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Exploring Child Mortality Risks Associated with Diverse Patterns of Maternal Migration in Haiti

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Abstract

Internal migration is a salient dimension of adulthood in Haiti, particularly among women. Despite the prevalence of migration in Haiti, it remains unknown whether Haitian women's diverse patterns of migration influence their children's health and survival. In this paper, we introduce the concept of lateral (i.e., rural-to-rural, urban-to-urban) versus nonlateral (i.e., rural-to-urban, urban-to-rural) migration to describe how some patterns of mothers' internal migration may be associated with particularly high mortality among children. We use the 2006 Haitian Demographic and Health Survey to estimate a series of discrete-time hazard models among 7,409 rural children and 3,864 urban children. We find that, compared with their peers with nonmigrant mothers, children born to lateral migrants generally experience lower mortality whereas those born to nonlateral migrants generally experience higher mortality. Although there are important distinctions across Haiti's rural and urban contexts, these associations remain net of socioeconomic factors, suggesting they are not entirely attributable to migrant selection. Considering the timing of maternal migration uncovers even more variation in the child health implications of maternal migration; however, the results counter the standard disruption and adaptation perspective. Although future work is needed to identify the processes underlying the differential risk of child mortality across lateral versus nonlateral migrants, the study demonstrates that looking beyond rural-to-urban migration and considering the timing of maternal migration can provide a fuller, more complex understanding of migration's association with child health.

Keywords

Maternal Migration; Child Mortality; Haiti

In line with broader trends in developing countries (Bilsborrow 1992), there is an increasing feminization of migration in Haiti (Wooding and Petrozziello 2013). One half of adult Haitian women (15–49 years old) have migrated internally (Macro International 2006)—a level of migration that is twice as high as that of Haitian men (Alscher 2011; Gammage 2004; Johnson 2007; Laguerre 1998). In addition to the sheer prevalence of female migration in Haiti, it increasingly consists of diverse patterns of internal movement: more

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than two thirds of women report having moved between rural or between urban settings (25% and 45%, respectively), although many move from rural to urban or urban to rural areas (20% and 10%, respectively) (Macro International 2006).

Haitian women typically migrate as a “livelihood strategy” (Collinson, Tollman, Kahn, Clark, and Garenne 2006) in response to the severe poverty that is endemic to Haiti (Ahlers 1978). Four out of five Haitians are unemployed (World Bank 2006), and the absence of steady employment opportunities leave women (and men) searching constantly for new economic opportunities (Farmer, Léandre, Mukherjee, Claude, Nevil, Smith-Fawzi, Koenig, Castro, Becerra, and Sachs 2001). In rural areas, most women work in the agricultural sector (Charmes 2000); however, the country’s large-scale environmental degradation continuously threatens agricultural output (Hunter, Reid-Hresko, and Dickinson 2011). Thus, many rural women migrate to other rural communities where superior cultivation opportunities are available or to Haiti’s urban centers in search of employment in petty trade, industry, or domestic work (Ahlers 1978). Although Haiti’s formal employment sector is concentrated in its urban settings, the crowded labor market encourages many women to migrate between urban areas in search of work. Other women move to rural areas, which often reflects their inability to secure favorable employment in the urban economy (Wang and Fan 2006).

Although the vast majority of Haiti’s female migrants relocates for economic purposes (World Bank 2006), some women migrate to fulfill family obligations or for personal reasons. For instance, some women may migrate to relocate with their husbands or move upon getting married (World Bank 2006). Furthermore, the concentration of educational institutions in Haiti’s metropolitan areas encourages some young women to migrate to continue their formal schooling (Lunde 2010).

Despite the high levels of Haitian women’s internal migration, its implications for their children’s well-being remain unclear. Research from other developing countries suggests that internal migration among women in Haiti may, indeed, influence their children’s health. Centered on rural-to-urban migrants, current research demonstrates that although children of rural-to-urban migrants experience *lower* child mortality than rural nonmigrants, largely due to positive migrant selection (Ssengonzi, De Jong, and Stokes 2002), they experience *higher* mortality than urban nonmigrants (Brockhoff 1994; Islam, Azad, and Abul 2008; Omariba and Boyle 2010; Stephenson, Matthews, and McDonald 2003). The latter disparity—the higher risk of child mortality among rural-to-urban migrants compared with their nonmigrant peers also residing in urban settings—is of central interest to this paper. The fact that children of rural-to-urban migrants experience poorer health than nonmigrants who also live in urban contexts raises questions about the child health risks of other streams of internal migration: Do children of urban-to-urban migrants also experience elevated mortality risk compared with urban nonmigrants? Is mothers’ migration status a risk factor in rural settings, leading to mortality disparities between rural-to-rural migrants, urban-to-rural migrants, and rural nonmigrants? Because one in every eight Haitian children will die before her fifth birthday (UNICEF 2010)—a level of risk that reflects the highest child mortality rate in the Western Hemisphere—answering these questions is of paramount importance.

In this paper, we use data from the 2006 Haitian Demographic and Health Survey (HDHS) to explore how each pattern of women's internal migration (rural-to-urban, urban-to-rural, rural-to-rural, and urban-to-urban) is associated with child mortality. We introduce the concept of lateral (i.e., rural-to-rural, urban-to-urban) versus nonlateral (i.e., rural-to-urban, urban-to-rural) migration to theorize how some patterns of migration may be associated with particularly elevated risk of child mortality whereas others are not. More specifically, we discuss how (1) migrant selection and (2) disruption and adaptation processes are likely to vary between nonlateral and lateral migrants, leading to higher child mortality among nonlateral migrants and lower child mortality among lateral migrants. Furthermore, in line with the disruption and adaptation perspective, we describe how the associations between maternal migration and child survival may further depend on whether the child was born immediately following versus several years after migration. Together, the study results provide a new look at the association between maternal migration and child mortality in Haiti and highlight complexities and variations that have been overlooked in prior research.

