Health Transition Review 4, 1994, 127 - 149

The impact of rural-urban migration on child survival

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Abstract

Large rural-urban child mortality differentials in many developing countries suggest that rural families can improve their children's survival chances by leaving the countryside and settling in towns and cities. This study uses data from Demographic and Health Surveys in 17 countries to assess the impact of maternal rural-urban migration on the survival chances of children under age two in the late 1970s and 1980s. Results show that, before migration, children of migrant women had similar or slightly higher mortality risks than children of women who remained in the village. In the two-year period surrounding their mother's migration, their chances of dying increased sharply as a result of accompanying their mothers or being left behind, to levels well above those of rural and urban non-migrant children. Children born after migrants had settled in the urban area, however, gradually experienced much better survival chances than children of rural non-migrants, as well as lower mortality risks than migrants' children born in rural areas before migration. The study concludes that many disadvantaged urban children would probably have been much worse off had their mothers remained in the village, and that millions of children's lives may have been saved in the 1980s as a result of mothers moving to urban areas.

Recent demographic surveys in several developing countries, including Ghana, Guatemala, Morocco, Niger, Nigeria, Pakistan, Uganda, and Zambia, indicate that child mortality decline in rural areas has slowed or halted since the 1970s, and that rural-urban child mortality differentials remained large or increased between the 1970s and 1980s (Cleland, Bicego and Fegan 1992). The most important reasons for persistent high child mortality in rural areas of many countries remain the subject of debate among researchers[1], but probably include a variety of causes in each country. Among the most common and plausible explanations are the continued concentration of public health-related resources in large cities (UNICEF 1994), the failure of immunization and family planning programs to achieve high levels of coverage in remote regions (USAID 1991), the resurgence of malaria and other infectious diseases in some tropical environments (WHO 1990; Bradley 1991), and the localization of prolonged civil wars in mountainous or jungle areas, for example in Afghanistan, Angola, Cambodia and Mozambique.

The limited progress of international health programs and rural development policies in improving child health and survival in many rural areas raises the question whether rural mothers or parents can improve their children's survival chances by leaving their villages and settling in towns and cities, where modern health and social services, income-earning opportunities, superior housing, stable food supplies, and modern information on child health care are generally more available. In other words, does cityward migration represent a means

[1] See the World Bank's *World Development Report* (1993) and Desai (1993), for example, for conflicting interpretations.

for rural families to experience quicker and more pronounced improvements in their children's health and life opportunities than waiting for the benefits of national economic growth or redistributive sectoral policies to 'trickle down' to the village level? If so, and in the absence of genuine attempts by governments to improve living conditions in rural areas, a case could be made that policies and measures implemented to restrict rural-urban migration discriminate against disadvantaged children and contradict the goals of child survival expressed at the 1990 World Summit for Children. Evidence that rural-urban migration enhances child survival would also bolster the arguments of those who maintain that seasonal and long-term mobility to urban areas should be allowed and in some cases facilitated as a family survival strategy or as a means to promote national economic growth (Richardson 1989; Findley 1992).

On the other hand, the conventional belief is that rapid in-migration to towns and cities of developing countries leads not only to such well-known problems as shortages of housing, jobs and social services, and to environmental degradation (UN 1993), but also to increased threats to the health of children of migrants as well as to those of the existing, resident urban population (Bogin, 1988). Throughout the developing world, migrant women in big cities are more likely than non-migrants to settle and remain in slums and shantytowns where basic household facilities essential for good health and survival are unavailable (Brockerhoff 1993). Furthermore, the physical process of moving and resettling in low-income areas typically exposes young children to numerous hardships — new diseases, temporary residence in crowded dwellings, separation from additional care-givers, termination or decrease in the frequency or intensity of breastfeeding — that undermine their well-being. For native children, the influx of new urbanites often brings them into contact with disease agents not typically found in modern urban environments (Prothero 1977; WHO 1991), and further strains the capacity of municipal services and infrastructure to meet their basic needs. Such pressures are recognized to be most common in 'mega-cities' originally designed to accommodate fewer than five million residents, but which now encompass more than ten million inhabitants (Brown 1987; Axelbank 1988). Evidence that rural-urban migration, on balance, exacerbates child health and survival chances would provide additional justification for current policies and measures implemented by virtually all developing country governments to curb rural-urban migration in order to reduce rates of urban growth (UN 1990).

The central question in this study is whether mothers improve or harm the survival chances of their children under age two by moving from rural to urban areas of developing countries, and if so, at what stage, by what magnitude, and through what mechanisms this occurs. Where possible, reference is made to the impact of in-migration on the survival chances of children already residing in urban areas, although direct evidence of such impact is unavailable. The study uses data collected by the Demographic and Health Surveys (DHS) project in 17 countries between 1986 and 1990 to analyse and compare the maternal migration-child survival relationship in four developing regions: sub-Saharan Africa, North Africa, Latin America and Southeast Asia. Pooled regional samples are used in multivariate analyses since most country surveys recorded insufficient vital events to reliably estimate child mortality risks at various stages of the migration process. The regional perspective is intended to identify where policies to curb urban in-migration on the basis of child health concerns are most appropriate.

Conceptual issues: how does maternal migration affect young children?

In assessing the impact of rural-urban migration on child survival, one can differentiate three types of young children who may be affected by their mothers' migration: those left behind in the village by migrant mothers, as foster-children in the care of relatives or with their fathers;

those who accompany their mothers to towns or cities, or soon follow them; and children born after the migrants settle in the urban area, a large majority of whom remain with the mothers through the first few years of life. As shown in Figure 1, children who migrate or are born after migration can be further distinguished according to the type of urban environment in which they reside: a town or small city, a low-income periurban or inner city settlement, or a modern city neighbourhood. Each group of children is hypothesized as subject to a distinct set of mortality risks as a result of their mothers' change of residence.

