Title

Mother and Child Migration Impact on Under-Five Mortality in the Informal Settlements of Nairobi

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Introduction

The failure of urban economies to generate enough jobs and of local authorities to provide adequate housing, basic amenities and other social services for the rapidly growing urban population have forced many poor urbanites to live in slum settlements because they cannot afford rent elsewhere[1]. According to estimates by UN-Habitat, about 72% of all urban residents in sub-Saharan Africa are estimated to live in slum settlements since they lack the basic amenities associated with planned urban residence (UN-Habitat 2003). Slums are sanctuaries for poor health because they are characterized by poor access to clean water, proper sanitation, garbage disposal and drainage system, overcrowding, poor housing conditions, and excessive environmental and air pollution from factories. In fact, the growth of slums and the associated poor health outcomes in these settlements have been touted as the primary reason for the decline in the extent of advantage that urban areas have traditionally had over rural areas in various health outcomes in sub-Saharan Africa (Gould 1998). Urban areas retain a health advantage at aggregated level, but this advantage is not universal in Africa and is essentially resulting from the positive effect of individual and household characteristics rather than the sheer urban environment (Van de Poel et al. 2008; Bocquier et al. 2009). As a result of declining economic performance, slum dwellers generally exhibit higher levels of morbidity, indulgence in risky sexual behaviors and drug abuse, lower utilization of health services, and higher mortality than other population subgroups, including rural residents (Zulu et al 2002; Magadi et al. 2003; Dodoo et al. 2007; APHRC 2002a; Mugisha and Zulu 2004; Ndugwa and Zulu 2008). The biggest inequities in health outcomes between slum and non-slum populations are observed among children (APHRC 2002a). For instance, data from the slums of Nairobi show that children living in slum settlements are considerably more likely to get sick from infectious diseases, less likely to use medical services, and more likely to die than other major sub-populations, including rural residents *(*APHRC 2002a; Kyobutungi et al 2008*)*. While rural infant mortality and child mortality rates for rural areas were 76 and 113 in 1998, the equivalent rates for slum settlements were 91 and 151, respectively.

Health indicators for slum dwellers are likely to shape national health indicators and the capacity of countries to achieve the health-related millennium development goals. Of particular interest to the study of Nairobi slums is the effect of migration of the mother and the child, as migration can have a selective effect on health. Migration cannot be discarded as a minor issue when the majority of the population is migrant. The proportion of Nairobi city-born residents does not exceed 20% for men and women of varying age groups and half of the migrant residents came to Nairobi between 17 and 23 years old (Agwanda et al 2008). Indeed, 70% and 91% residents aged 12 years and above in the two slum settlements analysed in the present paper (Korogocho and Viwandani) were born in rural areas (Zulu et al 2009). In this study, we contribute to the understanding of the effect of migration and other determinants on child health by using longitudinal data. The present study extends a previous study limited to the children born in the slums (Konseiga et al. 2009) by including all children who were residents for more than 6 months in the study site before their 5th

[1] Many people choose also to live in the relatively cheap squatter settlements in order to accumulate savings for various investments in their home communities while acquiring the city experience that prepares them for a more permanent formal urban job.

birthday, and by extending the study period from 2006 to 2007. As for the previous study, we control for right informative censoring, i.e. for potentially health-dependent migration. A description of the slum context is given in the introductory chapter of the present volume.

Methods

Study design and analysis

Our population of interest is children who resided in the slum settlements between January 1, 2003 and December 31, 2007. The NUHDSS recorded a total of 17,666 children who spent at least 180 days in the slums before their 5th birthday during the 5-year period covered by the study. However, analysis of migration patterns (not shown here) shows some inconsistencies in the data on the first two and the last two trimesters. To avoid migration bias, we excluded data from these four trimesters. Therefore, the outcome of interest was the death of the children who resided in the slums after July 1, 2003, and the 15,669 children at risk lived 20,688 person-years and 548 of them died by June 31, 2007.

We used a semi-parametric proportional hazards (Cox) model to assess the effect of a number of determinants on childhood survival rates. For each child, the observation time was age and started at birth (if born in the study area) or at age of in-migration in the slums (if born outside the study area) between July 2003 and June 2007, and ended either at the occurrence of the event of interest (death) or dates of censoring due to refusal, loss to follow-up, emigration, or end of the follow-up when the observation time was truncated for the children who were still alive on June 31, 2006, or at their 5th birthday. We allowed gaps in the observation time, meaning that children could out-migrate and come back.

