Family migration: a vehicle of child morbidity in the informal settlements of Nairobi city, Kenya?

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Abstract

Urban population growth in sub-Saharan Africa is driven by migration of young adults seeking better livelihoods in cities. Among these urban residents, 72% live in informal settlements. In the Kenyan capital city of Nairobi, the growth of the slums population is mostly fueled by rural-urban migration. Most in-migrants come to Nairobi to escape rural poverty, but end up living in slums characterized by poor livelihood opportunities, environmental sanitation, overcrowding, social fragmentation, unstable livelihoods, poor health outcomes, and high levels of insecurity. Slum residents mostly rely on low paying and unstable petty trading and casual jobs which perpetuate abject poverty in the urban setting as compared to rural origin places.

This study contributes to understanding the health consequences for children of a rapid urbanization amidst increasing urban poverty in African cities. The findings indicate that households who migrated together with their children in the slums of Nairobi experience higher child morbidity (43 per cent have at least one sick child in the last one month preceding the Nairobi Informal Survey in 2004) as compared to households who adopted the split migration strategy leaving children in their upcountry homes (31 per cent of morbidity rate). This is in line with existing descriptive evidences that children of migrants are safer upcountry even though not all households can afford this strategy. Households are able to choose this strategy only if they have strong social network in their origin community and/or they are big size households. This is an important finding in targeting the Millennium Development Goals because split strategy involves an important monitoring mechanism to be set in place upcountry. Alternatively households who own land or houses in Nairobi and are richer can afford also to leave families in the place of origin.

Keywords: Childhood morbidity, Split migration, Incidental truncation, Informal settlements Nairobi, Kenya.

[1] ~~I am grateful to Joost de Laat who~~ made this data available and to the African Population and Health Research Center in Nairobi for their support in understanding the complex setting of the NUHDSS.

Introduction

With the current lowest level of urbanization, sub-Saharan Africa's urban population is however growing at a higher rate than any other region in the world. Its urban population was 15 percent in 1950, 32 percent in 1990, and is projected to be 54-60% percent by 2030 (United Nations 1998). The unprecedented growth of urban areas in the context of declining economic performance (World Bank 2000), poor planning and governance have created a new face of poverty whereby a significant proportion of urban populations live below the poverty line in over-crowded slums and sprawling shanty towns in most African countries. It is estimated that about 72% of all urban residents in sub-Saharan Africa live in informal settlements, commonly known as slums (UN-Habitat 2003).

In Kenya, with an urban population of about 34%, about 71% of all urban dwellers are estimated to be living in informal settlements, which are characterized by extreme poverty, poor sanitation, inadequate social services, insecurity, social fragmentation, and poor livelihood opportunities. Emerging evidence shows that, the traditional advantage that urban areas enjoyed in health and social indicators over their rural counterparts have either drastically dwindled or even reversed in favor of rural areas (Brockerhoff and Brennan 1998; Magadi et al. 2003; Koenig et al 2004; Zulu et al. 2002; Mugisha and Zulu, 2004; APHRC 2002; Dodoo et al. 2002). Between one and two million migrants reside in cramped conditions in the slums of the capital city Nairobi without proper access to sanitation or affordable clean water. Children in such areas are exposed to enormous risks, health risks in particular. For example, a large demographic and health focused survey conducted in various Nairobi slums in 2002 by the African Population and Health Research Center (APHRC) finds that not only are morbidity risks for all major childhood illnesses (fever, cough, diarrhea) higher for slum children compared to children elsewhere in Kenya, slum children also have less access to healthcare, including immunization, and subsequently face higher mortality rates than even their rural counterparts.

