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Migration and fertility selection in Ghana: Going beyond rural-urban migration

(Short Title: Migration and fertility selection in Ghana)

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Abstract

This paper disentangles the relative role of three mechanisms –selection, adaptation and disruption—in influencing migrant fertility in Ghana. Using the 1998 Ghana Demographic and Health Survey, we fit poisson, and sequential logit regression models to discern the effects of the above mechanisms on cumulative fertility and annual birth probabilities. Four types of migration streams are examined and compared with non-migrants at origin and destination. We find substantial support for the selection hypothesis among rural-urban and urban-rural migrants. Disruption is evident only in fertility timing of second and higher order births in Ghana. Our finding that migrants exhibit childbearing at about the same rates as natives at destination implies that the growth rate of the cities will slow down quickly. Although it remains clear that family planning efforts need to be targeted toward rural population in order to attain a reduction in national fertility level.

Key words: Migration, fertility, Ghana, sub-Saharan Africa, selection, adaptation disruption

Introduction

Demographers have long been interested in the social and economic processes that affect fertility, such as cultural diffusion, assimilation, economic development and transformation of family roles that migration, particularly rural to urban migration entails. This interest stems from a concern for rapid growth of the urban population. Therefore, considerable amount of research has been carried out over the last few decades into the impact of migration on fertility; much of which has focused on movements of rural population to cities (see e.g. Goldstein 1973; Green 1978; Bach 1981; Lee & Farber 1984; Lee 1992; McKinney 1993; Brockerhoff &Yang 1994; White et al. 1995; Goldstein et al. 1997 among others). This focus largely ignores other streams of migration, as well as the impact of migration on rural fertility (for an exception see Goldscheider 1984). Since rural-urban migration has never been the dominant migration stream in sub-Saharan Africa (Oucho & Gould 1993) findings from these studies have limited ability to explain the effect of geographic mobility on national fertility trends in Africa. Moreover, while the current literature on migration-fertility relationship provides significant findings for specific cases, methodological and data constraints have often resulted in confounded and contradictory findings regarding the mechanism generating migrant-native fertility differentials.

In this paper we address these shortcomings by examining all four migration streams –rural-urban, rural-rural, urban-rural, and urban-urban, as well as the non-migrants in destination and origin to illuminate the processes through which residential mobility impacts fertility in Ghana.

Theoretical Framework and Previous Research Findings

Three mechanisms have been identified in the theoretical literature that accounts for migrant-native fertility differences: selection effect, adaptation effect, and disruption effect (Goldstein & Goldstein 1983). These differ from each other in their emphasis on exposure to different residential environments versus the circumstances of the move itself. The selectivity hypothesis refers to the tendency for migrants to be self selected for individual characteristics that are associated with lower or higher than average fertility compared to non migrants at the origin. Migrants often differ from non-migrants on observable socioeconomic characteristics –education, age at marriage and employment-- which have an impact on fertility. For example, women who migrate to urban areas may have higher education and age at marriage, and therefore fewer children compared to non-migrants producing a lower urban fertility rate (Goldstein & Goldstein 1981; Hervitz 1985). Selectivity may also occur on the basis of unobserved characteristics such as the propensity to postpone childbearing, openness to change or fertility aspirations (Ribe & Schultz 1980).

Whether or not migrants are selected for characteristics that are associated with lower/higher fertility requires information on non-migrants in the communities of origin. Studies (Kahn 1988; Campbell 1989) conducted with data on destination area only cannot be used to test the selection effect. Furthermore, the degree to which migration is selective depends upon the context of migration. Migrants moving to fulfill their social mobility aspirations are a select group at their place of origin. Once in their destination, their high aspirations may lead to reduced fertility. On the other hand selectivity for migrants moving for family reasons may be considerably less. For example, Lindstrom and Saucedo's (2002) results with regard to selectivity suggest that migrants may be differentially selected on fertility preferences with respect to migration strategy. Because migrants have heterogeneous preferences with respect to family size, decisions about choice of destination will be influenced by the cost of service and family maintenance in alternative locations, and hence the extent and type of selection will also vary.

A second mechanism is disruption in childbearing through spousal separation or a desire to delay childbearing until after the move. This disruption effect would lower fertility of migrants compared to non-migrants. The interruption in childbearing caused by migration in such cases may be followed by accelerated fertility among migrants (Sharma 1992). The impact of disruption therefore, would be found in the timing of a woman's fertility and the impact may last only a short duration.

The disruption effect has been studied most often in the context of temporary migration. Sharma (1992) explored the impact of temporary separation on fertility and concluded that any relationship between migration and fertility is reflected only in cumulative fertility and that disruption was not a major factor. Hampshire and Randall (2000) find that although seasonal migration is associated with substantially lower fertility, the fertility differential is caused largely by secondary sterility rather than disruption. Disruption has also been studied with detailed data on the timing of the two events (White et al. 1995; Lindstrom & Saucedo 2002). White et al. (1995) found that a residential move reduced the likelihood of childbearing in that year, which provides evidence for disruption effect. However, Goldstein et al. (1997) examined migrant fertility under very restrictive state policy regarding mobility and family planning, and they report conflicting findings. On the one hand they find that rural-urban migrants tend to have later first births, which the authors attribute to the disruption, but could also be a selection effect. On the other hand they find that temporary migrants have a slightly higher chance of (first) birth in a year. Using retrospective fertility and migration histories Lindstrom and Saucedo (2000) find, like Sharma (1992), that spousal separation due to temporary migration reduces birth probabilities in the short run, but has little impact on the long run marital fertility. Disruption effect may also be modified by gender and the purpose of migration (Lindstrom and Saucedo, 2000). If women migrate for marriage then we may see not disruption, but rather a short-term spike in fertility.