BACKGROUND

Maternal Migration and Child Mortality: Variation between Nonlateral versus Lateral Migration

A growing body of research shows that mothers' migration status is a salient determinant of children's health and survival in low-income countries (Brockerhoff 1990; Brockerhoff 1994; Brockerhoff 1995; Omariba and Boyle 2010). Focused on the large-scale rural-to-urban migration across the Global South, a key finding from this literature is that child mortality is elevated among rural-to-urban migrants in urban contexts: children of rural-to-urban migrants experience higher mortality before age five than their nonmigrant peers also residing in urban areas (Brockerhoff 1990; Brockerhoff 1994; Brockerhoff 1995; Omariba and Boyle 2010). Given that merely one fifth of Haiti's female internal migrants move from rural to urban areas, this finding raises questions regarding how other streams of internal migration influence child survival (Macro International 2006).

We draw from research on migrant selection and disruption and adaptation to argue that these processes, and the resulting child mortality risks, may vary tremendously across diverse patterns of mothers' internal migration. More specifically, we highlight the potential for divergent processes depending on whether the mother is moving between dissimilar residential areas (e.g., rural to urban or vice versa) versus similar ones (e.g., rural to rural or urban to urban). We describe how migrating "nonlaterally"—that is, moving to a destination community that is residentially dissimilar to the origin community—may be associated with elevated child mortality risks, whereas migrating "laterally"—moving to a destination community that is residentially similar to the origin community—may pose no risk to child survival and may even be associated with a survival advantage.

Migrant Selection

The concept of migrant selection contends that migrants are not a representative sample of the origin or destination communities' population but instead share a distinct set of traits (Greenwood 1997). Migrants tend to be positively selected on socioeconomic and

demographic characteristics compared with their peers (Ssengonzi, De Jong, and Stokes 2002); however, depending on the residential context to which they move, migrants may be disadvantaged compared with their nonmigrant peers in their destination setting. From this perspective, health disparities between children of migrants and those of nonmigrants may not be a result of migration per se but of migrants' socioeconomic profiles as distinct from those of nonmigrants in the destination setting (Ssengonzi, De Jong, and Stokes 2002).

For example, although rural residents who migrate to urban settings are among the wealthiest, healthiest, and most educated of the rural population (Byerlee and Eicher 1972), the underdevelopment of rural communities in Haiti may result in them being socioeconomically disadvantaged compared with urban nonmigrants. In rural Haiti, infrastructural provisions—such as schools, health services, and basic amenities (e.g., water, electricity, paved roads)—are scarce. Severe poverty is heavily concentrated in rural areas, with three times as many rural as metropolitan households living in poverty (Verner 2008). Furthermore, on average, rural Haitian women attend half as many years of formal education as their urban peers (3.5 years and 7.0 years, respectively) (Macro International 2006). The distinct profiles of Haiti's rural and urban populations suggest that nonlateral migrants moving from rural to urban settings may be socioeconomically disadvantaged compared with urban nonmigrants. Because children with poorer, less-educated mothers are more susceptible to illness and death (Cleland and Van Ginneken 1988), these socioeconomic distinctions are likely to result in children of rural-to-urban migrants experiencing elevated mortality compared with children of urban nonmigrants. In other words, even after migrating to the relatively advantaged urban setting, children of rural migrants may experience greater mortality risk simply because of their mothers' disadvantaged socioeconomic background.

At first glance, inverting this selection argument suggests that children of urban-to-rural migrants will be socioeconomically advantaged compared with rural nonmigrants, which could result in their experiencing superior health. However, migrants leaving relatively wealthier urban environments, where labor market opportunities are more widespread and living standards are generally higher, for poverty-endemic rural settings may be the most impoverished urban residents, who failed to secure optimal employment (Wang and Fan 2006). Given that Haiti's urban poor are significantly worse off than the country's rural poor (Verner 2008), their children may experience an elevated risk of illness, malnutrition, and, ultimately, mortality simply as a function of their socioeconomic disadvantage.

Taken together, selection processes suggest that nonlateral migrants in Haiti (i.e., rural-to-urban, urban-to-rural) may be socioeconomically disadvantaged compared with nonmigrants in their respective residential setting, thereby elevating their children's risk of mortality. However, the opposite is likely to be true for lateral migrants. In terms of rural-to-rural migrants, research from numerous developing countries demonstrates that child mortality is consistently lower among rural migrants than rural nonmigrants, and this difference is primarily due to rural migrants' positive selection on key socioeconomic traits (Omariba and Boyle 2010; Ssengonzi, De Jong, and Stokes 2002). Extrapolating these findings suggests that they may also translate to urban settings in Haiti: urban-to-urban migrants are more likely than urban nonmigrants to be positively selected on key socioeconomic traits.

Therefore, due to their mothers' socioeconomic background, children of lateral migrants will experience survival prospects that are comparable with, or superior to, those of children with nonmigrant mothers.

Disruption and Adaptation

Unlike the migrant selection perspective that attributes migrants' elevated child mortality to their distinct traits, the disruption and adaptation perspective posits a more direct explanation for why their children experience distinct mortality risks. From this perspective, moving and relocating is a disruptive process that requires adaptation to the new environment, which ultimately interferes with children's health (Omariba and Boyle 2010). For instance, the lengthy migration process is hypothesized to negatively impact mothers' economic well-being and engagement with institutions and healthcare services, thereby elevating their children's risk of poor nutrition, illness, and, ultimately, mortality—particularly soon after migration (Brockhoff 1990; Brockhoff 1994). However, this perspective contends that once migrants assimilate into their destination community and adapt to the new environment, their children's health outcomes will begin to mirror those of nonmigrants (Brockhoff and Brennan 1998).

Refining this perspective, the extent to which migration is disruptive and requires a lengthy adaptation process may vary according to whether the mother migrated nonlaterally versus laterally. Beginning with nonlateral migration, moving to a residential setting that is dissimilar from the origin community is likely to be particularly disruptive to women's financial well-being. Haiti's rural economies are agriculturally oriented, whereas the country's urban economies center on petty trade and services (Orozco 2006). Women moving between rural and urban areas must integrate into an unfamiliar economic context and, as a result, may experience significant challenges applying their labor skills to the local job market. Their susceptibility to prolonged bouts of unemployment could force nonlateral migrants to settle in impoverished neighborhoods where poor sanitation and crowded living conditions compromise their children's health (Omariba and Boyle 2010). Conversely, although lateral migration may also be associated with a period of economic uncertainty, this pattern of migration may be less financially disruptive than nonlateral migration given that it involves moving between similar economic landscapes. Thus, if lateral migrants are able to acquire employment relatively quickly, thereby reducing the risk of falling into poverty, their children may experience little or no negative health outcomes.