We used a number of demographic and socioeconomic factors known to affect child survival as control variables. We have three types of control variables: i) those directly related to the child (sex, ethnicity, migrant status), ii) those related to the mother (age, survival status, migrant status, and level of education), iii) those related to the household economic status for the household where the child lives (access to tap water; access to own toilet; floor finish; roof finish; access to KPLC electricity; ownership of dwelling unit; ownership of phone, radio, and TV), and iv) those related to the context (slum area, trimester introduced as a continuous variable to measure the overall trend over the study period). Unfortunately, classic determinants of child mortality such as birth interval and child's rank were not available for all children and therefore could not be included in the model.

The focus of this paper is on the variable that combines migration status of the child and of the mother. A child is considered to have been born to a recent migrant if he/she was born to a mother who migrated to the study community since January 2003. Children born to mothers who were in the study community before January 2003 are taken as children born to 'long-term residents'.[2] We crossed the migration status of the mother with that of the child, making a distinction between slum-born and non-slum-born children. So we are

[2] It should be noted that most mothers who were in the study area when APHRC started running the NUHDSS were migrants – 25% and 5% of the residents aged 12 years and above were born in Korogocho and Viwandani settlements, respectively (Zulu et al 2009). The analysis would have been most intuitive if we had controlled for duration of stay in the slum location, but this information was not available for all mothers.

comparing death rates of four categories of children: children not born in the slum settlements of long-term resident mothers (the reference category), children not born in the slums of recent migrant mothers, children born in the slums of long-term resident mothers, and children born in the slums of recent migrant mothers. This allows us to measure the effect of mother's migration that is not confounded by differences in exposure to another environment.

Migration in longitudinal analysis of mortality

One of the most critical issues that one should take note of and possible control for in longitudinal analyses is attrition, especially in cases where those leaving the study area are predisposed to different risks of dying compared to the general population. Attrition is particularly important in the NUHDSS setting because of the non-permanence of housing structures, unreliability of livelihood opportunities, and the consequent high levels of population mobility both within and outside the location. The two main sources of attrition in the NUHDSS are mainly out-migration and to a lesser extent loss to follow-up. Analysis of data of people who migrated to the slum settlements between 2003 and 2007 shows that the median duration of stay for the new migrants was 22 months for males and 26 months for females in Korogocho and 18 months for females and 22 months for males in Viwandani (Zulu et al 2009).

The NUHDSS field team sometimes fails to observe some individuals and households because it is hard to find an eligible respondent at home. The most difficult cases of loss to follow-up are named 'hanging cases', which are cases where the fieldworker confirms that the respondent has left the housing unit where he/she was living during the last visit and is informed that the person has moved to another location within the same slum. However, the fieldworkers fail to trace the person in the new location for several rounds. Because the effect of hanging cases is the same as out-migration (in that no events or updates can be done regarding the person), out-migration and exits are combined in one category to form the overall attrition. Out-migration is by far the most dominant source of attrition from the NUHDSS population. The NUHDSS data show that out of the 60,207 people (total population) who left the surveillance population between 2003 and 2007, out-migration accounted for 92%, while hanging cases and deaths accounted for 5% and 3%, respectively.

Therefore, migration is a major source of population change in DSS. The smaller the study area, the larger the migration is compared to other demographic phenomena. In Nairobi slums, the annual in-migration rate is 27.1% while the out-migration rate is 26.7%. This results in a dramatic turn-over of the slum population. The intensity of the circular migration system just cannot be ignored. The rates are even higher for the children under 5, respectively 36.9% for in-migration and 31.4% for out-migration (Béguy et al. 2009).

Other studies in Africa already showed that sending areas (mainly with prominently rural environment) experience an excess mortality due to people 'returning home to die' (Clark et al. 2007; INDEPTH 2009). It is expected therefore, though it has not been investigated so far, that receiving area experience the opposite: the mortality might be well underestimated due to migrants returning to the sending areas when getting (or deemed at risk of getting) sick. It is not quite sure if this could apply as well to children, considering that it is not them who make the decision to migrate but their parents (most likely their mother). Yet our hypothesis is that when children (are deemed at risk to) get sick, as they often would in a very promiscuous environment susceptible to the spread of infectious diseases, their mother will rather out-migrate to their origin area or send their children to this area for better care. Migration is a selective process that leads the children to stay in the slums as long as they are healthy. The mortality should therefore be under-estimated in a context of high circular migration pattern in a poor health environment. As we do not have follow-up data on the return migrants in their origin area to support that (it might be that the health conditions are not better than in the slums), we will a modeling approach to verify this hypothesis, as explained in the next section.