One coping strategy for slums dwellers is to adopt split migration where wife and children are secured in the home village while the head of household undertakes the income diversification and risk management project that is migration to Nairobi city. However this strategy is often impaired by the important monitoring costs that the

migrant incurs to ensure that spouse fulfills the ex-ante contract and does not divert the remittances into unproductive activities. The welfare implications of this information asymmetry are significant. Precious resources that could otherwise have been spent on, for example, healthcare or school fees, are spent on frequent costly traveling home. According to de Laat's estimations (de Laat, 2005) the average migrant couple visits each other at least 12.6 times per year, with the husband making the majority (at least 9.5) of the trips. The combined travel cost of these visits is $109, or 11.1 per cent of his annual urban income. Some families for whom monitoring is simply too costly decide to move altogether to Nairobi, leaving children to be raised in precarious urban slum conditions, with obvious implications for children's health and general well-being.

It's against this backdrop that the current study seeks to understand the contribution of joint migration as compared to the alternative strategy of split migration in the urbanization of poverty and poor health in the two slums (Korogocho and Viwandani) of the Nairobi Health and Demographic Surveillance System (NUHDSS). The paper focuses on the case of under-five children living in Nairobi and compares them to those living upcountry. The study examines the motivations behind the choice of joint migration as compared to split strategy and the effect of the former migration status on child morbidity, after controlling for incidental truncation and other socioeconomic factors. The study hypothesis is that children born to joint migrants are more likely to fall sick than children born to split migrants because of the poor socio-economic situation, the poor environmental sanitation and the absence of alternative medical care in the slums. Slum settlements are characterized by high levels of poverty, lack of social services and amenities, and poor environmental conditions, which expose children to high morbidity from preventable infectious diseases.

Conceptual framework and methods

Urbanization of poverty and migration theories

Urban population growth in sub-Saharan Africa is principally driven by rural-urban migration of young adults seeking jobs and other livelihood opportunities in urban areas (Anderson 2001; Adepoju 1995). Given the increasingly poor living conditions and livelihood opportunities that are observed in most metropolitan centers in the region

(Brockerhoff and Brennan 1998; World Bank 2000; APHRC 2002) it appears paradoxical that many rural residents continue to flock to urban areas. Classical migration theories portray migrants as rational economic agents moving to areas which maximize their incomes and overall well-being (Harris and Todaro 1970). However, the fact that the urban population growth rates have persisted at very high levels despite the sustained economic downturn experienced over the past two to three decades underscores the need for better understanding of rural-urban migrations in sub-Saharan Africa and to address the consequent growth of urban poverty and bad health performance, especially in the informal settlements. Kenya's national capital Nairobi represents a city associated with not only high urban growth through migration but also the concentration of migrants in large informal settlements. For instance, despite the fall in employment opportunities associated with the economic downturn in Kenya from the 1980s, Nairobi's population continued to grow at about 5% per year between 1969 and 1999 (Agwanda et al. 2004; Government of Kenya 2000). The city's population is principally composed of migrants; the proportion of city-born residents is no more than 20% up to age 35 and less than 10% after age 50. Half of the migrants came to Nairobi between 17 and 23 years old (Agwanda et al. 2004). In this context, differential of income between rural home and urban settlement and remittances cannot be the sole motivation for migration.

Migration is fundamentally a household strategy where the member migrant participate in income diversification and risk pooling mechanism that enables the origin household to smooth consumption level and finance its investments. Individuals are seen as migration actors who search to maximize the expected income of the household and by the same time to minimize production and health risks, especially of their children. The individual migrants participate to their households' strategy against different markets failures problems. Many migratory phenomena would not have occurred if the set of markets and financial institutions were perfect and complete, free of asymmetries. Migration operates as a risk management strategy and/or as a way to ease the liquidity constraint of the household in the absence of insurance and credit market. In Nairobi, attempts to move squatter residents to better and more expensive housing have had limited success because many slum dwellers prefer to live in the relatively cheap squatter settlements in order to accumulate savings for various investments in their home communities (Johnston and Whitelow 1974). An alternative to the view that migration decision is a response to