Nonlateral and lateral migrants are also likely to have distinct experiences assimilating into their destination community's local bureaucratic environment as a result of the systematic differences between the healthcare systems in rural and urban Haiti. Modern health care services are concentrated in urban areas, and rural health centers offer limited services (Gage and Calixte 2006). Mothers migrating nonlaterally may experience considerable challenges adapting to and navigating the new institutional setting, which may deter them from seeking preventative care or treatment for their children. Conversely, women moving laterally may be better equipped to navigate the new healthcare system given its familiarity, thereby making it easier for them to seek, locate, and acquire health services for themselves and their children.

In addition to selection processes varying across nonlateral and lateral migrants, the extent to which migration disrupts women's lives and challenges them to acculturate and assimilate into a new residential context may also vary according to their pattern of migration. Whereas nonlateral migration is likely to be particularly disruptive and require a lengthy adaptation period in the new environment, lateral migration may promote relatively quicker and more successful adaptation to the destination community. Thus, along with their potential socioeconomic disadvantage, children born to nonlateral migrant mothers are likely to experience more acute health risks and ultimately higher mortality than children of nonmigrants. In fact, although the adaptation hypothesis suggests that the health consequences of migration will fade as the mothers' duration of residence increases, if nonlateral migrants become trapped in unfavorable living circumstances such as slum environments and fail to assimilate into the local economy and institutional environment, their children's health risks may accumulate as their duration of residence increases (Omariba and Boyle 2010). Conversely, lateral migrants' socioeconomic advantage, and their potential ease adapting to their destination community, could result in their children experiencing health outcomes that are similar, or even superior, to those of nonmigrants.

STUDY AIMS

This study aims to provide a fuller understanding of the association between maternal migration and child survival in Haiti by investigating the association across diverse patterns of migration. The study also aims to provide insight into the role of selection versus disruption and adaptation processes as drivers of child health differentials across diverse migration streams. To do so, the study first provides a descriptive look at the distinct socioeconomic characteristics of lateral migrants, nonlateral migrants, and nonmigrants in both rural and urban Haiti. Although this admittedly crude approach will not definitively determine the role of selection given the cross-sectional nature of the data, these analyses will provide some insight into whether differences on key socioeconomic traits could drive divergent child mortality risks across streams of internal migration. Study results from multilevel discrete-time hazard models, which we describe in detail below, will clarify whether the mortality risks of children of lateral versus those of nonlateral migrants differ from the mortality risks of children of nonmigrant mothers. The study further explores whether socioeconomic selection could be driving the observed differences by first estimating the associations between maternal migration and child survival net of child characteristics and reproductive controls before incorporating socioeconomic indicators. Next, to more directly investigate disruption and adaptation processes, results from additional discrete-time hazard models test whether the timing of the child's birth in relation to migration influences the mortality risks of children of lateral or nonlateral migrants.

Because of the unique health contexts in rural versus urban Haiti, the study compares children living in the same residential context. More precisely, we compare children of rural-to-urban and urban-to-urban migrants with those of urban nonmigrants, and children of urban-to-rural and rural-to-rural migrants with those of rural nonmigrants. Unlike prior studies that compare the child health outcomes of migrants and nonmigrants across residential settings (Kiros and White 2004; Ssengonzi, De Jong, and Stokes 2002), this

enables us to provide a clearer understanding of the precise risks associated with migration status independent from the confounding influence of place of residence.

DATA AND ANALYTIC SAMPLE

The data for this study come from the 2006 HDHS. The HDHS is a household survey that uses a probability sampling framework to draw a multistage, stratified random sample that is representative of the Haitian population. Within the sampling framework, 339 “clusters,” based on census enumeration areas, are the primary sampling unit. The HDHS then uses a household listing operation to randomly select a sample per cluster, resulting in a sample of 9,998 households. Within each household, eligible men and women (15–49 years) are interviewed. The HDHS asks mothers detailed questions about each live birth, including the date of the birth, whether the child is still alive, and the month and year of death for all deceased children. The HDHS uses these data to generate a child-oriented data set of 24,830 births, which we use here.

We restrict our analytic sample of births in four ways. First, to minimize recall error for birth and death reports and to ensure that current family characteristics correspond with the child’s environment since birth, we focus our analysis on the 13,194 children born within ten years before the survey.ⁱ This restriction ensures that the sample does not disproportionately represent children of older mothers relative to those of younger mothers (Omariba and Boyle 2007). Second, we exclude 1,331 children (10.08%) who do not live with their mother but instead “live elsewhere.” Supplemental models confirm that the inclusion of these children does not meaningfully influence the results; however, to ensure that we accurately link children to the residential and household characteristics where they live, we ultimately decided to exclude these children from the analyses. Third, because we have information on the year of migration, not the month (which we discuss further in the measurement section), we omit 563 children (4.74%) who were born the same year that their mother migrated. Because we are interested in the influence of migration on child mortality, this restriction ensures that the mothers we classify as migrants moved before their child’s birth and, thus, before their child became at risk of mortality. Fourth, we exclude 27 children (1.00%) who are missing data on key variables. These restrictions result in a final analytic sample of 11,273 births.

To assess the survival differences of children born to migrants versus nonmigrants within the same residential context, we stratify the sample of children by residence (i.e., rural vs. urban). The final subsamples include 7,409 children in rural Haiti and 3,864 children in urban Haiti.

ⁱThe cross-sectional nature of the data prohibits us from accounting for change in household characteristics between the time of the survey and the child’s birth or, in the case of deceased children, death. We reduce the risk of misclassification by limiting the analyses to births that occurred in the ten years before the survey. Furthermore, in ancillary analyses we further restrict the sample to births that occurred less than seven years before the survey and confirm that the results are consistent with those shown here.