Figure 1
Hypothesized risks of child mortality associated with maternal migration to urban areas

Cross-national studies of child fosterage and living arrangements suggest that in most developing countries over 95 per cent of children under age five live with their mothers (Page 1989; Lloyd and Desai 1992). Given the lengthy breastfeeding practised in most countries, one may presume that almost all children live with their mothers until their second birthday, the period of interest in this study. Fostering of very young children may be more common among female migrants and mothers in urban areas (Lloyd and Desai 1992), however, and hence warrants some consideration of fosterage-child mortality links. Bledsoe and Brandon (1992) note the difficulty of ascertaining the effects of mother-child separation on child mortality, since fostered children may bring poor health or high mortality risks with them to their new homes. Their review of evidence from West Africa suggests that, while fostered children may be disadvantaged compared to other children in the household where they are staying in terms of access to food or health care, they may nevertheless be better off than if they had remained with their migrant mothers. This may be particularly true if children thus avoid exposure to new infectious pathogens by not migrating at this vulnerable time of life, if they have continued access to the economic resources of a non-migrant father, or if they indirectly benefit from remittances received from the migrant mother or parents. On the other hand, the mother's departure soon after a child's birth may result in premature exclusive

reliance on weaning foods, or placement in a dwelling with other young, unfamiliar children that increases the child's likelihood of contracting a disease. Most important, children who do not migrate with their mothers or parents may not experience any of the health-related benefits more closely associated with urban than rural residence, such as proximity to modern health services and facilities, potable water in the dwelling and greater educational opportunities for the mother.

Few studies have focused on the health and survival of children who migrate from rural areas or are born to migrants in urban areas of developing countries, although several studies have incorporated maternal migrant status as an explanatory variable in child mortality analyses (Farah and Preston 1982; Mensch, Lentzner and Preston 1985; Brockerhoff 1990; MbackŽ and van de Walle 1992). In the absence of an established theoretical framework that could be used to explain patterns of child mortality among migrants, Table 1 borrows the main concepts applied in studies of migrant fertility to illustrate some mechanisms by which rural-urban migration may affect child survival. These concepts are: migrant selectivity before the move; life disruption around the time of migration; and adaptation to modern norms, beliefs, opportunities and constraints in the new environment in the years following migration (Findley 1982; Goldstein and Goldstein 1982; Lee and Farber 1984). While Table 1 refers specifically to the process of long-term maternal migration, many of the linkages summarized in the table would also apply to family migration and short-term moves.

Rural-urban migrants are usually selected in rural areas according to personal or household characteristics that increase or lower their children's likelihood of dying in the village as well as after migration; certain traits established in rural areas determine both migration behaviour and child survival chances. Negative selection (migration of persons or families prone to higher mortality) is generally a response to 'push' factors in the countryside, such as famine, drought or civil war, or the perception that these are imminent; it typically results in short-distance moves, such as to the nearest town (Lee 1966). In the case of famine or drought, those who migrate to urban centres are usually persons who lose what Sen (1981) calls 'entitlement' to food — resources that can be used to produce food or obtain it through exchange — or other basic needs. This has been documented, for instance, in the famines of Bangladesh (Bengal) in 1943-44 and 1974-75 (Kane 1987) and China in 1959-61 (Kane 1989), and in the Sahel drought in the early 1970s (Caldwell 1975; Colvin 1981). Famine or drought migrants face an elevated risk of child mortality once they arrive at a temporary or final destination. In relief camps set up to absorb the rural exodus of the poor in Ethiopia in the mid-1980s, contagious childhood diseases, particularly measles, were rampant (Shears and Lusty 1987). At roughly the same time, young children who migrated to towns in the Darfur region of Sudan experienced extremely high excess mortality due to contamination of well water (de Waal 1989). When women who migrate are the most malnourished of the rural population, they probably subsequently experience higher neonatal mortality, due to poor foetal development, prematurity, or complications at delivery (Hugo 1984).

A more common cause of rural out-migration by the less healthy or less well-endowed, particularly in sub-Saharan Africa, is civil war. Refugees who leave their home countries at an early stage of a crisis, that is, anticipatory refugees, are probably wealthier and better educated than persons who choose to remain; as the crisis unfolds, however, migration becomes less selective, as more persons are forced by events to relocate. These later-stage refugees may experience psychological problems of adaptation — anomie, neurosis, alcoholism — in their new area of residence due to their overwhelming identification as members of the population at home, with consequent negative effects for the health of their children (Kunz 1981).

Negative selection of migrants can also occur during non-crisis conditions in rural areas. Divorce or widowhood, for example, often precipitates a mother's departure from the village,

Table 1
Main determinants of child survival during rural-urban migration process

Stage of migration	Impact on child survival	
	Negative	**Positive**
I. Pre-migration (Selection factors of migrants in rural areas)	Loss of entitlement to basic needs (e.g.food, income,shelter, safety) Malnourishment or history of illness of mother or child Divorce or widowhood of mother	Maternal schooling Occupational skills Wealth or income Modern world view (including high aspirations for children)
II. During migration (Disruption during or immediately before/after move)	Exposure to new diseases Abrupt termination of breast feeding or decrease in frequency/ intensity Temporary unavailability of health services, additional child-rearers, adequate shelter and nutrition Physical hardship of move Temporary loss of income	Spousal separation, or postponement of marriage or family formation (leading to longer birth intervals or later age at first birth)
III. Post-migration (Adaptation in urban area)	Exposure to new diseases (e.g.perinatal HIV transmission) Language/cultural/financial barriers to employment, housing, health services, etc. Psychological stress of adjustment More crowded living arrangements Discrimination by municipal authorities and institutions in service provision Depletion of savings (e.g.from need to send remittances).	Improved housing facilities and structure Increased access to/use of modern health services Increased disposable income Gradual adoption of modern reproductive and child-rearing practices Access to social support networks

and can deprive migrant mothers of the economic and social support required to rear healthy children (Morokvasic 1984). When there is no crisis, the departure of migrants who represented the high-mortality or more disadvantaged segment of the rural population should reduce overall rural child mortality levels. Such migrants are likely to experience much higher child mortality than the existing urban population after migration, as was the case in towns in Mali in the 1980s (Hill 1990). Their opportunities to enhance their children's welfare can improve dramatically, however, if they initially or eventually settle in urban neighbourhoods where modern services and housing are more available.

Studies of rural-urban migration in developing countries show, however, that most migrants are selected for characteristics associated with relatively low child mortality, such as having schooling, occupational skills, wealth, and modern attitudes such as a desire for personal advancement and to raise 'high-quality' children (Shaw 1975; Findley 1977). Female rural-urban migrants in sub-Saharan Africa in the 1980s, for instance, were more likely to be highly educated, in their prime income-earning years, and to have lower fertility than women who remained in the countryside (Brockerhoff and Eu 1993). Since most of

these positive traits are established over a period of several years before migration, they should distinguish child mortality levels among migrants and rural stayers for a substantial period of time before migration. They are also likely to facilitate the migrant's adjustment in the new location, and help her, or the family, achieve child mortality levels similar to those of the resident urban population. Migrants who are positively selected are more likely to travel the greater distance and longer duration usually required to reach a major city (Lee 1966), and their departure should increase child mortality, or reduce the rate of decline, in rural areas.