urban-rural wage differential has been elaborated by the New Economics of Labor Migration (NELM). Beyond income gap, factors such as individual and family characteristics, risk coping strategies and labor and capital market imperfections in the destination and home places influence the migration decisions, too (Stark, 2003). Characteristics of migrants and the process of self-selection are found to be important determinants of the rate of migration. Based on these findings that factors other than earnings differences influence migration decisions, the recent migration theory explain why migration sometimes fails to occur even when substantial earnings differences exist, or why migration will continue even without such differentials (see several illustrations in Stark 2003 and Bardhan and Udry 1999). For example, income uncertainty in the receiving destination may deter risk-averse persons from migrating, even if expected earning gains are positive. Even more important, family ties and cultural differences between source and receiving places raise the cost of migration. Alternatively migrant may choose to migrate for a short term, allowing him to return home where he leaves the family. Similarly ethnic enclaves in the receiving places encourage new migrants.

Family can play another important role in the migration decisions. If the current generation altruistically values the utility of their offspring, then utility maximizing migration decisions will be dynastic. It may pay the current generation to migrate even if the change in their own wealth is small or negative, because their descendants will be better off. This theory may partly explain why many rural residents continue to flock to urban areas and choose to live in the relatively cheap squatter settlements in order to accumulate savings for various investments in their home communities. However the well-being of migrant off-springs depends also on the economic and social context where children are kept. Therefore the current research assumes that children left behind in rural homes will enjoy better health outcomes than their urban counterparts in the Nairobi slums. Thus, migration and remittances could increase production output (including the health of children) of the migrant household if they release the liquidity constraints that are limiting the expansion of their activity and if the household adopt a split strategy. However, in the case of missing or imperfect labor market, the household must rely on the family labor and thus sending a household member may also stop the household from

moving toward the local high-return activity. The adverse effect of lost labor[2] may be higher when migrants tend to be younger and better educated than an average rural laborer. The household migration strategy raises also the question of asymmetric information. Any risk-pooling mechanism must overcome the information and enforcement problems associated with insurance contracts. The insurer might be subject to either moral hazard or adverse selection or both as discussed in Azam and Gubert (2002) and de la Briere, Sadoulet, de Janvry, and Lambert (2002). The welfare implications of this information asymmetry are significant. Therefore adding to the previous cost of labor leakage through migration, split migration strategy undergoes the important monitoring costs that the migrant incurs to ensure that spouse fulfills the ex-ante contract and does not divert the remittances into unproductive activities. Precious resources that could otherwise have been spent on, for example, healthcare or school fees, are spent on frequent costly traveling home. This may explain why some families for whom monitoring is simply too costly decide to move altogether to Nairobi, leaving children to be raised in precarious urban slum conditions, with obvious implications for children's health and general well-being.

Study site and data collection

The study is based on the 2004 Nairobi Informal Settlement Survey (2004 NIS) that collected data in two of Nairobi's slums, Korogocho and Viwandani (de Laat, 2004). The survey was conducted between 04 May 2004 and 27 June 2004 on a sub-sample in these two communities where the NUHDSS operates[3]. Eligibility was defined as being "ever married" and between the ages of 24 and 56 years old. The primary objective of this research project was to look at health and education of children whose parents live in the Nairobi informal settlements (Korogocho and Viwandani).

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2 If a migrant household's marginal product on the farm is positive, farm production will fall when the household sends out-migrants, due to the reduction in available labor.

3 APHRC is conducting an extensive Health and Demographic Surveillance System (NUHDSS), which served as sampling frame for the NIS survey. The data collection procedures of the NUHDSS include visits to all 23,000 households in the Demographic Surveillance Area (DSA) every four months to update information on all vital events (birth, deaths, movements, vaccinations and pregnancies). Movements include change of residence and migrations.

