urban Migrants	91.05	74.42
Urban-Rural Migrants	82.21	54.64

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Chi-squared tests were used to test for statistically significant differences among categorical variables.

**Table 4. Odds of Receiving Skilled Prenatal Care by Migrant Stream**

	Southern Africa						Eastern Africa						Central Africa						Western Africa					
	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.			
	Model 1			Model 2			Model 1			Model 2			Model 1			Model 2			Model 1			Model 2		
<b>Migrant Type</b>																								
Rural Non-Migrant (ref)	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
Urban Non-Migrant	5.55	0.75	***	2.56	0.43	***	5.97	1.45	***	2.60	0.72	***	3.24	0.60	***	1.62	0.36	*	5.29	0.49	***	2.40	0.25	***
Urban-Urban	8.20	1.94	***	3.01	0.79	***	3.55	1.27	***	1.22	0.47		6.59	2.46	***	2.85	1.16	**	6.01	0.71	***	2.52	0.34	***
Rural-Rural	1.14	0.12		1.11	0.12		1.06	0.10		1.00	0.10		0.98	0.18		0.98	0.19		0.78	0.05	***	0.96	0.06	
Rural-Urban	3.44	0.75	***	1.74	0.42	*	3.62	0.98	***	1.89	0.59	*	3.29	0.98	***	1.94	0.63	*	2.98	0.40	***	1.66	0.26	**
Urban-Rural	2.37	0.46	***	1.91	0.36	***	2.01	0.49	**	1.41	0.33		1.54	0.59		1.11	0.45		2.13	0.21	***	1.68	0.17	***
<b>Marital Status</b>																								
Ever Married (ref)				1.00	--					1.00	--					1.00	--					1.00	--	
Never Married				1.14	0.17					0.63	0.11	*				1.36	0.38					0.77	0.10	*
<b>Wealth Quintile</b>																								
Poorest (ref)				1.00	--					1.00	--					1.00	--					1.00	--	
Poorer				1.11	0.13					1.60	0.18	***				1.06	0.21					1.59	0.11	***
Middle				0.90	0.11					1.92	0.24	***				1.61	0.34	*				2.12	0.16	***
Richer				1.96	0.29	***				1.90	0.27	***				2.35	0.65	**				2.95	0.25	***
Richest				3.07	0.66	***				3.00	0.75	***				2.72	0.96	**				4.98	0.67	***
<b>Education</b>																								
None (ref)				1.00	--					1.00	--					1.00	--					1.00	--	
Primary				1.57	0.16	***				1.64	0.16	***				2.05	0.35	***				2.26	0.17	***
Secondary or Higher				2.25	0.38	***				2.83	0.67	***				2.21	0.54	***				3.88	0.35	***
<b>Age</b>																								
15-19 Years (ref)				1.00	--					1.00	--					1.00	--					1.00	--	
20-24 Years				1.06	0.10					1.10	0.11					1.13	0.20					1.10	0.06	
N	9,626			9,626			7,788			7,788			5,479			5,479			16,987			16,987		

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001  
All models control for countries included in regions

**Table 5. Odds of Receiving Skilled Prenatal Care by Migrant Stream & Duration of Residence**

	Southern Africa			East Africa			Central Africa			West Africa		
	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.
<b>Migrant Type</b>												
Rural Non-Migrant (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
Urban Non-Migrant	2.55	0.43	***	2.61	0.72	***	1.59	0.36	*	2.41	0.25	***
Urban-Urban < 3 Years	2.60	0.85	**	1.90	1.04		1.66	0.80		2.65	0.45	***
Urban-Urban > 3 Years	3.67	1.32	***	0.76	0.38		5.34	3.52	*	2.34	0.48	***
Rural-Rural < 3 Years	1.30	0.18		1.00	0.12		1.35	0.30		1.09	0.08	
Rural-Rural > 3 Years	0.90	0.13		1.01	0.14		0.72	0.18		0.83	0.07	*
Rural-Urban < 3 Years	1.60	0.51		1.58	0.57		1.34	0.54		1.53	0.34	
Rural-Urban > 3 Years	1.93	0.64	*	2.77	1.28	*	2.67	1.27	*	1.81	0.38	**
Urban-Rural < 3 Years	2.32	0.56	***	1.23	0.36		0.78	0.49		1.89	0.25	***
Urban-Rural > 3 Years	1.56	0.42		1.72	0.63		1.63	0.55		1.44	0.21	*
<b>Marital Status</b>												
Ever Married (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
Never Married	1.14	0.17		0.63	0.11	**	1.36	0.38		0.79	0.10	
<b>Wealth Quintile</b>												
Poorest (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
Poorer	1.10	0.13		1.60	0.18	***	1.04	0.21		1.59	0.11	***
Middle	0.91	0.11		1.92	0.24	***	1.58	0.34	*	2.11	0.16	***
Richer	1.96	0.29	***	1.90	0.27	***	2.42	0.65	***	2.93	0.25	***
Richest	3.10	0.67	***	3.01	0.75	***	2.78	0.97	**	4.96	0.67	***
<b>Education</b>												
None (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
Primary	1.57	0.16	***	1.65	0.16	***	2.04	0.35	***	2.24	0.17	***
Secondary or Higher	2.23	0.38	***	2.77	0.65	***	2.19	0.53	***	3.80	0.35	***
<b>Age</b>												
15-19 Years (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
20-24 Years	1.07	0.10		1.09	0.11		1.13	0.20		1.15	0.07	*
N	9,626			7,788			5,479			16,987		