MEASURES

Child mortality

The outcome variable in the analysis is the hazard of mortality before age five. More specifically, it is the risk of death between birth and age five (0–59 months) or between birth and the survey date in the case of children who were not yet five years old at the time of the survey.

Age—Our discrete-time hazard modeling strategy (described in more detail below) requires that we restructure the data from an individual-based data set, in which every child contributes a unique observation, to a time-based data set, in which observations refer to a unit of time (i.e., months) and each child contributes multiple records. To account for the differential risk of mortality before age five, we reshape the data to represent person-month observations. We then include a set of dummy variables for children's age in months (<1 month, 1–12 months, 13–24 months, 25–36 months, 37–48 months, and 49–59 months).

Maternal Migration—We use several survey items to create two indicators of maternal migration. The Demographic and Health Survey (DHS) classifies all women as living in a rural or urban area; records how long they have lived continuously in their current locality (in years); and asks whether they lived previously in a city, a town, or the countryside.ⁱⁱ With this information, in addition to data on the timing of the child's birth, we are able to determine whether mothers migrated; when they migrated (in relation to their child's birth), among those who did migrate; and their pattern of migration.

Before describing the two categorical indicators of maternal migration, it is important to discuss how we handle a complexity of the data. Because we rely on retrospective migration and mortality data, some children were born the same year, or years before, their mother migrated. As we discussed in the data and analytic sample section, we exclude the small percentage of children born the same year their mother migrated. However, children born before their mother migrated are another source of complexity. Because these children (1) had mothers who had not migrated when they became at risk of experiencing mortality (i.e., at birth) or (2) died before, or the same year, their mother migrated, we categorize them as having nonmigrant mothers. This decision is empirically justified. In ancillary hazard analyses (results available upon request), we confirm two important findings: (1) children born before maternal migration do not have significantly different mortality risks from those of children of nonmigrant mothers and (2) categorizing these children with those of nonmigrant mothers does not influence the key focus of the study: mortality differences of children with migrant mothers versus nonmigrant mothers. For these reasons, in the analyses shown here, we categorize children born before migration as having “nonmigrant mothers.” Thus, in our analyses “migrants” are mothers who migrated before the focal child's birth, whereas “nonmigrants” are those who either never migrated or had not done so at the time of the focal child's birth. It is also important to note that, although some of these children's mothers eventually migrated to a residential context dissimilar from the child's birth

ⁱⁱWe classify mothers' origin community as “urban” if she migrated from a city or town and “rural” if she migrated from the countryside.

residence (i.e., from a rural to an urban area or vice versa), in the main analyses, we categorize these small subsamples of children (4.08% of rural sample, 6.15% of urban sample) according to their birth residence. For example, children born in a rural setting before their mother eventually migrated to an urban area are included in the rural sample.ⁱⁱⁱ

With this information, the first indicator we create is a three-category variable that classifies children as having a (1) lateral migrant mother (i.e., rural-to-rural, urban-to-urban), (2) nonlateral migrant mother (i.e., urban-to-rural, rural-to-urban), or (3) nonmigrant mother.

The second indicator is a variable that further classifies children according to how recently their mother migrated before their birth to analyze the potential role of disruption and adaptation processes: we consider mothers to be “recent” migrants if they migrated within five years before the focal child’s birth and “established” migrants if they migrated six or more years before the child’s birth. More specifically, the five-category variable classifies children as having a (1) recent lateral migrant mother, (2) established lateral migrant mother, (3) recent nonlateral migrant mother, (4) established nonlateral migrant mother, or (5) nonmigrant mother. To provide an example, a recent lateral migrant mother moved from a rural to rural area or an urban to urban area five or fewer years before her child’s birth. Conversely, an established nonlateral migrant mother moved from a rural to urban or an urban to rural area more than five years before her child’s birth.

Control Variables—Based on prior research on child mortality, we control for a number of child characteristics and reproductive factors that may confound the association between maternal migration and child mortality (Islam, Azad, and Abul 2008; Omariba and Boyle 2010; Ssengonzi, De Jong, and Stokes 2002; Stephenson, Matthews, and McDonald 2003): child’s gender (female=1), whether the child is a multiple (=1), mother’s age at the time of the child’s birth (<20 years, 20–34 years [reference group], 35 years), the length of the birth interval before the child was born (firstborn, <36 months [reference group], 36 months), and the child’s sibship size.

In addition to these factors, we account for a robust set of socioeconomic indicators to explore whether such factors help to explain the observed associations between maternal migration and child mortality. More specifically, we control for the DHS–constructed wealth index, which utilizes assets and material resources to categorize households into five quintiles: poorest, poor, middle, rich, or richest (Bollen, Glanville, and Stecklov 2007; Houweling, Kunst, and Mackenbach 2003). We also include an indicator of whether the household is headed by a female. In terms of maternal characteristics, we account for mother’s level of formal education (no school [reference group], primary level, secondary level, higher education) and her marital status (married [reference group], unmarried [never married, widowed, divorced], cohabiting, or living independently from partner).

ⁱⁱⁱIn supplemental models (results available upon request), we also categorize these children according to their mother’s destination residence and confirm that, because of the small percentage of cases, the classification of these children does not influence the results.

METHODS

Children who are alive at the end of the observation period or who have not reached their fifth birthday are right censored. To address censoring, we use a discrete-time logit model, expressed the following way:

$$\text{logit}(h_{ti}) = \alpha_t + \beta x_{ti},$$

where h_{ti} is the hazard that child i dies at time t and x_{ti} is a vector of covariates with associated parameters β . Because retrospective mortality data are subject to heaping at certain ages, a discrete approach to addressing time is preferred to a continuous one. We account for the effect of age on mortality risks (α_t) by including a set of dummy variables for children's age in months (<1 month, 1–12 months, 13–24 months, 25–36 months, 37–48 months, and 49–59 months). All estimates are based on robust standard errors that appropriately address the fact that children are clustered within households and sampling units.