Two-stage equation models to control for selection

All event history analyses make the explicit assumption of independence between censoring and event. When censoring is not independent from the event of interest (e.g. migration in relation to death) then the results suffer from potential bias. In this analysis, we control for non-independent censoring and the consequent selection bias, i.e. when the same determinants may cause attrition and mortality. We adapted to the context of longitudinal data the two-stage equation model that has originally been developed for the control of endogeneity in cross-sectional data. The attrition (out-migration) risk is modelled using available independent variables, including an instrumental variable (IV), e.g. a variable that affects attrition but not mortality.

The selection (censoring by out-migration) equation takes the form:

$$\lambda_{C|Z(t)}\big(t\big|z(t)\big) = \lambda_{C0}(t)exp^{z(t)\beta}.$$

The main (mortality) equation takes the form:

$$\lambda_{T|x(t)}(t|x(t)) = \lambda_{T0}(t)exp^{x(t)\beta+\Lambda_{-1}(t)\alpha},$$

where:

$$\Lambda_{-1}(t) = \sum_{j=1}^{N}\lambda_{C|Z(t)}\big(t\big|z(t)\big).I\big(C_j \leq t\big),$$

is the cumulative hazard function computed at the observed informative censoring time *C* only. It is interpreted as a propensity (and not a probability since the cumulative hazard can take value higher than 1) to have out-migrated of the population at risk by censoring time *t*. The cumulative hazard function is preferred to the inverse of the survival function because of its generalization to renewable event, as is out-migration. The squared propensity term can also be introduced in the model to test non-linear effect of attrition.

The vectors *Z* and *X* are the covariates respectively for the selection and main equations that verify *Z*=*X* + *V*. *V* is a vector of instrumental covariates (variables that can explain the selection but not the event) typically related to data collection issues or to calendar effects that influenced the selection.

Taking the log of the main equation and rearranging gives:

$$y(t) = \log\left[\frac{\lambda_{T|x(t)}\left(t|x(t)\right)}{\lambda_{T0}(t)}\right] = x(t)\beta + \Lambda_{-1}(t)\alpha$$

The equation *y(t)* is identified if $Z \neq X$, i.e. when the residuals of *y(t)* are not correlated with instrumental variables *υ(t)* included in vector of covariates $z(t)=x(t)+\upsilon(t)$ used to compute the propensity $\Lambda_{-1}(t)$. Here we use as an instrumental variable *υ(t)* the notice of demolition of household structures under the Kenya Power and Lighting Company (KPLC) electric lines that lead to the eviction of part of the study population in 2004[3].

Results

Table 2 presents the results from the analysis with the following three models:

1. The attrition (out-migration) model: note the use of the demolition notice as an instrument (determinant of attrition but not of mortality).
2. The base mortality model with covariates but no control for attrition.
3. Mortality model controlling for attrition (using cumulative hazards computed from attrition model, and its squared value to check for non-linear effect) and other covariates.

Attrition model

The results show that being migration has a significant effect on the likelihood of leaving the study population during the study period (attrition). Children born of long-term residents mothers do not differ much whether they are born in or out of the slums. However, among children born of recent migrant mothers, the slum-born have a higher chance of out-migrating than the non slum-born (HR=1.5, $p<0.01$). Our hypothesis is that if the mother migrated in the slums for economic reasons and did not find a job or the child was not planned, then the woman is likely to go back home or send the child 'home'. The socio-demographic characteristics of the mother have mild effects on attrition while the household economic conditions have significant effects. In general, those with higher economic status (as measured by household possessions and amenities) are less likely to leave, suggesting that departure from the slums reflects failure to find livelihood opportunities and afford houses with relatively good amenities. Children living in households that either own the dwelling unit, a phone, a radio or a TV, or who have direct access to the network (KPLC) electricity are significantly less likely to move out of the study area. There are also significant differences in the likelihood of attrition across ethnic groups, with higher chances of attrition among the Kamba, Luhya and Luo ethnic groups compared to the Kikuyu. The Kikuyus'