After the decision to migrate has been made, there may occur a delay in marriage or family formation until after the move, which could have a positive effect on child survival through avoidance of high-risk births, such as first births and teenage births. Child survival around the time of migration may also be enhanced by the long birth intervals resulting from spousal separation, which have been observed in the years just before and after migration in sub-Saharan Africa (Brockerhoff and Yang, forthcoming) and Asia (Goldstein and Goldstein 1981). In most cases, however, one would expect a child's risk of contracting disease and dying to increase around the time of the move, because of disruptive changes in migrant behaviour or living conditions associated with moving and resettling. Immediately before migration, such changes may include a migrant's termination of employment and resulting loss of income, or insufficient preparation in the case of forced or hasty moves. During migration the child's diet may change because of termination of breastfeeding or food shortage, for example in situations of famine or negative migrant selection;,other changes might include heightened physiological stress during pregnancy; a temporary relaxation of child care, from the absence of spouse or family; depletion of savings; or temporary unavailability of curative health services. In the first months after settling in the urban area, migrants without family or social support networks are particularly vulnerable to such threats to child survival as unawareness of or lack of access to health resources, and the inability to secure a source of income.

The magnitude of disruptive effects on child survival is likely to depend on the type of migration involved. In general, short-term increases in child mortality are more probable when single moves occur over great distances or long durations, are involuntary, expose children to new epidemiological environments, and are innovative, that is, do not follow a traditional process. Where long-distance and more permanent migration between urban and rural areas has traditionally occurred in stages, in 'step-migration' from village to town to city as in much of sub-Saharan Africa, one would expect less effect on child mortality, since migrants experience cultural change and physical hardships of movement only gradually (Adepoju 1984). As suggested by Figure 1, children born after migration are less subject to disruptive influences of migration on mortality than children who migrate, since these short-term effects are presumed to diminish or disappear over time as the migrant mother or family adjusts to the new environment.

Improved child survival following migration to urban areas, that is, successful adaptation, depends not only on the behaviour and socio-economic mobility of the migrant mother or family, but also on the receptivity of the existing urban population and municipal authorities and institutions, and the conditions underlying migration:the reasons for the move and intended duration of stay (Goldlust and Richmond 1974). Hence, a migrant woman may radically alter her behaviour in ways favourable to child survival but still not experience improvements if, for instance, she faces discrimination in access to social services or severe competition for limited income-earning opportunities, or if she has settled under conditions of extreme duress. To enhance child health and survival, migrants and their children must often overcome numerous personal and situational obstacles which can be categorized as environmental: exposure to new disease agents, residence in more crowded or unsafe housing; psychological: the stress of leaving home and coping with the conflicting norms of a more heterogeneous population; socio-cultural: normative or linguistic barriers to use of

health services; political: discrimination or neglect by government because of non-citizenship or illegality of tenure; and economic: the need to get a source of income or economic support (WHO 1991; UN 1993). Surmounting these barriers usually requires what Skinner (1974, 1986) refers to as the 'ability to manipulate', that is, to use both 'traditional' and 'modern' skills and institutions in daily life. This implies some degree of behavioural change that makes migrants more closely resemble the resident urban population in terms of reproduction and childrearing. It also requires that migrants achieve sufficient economic success to attain the modern housing facilities and access to effective health services that strongly influence a child's survival chances. Since behavioural change and economic progress tend to occur slowly, and are more likely to occur with exposure to modern environments, Figure 1 posits that migrant children will experience superior survival chances when they are born well after migration and in modern city neighbourhoods.

Data

The 17 Demographic and Health Surveys analysed here, conducted between 1986 and 1990, are those in which basic information on residential history and mobility was collected from women aged 15 to 49. Most of the surveys were nationally representative[2]. Each survey defined 'urban area' according to the definition used in the most recent census. The content and quality of the DHS migration data are described elsewhere (Goldman, Moreno and Westoff 1989; Brockerhoff and Eu 1993; Brockerhoff and Yang, forthcoming), and not discussed here. Their most critical shortcoming, for this study, is that urban migrants identified at the time of the survey may not be representative of all women who in-migrated in the recent past in terms of characteristics that impact on child survival, if there has been selective onward or return migration. Other assessments of DHS data (Brockerhoff 1991), however, suggest that the importance of selective return migration can be discounted as a threat to the analyses in this study.

With respect to the fertility and mortality data used here, information collected by the DHS in retrospective birth histories generally compares favourably with data gathered by the World Fertility Survey (Institute for Resource Development 1990). Migrant and non-migrant respondents in the DHS do not appear to differ significantly in terms of accuracy or completeness of reporting of vital events (Brockerhoff 1991). This study focuses exclusively on children under age two in order to make periods of exposure to mortality roughly coincide with the pre-migration and post-migration periods used in the multivariate analyses. Analysis of infants and toddlers is also appropriate in light of the increasingly small number of deaths at older ages.

Table 2 presents the number of births of rural-urban migrant and rural and urban non-migrant women in the ten years preceding each survey. These constitute the samples used for most of the calculations and analyses in this study. Rural-urban migrants are considered as those women who moved from villages to towns or cities in the ten years preceding the survey, had lived in the urban area for at least six months at the time of the survey, and intended to remain there. Rural-rural and urban-urban migrants, who are of less interest to this study, and urban-rural migrants, who are too few to analyse, are excluded from the study. Table 2 shows that within each region migrant births are relatively evenly distributed across

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[2] Areas were omitted in the following surveys: five of 26 governorates in Egypt; one of 22 *departamentos* in Guatemala; seven of 27 provinces in Indonesia (representing seven per cent of the national population); the three southern regions in Sudan; and nine of 34 districts in Uganda (representing 20 per cent of national population). In addition, nomads were totally excluded in Sudan and partly excluded in Mali.

countries, although they are under-represented in Ghana, Peru and Guatemala. Results of the regional multivariate analyses shown in Table 6 are therefore less indicative of migration-child survival relationships in these countries than in other countries in the regions.