The survey randomly selected 1817 'eligible' heads of households i.e. (1) heads of households who are divorced or separated (153 in total), or widowed (150); heads of households who are married and live with their spouse together in the Nairobi informal settlement (858 joint migrants in total); or heads of households who are married but live split from their spouses who usually live in the up-country village (656 split migrants in total). There was no stratification by informal settlement area. A total of 37 household head refused to participate in the NIS 2004, which represents only 2 % of the initial sample. The most comprehensive survey questionnaire is that for the category of married household heads that live split from their spouse. The survey also contains relatively detailed information about family members who are not members of the household being interviewed. The following information is recorded in the database:

- All variables at household level, including consumption.
- All variables related to member of the household who are living in the Nairobi slums.
- All variables related to the spouse (s) of the household head (spousal household).

Methodological approach

The objective of the paper is to understand why some parents have their children in the slums and others do not, and what the effects are for the wellbeing of the children. The findings may suggest relevant policies that may improve the lives of poor people living in cities in line with the Millennium Development Goals.

While some studies ask about the health and education of children, these studies often do not recognize that while some people have their whole family in the urban slums, many others have children and spouses living upcountry. The paper focuses on the health of children whose parents are currently married. It is assumed that the groups of widowed, divorced, separated households are independent from the study groups and they can be left out. Two groups of households are then considered: parents who live in the slums with their spouse (s) and children and those who keep the whole family upcountry. Thereafter these groups are referred to respectively as joint migrants and split migrants. The following information available in the NIS database is used for the study:

Type 1: Married Split:

-Urban household roster

-Spouses household roster

-Non-householder children

-Non-householder parents

-Non-householder siblings of the household head, and

-Non-householder siblings of the spouse.

Type 2: Married Joint:

-Urban household roster

-Non-householder children

-Non-householder parents

-Non-householder siblings of the household head, and

-Non-householder siblings of the spouse.

Comparing the above two sources of information, it appears that the major difference is the need to enquire about Type 1's spouse and children who are not observed in the risk set of the DSA. For this purpose, the survey included the additional module called spouses household roster. However this has a strong methodological impact as follows. Indeed the study disposes of a dataset with 1514 observations on migration living arrangements outcomes (migration type) in Viwandani and Korogocho. I have full data (no missing values) for all the covariates in the morbidity and migration type participation functions. With the latter information, I want to estimate a child morbidity function. This estimation needs to be corrected for selection into the DSA as split or joint migrant. The problem can be summarized by considering the data on:

- "Split" subsample: heads of households who are married but live split from their spouses who usually live in the up-country village (656 in total)[4].
- "Joint" subsample: heads of households who are married and live with their spouse together in the Nairobi informal settlement (858 in total);

[4] In fact this group is reduced to 652 cases of split migrants who have information on their spouse upcountry.

While the outcomes of the joint children are observed, "split children" morbidity data are not observed in the slums conditions and then obviously missing for the slum structural model. This entails a problem of incidental truncation that can be resolved using the Heckman model. The latter consists in using sample ("Joint+Split") to estimate the migration selection model and then uses subsample "Joint" to estimate the children morbidity equation.

Statistical model and analysis

Econometric methodology

While most of the earlier work distinguished between permanent and seasonal migration the importance, split migration is not documented. Typically split migrants are heads of households who are married but live split from their spouses (who usually live in the up-country village with the children). This allows protecting the children health from the poor environmental conditions of the destination place. 62.81 percent of the study population have at least one child (951 households) and among them 43 percent have left their upcountry. The relevant sample for the current study is composed of 557 joint households against 397 split households.

The sample distribution therefore indicates that 43 percent of the currently households who have children consider the migration project more beneficial if they leave children upcountry according to the theory. Analyzing the behavior of split migrant households from a population leads to incidental truncation problem because these migrants are a restricted nonrandom part of an entire population. The households that supply migrants' labor may possess unobserved characteristics that are generally positively related to the health and income, which result in a sample selection bias. With such a distortion, results from a standard Ordinary Least Squares (OLS) are simply biased. The regression model that includes the above selection issue is the migration model à la Nakosteen and Zimmer (1980). The simultaneous system writes:

Net benefit of moving:

$$V_i^* = \alpha' Z_i + \gamma' X_i + \varepsilon_i \qquad (1)$$

Children morbidity outcomes of joint migrant households:

$$\log mo_{fi} = \beta_f' X_{fi} + \mu_{fi} \qquad (2)$$

and children morbidity outcomes of split migrant households:

$$\log mo_{hi} = \beta_h' X_{hi} + \mu_{hi} \qquad (3)$$

To estimate the simultaneous migration type decision and child morbidity equations, it is assumed that V_i* and $\log mo_i$ have a bivariate normal distribution with correlation ρ. An analysis of morbidity in either sub-sample must account first for the structural differences of health and production markets in the related locations (slums and upcountry) and for the incidental truncation of the split's (joint's) morbidity on the sign of the net benefit. To face estimation problems of a model with sample selection, a Heckman two-step procedure is used for the study of joint migration. In this case, outputs are interpreted with split migrants as the reference category. The Heckman regression model adapted to the current situation where the outcome variable is binary can be written for the selected sample as in equations (1)' and (2-3)' below.

Selection model:

$$P_i^* = \alpha' Z_i + \gamma' X_i + \varepsilon_i \qquad (1)'$$ where $\boldsymbol{P}^*$ is the probability of the variable indicator of the sign of the selection criteria, that is the net benefit from joint migration. $\boldsymbol{Z_i}$ and $\boldsymbol{X_i}$ represent the independent variables of the selection equation identification and those of the morbidity equation respectively.

Morbidity model:

$$\log m_i = \beta' X_i + \beta_\lambda \lambda_i + \nu_i \qquad (2-3)'$$ where the following relationship exists between the coefficient of the inverse Mills' ratio λ and the model statistics: $\beta_\lambda = \rho\sigma_\mu$. The inverse Mills' ratio (IMR) itself evaluates as the ratio of the probability and cumulative density functions from the selection equation.

Heckman (1979) argues that this function is a monotone decreasing function of the probability that an observation is selected into the analyzed sample.

The Heckman's two-step estimation procedure is applied to the selected group of joint migrants taking into account the fact that joint migrants and split migrants face distinct labor and production market structure respectively in their rural homes and in the slums. The probit equation (1)' is estimated to obtain estimates of α and γ and compute the inverse Mills' ratio. At a second step of the Heckman procedure, the inverse Mills' ratio is added to the child morbidity outcomes equation (2-3)' to produce the consistent estimates of β and β_{λ}.

However, the coefficients estimated in equation (1)' (respectively (2-3)') measure how the log-odds in favor of migrating (respectively falling sick) change as the independent variables change by a unit. For the correct interpretation of these nonlinear outcomes, marginal effects should then be computed (Long and Freese 2001).

Model variables and estimation

The dependent variable is an indicator of whether the household had a child who was sick in the month preceding the NIS 2004 survey or not. Table 1 shows that while only 31 per cent of split household had an under-five child who was sick last month, about 44 per cent of joint migrants had a child exposed in the slums who suffered illness. 61 per cent of all split households have children under-five years old who live upcountry ("split children"). The proportion in the urban or joint households group who has under-five children is 64 per cent. This suggests the two groups of the study population are comparable in terms of their fertility rates.

The data collected on self reported morbidity outcomes, especially for children may have some measurement errors but this may not be a major problem as morbidity is the primary dependent variable of interest. However it is important to compare the current findings with data collected using more reliable forms of measuring child health such as using anthropometry or biomarkers to measure nutritional status for children and mothers or using World Health Organization (WHO) and other quality of life measurements for child and adult health focused on disability, mental health, etc. In the

current study, attempts to control for the measurement bias did not show any significant evidence of information bias on reporting sickness upcountry versus urban location. The respondent bias were captured as an indicator of household head who did not know about sickness status of his children living upcountry (missing, refusal or don't know as response) but knew the morbidity status of his members in the slums.