The third mechanism is adaptation to the fertility regimes of the destination. The adaptation theory has its roots in both sociological and economic theories explaining determinants of fertility (Findley 1980). From the sociological perspective adaptation theory rests on the premise that fertility is determined by social and cultural norms present in the residential environment and emphasizes factors that are important in shaping and transmitting values and ideas (Caldwell 1982). The economic perspective describes the adaptation process primarily in terms of household income and the relative cost of children. Wage differentials for men, women and children, and price and income constraints at the destination area, along with employment and educational opportunities change the real and opportunity cost of childbearing, which alters fertility behavior (Becker 1981). Benefo and Schultz consider rural-urban migration for women an investment that confers significant productivity gains (Benefo and Schultz, 1996). Such gains could be seen as adaptation likely to raise the costs of childbearing and childcare. Exposure to different socio-cultural norms and relative costs of childbearing will lead to changes in fertility behavior, such that migrant fertility will ultimately converge to that of the natives at destination. The process of assimilation/adaptation is therefore gradual and typically takes a longer time to influence fertility. Therefore 'duration of exposure' to the new norms, as measured by length of residence is the crucial element that measures the extent of adaptation change due to migration.

Often researchers are unable to test for adaptation effects, because the time span of their data is not long enough (White et al. 1995). A number of studies using US census data find a negative relationship between fertility and time spent in the destination area --US. These studies attribute this relationship to the gradual assimilation of low fertility norms and to the influence of economic opportunities and constraints in the US that discourage large families (Bean et al. 1984). Kahn (1988) opines that for migrants moving between two types of areas with inherently different norms, their fertility behavior will reflect the combined influence of both the areas.

The empirical evidence of the importance of the three processes in generating migrant-native fertility differentials is not clear. For example, Bach (1981) finds that adaptation is stronger in explaining migrant fertility than what he calls the "migration effect" --selection or disruption. Trovato (1987) reports that in keeping with the adaptation hypothesis, migrants eventually reduce their fertility, once assimilation to the urban milieu has taken place. Similarly, Lee & Pol (1993) report a significant rural-urban adaptation effect in Korea and Mexico, even after the selection effect had been controlled; yet they found little evidence of adaptation in Cameroon.

Goldstein and Goldstein (1981) in their Thai study found support for both selectivity and disruption. Kahn (1988) finds support for adaptation in that although migrants to the United States tend to display the fertility pattern of their origins, the overall native-migrant completed fertility differentials are quite modest. Campbell's (1989) study on desired family size fits better with disruption than adaptation. In Sub-Saharan Africa Brockerhoff (1995) finds that new arrivals in cities actually exhibit much lower fertility than long term residents of similar age and parity, Brockerhoff attributes this to a selection effect and absence of adaptation effect. Adewuyi's (1986) study reveals that there may be situations when migration is not selective, and neither is there any opportunity to change behavior after migration.

These three mechanisms are not mutually exclusive. In addition there may be some interdependence among the three processes. It is likely that a strong selection effect may make adaptation moot. On the other hand, a high level of disruption could lead couples to make up for lost fertility by spacing births more closely after migration and /or delaying the age at which childbearing is stopped. It is necessary, therefore to distinguish the potential effects of migration on cumulative fertility versus the effect on immediate fertility. In so doing, we can better understand the effect of geographic mobility on national fertility trends.

Studies that disentangle the mechanisms through which geographic mobility impact national fertility have critical implications for government programs for fertility reduction and policies for curbing urban growth. For example, if migrants are self selected for lower fertility they can act as innovators in the community. Similarly, those who move into an area with a propensity for higher fertility can serve as the target group for fertility programs. And given that diffusion of ideational change may be important to fertility reductions (Casterline, 2001), movement between rural and urban areas may help spread new concepts related to union formation and childbearing. Unfortunately, lessons learned from other parts of the world may not be applicable to Africa in general and, Ghana in particular, because of the unique biosocial context, which defines African reproduction and the rather atypical migration pattern in Ghana.

The Context

Centrally located in the West African sub-region, Ghana occupies a total land area of 238,539 square kilometers (roughly the size of Oregon in the US). Since independence in 1957 significant changes have taken place in various aspects of Ghanaian society. We highlight some of the documented changes in Ghana that are relevant to the relationship between migration and fertility. Among these are changes in urbanization, educational attainment, reproductive behavior and economic structure.