Table 2
Number of births to recent rural-urban migrants and rural and urban non-migrants recorded by the DHS

	Rural-urban migrants		Non-migrants		
		% of regional total	Rural	Urban	Total
Sub-Saharan Africa	3,077	100.0	24,180	6,930	34,187
Ghana, 1979-1988	190	6.2	3,455	1,305	4,950
Kenya, 1980-1989	769	25.0	8,098	1,249	10,116
Mali, 1978-1987	590	19.2	2,552	1,449	4,591
Senegal, 1977-1986	562	18.3	3,210	1,617	5,389
Togo, 1979-1988	490	15.9	2,237	719	3,446
Uganda, 1981-1990	476	15.4	4,628	591	5,695
North Africa	2,399	100.0	25,053	13,712	41,164
Egypt, 1980-1989	510	21.3	8,246	5,506	14,262
Morocco, 1978-1987	763	31.8	6,426	2,604	9,793
North Sudan, 1980-1989	487	20.3	7,182	3,288	10,957
Tunisia, 1979-1988	639	26.6	3,199	2,314	6,152
Latin America	2,604	100.0	15,937	15,838	34,379
Bolivia, 1980-1989	611	23.5	3,810	4,400	8,821
Ecuador, 1978-1987	870	33.4	2,340	2,053	5,263
Guatemala, 1978-1987	329	12.6	4,623	1,629	6,581
Mexico, 1978-1987	575	22.1	2,815	5,323	8,713
Peru, 1977-1986	219	8.4	2,349	2,433	5,001
Southeast Asia	1,508	100.0	11,708	4,933	18,149
Indonesia, 1978-1987	832	55.2	8,547	3,667	13,046
Thailand, 1977-1986	676	44.8	3,161	1,266	5,103

Descriptive analyses

The early child mortality rates ($_2q_0$) presented in Table 3 are crude indicators of whether women who moved from villages to towns and cities in the late 1970s and 1980s improved their children's survival chances as a result of migration. Pre-migration rates are based on births that occurred during the month of migration or earlier, so these include children exposed to mortality in the village for the entire 24-month period (those born more than two years before the mother's migration), as well as the smaller number of children who were born during the two years before migration and who accompanied their mothers or remained in the village. Post-migration rates are based on children born at least one month after the mothers'' migration. These children are assumed to have been exposed to mortality only in the new urban setting: not to have been born during a return visit by the migrant mother, and not to have been immediately sent back to the village after birth. Some rates are estimated on small numbers of births, as reflected by the high standard errors, so apparent changes in mortality in these countries should be interpreted cautiously. The summary pre- and post-

migration rates are calculated using as weights each country's share of pre- and post-migration births in the total pooled sample of 17 surveys[3] . Since migrants moved at various times in the ten years

Table 3
Estimated early child mortality rates ($_2q_0$) of rural-urban migrants before and after migration per thousand

	Pre-migration (rural)		Post-migration (urban)	
Sub-Saharan Africa				
Ghana,1979-88	68.5	(24.6)	52.6	(21.3)
Kenya, 1980-89	61.9	(12.7)	40.7	(11.6)
Mali, 1978-87	203.5	(25.4)	148.0	(23.3)
Senegal, 1977-86	180.7	(21.0)	127.7	(20.8)
Togo, 1979-88	115.2	(22.8)	67.7	(18.4)
Uganda, 1980-89	122.2	(20.5)	114.5	(24.3)
North Africa				
Egypt, 1980-89	153.8	(32.6)	99.0	(16.1)
Morocco, 1978-87	88.1	(15.9)	86.8	(15.0)
North Sudan, 1980-89	145.5	(23.8)	81.8	(16.7)
Tunisia, 1979-88	104.7	(19.9)	58.3	(12.8)
Latin America				
Bolivia, 1980-89	171.8	(22.0)	132.4	(20.7)
Ecuador, 1978-87	66.2	(13.2)	76.3	(13.1)
Guatemala, 1978-87	93.7	(23.4)	74.1	(18.8)
Mexico, 1978-87	50.7	(13.6)	46.3	(13.5)
Peru, 1977-86	106.1	(31.4)	122.8	(27.9)
Southeast Asia,				
Indonesia, 1978-87	102.6	(16.1)	68.7	(12.6)
Thailand, 1977-86	56.5	(13.7)	41.8	(12.0)
Total	110.1	(19.5)	82.1	(15.6)
Rural sedentary	107.9	(4.3)		
Urban sedentary			74.5	(6.5)

Notes: Estimates for migrants are based on births that occurred before and after the calendar month of the most recent migration. Standard error of estimate in brackets.

preceding the surveys, post-migration rates do not necessarily represent a much later calendar period than pre-migration rates, and migrants' rates are comparable to the rates of rural and urban non-migrants over the ten-year periods.

Overall, women appear to experience a 25 per cent reduction in their children's mortality under age two with the change from rural to urban residence, from a level of 110 deaths per

[3] Summary figures are country rates weighted by each country's share of migrant and non-migrant children exposed to mortality in the total pooled sample of countries. These sample shares are not equal to each country's share of migrant and non-migrant children in the actual aggregate population of these countries (which is unknown). Therefore, the summary figures do not represent the actual rates experienced in this group of countries, although they may be reasonable approximations.

thousand births before migration, to 82 after migration. The extent of improvement is roughly equivalent to the mortality differential among rural and urban non-migrant women; migrant child mortality approximates the level of rural stayers before migration, and is slightly higher than that of urban non-migrants after migration. In all countries outside Latin America, except Uganda and Morocco, there appears to be a substantial decline in mortality after migration. This decline is large in both absolute and relative terms, and seems unrelated to the level of mortality experienced by migrants in rural areas before they moved. The implication is that rural-urban migration can improve children's early survival chances regardless of mortality levels in rural areas, if conditions are better in urban areas. Of the five Latin American countries studied here, three, Ecuador, Mexico and Peru, show no improvement, and possibly deterioration, in child survival following migration to towns and cities. Many recent female migrants to the main cities of these countries — Guayaquil, Mexico City and Lima — are known to be residing in slum or shanty dwellings that lack basic child health-related amenities such as potable drinking water, flush toilets and electricity (Brockerhoff 1993), which may account in part for the mortality patterns observed here.