Table 1: The distribution of the study participants according to the migration status and the age of the slum households

		Survey sample (household)		Household with Children (estimation sample)		Child morbidity prevalence (household level)	
		n	**%**		**%**	**N**	**%**
Total		1,514		951		951	
Joint							
	NIS 2004	858	57%	557	59%	241	**43%**
	Viwandani	470	31%	294	31%	117	40%
	Korogocho	82	5%	49	5%	20	41%
	Nyayo	306	20%	214	23%	104	49%
Split							
	NIS 2004	656	43%	397	42%	125	**31%**
	Viwandani	497	33%	311	33%	90	29%
	Korogocho	33	2%	14	1%	3	21%
	Nyayo	126	8%	72	8%	32	44%
Age		945	62%	945			
	0 year	97	6%	97	10%		
	1 year	190	13%	190	20%		
	2 year	325	21%	325	34%		
	3 year	194	13%	194	21%		
	4 year	139	9%	139	15%		

Source: NIS 2004
Notes: Korogocho includes Nyayo in the definition of the NUHDSS
Note: 9 households (3 in Nyayo and 6 in Viwandani) have children both in the urban and rural places. This may be an interesting strategy where split household head take to Nairobi the older children.

Table 2 shows the total morbidity rate in the two slums of Nairobi at individual level, that is, 23.22% for the whole population. However child morbidity reaches the important level of 39% in 2004. There appears no significant difference between male and female of the study population as regards under-five morbidity. However, under-five children in the slums tend to be sicker than their rural counterparts and even so for girls (7 percentage points difference).

Table 2: Gender and morbidity profile in the slums and upcountry (individual level)

Urban population		5,733		Under-five urban population		865
	Male	3,165	55%	Male	420	49%
	Male-sick	737	13%	Male-sick	164	**19%**
	Female	2,568	45%	Female	445	51%
	Female-sick	594	10%	Female-sick	173	**20%**
Upcountry population		2,773		Under-five population upcountry		531
	Male	1,144	41%	Male	293	55%
	Male-sick	214	8%	Male-sick	75	**14%**
	Female	1,629	59%	Female	238	45%
	Female-sick	297	11%	Female-sick	71	**13%**

Source: NIS 2004

The covariates used in the Heckman model to identify the selection equation and explain morbidity outcomes in the slums are summarized in table A1 (see Appendix) and include:

- Explanatory variable
  - Migration status (joint versus split migration)
- Control Variables
  - Age of the children, average educational attainment of the household, literacy of the household head in the urban settlement, religion, gender of the household head, orphan status, ethnicity, total size of the household, care giver, social network in the origin place, the wealth index, production factors (land and labor) and location of the urban head.

Empirical results

This section implements the econometric analysis and interprets successively the reduced form of the migration type selection and the morbidity outcome model. The latter evaluates the impact of the covariates corrected for selection bias.

Table 3 indicates that the bivariate effect of choosing the joint migration strategy is significantly high. The risk of having a child to fall sick is 39.2 per cent higher in the slums than in the home rural place.

Table 3: Morbidity of slum children in joint/split household

Explanatory variables	Sick last month
married under joint migration	0.331***
	(3.90)
Constant	-0.482***
	(-7.35)
Observations	945
Log Lik	-623.2

z statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A more elaborate estimation that controls for selection bias and other covariates follow in table 4. The results in regression 1 in table 4 support that the child morbidity of joint migrant households in the slums of Nairobi is a positive function of the schooling capital in the household but negatively depend on the education level of the head of household as compared to the reference group of split migrant. This suggests that the presence of the educated head (joint migration) is very important for the health of children. Children born to educated household heads who stay far from the family may be sicker. In the case of missing or imperfect labor market, the household must rely on the family labor and thus sending a household member (the head in this case) may also stop the household from moving toward the local high-return activity (farm and health productions). The adverse effect of lost labor may be higher when migrants tend to be younger and better educated than an average rural laborer.

However, the average level of education of the urban household seems to similarly play against the health of children. This is explained by the fact that educated adults tend to leave children with care-givers while at work. In the poor sanitation conditions of the slums, it is the younger children who suffered most (negative impact of age of under-five children). Similarly father-orphan's children who are raised in the conditions of the slums suffered more diseases than others.

