Returning Home to Die:

Circular Labor Migration and Mortality in Northeast South Africa

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Abstract

Aim

To examine the hypothesis that circular labor migrants who become seriously ill while living away from home return to their rural homes to convalesce and possibly to die.

Methods

Drawing on longitudinal data collected by the Agincourt demographic and health surveillance system in rural northeast South Africa between 1995 and 2004, discrete time event history analysis is used to estimate the likelihood of dying for residents, recently returned migrants and long-term returned migrants controlling for sex, age and historical period.

Results

The annual odds of dying for recently returned migrants are generally 1.1 to 1.9 times (depending on period, sex and age) higher than those of residents and long-term returned migrants, and these differences are generally highly statistically significant. Further supporting the hypothesis is the fact that the proportion of HIV/TB deaths among recently returned migrants increases dramatically as time progresses, and recently returned migrants account for an increasing proportion of all HIV/TB deaths.

Conclusions

This evidence strongly suggests that increasing numbers of circular labor migrants of prime working age are becoming ill in the urban areas where they work and coming home to be cared for and eventually to die in the rural areas where their families live. This shifts the health care burden of caring for them in their terminal illness to their families and the rural health care system with significant consequences for the distribution and allocation of health care resources.

(235 words)

Key Words

Mortality, HIV, AIDS, Labor, Migration, South Africa, Agincourt.

Word Count

3,345 words.

Background

The population settlement and mobility patterns in South Africa have been strongly influenced by the history of the mining industry, and in particular the notorious migrant labor system that supplied labor for the mines and industrial development from the 1940's to current times [1, 2]. The supply of labor was tied to the Apartheid political system through a range of state mechanisms such as Influx Control and the Group Areas Act, and consequently a deliberate impermanence was introduced into the urbanization process of black South Africans. People were forced to live in 'homeland' areas based on assigned ethnic identity, and within homelands access to land was severely restricted by a process of 'villagization' in which people were forcibly moved to peri-urban villages [3]. This created a shortage of land for villagers and resulted in a transition from an agrarian to a cash-based economy [4, 5] that critically depended on migrant labor.

One result was rural poverty with vast numbers of separated families living in dense settlements largely without adult males. These features still characterize much of South Africa's rural interior although the patterns of migration have altered considerably over the last three decades. Migrant labor is tending to involve longer periods of circular migration, but with more frequent returns home, enabled by transport and infrastructural development [2]. The general trend of high and increasing levels of temporary (or circular) migration is supported by data from the Agincourt field site (the locus of the present study) [6] although now the range of destinations and types of work involved are more diverse than mining alone.

There is a growing literature on the relationship between temporary migration and the HIV epidemic; for South Africa see Jochelson [7] and Lurie [2], and for other parts of sub-Saharan African see Nunn [8], Pison [9], Decosas [10] and Quin [11]. A study of the sero-prevalence of HIV in rural KwaZulu-Natal found a three-fold higher risk of HIV infection associated with a recent migration [12]. The mechanism underlying this risk is that migrants are more likely than non-migrants to practice unsafe sex with multiple sexual

partners [13]. This risk can be increased by rural migrants experiencing emotional instability on exposure to the urban environment which can lead to 'temporary solutions in serial and potentially high-risk sexual relationships' [14]. However recent studies [13, 15] show that the link between migration and HIV transmission may be more complex than first suggested, and that both sending communities and work-place communities are affected by the high levels of migration. While much existing literature focuses on the role of migration in the transmission of the HI virus, this paper examines the role of chronic, terminal illness in migration, specifically movement back to rural homes.

There are a number of important public health implications. Critical information for planning involves 'place': where people are getting sick and where people are dying. This is part of a more general challenge – little addressed – of how to develop health services that can adequately respond to the needs of circular labor migrants.

Aims

In large parts of rural South Africa, high levels of endemic circular labor migration resulting from Apartheid-era labor policies ensure that large fractions of working-age men, and increasingly women, spend significant portions of the year living in urban areas and working away from their rural homes. With the advent of the HIV/AIDS epidemic in South Africa many of these regular labor migrants are at increased risk of exposure to infection with HIV while they are living alone in comparatively poor conditions in the urban centers far from their families and home communities.