An obvious explanation for improved child survival after migration is that urban residence immediately provides migrants with greater access to the modern health resources, such as hospitals and clinics, health professionals, drugs and vaccines, that are typically concentrated in cities. To assess this, Table 4 shows the percentage of pre- and post-migration births, in the five years before the survey, for which mothers received at least one tetanus injection and prenatal care and birth assistance from a trained physician, nurse or midwife. Because of the shorter time frame represented here than in Table 3, pre-migration and post-migration differentials in use of health services may be somewhat smaller than in mortality rates, and differences in use of these services between the two periods may mainly reflect changes in access to health care, rather than sudden behavioural changes that would motivate mothers to make greater use of urban than rural services. In sum, the three measures may also reflect other changes in use of health services that result from migration but cannot be assessed reliably with these data, including immunization against major childhood diseases and use of oral rehydration therapy to treat episodes of diarrhoea. In interpreting the figures in Table 4, it should be recognized that professional health services probably vary in quality from country to country, and are not in all cases superior to traditional services.

In a few countries — Mali, Senegal, Bolivia, Ecuador, and possibly Peru and Egypt — use of modern health services clearly increased after migration. These are all countries where large disparities exist between urban and rural areas in the prevalence of childhood morbidity and treatment patterns (Boerma, Sommerfelt and Rutstein 1991), immunization coverage (Boerma and Rojas 1990), access to safe water and adequate sanitation (UNICEF 1994), and probably level of income per capita , and hence where there seem to be great opportunities for improved child survival through migration to urban areas. Overall, however, changes in use of health services after migration were modest. In eight of the 14 countries for which all three indicators are available, migrant women were more likely to have received each of the services after they migrated, but the degree of change is unimpressive. In almost all countries, migrants were much more likely to have received professional assistance at delivery for post-migration births, but the positive effects of modern birth assistance on early child survival are probably weaker than those of prenatal care and immunization (Bicego and Boerma 1991). Moreover, in some countries changes in use of health care by migrants are inconsistent with changes in early mortality levels observed in Table 3; although different cohorts of children are represented in the two tables. In Togo and Tunisia, for example, child survival appears to have improved substantially after migration without increased use of health services. Thus, greater use of modern health resources seems, at best, a partial

explanation for the child mortality decline experienced by recent rural-urban migrants in most of these countries.

Table 4
Percentage of rural-urban migrants' children whose mothers received modern health care pre and post migration

	Tetanus toxoid		Professional prenatal care		Professional birth assistance	
	pre	post	pre	post	pre	post
Sub-Saharan Africa						
Ghana, 1983-88	(87.5)	(70.4)	(95.8)	(92.6)	(66.7)	(59.3)
Kenya, 1984-89	94.7	96.2	74.5	83.0	69.1	80.7
Mali, 1982-87	45.1	49.2	35.3	50.0	35.3	49.2
Senegal, 1981-86	38.7	52.6	44.1	51.3	26.9	46.1
Togo, 1983-88	82.5	85.5	75.5	73.6	68.5	68.4
Uganda, 1984-89	58.8	78.2	92.5	93.2	65.1	79.9
North Africa						
Egypt, 1984-89	(12.5)	17.4	(41.7)	65.8	(37.5)	53.7
Morocco, 1982-87	NA	NA	21.4	24.4	27.1	39.4
North Sudan, 1985-90	31.0	64.3	83.3	78.6	76.2	76.2
Tunisia, 1983-88	41.9	34.5	69.7	59.7	69.8	86.3
Latin America						
Bolivia, 1984-89	14.1	26.3	29.4	40.4	21.2	36.3
Ecuador, 1982-87	39.3	45.3	69.1	79.3	75.2	84.7
Guatemala, 1982-87	(9.7)	17.2	(54.9)	41.4	(29.1)	41.4
Mexico, 1982-87	NA	NA	80.2	84.4	75.6	83.3
Peru, 1981-86	(18.8)	(25.0)	(25.0)	(62.5)	(31.3)	(54.1)
Southeast Asia						
Indonesia, 1982-87	NA	NA	NA	NA	57.2	66.3
Thailand, 1982-87	77.4	74.8	86.0	93.4	85.0	95.4

Notes: Professional prenatal care and birth assistance refer to attendance by a trained physician, nurse or midwife. ( ) = Based on < 50 births. NA = not available.

The Demographic and Health Surveys also make it possible to test the long-held belief that migration from traditional rural societies to modern urban areas leads to a decline in length of breastfeeding, as migrant women increasingly adopt modern methods of contraception to avoid pregnancy, wean their children earlier onto infant formula and other foods that are more plentiful in urban areas, fail to start breastfeeding in order to take advantage of greater income-earning opportunities, and free themselves from the social constraints, like residence with parents or in-laws, that dictate prolonged breastfeeding in rural areas (Huffman and Lamphere 1984; Latham,Agunda and Eliot 1988). This perspective implies that changes in breastfeeding are one aspect of the modernization of migrant behaviour in urban areas that confers a wide range of health benefits on children of migrants. On the other hand, relatively low durations of breastfeeding of migrant children may be associated with increased risks of early mortality, insofar as they reflect abrupt termination or non-initiation of breastfeeding due to separation of mother and child, and earlier intake of contaminated water and foods in low-income urban areas; or they result in short birth intervals.

Table 5
Median number of months of breastfeeding of rural-urban migrants and non-migrants

	Rural-urban migrants	Non-migrants urban	Non-migrants rural
Sub-Saharan Africa			
Ghana, 1983-88	(20.6)	18.8	23.1
Kenya, 1984-89	16.8	19.6	21.0
Mali, 1982-87	21.1	19.5	22.7
Senegal, 1981-86	17.7	17.0	21.3
Togo, 1983-88	21.3	21.2	23.7
Uganda, 1984-89	18.1	15.2	20.7
North Africa			
Egypt, 1984-89	17.8	15.6	20.5
Morocco, 1982-87	13.7	12.1	17.8
North Sudan, 1985-90	18.7	18.3	22.3
Tunisia, 1983-88	18.0	12.4	18.7
Latin America			
Bolivia, 1984-89	17.2	15.1	17.6
Ecuador, 1982-87	12.6	11.6	16.1
Guatemala, 1982-87	19.1	20.1	20.6
Mexico, 1982-87	7.4	4.5	15.0
Peru, 1981-86	(18.7)	10.2	21.0
Southeast Asia			
Indonesia, 1982-87	19.8	20.3	23.4
Thailand, 1981-86	7.9	7.6	14.5
Total	15.7	14.6	21.4

Figures refer to median duration of any (full or partial) breastfeeding.
Notes: ( ) = Based on fewer than 100 births.