RESULTS

Table 1 provides descriptive statistics of child deaths and maternal migration in rural and urban Haiti. A total of 11.20% of children in the rural sample died before their fifth birthday, whereas 9.27% of children in the urban sample died.^{iv} The two-percentage point difference in child mortality risks across rural and urban Haiti reflects the country's diverse health contexts and highlights the need to omit the confounding effect of a residential setting when analyzing the potential health implications of maternal migration.

Table 1 also demonstrates the diversity of maternal migration experiences among children in rural and urban Haiti. Beginning with children in rural Haiti, whereas the majority of children (65.52%) has nonmigrant mothers, 28.37% have lateral migrant mothers (i.e., rural-to-rural) and 6.11% have nonlateral migrant mothers (i.e., urban-to-rural). Having a migrant mother is even more common among children in urban Haiti: whereas a sizeable minority of children has nonmigrant mothers (38.41%), 41.49% of children have lateral migrant mothers (i.e., urban-to-urban) and 20.10% have nonlateral migrant mothers (i.e., rural-to-urban).

The second indicator for the timing and pattern of maternal migration further uncovers diversity in maternal migration experiences among Haitian children. Although the majority of children's lateral migrant mothers (i.e., rural-to-rural, urban-to-urban) is classified as established, a notable proportion have recent migrant mothers (19.29% vs. 9.08% in rural Haiti; 28.47% vs. 13.02% in urban Haiti). Similarly, although the majority of children with nonlateral migrant mothers (i.e., urban-to-rural, rural-to-urban) was born to established migrants, many children with nonlateral migrant mothers were born soon after their mother moved. The significant variation in maternal migration experiences among Haitian children

^{iv}In both rural and urban Haiti, mortality is significantly higher in the first month of life and then drops throughout the remainder of the first five years. There is a nominal increase in mortality in later childhood in the rural sample, which likely is evidence of age heaping. As discussed in the methods section, our discrete-time modeling approach is ideal for handling the age heaping that is a common feature of retrospective mortality data.

further motivates our investigation of whether accounting for this diversity brings new understanding to the relationship between maternal migration and child mortality.

Table 2 further characterizes children by place of residence and maternal migration status. This descriptive portrait highlights two major findings: (1) Haitian children's socioeconomic profiles vary considerably by maternal migration status within both rural and urban areas, suggesting that migrant selection potentially drives child mortality disparities across migrants and nonmigrants; (2) children in rural and urban Haiti have distinct socioeconomic profiles, highlighting the need to remove the confounding nature of place of residence when analyzing the relationship between maternal migration and child mortality. Beginning with the distinctions across maternal migration status, although we anticipated nonlateral migrants would generally be socioeconomically disadvantaged compared with nonmigrants, in rural Haiti, the results demonstrate that children of urban-to-rural migrants have more advantaged socioeconomic profiles. These children live in wealthier households and have more highly educated mothers, which may result in their having a lower risk of mortality than their nonmigrant peers. In terms of reproductive factors, there are few differences between children by maternal migration status in rural Haiti, with the exception that nonlateral migrant mothers are, on average, younger and have fewer children than nonmigrants.

Conversely, the descriptive results for children in urban Haiti show that, as anticipated, children of nonlateral migrants live in poorer households and have mothers who are less educated compared with their nonmigrant peers. On the other hand, as anticipated, children of lateral migrants enjoy socioeconomic advantages: on average, they live in wealthier households and have more highly educated mothers. These descriptive results suggest that, from a migrant selection perspective, in urban Haiti, children of lateral migrants may experience a survival advantage, whereas children of nonlateral migrants may experience a survival disadvantage.

In addition to highlighting the distinct socioeconomic profiles across maternal migration status, Table 2 also demonstrates that children residing in rural areas are, on average, poorer than their urban peers, have less-educated mothers (54.79% uneducated mothers vs. 22.36%), and have more siblings (5.27 vs. 3.82). These distinctions further highlight the benefit of comparing children within place of residence.

Turning to the multivariate hazard models, Table 3 shows the associations between diverse patterns of maternal migration and child mortality in rural Haiti. Model 1 shows marked differences in the mortality experiences of children with migrant mothers compared with children with nonmigrant mothers, net of reproductive factors. However, the mortality risk among children with migrant mothers differs dramatically depending on the pattern of migration. As we anticipated, children born to lateral migrant mothers (i.e., rural-to-rural) have a 27.0% lower risk of mortality than children of nonmigrant mothers ($p < .01$). Conversely, children with nonlateral migrant mothers (i.e., urban-to-rural) have a 33.8% higher risk of mortality than children with nonmigrants mothers; however, the association is nonsignificant (at $p < .05$ level).

Inclusion of socioeconomic variables in Model 2 does not attenuate the observed differences in the child mortality risks across diverse patterns of maternal migration—net of socioeconomic factors, children of lateral migrants continue to experience a 28.5% lower risk of mortality ($p<.01$) than their peers with nonmigrants mothers. The fact that accounting for the subgroups' distinct socioeconomic profiles does not help to explain the observed associations between maternal migration and child mortality lends some preliminary support to the perspective that disruption and adaptation processes could be at play.

Table 4 shows the results for children in urban Haiti, which are of similar nature to the findings documented in rural Haiti. Beginning with Model 1, the results show that whereas having a lateral migrant mother (i.e., urban-to-urban) is associated with a survival advantage, having a nonlateral migrant mother (i.e., rural-to-urban) is associated with a survival disadvantage; however, the differences are nonsignificant (at $p<.05$ level). This suggests that the more advantaged urban context dampens mortality disparities between migrants and nonmigrants. Turning to Model 2, the results demonstrate that omission of socioeconomic factors do not meaningfully alter the nonsignificant associations documented in Model 1.

Given that inclusion of socioeconomic factors does not explain the associations between maternal migration and child mortality in rural and urban Haiti, to provide further insight into the potential role of disruption and adaptation processes, we analyze how survival disparities by maternal migration vary by its timing in relation to the child's birth. We find no support for the traditional disruption and adaptation perspective, which contends that the health risk associated with migration should be strongest soon after relocation and fade as duration of residence increases. However, the results do uncover important variation in child mortality risk by timing of maternal migration. In rural Haiti, the results show that the survival advantage of having a lateral migrant mother is only significant for children born soon after migration: children with recent lateral migrant mothers (i.e., mother migrated from a rural to a rural area 5 years before birth) have a 53.8% lower risk of mortality than children with nonmigrant mothers ($p<.001$). The results are consistent in urban Haiti: having a lateral migrant mother who moved recently is associated with a 54.3% lower risk of mortality. Contrary to the notion that migration involves a harmful adaptation period immediately after moving, the results show that the survival advantages of having a lateral migrant mother are strongest for children born soon after their mother moved.