This work examines the hypothesis that people who become seriously ill while living away from home return to their rural homes, where social networks and support systems may be stronger, to convalesce and possibly to die.

Beyond describing a further heartbreaking twist to the unfolding HIV/AIDS epidemic affecting South Africa, the answer to this question will be important in assessing which communities should receive special allocations and supports aimed at caring for persons

with AIDS. Moreover there may well be additional burdens placed on already strained rural health services; this warrants judicious monitoring and timely intervention where indicated.

Methods

Data

Data supporting this investigation come from the Agincourt demographic and health surveillance system (ADHSS) in rural northeast South Africa [16, 17]. From 1992 to the present the ADHSS has monitored approximately 70,000 individuals comprising roughly 11,500 households in 21 villages of Bohlabelo District, Limpopo Province, South Africa. Annual visits are made to each household during which a range of individual and household-level demographic, socio-economic and health-related information is collected, and importantly all vital and migration events that occurred during the preceding year are recorded. A separate team follows up on each reported death and conducts an in depth verbal autopsy interview to assign a probable cause to each death [18-22]. Each verbal autopsy is read independently by two physicians who assign ICD-10-coded main, immediate and contributing causes. When there is disagreement and consensus cannot be reached, a third physician, blind to prior findings, reviews the case. When this diagnosis is congruent with one of the others it is accepted as the probable cause of death. When all three disagree the case is assigned to an undetermined category. During 2002 (the most recent full year for which all deaths have been assigned a cause) roughly one third of both female and male adult deaths resulted from an AIDS-related cause. Finally, during each annual update, the residence and migration status of each individual living in the surveillance site is ascertained. Circular labor migrants are identified as adults who spend six months or more working away from home during the year, but return regularly and continue to view their rural home as the center of their social and economic lives. The current residence location and most recent date of return are also recorded for each circular labor migrant. From the late 1990s to the present roughly 60 percent of men and 20 percent of women aged 20-60 years are considered regular circular labor migrants [23].

Analysis

The hypothesis predicts a differential in the likelihood of dying between residents of the study area and recently returned circular labor migrants. Discrete time event history analysis [25-27] is used to estimate the likelihood of dying for residents, recently returned migrants and migrants who returned permanently some time in the past, controlling for sex, age and historical period. This method provides the ability to take into account the duration-specific components of the likelihood of dying in addition to providing statistical tests of the differences in likelihoods of dying between different migrant status groups and through time.

A person year file is constructed that contains one record for each year lived by each individual in the study population. The values of the following attributes are defined at the beginning of each person year: individual ID, sex, date of birth (DOB), date of death (DOD), age, calendar year, return date for circular migrants who have moved back home permanently, whether or not the person dies during the year, and - if there is a death - the ICD-10-coded causes (main, immediate and contributing). This file contains 682,056 person years for both sexes and all ages over the period 1992-2004. Restricting this to working-age adults between 20-80 years of age leaves 317,510 person years with 3,689 deaths. Further restricting this to only those years for which all deaths have been assigned a cause 1992-2002 leaves 291,713 person years and 2,952 deaths (reading the verbal autopsies and assigning causes is a time-consuming task and consequently there is always a lag between the time deaths are recorded and causes are assigned). All of the analysis presented here is conducted using this person year file.

Discrete time event history analysis is used to estimate the annual hazard of death of adults aged 20-80 years as a function of historical period, sex, age, and migrant status. Two historical periods are used in this analysis: the first 1992-1997 covers the initial phase of the HIV epidemic during which comparatively few HIV-related deaths occurred, and the second 1998-2004 covers the remainder of the study period when AIDS is an increasingly

important cause of death [28]. Migrant status is assigned one of three values: 1) resident, 2) short-term (or recently) returning migrants, and 3) long-term returning migrants. Short-term returning migrants have been back home on a permanent basis for less than five years while long-term returnees have been home five years or more. The basic model relates the probability of dying during a person year (the annual hazard of death) to migrant status and historical period. This model is estimated separately for males and females in 20-year age groups 20-39, 40-59 and 60-79 using ordinary logistic regression. The resulting period, sex, age, migrant status-specific annual hazards of death are converted to life table probabilities of dying ${}_{20}q_{20}$, ${}_{20}q_{40}$ and ${}_{20}q_{60}$ (${}_{n}q_{x}$: the probability of dying between ages x and x+n for those who survive to age x).