<u>Urbanization and Migration Pattern</u>: Despite the disproportionate attention it receives in the literature and among policy makers, rural-urban migration has never been the major form of migration in sub-Saharan Africa (Oucho & Gould 1993: pg. 264). Rural-rural migration has historically been the dominant form of migration. Recent evidence suggests that rural to urban migration has further declined over time in Africa (Montgomery et. al 2003; pg 91) leading to substantial urban to rural migration flows in West Africa (Bocquier and Tracore 1998). Analyses of Ghanaian census data census suggest a prominent role for urban-rural migration. Census tabulations from 1970 point to a slight excess of urban-rural over rural-urban moves (Zachariah and Conde 1981), while analysis of the 1984 census indicated that 16.2% of internal migration movements were rural-urban, while 25.4% of moves were urban-rural (Twum-Baah et al, 1995). A 1991 survey

continued to find that the urban-rural flow exceeded that of the rural-urban and that over half of all return migration was urban-rural in nature (Twum-Baah, et al., 1995 p. 172, p. 176). More recently, Litchfield and Wadington (2003) have shown that urban-rural migration in Ghana exceeds rural-urban and rural-rural migration.

An explanation for the growth in urban-rural migration in Ghana possibly lies in changes in resource distribution and opportunities – in particular educational and job opportunities. Ghana initiated a program economic restructuring in 1983 after a decade of economic stagnation, which removed government support for many critical sectors and caused social and economic distress, particularly among urban residents. A unique feature of current African urbanization is that, unlike the cities of Asia, and Latin America, African cities are economically marginalized in the new global economy making it impossible to provide low income housing, high quality services or sufficient employment (Montgomery et al. 2003; pg 102). Secondly, in Ghana, as in most African countries there is a tendency to locate a disproportionate share of education facilities in urban areas and a large number of migrants move simply for educational reasons (Preston 1979; Achanfuo-Yeboah 1993). In the absence of commensurate job opportunities, a high proportion of migrants who had moved to urban areas for education may move back to rural areas after completion of their education contributing to the size of the flow.

Moderately high rates of urban growth over time (through both prior migration and natural increase) will increase the pool of urban residents available for rural-ward moves. Reclassification may also play a role if later-life return migration (to a low-density settlement) involves a departure from a place that has grown enough to cross the urban threshold.

Reproduction: Reproductive behavior in Ghana has changed in favor of lower fertility. Use of modern contraceptive methods in 1998 was 13.4 percent (compared to 5 percent in 1988); fertility desires have changed, with the mean ideal number of children declining from 5.3 percent in 1988 to 4.2 percent in 1998. Despite these changes the total fertility rate in 1998 was 4.5 – well above replacement level of fertility (Ghana Statistical Service (GSS) and Macro International (MI), 1994, 1999). Caldwell & Caldwell (1987) emphasize the centrality of the lineage, the weak conjugal bond and the unique family system –especially polygamy child fostering in the persistence of high fertility in Africa.

An important feature of Ghanaian demographics is the socio-economic divide in fertility. Variations in reproductive behavior by residence have been well documented. Marriage is still virtually universal in Ghana and provides the generally accepted avenue for childbearing (although childbearing outside marriage does occur). The prevailing marital practices would therefore, have implications for the relationship between migration and fertility. Marriage occurs earlier in rural than urban areas. Rural women are more likely to be married at each age than their urban counterparts and remarriage are also more common in rural than urban areas (Aryee, 1985). Polygamy is more common in West Africa than other parts of the continent (Lesthaeghe et. al. 1989). The 1998 DHS indicates that 23 percent of currently married women report themselves to be in a polygamous union (GSS & MI 1999). Polygamy is much lower in urban areas and among younger women. However, the fertility impact of polygamy is unclear. Lee (1992) cites lower prevalence of polygamy and more stable marriages in urban area as a factor that could lead to increased fertility in urban areas. Mobogunje (1990), on the other hand, argues that increased nucleation in family relationships in urban areas leads to reduced fertility. Caldwell's (1987) theory of fertility decline also suggests that modern family system in urban areas would lead to a decline in fertility in Africa. Moreover, the decline in polygamy has also been linked to an increase in age at marriage (Timacus and Graham 1989), which would tend to depress fertility.

The prevalence and duration of Postpartum abstinence and breast-feeding, which have fertility depressing effect is higher in rural areas than urban areas, while the prevalence of contraceptive use and primary sterility is higher in urban areas (Jolly and Grible 1993; table 3-5), as is the rate of early pregnancy loss (GSS & MI 1999). Bongaarts, Frank and Lesthaeghe (1984) (also Larsen 1989) recognize that urbanization in sub-Saharan Africa brings about greater sexual mobility, exogamy and incidence of prostitution, which could foster increased infertility through higher incidence of sexually transmitted diseases. The mere availability of health care may not be enough to reduce the level of STDs and infertility. Urban areas thus show a higher level of pathological sterility. The greater sexual freedom in urban areas may also lower age at first intercourse. However, Agyei et al. (2000) examined age at first intercourse in a sample of unmarried Ghanaians age 15-24 and found little difference among those living in Accra, periurban areas and rural villages. Data from the 1998 Ghana DHS also shows that the age at first intercourse is not very different for urban and rural residents (17.3 in urban areas vs. 17.0 in rural areas).