[3] KPLC issued a notice to all residents of Nairobi city whose houses were located below high voltage electricity lines to demolish their dwelling units within three months or face force eviction/demolition. This lead to mass demolition of houses in the two slums and while some of the residents relocated to other dwelling units within the two slums, a lot of the people from the affected houses moved out of the slums. That is why 2004 has a markedly high number of out-migrants than the other years (Table 1). While the notice of demolition clearly led to a higher level of attrition, there is no reason to believe that the departure from the study population due to this fact affected survival probabilities of the children beyond the normal effect of out-migration.

original home area (Central Province) is close to Nairobi and the lower levels of attrition in this group may be suggestive of the fact that many of the Kikuyus living in the slums are actually long stayers and more likely to be doing well economically. The notice of demolition effect is strong and significant (HR=2.7; $p<0.01$) on attrition.

Mortality Model

As shown in Table 2, the mortality models differ marginally whether we control for out-migration or not. The attrition effect is mild (HR: 0.6; $p<0.10$) but in the expected direction, confirming that out-migration may be endogenous to the mortality of the children. Censoring by out-migration does not seem to be independent from the death event and may therefore be a source of bias in estimating mortality. This result suggests that mortality rates in the slums would be higher if those who left had stayed in the population. The Kaplan-Meier estimate is 106 per 1000 over the period and it would be 152 per 1000 with a zero propensity to out-migrate. In the following, we comment only on the results of the mortality model controlling for out-migration propensity, as they are less susceptible to out-migration biases.

Mortality among children born in the slums to recent migrants is higher than that of other children (HR=1.75; $p<0.01$). From the results in Table 2, we can also compare the relative risk by the migration status of the children and by the migration status of the mother. Among children born to recent migrant mothers, being born in the slum is clearly more disadvantageous (HR=2.07; $p<0.01$) than among the children born to long-term resident mothers, for whom the difference (HR=1.24) is not significant. Children born in the slums appear to be more vulnerable when they are born to recent migrant mothers (HR=1.41; $p<0.01$), while there is no significant difference among non slum-born (HR=0.85). Therefore, it is the combination of the migrant status of the mother with the non-migrant status of the child that decreases the survival chance of the child.

The effect of ethnicity is fairly significant (both the Luos and Luhyas have significantly higher mortality risks than Kikuyus, while the Kisii and the minority ethnic groups have lower mortality). Children born of non-educated mothers have higher mortality (HR=1.61; $p<0.05$). The effect of mother's death is very strong (HR=5.50, $p<0.01$). Most measures of socioeconomic status had no significant effect on child mortality except for dwelling ownership, which significantly reduces the risk of mortality (HR=0.58, $p<0.01$) and ownership of a phone, which marginally decrease the risk of mortality for children (HR=0.81; $p<0.10$). There is no significant reduction of mortality over the period.

Table 2: Migration and mortality models for under-5 children (July 2003 – June 2007)