Children born to a protestant family appears to be less sick than children from the other religious groups. This suggests that the protestant social network and level of cooperation work better in the conditions of the city life. On the opposite being from a Luhya family exposed children to higher health risk as compared to other ethnic groups such as Kikuyu.

Table 4: Morbidity of slum children in joint/split household

Covariates	(1) Sick last month	(2) Joint migrant
Average Years of schooling of the household	0.0519**	
	(2.14)	
Average age of the under 5	-0.0640	
	(-1.34)	
Religion==Protestant	-0.122	
	(-1.09)	
Urban head is literate==Yes	-0.781*	
	(-1.75)	
Has lost father in the last 10 years	0.264**	
	(2.19)	
Female household head	0.465**	
	(2.35)	
Ethnicity==Luhya	0.328**	
	(2.11)	
Slum==Nyayo	0.172	
	(1.45)	
Social network from origin community ==0		0.0396
		(0.30)
Social network from origin community ==11-30		-0.343***
		(-3.21)
Social network from origin community ==31-50		0.00173
		(0.011)
Social network from origin community ==50+		-0.0132
		(-0.082)
Members in spousal+urban household		-0.201***
		(-8.62)
Own land/houses in Nairobi		-0.0481**
		(-2.30)
Available agricultural production factors		0.00811**
		(2.18)
	0.108	1.299***
	(0.20)	(9.72)
	946	946
	-955.9	

z statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The likelihood of the household to migrate jointly (regression 2 in table 4) is significantly dependent on medium size of social network, the wealth index and the availability of agricultural factors. Compared to households who know 1 to 10 people in their origin community upcountry, households who know between 11 and 30 people are more likely to choose split migration. The social network literature argues that knowing more people can enables the departure of the migrant. In the 2004 NIS survey, it is found

that monitoring cost in terms of controlling the work effort and investment behavior of the spouse is very costly (at least 11 percent of the urban annual income on frequent travels upcountry). The most frequent and costly monitoring mechanism is frequent travels upcountry and the split migrant can substitute this by delegating some monitoring activities to his relatives left behind. Finally households who are better endowed with production factors (land and labor) or are richer (own houses in Nairobi) are those who can afford the split migration, leaving the family members to work on the agricultural farms while being able to face important monitoring costs.

Conclusion

To provide better education and health services to everyone as required by the Millennium Development Goals (MDGs), it is important to understand why some parents have their children in the slums and others do not, and what the effects are for the children.

The present study examines the joint migration of the whole family in the slums of Nairobi and estimated the effect of such strategy on children morbidity. On the one hand, it appears that the likelihood of the household to migrate jointly is significantly higher for household with poor social network in their origin community, which makes it is impossible for the household head to face the high monitoring cost related to the split migration. Households who are better endowed with production factors (land and labor) or are richer (own houses in Nairobi) are also those who can afford the split migration, leaving the family members to work on the agricultural farms while being able to face important monitoring costs.

The findings indicate that the bivariate effect of choosing the joint migration strategy is significantly high. The risk of falling sick for a child is 39.2 per cent higher in the slums than in the home rural place. The results support that the morbidity of joint migrant households in the slums of Nairobi negatively depends on the education level of the head of household as compared to the reference group of split migrant. This suggests that the presence of the educated head is very important for the health of children. Children born to an educated household head that stays far from the family may be

sicker. In the case of missing or imperfect labor market, the household must rely on the family labor and thus sending a household member (the head in this case) may also prevent the household from moving toward the local high-return activity (farm and health productions). The adverse effect of lost labor may be higher when migrants tend to be younger and better educated than an average rural laborer.

Finally the research indicated that in the poor sanitation conditions of the slums, it is the younger children who suffered most. Similarly children who lost their father but are raised in the conditions of the slums suffered more diseases than others.