Given the above, migration to urban areas in Ghana is likely to depress the supply of children, except through the effect of breastfeeding and post-partum abstinence. Despite the tendency of these factors to raise fertility, empirical studies in Ghana desire and have nonetheless consistently observed that women living in urban areas desire and have fewer children than their rural counterparts (GSS and IRD 1989; GSS and MI 1994, 1999).

Data and Methods

The analysis uses data collected by the Demographic and Health Surveys (DHS) conducted in Ghana between November 1998 and February 1999. The survey is a nationally representative, stratified, probability sample of women aged 15-49. It interviewed 4843 women between the ages 15-49 from 6003 households, and collected data on fertility, family planning, and maternal and child health, including complete birth histories. Information on demographic characteristics of the respondents, such as age, education, religion, and region of residence was also collected. All analyses incorporated weights to reflect survey sampling and non-response. To accommodate the design effect from stratified sampling, we present p-values associated with robust standard errors throughout. Table 1 gives the sample characteristics of the Ghana DHS by type of current residence. Data in Table 1 indicate selectivity along observable characteristics, where people, who are younger, more educated and less traditional, live in urban areas compared to those living in rural areas

Table 1 about here

We find, from table 1, that the level of female mobility in Ghana is quite high. Over 60% of the respondents had changed places at least once in their lifetime. The socioeconomic and fertility differentials between rural and urban residents in Ghana are also quite obvious. On the average rural residents have one additional child compared to urban residents. Rural residents are also somewhat older, less migratory, less educated, less wealthy, less likely to be Christian, and more likely to be married.

The Ghana DHS also contains data from four questions on lifetime mobility: childhood residence, previous residence, current residence, and duration at current residence. Our primary explanatory variable --migration status-- is determined from the questions on current residence, childhood residence, last residence and duration of residence at the current place. We identified migrants and non-migrants from responses to the duration of residence question. Any woman who responded 'always' (lived in this place) to the question was classified as a non-migrant; others were classified as migrants. We constructed four categories of migrants: rural-urban, urban-urban, urban-rural and rural-urban depending on the type of childhood/last residence and current residence, while excluding visitors from our analysis (52 respondents or 1.07% of the sample).[1] Wherever possible we compared results for migration definitions based on childhood residence and last residence, and found them to be very similar. We present, results from migration types based on childhood residence except where the analysis required information on the timing of move. In such cases we used information on last residence since the Ghana DHS collected information on the timing of only the most recent move.

Table 2, which gives the distribution of the population by migration types, shows that the rural-urban group of migrants only forms a small part of the population and that urban-rural mobility is the dominant form of migration in Ghana. That rural-urban migration has never been predominant in Ghana or Sub-Saharan Africa is quite well

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[1] We also examined another migration variable based on childhood residence, last residence and current place of residence. The analysis did not differ significantly, and so we report only these results. However, we do recognize that the results that we present in this paper may be sensitive to alternative defination of migration that can be derived from more detailed data on residence histories.

established (Oucho & Gould 1993: 264). Recent studies have also shown the growing trend of urban-rural migration in Ghana (Bocquier and Tracore` 1998; Twum-Baah et al, 1995; Litchfield & Wadington 2003). Litchfield and Wadington (2003) study based on the 1998/99 Ghana Living Standards Survey, for example reports that rural urban migrants form only about 10% of internal migrants, whereas urban rural migrants form about 35% of total internal migrants (Table 3 pg 15). Corresponding estimates for migrant types based on last and current residence from the Ghana DHS are 7% rural-urban and 39% urban-rural migrants. Considering that our study population consists only of women, the slightly lower estimate of prevalence of rural-urban migration is expected. Indeed, the quality of DHS data was recently analyzed by DHS staff and found to be generally acceptable. In cases where data problems were identified, they did not include migration pattern (Foote et. al. 1993).

Table 2 about here

In order to examine the effect of migration on fertility, it is important to look at the impact of migration on total fertility as well as, the timing of births. For example it may be the case that migrants and non-migrants ultimately have the same number of children, but migrants complete their family building process more quickly than non-migrants. Therefore, in this analysis we seek to determine the effect of migration on both aspects of fertility. First we examine how past migration experience impacts the total number of children born to a woman. Secondly, we use a sequential logit event history approach to analyze the effect of migration on the pace and timing of births.

To bring out the selection of migrants by observable factors we introduce covariates that are known to influence selectivity. For example, in Sub-Saharan Africa unmarried and single, better educated, and adult women in their 20's are more likely to move to urban areas (Brockerhoff & Eu, 1993). In addition to age, education and marital status, we also introduced other control variables, which influence migration and fertility in Ghana (McKinney 1993; Brockerhoff & Yang 1994; Tawiah 1997) --religion, region of residence, age at first marriage (or union) for ever married women and, a measure of household wealth[2]. After eliminating the observable factors, we envisage that any remaining fertility differential between non-migrants and migrants in their area of **origin** is attributable to **migrant selection** by unobservable factors such as motivation or family orientation. We also compare the fertility of rural-urban and urban-rural migrants before migration with the fertility of those remaining in the area of origin. Lower pre-migration fertility compared to non-movers at origin after adjusting for differences in age, education, religion and region of residence and prior fertility would indicate a selection effect. We test the disruption effect first by comparing the fertility of migrants who have moved to the same type of place as their place of origin –rural-rural and urban-urban—with the non-migrants. Moreover, we explicitly examine the effect of experiencing a move on the probability of having a birth in the same year since the impact of disruption is expected to lie in the timing fertility and the impact may not be discernible in the *number* of children born.