The results for nonlateral migrants similarly provide no support for the traditional disruption and adaptation perspective. In rural Haiti, the results show that the elevated mortality risk associated with having a nonlateral migrant mother does not dissipate as mothers' duration of residence in the destination community increases. Instead, children born several years (>5 years) after their mother moved nonlaterally experience a 76.3% higher mortality risk ($p<.05$). Diverging from the general finding that nonlateral migrants experience a survival disadvantage, the results for urban Haiti demonstrate that children of recent nonlateral migrant mothers experience a 47.9% lower mortality risk compared with urban nonmigrants ($p<.05$). Together, these results demonstrate that, contrary to the disruption and adaptation perspective, nonlateral migrants in rural areas experience greater mortality risk as their

duration of residence lengthens, although lateral migrants (and nonlateral migrants in urban settings) experience a survival advantage soon after relocating.

DISCUSSION

Internal migration is a salient dimension of Haitian women's lives (Wooding and Petrozziello 2013). Despite the high proportions of Haitian mothers engaged in internal migration, its implications for their children's well-being remain unclear. Research from other developing countries focuses heavily on rural-to-urban migrants, providing only a narrow view of maternal migration's potential influence on child health in Haiti. Thus, in this paper, we analyze how varied patterns of maternal migration are differentially associated with child health. Introducing the concept of "lateral" (i.e., rural-to-rural, urban-to-urban) versus "nonlateral" (i.e., rural-to-urban, urban-to-rural) migration, we argue that moving between dissimilar versus similar residential settings may be associated with a particularly elevated risk of child mortality as a result of distinct (1) migrant selection and (2) disruption and adaptation processes.

Our findings demonstrate that the association between maternal migration and child survival varies significantly across diverse patterns of internal migration. In general, we find that having a lateral migrant mother is associated with a survival advantage, whereas having a nonlateral migrant mother is associated with a survival disadvantage. However, the survival disparities are nonsignificant in urban Haiti, suggesting that the more advantaged health context may dampen health inequalities across households.

Our cross-sectional data prohibit us from formally testing whether selection and/or disruption and adaptation processes are driving these associations, which is a limitation we discuss further below; however, we attempt to provide some insight into the potential role of each mechanism. We find important differences in the socioeconomic profiles of children based on their mothers' migration status; however, we find no evidence that these differences help to explain the distinct child mortality risks across streams of maternal migration. Furthermore, in analyzing the timing of maternal migration, we find no evidence supporting the traditional disruption and adaptation perspective. However, the results clearly show that considering the timing of maternal migration reveals important complexities in the association between maternal migration and child survival. We find that lateral migrants do not experience any elevated health risks immediately following migration, but instead experience a survival advantage. Recent nonlateral migrants also enjoy a large child survival advantage in urban Haiti. However, in rural Haiti, nonlateral migrants experience greater mortality risk that accumulates as their duration of residence lengthens.

The higher risk of mortality among children whose mothers moved from urban areas to rural settings several years before their birth compared with children of rural nonmigrant mothers is of particular concern. Although some work shows that rural-to-urban migrants experience lasting health disadvantages (Omariba and Boyle 2010), we are unaware of any study documenting this in a rural context. The fact that urban-to-rural migrants experience a lasting survival disadvantage is particularly striking, as these migrants are socioeconomically advantaged compared with their rural nonmigrant peers (Table 2). It is

unclear why—particularly in light of their living in wealthier households and being more educated than their nonmigrant peers—urban migrants face challenges protecting their children's health in Haiti's rural, agrarian communities. Urban migrant women may not be as well versed in the health behaviors that Haiti's rural environments necessitate, such as boiling unclean water or properly storing food without electricity. Furthermore, urban migrants may face greater difficulty navigating local health institutions in rural Haiti, thereby discouraging them from receiving preventative care and treatment that may lower the risk of child mortality. Unfortunately, data constraints prohibit us from identifying which, if any, of these processes underlie the observed association. Future ethnographic research on urban migrants in Haiti's rural communities will help to clarify the precise conditions that ultimately lead to their children having a higher risk of mortality.

Shifting to urban Haiti, recent rural-to-urban migrants' survival advantage is equally puzzling. This finding runs contrary to considerable research showing that rural-to-urban migrants generally experience health disadvantages compared with their urban peers in other developing contexts. In Haiti, although we do not find that rural-to-urban migrants are positively selected on socioeconomic traits, it is possible that they are positively selected on unobservable traits and characteristics that we do not, and cannot, capture in this study. For instance, some researchers argue that migrant women's personalities are characterized by greater motivation, higher aspirations, and stronger intentions than those of their nonmigrant peers—each of which may benefit child health (Kiros and White 2004). Given the contextual dissimilarities between rural and urban Haiti, leaving an impoverished rural, agrarian community for a metropolitan center does require a certain disposition, suggesting that positive, unobservable traits could be driving recent rural-to-urban migrants' child health advantage in urban Haiti. However, more detailed data on migrant characteristics are needed to confirm whether this is the case.

Although this study clearly demonstrates important distinctions in maternal migration's influence on child survival depending on its pattern and timing in Haiti, it is limited by its inability to formally test the mechanisms driving the observed differences. Making use of the socioeconomic data that we have on children and mothers, we find no evidence that selection on these traits helps to explain the observed associations. In fact, in most instances, our findings run counter to expectations based on migrants' socioeconomic profiles. For example, despite their relative advantage compared with children of rural nonmigrants, children of urban-to-rural migrants experience elevated mortality risk. However, because we have no data on women's socioeconomic status before migration and are unable to capture unobservable characteristics such as adeptness in securing resources, aspirations for social mobility, and amenability to social change, we cannot fully rule out selection processes. Furthermore, although our analysis on timing of migration yields no support for the disruption and adaptation perspective, because we do not have pre- and postmigration data on women's financial circumstances or their interaction with institutions and health services, we cannot fully address the extent to which migration disrupts women's lives.