Determinants	% person-years at risk, or mean value	Out-migration model	Mortality model without controlling for out-migration	Mortality model controlling for out-migration
Non slum-born of long-term resident mother [Ref.]	35.18%			
Slum-born of long-term resident mother	20.46%	0.925*	1.239	1.237
		(0.040)	(0.171)	(0.171)
Non slum-born of recent migrant mother	31.63%	0.940**	0.834	0.846
		(0.028)	(0.131)	(0.126)
Slum-born of recent migrant mother	12.72%	1.396***	1.718***	1.748***
		(0.065)	(0.270)	(0.278)
Female [Ref.]	48.93%			
Male	51.07%	0.991	1.171	1.168
		(0.023)	(0.114)	(0.112)
Korogocho [Ref.]	50.13%			
Viwandani	49.87%	1.280***	0.802**	0.822*
		(0.043)	(0.085)	(0.093)
Kikuyu ethnic group [Ref]	27.77%			
Luhya ethnic group	16.36%	1.140***	1.213	1.233*
		(0.042)	(0.167)	(0.139)
Luo ethnic group	20.58%	1.137***	1.731***	1.756***
		(0.041)	(0.210)	(0.236)
Kamba ethnic group	20.64%	1.145***	0.842	0.854
		(0.040)	(0.117)	(0.122)
Kisii ethnic group	4.12%	1.092	0.491*	0.495*
		(0.068)	(0.198)	(0.188)
Meru/Embu ethnic group	1.81%	1.141	1.114	1.121
		(0.100)	(0.431)	(0.475)
Somali ethnic group	2.13%	1.128	0.754	0.754
		(0.125)	(0.276)	(0.281)
Other ethnic groups	6.58%	1.180***	0.586**	0.591**
		(0.068)	(0.147)	(0.153)
Non educated mother	4.93%	0.831**	1.649**	1.613**
		(0.061)	(0.353)	(0.341)
Primary educated mother [Ref.]	69.65%			
Secondary educated mother	22.92%	1.040	1.007	1.007
		(0.030)	(0.114)	(0.113)
Tertiary educated mother	0.39%	1.085	1.834	1.837
		(0.188)	(13.159)	(19.852)
Education of the mother missing	2.11%	0.931	0.707	0.704
		(0.072)	(0.293)	(0.279)
Mother age at birth	24.18	1.018	0.988	0.986
		(0.016)	(0.049)	(0.046)
Mother age at birth squared	618.35	0.999**	1.000	1.000
		(0.000)	(0.001)	(0.001)
Mother alive [Ref.]	98.86%			
Mother dead	1.14%	0.772**	5.588***	5.503***
		(0.094)	(1.060)	(1.129)
No tap water [Ref.]	10.63%			
Tap water	89.37%	1.012	0.854	0.851
		(0.041)	(0.129)	(0.149)
No toilet [Ref.]	98.16%			
Own toilet	1.84%	0.922	0.846	0.846
		(0.097)	(0.342)	(0.299)
No floor finish [Ref.]	21.86%			
Floor finish	78.14%	1.083**	0.868	0.876
		(0.035)	(0.089)	(0.093)
No roof finish [Ref.]	1.09%			

Roof finish	98.91%	1.707*** (0.241)	1.500 (9.077)	1.569 (12.212)
No KPLC electricity [Ref.]	76.35%			
KPLC electricity	23.65%	0.918** (0.033)	0.946 (0.110)	0.940 (0.112)
No own dwelling [Ref.]	90.58%			
Own dwelling	9.42%	0.697*** (0.041)	0.601*** (0.118)	0.583*** (0.110)
No phone [Ref.]	37.18%			
Phone	62.82%	0.453*** (0.013)	0.894 (0.099)	0.809* (0.088)
No radio [Ref.]	8.77%			
Radio	91.23%	0.746*** (0.023)	0.875 (0.125)	0.829 (0.116)
No television [Ref.]	59.04%			
Television	40.96%	0.729*** (0.025)	0.889 (0.098)	0.863 (0.096)
Time trend (by trimester)	8.33%	0.982*** (0.003)	0.988 (0.010)	0.987 (0.009)
No notice of demolition [Ref.]	96.83%			
Notice of demolition	3.17%	2.737*** (0.107)	/	/
Out-migration propensity (mean)	0.716	/	/	0.604* (0.156)
Out-migration propensity squared (mean)	1.264	/	/	1.042 (0.031)
Number of person-years	20688	20688	20688	20688
Number of subjects	15669	15669	15669	15669
Number of events	/	7651	548	548

Note: All models used bootstrap standard errors (200 replications, with individuals as clusters) and shared frailty on field-workers.
The second column contains the percentage distribution (100%=26143 person-years) or the mean value of migration propensity scores.
Significance level: *=10%; **=5%; ***=1%.

Discussion

Our data generated from the DSS were generally appropriate to explore and assess risk factors associated with childhood mortality. However, classic determinants of child mortality such as birth interval and child's rank were not available for all children and therefore could not be included in the model. Another major limitation is that most of the variables included in our model were not time-dependent, except for trimester that captures the trend over the study period and notice of demolition used as an instrumental variable in the out-migration model. For instance, we only used the household economic status data that were collected close to the date of birth or in-migration of the child, and these could have changed over the study period. The NUHDSS started collecting data on household amenities and assets annually from 2006. This will allow treatment of these proxy measures of household economic wellbeing as time-varying variables in future analyses.

Many studies have assessed the risk of infant and childhood mortality and associated risk factors (Ouoba 1998, Gyimah 2002, Mboup 2001). However, these studies are mostly based on cross-sectional data, known to be less appropriate for the analysis of most vital demographic events. The few studies that use longitudinal techniques are based on rural settings (e.g. Becher et al 2004) and the risk factors assessed rarely include migration.