The adaptation effect is also measured in two ways. First, we compare the fertility of migrants with non-migrants at destination. Significant difference in fertility between migrants and non-migrants in **destination** would indicate a lack of adaptation

[2] DHS data do not contain direct information on household income or wealth. The possession of household assets is, therefore, used as proxy, with a categorization that reflects low, medium, high and very high household wealth according to the quartiles of the distribution. Note 2 of Table 1 describes how the wealth score was calculated.

among the migrants. Secondly we introduce a variable for duration of residence based on the timing of the last move and examine if this variable reveals a converging or diverging trend to the fertility of non-migrant in the destination area.

Migration and Cumulative Fertility: We use bivariate and multivariate methods to study how past migration experience affects the total number of children a woman bears. The dependent variable is children ever born (CEB). We decided to use a count model, here a Poisson model, for our multivariate analysis of cumulative fertility where the distribution of the number of births a woman has is given by

$$P(Y = y) = \frac{e^{-\lambda} \lambda^{y}}{y!}$$

Here the incidence rate of birth λ is influenced by a set of explanatory variables X_is.

$$\lambda = \exp(b_0 + \Sigma b_i X_i)$$

where b_0 is the constant term, and b_i's are the effect coefficients.

Migration and Timing of Births: In this second analysis we us annual birth histories, together with the information on the characteristics of the origin and destination areas, to assess the effect of migration on the timing of births. We estimate a discrete time hazard model (sequential logit model) and therefore use a person-year data structure. Each year from age 11 of a person constitutes a record for the analysis. Given the nature of our analysis we had to choose among several possible starting times. We considered age at first intercourse to be the start of the risk period. However, this would mean the starting time would be subject to individual variation not controlled for in our study. We chose to use age 11 as the starting point in our analysis because it represents a fixed starting point for all individuals, and would yield a positive probability for all births in the sample[3].

Unlike many applications of event history, the event of interest in our analysis – births—is a repeatable event. We therefore, chose a time interval of one year for a record, which is sufficiently short so that no more than one event (birth) occurs in any discrete time unit. Each record –that is, a year in a respondent's life from age 11 to age at survey date contains several characteristics some of which are fixed for all the records of an individual, while others change from record to record. This structure for our data[4] allows us to use logistic regression to estimate the annual birth probabilities. In short, the log odds of a birth occurring in a year 't' is given by:

$$Ln\left(\frac{p_{it}}{1-p_{it}}\right) = b_0 + \sum b_i X_i + \sum b_j X_{jt} + e_{it} \qquad (1)$$

Where Xi's represent the values of fixed covariates, unchanged in the observation period for each individual woman. These include migration status, education, age at first marriage/union, religion, region of residence, and household wealth. Xj's represent time-varying covariates that change as life experience changes. These include respondent's age, marital status, birth order etc. To estimate the right hand side of equation (1) we define an indicator for whether or not a birth occurred in a year of the person year file. Moreover, we model the first birth and higher order births separately since these are essentially different processes with biological factors exerting a greater influence on the probability of first births than in higher order births. Once an event, for example the first

[3] Two births in the sample were recorded as occurring before age 11. Both were assessed as bad data based on the timing of first intercourse.

[4] Using person-year data does not automatically lead to underestimated standard errors or overestimated test statistics, unless the model is misspecified and there is unobserved individual variation, for which the analysis fails to control.

birth, takes place, the woman is removed from the risk set for that event. Censoring via the survey or reaching age 50 also ends the observation. A description of the independent variables used in the study is given below.

The primary independent variable in this study is migration status. Migration experience is defined as lifetime status. Given the nature of DHS questions on childhood residence, it was not possible to determine the changing migration experience for each year of an individual. Therefore, this variable is kept in the hazard model as a fixed covariate. In order to examine the pre-migration fertility we defined the migrant groups based on the last move and used the information on the timing of the last move.

Selection of other appropriate socioeconomic and demographic background variables for controls in the analysis was aided by former studies on migration and fertility and theoretical considerations. Ten variables were chosen for in-depth analysis. Socioeconomic variables included were respondent's education, religion, region of residence, marital status and, a measure of household wealth and childhood residence. We recognize that household wealth may in fact be determined partly by prior fertility and the estimates associated with this variable may be biased. However, given the known association of wealth with residence (Table 1) and migration status, failing to control for this variable would confound the migration effects with household wealth effect. Marital status was introduced as a time varying covariate in the hazard model. However, in the absence of a complete marital history, it was only possible for us to determine the ever-married status for all the years in the person year data based on age at first marriage (or union). A variable for age at first marriage was introduced in the Poisson model to control for exposure time.