A second study limitation is the lack of data on the month of migration. Although we creatively exploit information on the correspondence between the year of the child's birth and the mother's migration to capture the relative timing of maternal migration, the DHS

does not collect data on the month of the mother's migration. This prohibits us from analyzing the time-ordering of events within years and necessitates that we exclude a small percentage (<5%) of children born the same year their mother migrated. This data limitation reflects the need for more systematic, in-depth data on migration in low-income countries like Haiti. Given that one half of Haitian adult women report having ever migrated and that their children experience distinct survival prospects for several years after the move occurred, there is a clear need for migration to be a more salient feature of standard demographic surveys. Incorporation of a detailed migration calendar similar to the DHS's birth calendars would allow researchers to more carefully analyze the time-ordering of migration and reproductive events. Such data would not require a substantial time investment but would enable a more dynamic approach than the one shown here. Furthermore, efforts to incorporate more nebulous, but potentially demographically salient, characteristics of individuals' personalities may lend themselves to a better understanding of the potential role of these factors in social phenomena.

Despite these limitations, this study extends prior research by making both theoretical and empirical contributions. By introducing the concept of lateral versus nonlateral migration, the study provides a useful theoretical framework for future studies investigating diverse patterns of internal migration. Although additional research is needed to confirm these associations in other contexts and to identify the precise mechanisms linking maternal migration and child survival in Haiti, this study provides a valuable springboard for future efforts to gain a fuller, more in-depth understanding of the association between maternal migration and child health.

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Table 1

Descriptive Statistics of Key Measures

	Rural [†] (%)	Urban [‡] (%)
Child Deaths	11.20	9.27
Pattern of Maternal Migration		
Lateral	28.37	41.49
Nonlateral	6.11	20.10
Nonmigrant	65.52	38.41
Timing and Pattern of Maternal Migration		
<i>“Recent” migrant (5 years before birth)</i>		
Lateral	9.08	13.02
Nonlateral	1.79	6.21
<i>“Established” migrant (>5 years before birth)</i>		
Lateral	19.29	28.47
Nonlateral	4.32	13.89
Nonmigrant	65.52	38.41
N	7,409	3,864

Source: Haitian Demographic and Health Survey

[†] Lateral migrant=rural-rural; Nonlateral migrant=urban-rural

[‡] Lateral migrant=urban-urban; Nonlateral migrant=rural-urban

Table 2
 Characteristics of Children in Rural and Urban Haiti by Pattern of Maternal Migration

Variable	Rural [†]					Urban [‡]				
	%/Mean (SD)	Full Sample	Lateral Migrant	Nonlateral Migrant	Nonmigrant	Full Sample	Lateral Migrant	Nonlateral Migrant	Nonmigrant	Nonmigrant
<i>Socioeconomic Factors</i>										
Household wealth										
Poorest		42.83	43.68	24.79*	44.22	2.48	1.17*	2.65		4.08
Poor		30.58	31.24	27.54	30.59	6.55	2.86*	7.60*		10.65
Average		19.15	18.51	19.49	19.41	24.07	19.70*	28.71*		26.81
Rich		5.72	5.61*	18.86*	4.47	39.44	40.79*	47.17		32.85
Richest		1.71	0.96	9.32*	1.31	27.46	35.48*	13.87*		25.60
Mother's education										
No education		54.79	59.14*	36.22	54.62	22.36	20.81	28.60*		20.64
Primary		36.87	34.93	43.01*	37.16	43.61	39.51*	52.83*		43.13
Secondary		8.14	5.79*	19.92*	8.05	31.44	36.41	18.21*		33.13
Higher		0.20	0.14	0.85*	0.17	2.59	3.27	0.36*		3.10
Marital status										
Married		81.62	87.28*	75.63*	79.60	72.44	74.58*	78.65*		65.78
Unmarried		2.60	1.87*	3.39	2.87	3.26	3.74	1.69*		3.63
Cohabiting		10.45	7.93*	14.62*	11.19	14.57	11.92*	11.94*		19.64
Living independently		5.33	2.92*	6.36	6.34	9.73	9.76	7.72*		10.95
<i>Reproductive Factors</i>										
Female		49.83	49.66	44.92*	50.40	48.81	48.45	50.05*		48.49
Twin		2.66	3.01	2.54	2.51	2.69	2.10	2.90*		3.32
Mother's age at child's birth										
<20		11.46	10.31	12.71	11.87	14.78	14.44	12.18*		16.84
20–34		66.81	68.35*	79.45*	64.84	70.21	71.88*	71.41*		67.30
35–49		21.73	21.34	7.84*	23.29	15.01	13.68	16.41*		15.86

Variable	Rural [†]				Urban [‡]			
	%/Mean (SD)	Full Sample	Lateral Migrant	Nonlateral Migrant	Nonmigrant	Full Sample	Lateral Migrant	Nonlateral Migrant
Length of preceding birth interval								
Firstborn		18.18	14.41 [*]	25.00 [*]	19.24	30.18	33.14	23.89 [*]
<36 months		22.31	24.81 [*]	19.28	21.46	16.07	15.31	19.54 [*]
36+ months		59.51	60.78	55.72	59.30	53.75	51.55	56.57 [*]
Sibship size		5.27 (2.82)	5.46 (2.64)	4.18 [*] (2.30)	5.30 (2.93)	3.82 (2.35)	3.50 (2.13)	4.51 [*] (2.60)
N		7,409	2,102	453	4,854	3,864	1,603	777

Source: 2006 HDHS

^{*} p<.05 from tests of equal means (t-test) or proportions (chi-square) compared with nonmigrants

[†] Lateral migrant=rural-rural; Nonlateral migrant=urban-rural;

[‡] Lateral migrant=urban-urban; Nonlateral migrant=rural-urban

Table 3
Results from the Discrete-Time Hazard Models of Child Mortality in Rural Haiti