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

All models control for countries included in regions

**Table 6. Odds of Receiving Skilled Delivery Assistance by Migrant Stream**

	Southern Africa						Eastern Africa						Central Africa						Western Africa								
	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.			
	Model 1			Model 2			Model 1			Model 2			Model 1			Model 2			Model 1			Model 2					
<b>Migrant Type</b>																											
Rural Non-Migrant (ref)	1.00	--		1.00	--		1.00	--	--	1.00	--	--	1.00	--	--	1.00	--	--	1.00	--	--	1.00	--	--	1.00	--	--
Urban Non-Migrant	7.79	0.81	***	3.04	0.38	***	7.30	1.23	***	2.41	0.41	***	5.40	0.82	***	2.81	0.56	***	5.95	0.48	***	2.37	0.22	***			
Urban-Urban	10.42	1.56	***	3.56	0.59	***	12.33	2.84	***	3.18	0.77	***	5.41	1.32	***	2.47	0.70	***	6.34	0.64	***	2.32	0.28	***			
Rural-Rural	1.11	0.09		1.13	0.09		0.96	0.09		1.02	0.10		0.95	0.15		1.03	0.17		0.77	0.06	***	1.02	0.08				
Rural-Urban	5.46	0.83	***	2.57	0.43	***	4.76	1.09	***	1.95	0.47	**	3.25	0.70	***	2.01	0.51	**	4.14	0.51	***	2.17	0.31	***			
Urban-Rural	2.61	0.34	***	2.05	0.28	***	1.79	0.32	***	1.31	0.22		1.30	0.35		1.03	0.30		2.32	0.23	***	1.81	0.19	***			
<b>Marital Status</b>																											
Ever Married (ref)				1.00	--					1.00	--					1.00	--					1.00	--				
Never Married				1.28	0.13	*				1.07	0.14					2.02	0.43	***				0.93	0.11				
<b>Wealth Quintile</b>																											
Poorest (ref)				1.00	--					1.00	--					1.00	--					1.00	--				
Poorer				1.08	0.10					1.10	0.13					1.29	0.23					1.66	0.15	***			
Middle				1.44	0.14	***				1.31	0.15	*				1.64	0.30	**				2.13	0.19	***			
Richer				2.45	0.27	***				2.10	0.26	***				2.42	0.53	***				3.56	0.34	***			
Richest				3.40	0.47	***				4.20	0.69	***				4.02	0.93	***				7.20	0.91	***			
<b>Education</b>																											
None (ref)				1.00	--					1.00	--					1.00	--					1.00	--				
Primary				1.73	0.17	***				1.97	0.20	***				1.75	0.27	***				2.00	0.15	***			
Secondary or Higher				3.21	0.41	***				4.25	0.65	***				1.75	0.35	**				4.60	0.41	***			
<b>Age</b>																											
15-19 Years (ref)				1.00	--					1.00	--					1.00	--					1.00	--				
20-24 Years				0.86	0.07					0.97	0.09					1.00	0.15					0.87	0.06	*			
<b>N</b>	9,633			9,633			7,789			7,789			5,481			5,481			16,975			16,975					

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

All models control for countries included in regions



**Table 7. Odds of Receiving Skilled Delivery Assistance by Migrant Stream & Duration of Residence**

	Southern Africa			East Africa			Central Africa			West Africa		
	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.	OR	Std. Err.	Sig.
<b>Migrant Type</b>												
Rural Non-Migrant (ref)	1.00	--		1.00	--		1.00	--		1.00	--	
Urban Non-Migrant	3.04	0.38	***	2.41	0.41	***	2.82	0.56	***	2.38	0.22	***
Urban-Urban < 3 Years	3.84	0.78	***	3.53	1.09	***	3.33	1.00	***	2.71	0.41	***
Urban-Urban > 3 Years	3.20	0.73	***	2.71	0.92	**	1.98	0.75		1.85	0.30	***
Rural-Rural < 3 Years	1.26	0.12	*	1.16	0.13		1.12	0.23		1.21	0.11	*
Rural-Rural > 3 Years	0.95	0.11		0.82	0.11		0.94	0.21		0.79	0.08	*
Rural-Urban < 3 Years	1.98	0.37	***	1.52	0.43		1.77	0.57		2.33	0.46	***
Rural-Urban > 3 Years	3.75	1.01	***	3.52	1.31	***	2.24	0.73	*	1.97	0.36	***
Urban-Rural < 3 Years	2.60	0.47	***	1.26	0.25		0.92	0.40		2.08	0.28	***
Urban-Rural > 3 Years	1.54	0.29	*	1.39	0.39		1.16	0.39		1.48	0.22	**
<b>Marital Status</b>												
Ever Married (ref)												
Never Married	1.29	0.13	*	1.08	0.14		2.02	0.44	***	0.95	0.11	
<b>Wealth Quintile</b>												
Poorest (ref)												
Poorer	1.08	0.10		1.10	0.13		1.29	0.23		1.66	0.15	***
Middle	1.44	0.14	***	1.31	0.16	*	1.63	0.30	**	2.12	0.19	***
Richer	2.46	0.27	***	2.11	0.26	***	2.42	0.53	***	3.53	0.34	***
Richest	3.40	0.47	***	4.22	0.70	***	4.01	0.93	***	7.16	0.90	***
<b>Education</b>												
None (ref)												
Primary	1.74	0.18	***	1.96	0.20	***	1.75	0.27	***	1.99	0.15	***
Secondary or Higher	3.22	0.41	***	4.19	0.64	***	1.74	0.35	**	4.46	0.40	***
<b>Age</b>												
15-19 Years (ref)												
20-24 Years	0.88	0.07		0.99	0.09		1.01	0.15		0.92	0.06	
N		9,633			7,789			5,481			16,975	

Note: \* p&lt;0.05, \*\* p&lt;0.01, \*\*\* p&lt;0.001

All models control for countries included in regions