Among demographic variables we included maternal age, measured as age of the mother at the time of the birth to capture the age effect on the biology of fertility. We also included a measure of sex composition of prior births, which has been identified as an important determinant of the probability of giving birth. Since each individual may contribute more than one event to the sample, it was necessary to consider controlling for the dependence of the hazard rate on individuals' previous history. We constructed a variable (parity), which was coded 'k' for all years starting from the year after the k^{th} birth to the year of the $(k+1)^{th}$ birth. We modeled first births and higher order births separately, because we believe that the two processes are intrinsically different. Certain variables such as number and timing of prior births may be important determinants of the timing of higher order births only. Therefore, for second and higher order births we introduced the number and sex composition of previous births and the length of time between consecutive births as a covariate. Such a strategy also controls for individual woman's unobserved fecundity (Allison 1982). The analysis was conducted using the statistical package, STATA.

Results

Bivariate Analysis of Cumulative Fertility: The bivariate association between migration status and completed fertility appears to be quite strong ($p<.01$). In general, migrants in Ghana have higher fertility, compared to non-migrants, and migrants to rural areas have higher fertility compared to migrants to urban areas (table 3). Much of the variation may, however, be explained by migrants' higher age. Because migrants to rural areas are the oldest groups they have higher completed fertility. Similarly, migrants to urban areas who are older than non-migrants at urban areas have greater number of children. In this case it seems variations in the events –migration and fertility-- are driven by variations in exposure time. Moreover, there may be other confounding factors, apart from age that could give rise to the observed difference in the number of children among the groups. In the following sections we specify a multivariate model, which controls for several variables known to impact fertility independently to study the effect of migration on children born and the pace and timing of fertility.

Table 3 about here

Multivariate Analysis of Children Born: The coefficients for the migration related variables from our Poisson regression model are in table 4. The first thing to notice is the remarkable similarity of the coefficients between model 1, which is based classification by residence change since childhood and model 2 based on a classification since last move. This indicates first that our model is quite robust to alternative definitions of migration. Secondly, we see that despite controlling for known or observed factors affecting migrant selectivity, many of the coefficients for migration related variables are statistically significant, consistent with further selection based on motivational factors (Ribe & Schultz, 1980; Kahn 1988). For example, the migration related coefficients show that rural origin migrants to urban areas have lower ($p<.05$) fertility than rural non-movers. On the average rural-urban migrants have, about 11 to 13 ($e^{-0.12}=0.89$; $e^{-0.14} = 0.87$) percent fewer children compared to rural non-migrants of similar characteristics. All three types of urban residents at survey (including urban-urban and rural-urban migrants) exhibit a fertility differential from rural non-migrants of about this magnitude. Similarly, urban-rural migrants seem to manifest somewhat higher fertility. Compared to urban stayers, migrants to rural areas have higher fertility ($p<.01$) and their expected fertility is almost same as that of rural non-movers.

Table 4 about here

Analysis of pre-migration fertility compared to the fertility of non-movers provides a clearer window on the selection effect. Using the information on duration in current residence to remove childbearing that occurred in current place of residence[5], we found that rural-urban migrants had 13% ($e^{-0.14}=0.87$, $p<.05$) fewer children compared to women who stayed in rural places. Urban-Rural migrants had 6% ($e^{0.06}=1.06$, $p<.10$) more children than women who stayed on in urban areas. Indeed, the pre-migration fertility of rural-urban, as well as urban-rural migrants was not found to be significantly different from the fertility of natives in destination area ($p =0.38$ and 0.14 respectively).

Comparisons of lifetime fertility (not just pre-migration fertility) of migrants with natives at destination show that migrant fertility is not statistically different from fertility of the natives indicating perhaps an adaptation effect (table 4). For example, the coefficient for Rural-Urban migrants is not significantly different from that of urban natives. Similarly, the coefficient for Urban-Rural migrants is not significantly different from that of rural natives. Analysis of migrant fertility by length of stay in destination area revealed that fertility of even the most recent migrants matches the fertility of the natives at destination (table 5) providing somewhat more evidence for selection. This agrees with Brockerhoff's (1995) study where he reports that new arrivals in cities actually exhibit much lower fertility than long term residents of similar age and parity.

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[5] Because we lack complete residence histories, we can only make a comparison that eliminates childbearing in the most recent residence spell. We are fortunate that current DHS data have more detail on timing of demographic events, but fully longitudinal (panel) data is not yet available.

The coefficients for migrants moving to and from similar places offers little credence to the disruption hypothesis, which predicts lower fertility for migrants, compared to non-migrants. Both, rural-rural and urban-urban migrants have higher or same fertility as compared to non-movers in those areas (table 4). However, disruption in childbearing because of migration may be a temporary phenomenon discernable only in fertility timing and not in cumulative childbearing.

Migration and Fertility Timing:

Table 6 gives the effect of migration experience on the annual birth probabilities controlling for demographic and socioeconomic factors. This model differs from the earlier model in that it more explicitly examines birth timing. The first column of the table shows the effect of migration on the risk of experiencing the first birth, while third column gives the effect of migration on the risk of experiencing higher order births. Except for urban to rural movers, migration status in general does not have a statistically significant ($p=0.18$) impact on the hazard of first birth. The act of moving in a particular year does not impact the probability of a first birth in that year. This seems quite plausible as first births are influenced more by biological and socioeconomic background factors, rather than migration experience.