Table 5 presents the median duration of full or partial breastfeeding of children born to women who migrated from rural to urban areas in the five years preceding the surveys, and among rural and urban non-migrant children. Migrant children include those born before migration, whose breastfeeding may have terminated at the time of migration because of separation from the mother or the stress and necessary adjustments imposed on the mother by moving; and children born soon after migration, who may be more subject to the constraints and opportunities associated with lower breastfeeding durations in urban than rural areas. Pre- and post-migration births are not distinguished, so that reliable estimates for the five-year period can be derived. Since the measure in Table 5 does not indicate age at weaning, or weaning practices, its relationship to child survival is difficult to discern. Presumably, however, much lower breastfeeding durations among migrants than rural non-migrants would partly reflect very early ages at full weaning for some migrant children — with negative effects for health and survival — due to the disruptive factors noted above.

Results in Table 5 are remarkably consistent across countries: in 14 of the 17 countries, children of migrants were breastfed for fewer months than were rural non-migrant children, but for longer than urban non-migrant children. In the other three countries, Kenya, Guatemala and Indonesia, migrant children were breastfed for shorter periods than both non-migrant groups. The summary measure[4] suggests that migrant children were breastfed almost

[4] Computed as in Table 3.

six months less than children of rural non-migrants, but only one month longer than urban non-migrant children. Since all of the migrant women represented in Table 5 had lived in the town or city for less than five years, and most for less than three years, it is unlikely that similar breastfeeding durations of urban migrant and non-migrant children result from migrant mothers' sudden adoption of the breastfeeding norms and practices of long-time urban residents. A more plausible explanation is that for some children breastfeeding is disrupted by migration, in which case an increased risk of child mortality might be expected in the months following their mothers' departure to the urban area. This temporal pattern of mortality is considered in the following multivariate analyses.

Multivariate analysis

Model and variables

For the purpose of multivariate analysis, the 17 countries included in this study have been aggregated into four pooled samples, representing sub-Saharan Africa, North Africa, Latin America and Southeast Asia. This allows for more robust estimates of the effects of migration on child survival, and hence for more meaningful comparisons of results among the regions. The countries in each region are noted at the bottom of Table 6.

The Cox proportional hazards model is used to analyse the chance of dying between ages one month and 24 months in the ten years preceding the survey in each country. Neonates are excluded from the analysis because their survival chances are known to be largely biologically determined. Our model estimates rural-urban migrants' hazards of child mortality at various time periods before and after migration in relation to the hazards among rural non-migrants throughout the ten years. Since migrant women may have moved at any time in the ten years, their calendar period for exposure to the risk of child mortality is roughly similar to that of non-migrants. We cannot distinguish the types of urban locations in which migrant children reside (as in Figure 1) because of the paucity of vital events recorded after migration, and lack of information on whether migrants moved between types of urban locations after leaving the countryside.

The model takes the following form:

$$\ln(h_t) = p_1F+q_1S+r_1U+s_1M1+s_2M2_t+s_3M3+s_4M4$$

where

h= hazard of dying at time t;
F= a set of fertility-related predictors of child mortality (length of preceding birth interval, birth order, mother's age at birth);
S = mother's level of education;
U= a dummy variable for non-migrants (1=urban residence, 0=rural residence);
M= a set of dummy variables for duration of residence of rural-urban migrants

such that

M1 = 1 if 24 or more months before move, 0 otherwise;
$M2_t$ = 1 if 23-0 months before move, 0 otherwise;
M3 = 1 if 1-24 months after move, 0 otherwise;
M4 = 1 if more than 24 months after move, 0 otherwise;

and

p1, q1, r1, s1...s4 = parameters to be estimated.

The dummy variables represented by M indicate whether migrants' children were exposed to mortality in rural or urban environments between ages one month and 24 months. Respectively, they are proxies for exposure to pre-migration rural conditions (M1), to rural conditions before migration then, if the child has survived, urban conditions after migration

($M2_t$), to urban conditions immediately after migration (M3), or to urban conditions longer after migration (M4). If we interpret these variables in terms of type of residence, where 0=rural and 1=urban, then M1=0, $M2_t$=0 then changes to 1 after migration, M3=1, and M4=1. M1, M3 and M4 are thus static variables, in that children born during these stages of migration are presumed to have been exposed to only one type of environment, whereas $M2_t$ is a time-dependent covariate representing maternal migration during the child's period of exposure to mortality: at least one month after birth and before the child could have reached age 25 months. Since the specification of M1 allows a future event (a move 24 or more months later) to shape the mortality risk faced in the present, at time t, this estimated coefficient should be interpreted in terms of the selectivity of rural-urban migration according to child mortality experience, rather than in terms of causal effects of migration on child mortality.

The independent variables included in the model, other than stage of migration, are chosen on the basis of their well-documented relationship with early child mortality in low-income settings (Hobcraft, McDonald and Rutstein 1984, 1985). The analysis is also constrained to use explanatory variables that are known to have applied to children or their mothers at specific stages of migration. This is obviously the case with the birth-related variables; it is true of maternal education if we assume, as virtually all mortality and fertility analyses of WFS and DHS data have done, that mother's level of educational attainment had not changed in the ten years preceding the survey. Insofar as migrant status, as represented by M1...M4, is a consequence of knowledge, attitudes, etc. for which mother's level of education is a proxy, its effects on child mortality will be conditioned by education. While the inclusion of maternal education level in the model probably has different effects at different stages of the migration process, it is expected to cause an underestimate of the effects of migration on early child mortality. The dummy variable for urban non-migrant status is of particular interest insofar as it provides a purer measure of the early child survival advantage of urban children by excluding urban migrants, so that it is not biased by their possible exposure to mortality in rural environments.

Results

Table 6 presents exponentiated parameter estimates (relative risks) of mortality between ages one month and 24 months at different stages of the rural-urban migration process, and other results of the multivariate models. The bracketed asterisks indicate that migrants' risks of mortality around the time of migration and after settling in the urban area were significantly different from their risks more than two years before migration; they thus provide evidence more direct than comparisons with rural non-migrants, of whether migrant women affected their children's survival chances by leaving the countryside. The estimated risks at each stage of migration are also illustrated in Figure 2.

Children born more than two years before their mothers left their villages experienced a 16 per cent higher risk of death than children of rural stayers in sub-Saharan Africa, and a 48 per cent higher risk in Southeast Asia. Migrants in these two regions can therefore be said to have been selected disproportionately from the high-mortality segment of the rural population.