The key studies that have specifically examined the effect of migration on child survival (e.g. Brockerhoff 1990, 1995; Stephenson et al. 2003; Bocquier et al. 2009) have also been based on cross-sectional data, with limited migration data. In the present study we used longitudinal data collected from poor urban slum settlements in Nairobi City, Kenya, to assess the effect of the mother's migration status and child's migration status on childhood mortality. This study contributes to the understanding of the underlying factors for the relatively high disease burden exhibited by slum residents (APHRC 2002a; Ndugwa and Zulu 2008; Kyobutungi et al. 2008).

Our results show that children born in the slum to recent migrant mothers have 1.75 times higher risk of dying than other children, after controlling for attrition and other factors. Non slum-born have generally a lower mortality, indicating that in-migration in the slums is probably selective. This confirms our hypothesis that migrant children are selected among healthy children and that children born in the slum suffer from the bad slum environment. The out-migration propensity effect also shows that out-migration is selective of people who are more prone to poorer health outcomes, and that the mortality rates in slum settlements would actually be higher than the observed rates if many of the people who are leaving the locations stayed there longer. Slum-born children of recent migrant mothers are more often out-migrating than other children and that may reflect their bad health.

Out-migration is lower for households with better economic indicators as measured by ownership of household assets (including ownership of dwelling units) and access to electricity. Another study from the same data indicates that new migrants are less likely to be employed and make less money (Zulu et al 2006). This calls for the need to understand why the mother being new in the slum setting, other factors being equal, exposes children to higher risks of dying. The observed outcome may partly reflect lack of appropriate measurements of economic status and access to health care in the present study. However, evidence from other settings point to the adaption problems that new migrants often face when they come to new settings. The new migrant mothers may not yet be integrated into the new environment and may not know how and where to seek health care services for their children. Children born in the slums of recent migrant mothers may also be unwanted children whose mother is not prepared to care for. Kiros and White (2004) reported in Ethiopia low vaccination coverage (vaccination was provided free of charge) among children from migrant mothers compared to those from non-migrants and explained these differences by the integration level of the mother in the host community.

We also identified other major risk factors associated with childhood mortality in the slums. The significant effect of ethnicity on mortality suggests that there might be genetic and cultural factors that affect child mortality (Blacker 1991). Children born to Luo and Luhya mothers have significantly higher risks of dying than children born to Kikuyu mothers. We should also note that Kikuyus are more likely to be long-term migrants compared to Luos and Luhyas. However, the relation between migration and mortality does not hold for Kamba and minority ethnic groups. While our findings call for more detailed case studies of the ethnic effect, they converge with other surveys like the DHS that show that Luos and Luhyas exhibit poorer health outcomes, including child mortality, than other ethnic groups in Kenya. Ethnic group differences in mortality risk have also been reported in other settings (Blacker 1991, Becher et al 2004).

Most socioeconomic factors were not significantly associated with mortality risk. The exception is dwelling ownership. More than 90% of the children lived in rented house where their mothers would not invest so much in improving the living conditions by anticipation of a migration or by fear of losing their investment to the owner. The minority of mother who own their dwelling may have longer prospects and may chose to improve their environment and that of their children to the effect of reducing health hazards.

Another major risk factor for childhood mortality is the death of the mother, which multiplied the risk of mortality by 5.5 but reduced out-migration by 23%. Similar findings have been seen in other studies (Koblinsky et al 1994, Becher et al 2004). Children who lose their mothers are likely to be exposed to several factors that can increase their mortality risk, including: reduction of care, cessation of breastfeeding, improper bottle feeding, and HIV transmission from their mothers. Due to the HIV/AIDS epidemic an increasing number of children are experiencing the death of their mother and so the impact on childhood mortality will be substantial.

Conclusion

Childhood mortality in the Nairobi informal settlements remains very high, especially among children born in the slums to new migrant mothers. While emerging evidence highlight the need to pay attention to the plight of slum dwellers in African cities, this study demonstrates the need to look at inequities in health outcomes even within the so-called 'marginalized groups'. Given the high degree of rural to urban migration, in the context of persisting large socioeconomic inequities between rural and urban areas, it is important that policy makers understand and address factors predisposing children of recent migrants to such high risks of mortality. There is, therefore, need to investigate factors that predispose children born to recent migrants to higher mortality risks than other children born out of the slums or born to long-term residents. If unwanted pregnancies and poor utilization of health services by new migrants is the problem, as suggested in other studies, all efforts should be made to find cost-effective mechanisms for increasing access to contraception and health care for the recent migrants.

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