Table 6 about here

Our result on migrant-non-migrant differentials on the pace and timing of second and higher order births is quite similar to our finding on total fertility. Table 6 shows that rural-urban migrants have significantly lower risk of having a second or higher order births compared to rural non-migrants ($OR= e^{-0.28} = 0.76$; $p<.01$). On the other hand urban-rural migrants exhibit a slightly lower risk of next birth than rural non-migrants, but this was significantly higher (OR= $e^{(-0.03+0.22)}$ =1.21; p<.01) compared to women who remained in urban areas.

As in the case of completed fertility, we conducted a more stringent test of selection effect by examining the pre-migration propensity to bear children, controlling for the standard set of personal covariates. Although, we uncover no migration effect on first births, the result showed that even before migration, rural-urban migrants had lower rate of childbearing than rural stayers (OR=0.82 p<.05) and urban-rural migrants had higher fertility than urban stayers (OR=1.20 p<.01) all else being equal. Again as in the case of cumulative fertility, the migrants' propensity to bear children looks similar to that of destination even before the move (p=0.79 and 0.78). Both groups of migrants—rural-urban and urban- rural show a similar rate of childbearing to native women of the destination area.

The coefficients in table 6 associated with the variable indicating residential move in a year provides evidence of disruption in childbearing associated with second or higher order birth. A residential move in a year depresses the chances of a second or higher order birth by 36% (OR = $e^{-0.45}$ = 0.64; p<.01).

Discussion

Of the three mechanisms through which migration impacts fertility, this study finds most support for the selection hypothesis. The fertility of migrants whether moving from rural to urban or from urban to rural areas is considerably different from the fertility of non-migrants at origin and mimics the fertility of the women in destination area even before migration. Except for the first birth, these relationships hold for the pace of childbearing and the level of fertility. We do not find any effect of migration on the probability and timing of first birth.

The effect of disruption is visible only in delaying higher order births, while having little or no impact on total number of children. This is in keeping with earlier studies on the effect of disruption on annual probabilities of childbearing (White et al. 1995; Lindstrom & Saucedo 2002). Since disruption is a temporary phenomenon, our finding that it does not impact the total number of children seems reasonable.

Our initial analysis indicated migrant fertility to be similar to the fertility of natives at destination, in terms of total children as well as, timing of births pointing to a possible adaptation effect. However, an examination of migrant fertility by length of stay, a comparison of pre-migration fertility, and migrant fertility with the fertility of non-migrants at origin revealed that migrant fertility is significantly different from non-migrant fertility at origin and approaches the fertility regime of the destination area even before migration. We also found that there is little change in the number of children borne by migrant women, subsequent to the move. We conclude that migrant selection or fertility preference of migrants play a greater role in eliminating migrant non-migrant differentials in destination areas than adaptation.

Brockerhoff (1995) reported a similar finding. He also found that new arrivals in cities actually exhibited much lower fertility than long-term residents of similar age and parity, and attributed this to a selection effect and absence of adaptation effect. Lee (1992), on the other hand interprets the lack of change in migrant fertility after a move as evidence of adaptation, since urban exposure in sub-Saharan Africa may increase the supply of children. We compare migrant fertility overtime with the fertility of the natives in destination, who are subject to the same supply curve as the migrants and still see no evidence of fertility change. Rather our analysis on pre-migration fertility comports with "anticipatory socialization" hypothesis. That is, adoption of norms, values, and behaviors associated with destination area while the migrant is still residing in the area of origin (Hanna and Hanna 1971). Such a phenomenon is common when, as in Ghana, individuals are exposed to aspects of both, urban and rural life through association with return migrants or their own circulation between urban and rural areas and other potential sources of ideational diffusion (Casterline 2001). In such cases migrants may be differentially selected on fertility preferences with respect to migration strategy. Lindstrom and Saucedo (2002) report such a phenomenon in the context of US-Mexico migration that is also characterized by a high degree of circular migration. However, these conditions will not always be present, and our findings may not be generalizable to those situations.

The large scale out-migration of high fertility women from urban areas and the low level of migration of rural residents into urban, coupled with their low fertility suggest that the urban population growth in Ghana will slow down in a fairly short period of time, easing much of the current pressures on urban infrastructure and services. However, rural residents would tend to work to maintain higher rural and national growth rates. In terms of policy intervention, our results suggest that rural-urban migrants are a low fertility group and thus not in differential need of family planning attention compared to their fellow city dwellers. To the extent that there is unmet need for family planning in rural areas, further consideration of urban-rural migrants may be in order.

Our analysis indicates the value of looking at population redistribution as a contributor to relative urban and rural growth rates and overall national population dynamics. Future work along these lines will be better served by more temporal and geographic detail in the recording of residential histories.