In this case, one might expect migrant mothers' change of location to have contributed to any recent decline in rural child mortality in these regions. Such negative migrant selection is not surprising in light of the famines, droughts and civil wars that occurred throughout much

Figure 2
Relative risks of early child mortality (ages 1 - 24 months) during rural-urban migration process

Note: Relative risks taken from model that is controlled for mother's level of education, parity, length of preceding birth interval and mother's age at birth (see table 6).

of rural Africa and parts of rural Thailand and Indonesia in the 1970s and 1980s, that may have
forced many villagers, including those considered as refugees, from their homes to urban centres. Alternatively, African and Asian women who experience one or several child deaths in rural areas may be more motivated to obtain the superior child-health-related amenities located in urban areas than their counterparts in other developing regions, who are generally better served by rural health services (UNICEF 1993), and whose children may therefore have less to gain from the change of location.

Rural-urban migration in developing countries clearly results in a dramatic short-term increase in children's likelihood of dying. In sub-Saharan and North Africa, Latin America, and possibly Southeast Asia, children born in the two years preceding migration — who were either fostered out, accompanied or followed their mother, or died just before the mother's move — experienced an increased risk of mortality in the time immediately preceding or following migration. This increase is most apparent in North Africa, where migrants' children temporarily experienced three times the risk of death of rural non-migrants' children, and significantly higher risks than during migrants' earlier pre-migration stage. In sub-Saharan Africa and Latin America the increase was more modest but still substantial.

Table 6
Cox proportional hazards models of the relative risks of early child mortality (1-24 months) in developing regions period ten years preceding surveys

	Sub-Saharan Africa	North Africa	Latin America	Southeast Asia
Time of birth of migrant's child relative to migration				
Rural non-migrant	1.000	1.000	1.000	1.000
24 + months before	1.163*	0.912	0.860	1.482**
0-23 months before	1.597*** [*]	2.932** [**]	1.461** [**]	2.129
1-24 months after	0.941	0.875	0.748	0.549* [**]
24 + months after	1.126	0.573** [**]	0.508***[**]	0.296**[**]
Non-migrants				
Rural	1.000	1.000	1.000	1.000
Urban	1.012	0.725****	0.768****	0.772***
Mother's education				
None	1.000	1.000	1.000	1.000
Primary	0.668****	0.792****	0.850***	0.758***
Secondary+	0.369****	0.373****	0.423****	0.496****
Length of preceding birth interval				
36 or more months	1.000	1.000	1.000	1.000
Less than 18 months	2.855****	4.331****	3.424****	3.104****
18-35 months	1.637****	1.880****	1.850****	1.441****
Birth order				
2-6	1.000	1.000	1.000	1.000
1	1.573****	2.294****	1.581****	1.343**
7 or higher	0.902	1.100*	1.143**	1.711****
Mother's age at birth				
18-39	1.000	1.000	1.000	1.000
Under 18	1.263***	1.211**	1.425****	1.299*
40 or older	0.860	0.958	1.645****	0.730
Initial model				
- 2 log-likelihood	46738.573	42099.415	33438.769	12598.679
df	31,605	33,326	27,762	15,479
Final model				
- 2 log-likelihood	46344.950	41389.903	32893.299	12378.639
df	31,592	33,313	27,749	15,466
Model X^2 (df=13)	393.623**,	709.512****	545.470**,	222.040***,

Notes: *Significant at p<.10, ** p<.05, *** p <.01, **** p<.001, two-tailed test.
Countries included in analyses: Sub-Saharan Africa: Ghana, Kenya, Mali, Senegal, Togo, Uganda; North Africa: Egypt, Morocco, North Sudan, Tunisia; Latin America: Bolivia, Ecuador, Guatemala, Mexico, Peru; Asia: Indonesia, Thailand.
[ ] indicates that estimates are significantly different from those during period 24 or more months before migation.

The Demographic and Health Surveys do not provide sufficient information on migrants' living conditions or behaviour just before or after migration to explain this pattern, and the

scarce literature on migration-child survival interrelationships also provides little empirical evidence to support these findings. Nevertheless, the preceding discussion has suggested a number of factors probably responsible, to varying degrees, for short-term increases in migrant child mortality. Only a small part may be due to fostering, owing to the rarity of fostering before age two in most developing regions and the ambiguous relationship between fostering and child health and survival. It is more likely that infants and toddlers who settle in new urban environments are suddenly exposed to threats that they would not have experienced had they remained in their villages: new infectious disease agents; temporary residence in more crowded housing where contaminants are easily spread and competition for resources is strong; changes in caregiving relationships if, for example, the mother seeks work outside the home; a termination of breastfeeding at the time of the move as the mother adjusts to new economic and social constraints; a decrease in household income for reasons such as the temporary absence of the spouse or partner or other household income-earners; and the failure of the mother or caregiver to quickly familiarize herself with, locate and gain access to modern health services and facilities, which may result in accompanying children not receiving complete immunization. These and other explanations for the startling short-term increase in early child mortality associated with rural-urban migration in developing countries deserve consideration in future studies of this topic.

No analysis can prove conclusively that migrants improve their children's survival chances, or change their behaviour, or improve their standard of living, as a result of changing locations, since it is not known what mortality patterns migrants would have experienced had they remained at their former location. However, results in Table 6 suggest that women who migrated from villages and settled in towns and cities dramatically enhanced their children's survival chances in the long run in North Africa, Latin America and Southeast Asia. These reductions in the risk of mortality over time do not appear to be related to changes in fertility patterns during the process of migration. In Southeast Asia, the improvement was immediate. Children born during the mother's first two years of residence in the urban area experienced a mortality risk almost one-half that of rural non-migrant children, and about one-third the level experienced by migrants several years before they left the countryside. Children born more than two years after migration experienced further reductions in risk of mortality, to levels far below those of both urban and rural non-migrant children. In North Africa and Latin America, the improvement resulting from migration was more gradual. Children born soon after migration had mortality risks similar to those born well before migration. Children born after their migrant mothers had lived in the urban area more than two years, however, had significantly better survival chances than early pre-migration births, as well as mortality risks almost 50 per cent lower than rural non-migrant children. The general finding that migrants experience substantial improvements in early child survival with increased duration of residence in urban areas supports the long-held notion of migrant adaptation, or adjustment, to the modern norms and behaviours that are said to characterize most urban residents in developing countries, and is consistent with gross disparities in economic opportunities and housing quality between urban and rural areas of most countries.