Variable	Model 1			Model 2		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
Pattern of Maternal Migration[†]						
Lateral	0.730	0.083	**	0.715	0.080	**
Nonlateral	1.338	0.234		1.385	0.242	
Nonmigrant (ref)	--			--		
Controls						
<i>Socioeconomic Factors</i>						
Household wealth						
Poorest (ref)				--		
Poor				0.946	0.109	
Average				1.219	0.146	
Rich				1.085	0.200	
Richest				0.898	0.292	
Mother's education						
No education (ref)				--		
Primary				0.821	0.088	
Secondary				0.626	0.113	**
Higher				0.955	1.068	
Marital status						
Married (ref)				--		
Unmarried				0.902	0.239	
Cohabiting				0.774	0.109	
Living independently				1.169	0.208	
<i>Reproductive Factors</i>						
Female	0.847	0.071	*	0.843	0.070	*
Twin	10.690	3.841	***	10.809	3.911	***
Mother's age at child's birth						
<20	1.414	0.219	*	1.420	0.226	*

Variable	Model 1			Model 2		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
20–34 (ref)	--			--		
35–49	0.316	0.048	***	0.315	0.048	***
Length of preceding birth interval						
Firstborn (ref)	--			--		
<36 months	0.675	0.127	*	0.633	0.120	*
36+ months	0.347	0.059	***	0.321	0.056	***
Sibship size	1.384	0.032	***	1.362	0.032	***
Constant	0.041	0.006	***	0.053	0.009	***
Model Fit						
Log likelihood	–2038.03			–2030.40		

Source: 2006 HDHS

p<.001;

**
p<.01;

*
p<.05

Rural Sample N=7,409

[†] Lateral migrant=rural-rural; Nonlateral migrant=urban-rural

Table 4

Results from the Discrete-Time Hazard Models of Child Mortality in Urban Haiti

Variable	Model 1			Model 2		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
Pattern of Maternal Migration [‡]						
Lateral (Urban-to-urban)	0.787	0.117		0.769	0.122	
Nonlateral (Rural-to-urban)	1.010	0.163		0.934	0.162	
Nonmigrant (ref)	--			--		
Controls						
<i>Socioeconomic Factors</i>						
Household wealth						
Poorest (ref)				--		
Poor				0.844	0.272	
Average				0.872	0.279	
Rich				1.034	0.346	
Richest				1.083	0.382	
Mother's education						
No education (ref)				--		
Primary				0.818	0.130	
Secondary				0.460	0.097	***
Higher				0.327	0.204	
Marital status						
Married (ref)				--		
Unmarried				0.730	0.269	
Cohabiting				1.139	0.174	
Living independently				1.338	0.243	
<i>Reproductive Factors</i>						
Female	1.064	0.132		1.058	0.131	
Twin	49.845	19.873	***	50.533	18.479	***
Mother's age at child's birth						
<20	2.194	0.374	***	1.973	0.344	***

Variable	Model 1			Model 2		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
20–34 (ref)	--			--		
35–49	0.193	0.046	***	0.194	0.046	***
Length of preceding birth interval						
Firstborn (ref)	--			--		
<36 months	0.771	0.182		0.727	0.169	
36+ months	0.409	0.094	***	0.360	0.083	***
Sibship size	1.604	0.069	***	1.559	0.072	***
Constant	0.027	0.005	***	0.045	0.017	***
Model Fit						
Log likelihood	–1074.70			–1064.05		

Source: 2006 HDHS

p<.001;
**
p<.01;
*
p<.05

Urban Sample N=3,864

[†]Lateral migrant= urban-urban; Nonlateral migrant= rural-urban

Table 5

Results from the Discrete-Time Hazard Models Analyzing How the Pattern and Timing of Maternal Migration Is Associated with Child Mortality in Rural and Urban Haiti

Variable	Rural ^a			Urban ^b		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
Pattern and Timing of Maternal Migration						
<i>"Recent" Migrant</i>						
Lateral	0.462	0.086	***	0.457	0.126	**
Nonlateral	0.728	0.261		0.521	0.151	*
<i>"Established" Migrant</i>						
Lateral	0.832	0.110		0.977	0.164	
Nonlateral	1.763	0.320	**	1.170	0.220	
Nonmigrant (ref)	--			--		
Controls						
<i>Socioeconomic Factors</i>						
Household wealth						
Poorest (ref)	--			--		
Poor	0.953	0.109		0.787	0.256	
Average	1.223	0.144		0.797	0.243	
Rich	1.104	0.197		0.933	0.299	
Richest	0.917	0.304		0.965	0.326	
Mother's education						
No education (ref)	--			--		
Primary	0.812	0.087		0.836	0.134	
Secondary	0.611	0.111	**	0.465	0.100	***
Higher	0.909	1.014	*	0.323	0.203	
Marital status						
Married (ref)	--			--		
Unmarried	0.876	0.234		0.743	0.266	
Cohabiting	0.753	0.107	*	1.117	0.173	
Living independently	1.122	0.201		1.277	0.236	

Variable	Rural [†]			Urban [‡]		
	O.R.	S.E.	Sig.	O.R.	S.E.	Sig.
<i>Reproductive Factors</i>						
Female	0.844	0.070	*	1.052	0.131	
Twin	10.643	3.892	***	58.870	22.697	***
Mother's age at child's birth						
<20	1.407	0.223	*	1.935	0.335	***
20–34 (ref)	--			--		
35–49	0.315	0.048	***	0.200	0.047	***
Length of preceding birth interval						
Firstborn (ref)	--			--		
<36 months	0.652	0.125	*	0.754	0.180	
36+ months	0.331	0.058	***	0.373	0.087	***
Sibship size	1.351	0.031	***	1.540	0.072	***
Constant	0.055	0.010	***	0.051	0.019	***
Model Fit						
Log likelihood	–2023.47			–1055.26		

Source: 2006 HDHS

Rural Sample N=7,409; Urban Sample N=3,864

*** p<.001;

** p<.01;

* p<.05

[†] Lateral migrant=rural-rural; Nonlateral migrant=urban-rural;

[‡] Lateral migrant=urban-urban; Nonlateral migrant=rural-urban