Table 1: Sample Characteristics

Variable	Rural Sample		Urban Sample	
	Mean	S.D.	Mean	S.D.
Children Ever Born***	3.00	2.76	1.99	2.22
Age***	29.40	9.65	28.63	9.35
Migration				
Proportion Non-Migrant	0.39	0.49	0.38	0.48
Duration at current residence	16.45	12.60	15.66	12.22
Education ***				
Proportion with No education	0.36	0.48	0.16	0.37
Proportion with Primary education	0.20	0.39	0.15	0.35
Proportion with Secondary education	0.43	0.50	0.64	0.48
Proportion with High school & above	0.01	0.10	0.05	0.21
Age at first marriage/union***	18.45	3.81	18.98	3.96
Proportion never married***	0.20	0.40	0.31	0.46
Region***				
Proportion residing in Greater Accra	0.03	0.17	39.08	0.49
Proportion residing in Western region	0.18	0.38	0.09	0.28
Proportion residing in Central region	0.12	0.33	0.10	0.30
Proportion residing in Eastern region	0.22	0.42	0.13	0.34
Proportion residing in Northern[1] Ghana	0.06	0.23	0.03	0.17
Proportion residing in Volta region	0.14	0.35	0.05	0.22
Proportion residing in Ashanti region	0.15	0.36	0.14	0.35
Proportion residing in Brong-Ahafo	0.09	0.29	0.04	0.21
Religion***				
Proportion Christian	0.75	0.43	0.84	0.38
Proportion Moslem	0.10	0.30	0.12	0.33
Proportion following Other[2] religion	0.15	0.36	0.04	0.19
Household wealth score[3] ***	1.37	1.81	3.75	2.70
Total sample	3258		1585	

Note 1: Includes Northern, Upper East and Upper West regions
2: Includes no religion and traditional religion
3: We assigned a score of 1 each if the household had electricity, radio, or a bicycle; a score of 2 each for the possession of television, refrigerator, or motorcycle; and a score of 3 for the possession of a car. The household wealth score is the sum of these scores.
4: Proportions can be interpreted as means of dichotomous variables, which take the value 1 if an individual belongs to the group and 0 if not. The standard deviation presented in this table represents the standard deviation of such a variable.
*** $p<.01$
** $p<.05$

Table 2: Population Distribution by Migrant Type

Migrant Status	Percentage of Female Population
Urban Non-Migrant	13.6
Rural Non Migrant	24.8
Rural-Rural	17.4
Urban-Rural	21.7
Rural- Urban	5.4
Urban-Urban	17.1

Table 3: Mean and Standard Deviation of Cumulative Fertility by Migration Status and Age

Migrant Status	Age*	Children Ever Born*
	Mean (Std. Deviation)	Mean (Std. Deviation)
Urban Non-Migrant	27.08 (9.33)	1.72 (2.12)
Rural Non Migrant	27.83 (9.93)	2.58 (2.67)
Rural-Rural	30.96 (9.55)	3.49 (2.85)
Urban-Rural	30.03 (9.19)	3.10 (2.71)
Rural-Urban	29.90 (9.18)	2.32 (2.1)
Urban-Urban	29.49 (9.29)	2.11 (2.31)

* $p < 0.01$

Table 4: Effect of Migration on Lifetime Cumulative Fertility: Results from the Poisson Model.

Variable	Model 1	Model 2
Migrant status (vs. rural non-migrant)		
Rural-Rural	0.04*	0.05**
	(0.02)	(0.02)
Urban-Rural	0.02[a]	0.02[a]
	(0.02)	(0.03)
Rural-Urban	-0.14***	-0.12**
	(0.04)	(0.05)
Urban-Urban	-0.11***	-0.11***
	(0.03)	(0.04)
Urban non -migrant	-0.12***	-0.11***
	(0.03)	(0.04)

Note: Figures in parenthesis represent standard errors.
Model 1 uses childhood residence and Model 2 uses last residence to determine migrant type
Models also control for age, age squared, education, household wealth, marital status, age at marriage, religion and region of residence and childhood residence in model 1.

a significantly higher than urban non-migrants (p<.01)
*** p<.01
** p<.05

Table 5: Effect of duration of residence at destination on cumulative fertility: Results from the Poisson Model

Migrant type	Coefficient			
	Length of stay in destination area			
	0-2 yrs	3-6 yrs	7-14 yrs	15+ yrs
Rural-Urban Vs. Urban natives	-0.12	0.04	0.04	-0.05
	(0.18)	(0.07)	(0.10)	(0.07)
Urban-Rural Vs. Rural natives	-0.05	-0.03	0.05	0.07
	(0.05)	(0.04)	(0.03)	(0.04)

Note: Figures in parenthesis represent standard errors.
Model controls for age, age squared, education, household wealth, marital status and age at marriage, religion, region, and childhood residence

Table 6: Effect of Migration Status on Annual Birth Probabilities.

	First Birth		Higher Order Births	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
Migrant status (vs. Rural Non-Migrant)				
Urban-Rural	0.03[b]	0.06	-0.03[a]	0.03
Rural-Urban	-0.10	0.10	-0.28***	0.06
Urban non migrant	-0.14	0.07	-0.22***	0.04
Move in year	-0.14	0.09	-0.45***	0.07

Note: Models also control for age, age square, ever married status (TV) education, religion, past fertility, household wealth, and region of residence at the time of the survey.

*** P<.01
** P<.05
a Significantly higher than urban non-migrants (p <.01)
b Significantly higher than urban non-migrants (p <.05)

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