It is apparent from the mortality rates presented in Table 3 that rural-urban migration probably improves child survival in most sub-Saharan African countries. Results in Table 6 suggest that this may be due to the rapid and pronounced decline in fertility that accompanies rural-urban migration in Africa (Brockerhoff and Yang, forthcoming). It may also result from increased educational attainment following migration to towns and cities, although this is unlikely since the mean age at migration of women in this regional sample was over 25.

Available data suggest that rural-urban migration in sub-Saharan Africa is less likely to represent change from a less to a more economically advanced living environment than migration in other regions. Rural-urban differentials in access to safe drinking water and

adequate sanitation in the late 1980s, for instance, were smaller in sub-Saharan Africa than in most other regions (UNICEF 1993). On the other hand, the relatively constant pattern of migrant child mortality in this region is surprising in view of findings that rural-urban differentials in immunization coverage, use of oral rehydration therapy to treat diarrhoea, and use of professional services for prenatal care and birth assistance are probably greater in sub-Saharan Africa than in other developing regions (Boerma and Rojas 1990; Boerma et al. 1991; Govindasamy et al. 1993). As the figures in Table 4 suggest, however, the greater availability of modern health services in urban areas does not necessarily mean that new arrivals to towns and cities will make use of these services, at least in the first few years of residence.

Furthermore, migration research in sub-Saharan Africa has consistently recorded that adult migrants typically retain many norms and behaviours, occupations and living arrangements associated with rural ways of life even after many years of urban residence (Hanna and Hanna 1981; O'Connor 1983; Illiffe 1987). Since most migrants historically returned to settle in their home villages later in life, commitment to the village necessarily remained strong: upholding its shared values and practices, accommodating new arrivals into housing, social and occupational networks, making return visits and sending remittances. Traditional links between rural and urban areas of Africa have no doubt been reinforced by more modern developments: centralization of political authority and the process of nation-building; the increased volume of population mobility; improvements in transportation and information systems; greater economic interdependence between areas. In this context, rural-urban migration in sub-Saharan Africa can be regarded as movement along an economic and socio-cultural continuum, involving fewer structural and behavioural changes that impact on child health and survival than in other developing regions.

With respect to the other variables presented in Table 6, findings are remarkably consistent across regions and are not surprising. In each region, the risk of early child mortality is moderately reduced when the mother has attended primary school and greatly reduced by a secondary school education. Effects of fertility on mortality are consistent with World Fertility Survey findings for the 1970s (Hobcraft et al. 1985), but it is noteworthy that children born to women in their forties face an elevated risk of early death only in Latin America. In North Africa, Latin America and Southeast Asia children of lifelong urban residents experience significantly lower chances of dying than their rural counterparts, even after controlling for the variation in maternal level of education that presumably results in differences in income and childraising behaviour between urban and rural residents. Of the numerous characteristics of urban and rural places and their inhabitants that could account for this urban advantage, the quality of housing facilities and availability of modern health services probably deserve priority consideration in future research.

Discussion

This study has analysed patterns of early child mortality during the process of rural-urban migration in developing regions in the late 1970s and 1980s. Results of the study generally confirm the hypotheses of migrant selectivity, life disruption and adaptation used to explain the reproductive behaviour of migrants in low-income settings. Before migration, the mortality risks to children of migrant women were similar to those to children of rural non-migrants, or slightly higher. In the two-year period surrounding the mother's migration, their chances of dying increased sharply, to levels well above those of rural and urban non-migrant children. Children born after the migrant had settled in the urban area, however, gradually experienced much better survival chances than children of women who remained in rural areas, as well as lower mortality risks than migrants' children born in rural areas before migration. A possible exception to the trend of declining migrant mortality in urban areas is

sub-Saharan Africa, where no decline is observed in the analysis after controlling for other characteristics of the mother and child. This study leads to the conclusion that mothers in most developing regions improved their children's survival chances in the first two years of life by leaving the countryside and settling in towns and cities.

Unfortunately, the Demographic and Health Surveys provide limited time-specific information that could be used to understand the mechanisms affecting migrant child survival over time. There is very little evidence, for instance, that reductions in early child mortality following maternal migration to towns and cities are related to greater use of modern health services. However, changes in child survival in North Africa, Latin America and Southeast Asia are not solely the result of changes in migrant fertility, and migrant-non-migrant differentials are large even after accounting for possible differences in level of maternal education.

Is the eventual improvement in child survival resulting from maternal migration from villages to urban areas in most regions sufficient cause to modify current policies deterring migration to cities in these areas, in favour of less forceful, unrestrictive, or promoting measures? Obviously, young children are only one age group affected by urban in-migration, and the long-term impact on other groups, as well as on social and political institutions, economic growth and the quality of the urban environment must be considered in developing and implementing appropriate migration and spatial policies. One limitation of this study is that we have not considered the effects of in-migration on the health and survival chances of children already residing in the town or city, which may be unfavourable. Moreover, the apparent benefits experienced in the 1980s may not occur in the future, as cities continue to grow in size and municipal governments confront overwhelming needs for housing, jobs and services. We already know, for instance, that children experience much higher mortality risks between ages one and five in big cities than in smaller cities of developing countries, and that children of migrants are particularly disadvantaged in big cities (Brockerhoff 1993). This suggests that the advantages of rural-urban migration for child survival may diminish during the process of urban growth.

These cautionary remarks aside, it is possible, in view of the large volume of rural-urban migration in recent years and the finding of rapid and dramatic declines in migrant child mortality presented here, that millions of children's lives were saved in the late 1970s and 1980s as a result of mothers leaving the countryside and settling in towns and cities of developing countries. The conclusion that rural-urban migration may have hastened the decline of infant and toddler mortality in many developing countries, however, awaits evidence that the continuing rapid influx of migrants to towns and cities has no consequent negative impact on the survival chances of urban non-migrant children. The current preoccupation of international health organizations, health researchers and the popular media with the plight of recent settlers in urban slums and shantytowns is certainly justified, given the deplorable living conditions and survival chances of children and other vulnerable groups in many of these areas (Harpham and Stephens 1991; WHO 1991). Nevertheless, future discussions of urban health conditions should acknowledge that many disadvantaged or under-served urban children would probably have been much worse off had their mothers remained in the village. Moreover, the overwhelming evidence of sharp and persistent migrant fertility decline in various urban settings (Zarate and Zarate 1975; Findley 1982), in combination with these findings of migrant child mortality decline, suggest that interventions to control migration to towns and cities in developing countries should be based on a recognition that long-term female rural-urban migration may be helping to promote the demographic transition in many of these countries.

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