The study suggests several ways to ensure better health of the slum children through the promotion of the split migration strategy. These findings can be validated using the huge longitudinal data collected by the NUHDSS which unlike the cross-sectional NIS survey may allow studying the time dimension in monitoring changes in health status of the urban poor.

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APPENDIX

Table A1 Descriptive statistics by migration status

Variable	Migration strategy	N	% Missing	Mean	SD
average Years of schooling of the household	Split	403	0	9.26	2.43
	Joint	543	0.91	7.67	2.56
average age of the under 5	Split	397	1.49	2.26	1.19
	Joint	548	0	2.09	1.16
Income activity last month==Yes	Split	403	0	0.98	0.14
	Joint	548	0	0.98	0.13
Religion==Catholic	Split	403	0	0.36	0.48
	Joint	548	0	0.3	0.46
Religion==Protestant	Split	403	0	0.54	0.5
	Joint	548	0	0.49	0.5
Religion==Other Christian	Split	403	0	0.04	0.2
	Joint	548	0	0.09	0.29
Religion==Muslim	Split	403	0	0.02	0.13
	Joint	548	0	0.05	0.21
Religion==No Religion	Split	403	0	0.03	0.16
	Joint	548	0	0.05	0.21
Literate==Yes	Split	403	0	0.98	0.15
	Joint	548	0	0.98	0.13
has lost father in the last 10 years	Split	403	0	0.17	0.37
	Joint	548	0	0.3	0.46
Female household head	Split	403	0	0.01	0.12
	Joint	548	0	0.09	0.28
ethnicity==Luhya	Split	403	0	0.07	0.26
	Joint	548	0	0.15	0.36
Social network from origin community==0	Split	403	0	0.11	0.32
	Joint	548	0	0.14	0.35
Social network from origin community==1-10	Split	403	0	0.42	0.49
	Joint	548	0	0.48	0.5
Social network from origin community==11-30	Split	403	0	0.3	0.46
	Joint	548	0	0.2	0.4
Social network from origin community==31-50	Split	403	0	0.07	0.26
	Joint	548	0	0.08	0.27
Social network from origin community==50+	Split	403	0	0.08	0.28
	Joint	548	0	0.08	0.27
members in spousal+urban household	Split	403	0	5.7	1.98
	Joint	548	0	4.61	1.69
Own land/houses in Nairobi	Split	403	0	1.83	13.34
	Joint	548	0	1.04	9.7
available agricultural production factor	Split	403	0	8.94	66.52
	Joint	548	0	6.74	65.97
Slum==Nyayo	Split	403	0	0.18	0.39
	Joint	548	0	0.39	0.49

Table A2: Morbidity of slum children in joint/split household

Variables	(1) Sick last month	(2) Joint Migrant
average Years of schooling of the household	0.0396*	
	(1.65)	
average age of the under 5	-0.0670	
	(-1.41)	
Income activity last month==Yes	-0.480	
	(-1.12)	
Religion==Catholic	0.175	
	(1.39)	
Religion ==Other Christian	0.0930	
	(0.47)	
Religion ==Muslim	-0.153	
	(-0.54)	
Religion ==No Religion	0.0218	
	(0.079)	
Head is literate==Yes	-0.743*	
	(-1.68)	
Has lost father in the last 10 years	0.286**	
	(2.37)	
Female household head	0.528***	
	(2.66)	
ethnicity==Luhya	0.343**	
	(2.20)	
Social network from origin community ==0		0.0415
		(0.31)
Social network from origin community ==11-30		-0.344***
		(-3.23)
Social network from origin community ==31-50		0.000640
		(0.0040)
Social network from origin community ==50+		-0.0121
		(-0.075)
Members in spousal+urban household		-0.201***
		(-8.61)
Own land/houses in Nairobi		-0.0479**
		(-2.29)
available agricultural production factor		0.00808**
		(2.16)
	0.562	1.299***
	(0.84)	(9.72)
	946	946
	-956.0	

z statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1