Deaths are classified and counted by historical period, sex, age, migrant status and cause category. Because assigned causes are not available for all deaths occurring in 2003-2004 the historical periods are 1992-1997 and 1998-2002. The cause categories are HIV/TB (using the verbal autopsy method it can be difficult to distinguish AIDS and TB as causes of death at ages younger than 60, and because HIV and TB so often occur together in patients the two causes are pooled under the assumption that most tuberculosis deaths have AIDS as a contributing cause.), non communicable diseases (NCD), external causes (including both intentional and unintentional injury), and *all* other causes (the "other" category includes a small number of deaths that do not have a verbal autopsy and deaths for which a probable cause could not be determined based on the verbal autopsy). We are primarily interested in the deaths due to HIV/AIDS and tuberculosis, but it is instructive to compare trends in HIV/TB deaths to trends in the NCD deaths that should be less affected (there are some exceptions to this, for example some stroke, some cancer of the cervix and some other malignancies can be associated with HIV.) by the HIV epidemic or the mechanisms contributing to the transmission of HIV.

Results

To test the hypothesis that recently returning migrants face a greater risk of dying

compared to similar people who are permanent residents or long-term returning migrants, life table probabilities of dying ($_nq_x$) are calculated and plotted by sex, period, migrant status and age, Figure 1. Since there is no statistical difference in the risk of dying experienced by permanent residents and long-term returning migrants, these two groups have been merged and treated as one. Table 1 displays the odds ratios, p-values and confidence intervals for the logistic regressions of death during a year on migrant status and period at the beginning of the year. These regressions are performed separately for each sex-age group and therefore relate the risk of dying of recent returning migrants to residents and long-term returning migrants within a specific sex-age category. The $_nq_x$ values in Figure 1 are calculated from the annual hazards of death predicted by these regression results.

Females aged 60-79 is the only group without a statistically significant difference between recent migrants and residents/long-term returning migrants. This is a group that contains very few recent returning migrants and would not be expected to contain very many because the recent upswing in female circular labor migration relates to younger women. The remaining differences in $_nq_x$ values between recently returning migrants and residents/long-term returning migrants are statistically significant within sex-age categories. The only sex-age group to demonstrate a statistically significant difference between recent and long-term returning migrants is females aged 20-39.

Controlling for period, recently returned migrants have odds of dying that are between **1.1** and **1.9** times greater than residents and long-term returning migrants, depending on period, sex and age (except for men in the 60-79 age group who are discussed below). Figure 1 clearly reveals that short-term returning migrants of both sexes in both periods and of all ages face a substantially higher risk of dying. Furthermore, the risk of dying increases dramatically over time in all categories, but the difference in the risk of dying between short-term returning migrants and everyone else is even more pronounced in the second period when AIDS mortality is more significant, Figure 2. Note that the greatest

difference between recent migrants and residents is for young (20-59) women in the most recent period 1998-2004. This may reflect the rapid increase in HIV prevalence among young women, and also their greater susceptibility to infection while living away from home in urban areas. These findings confirm that circular labor migrants who have moved back home within the past five years are more likely to die than either permanent residents or circular migrants who returned home more than five years ago, regardless of their sex or age; and furthermore, that this additional risk is greater in the more recent historical period (1998-2004).

There is one puzzling exception to this pattern; older men 60-79 who are long-term returned migrants actually have an important and significant lower likelihood of dying compared to residents. This is likely due to a sustained, strong selection process that eliminated less healthy male migrant laborers over the past 40 years or so, and additionally men in this age group are less likely to have become infected with HIV before returning home (remember that they returned some time earlier than five years into the past). However, additional investigation is necessary to explain this finding with confidence.

We explain the general finding that recently returned migrants experience a higher likelihood of dying by hypothesizing that the increase in the prevalence of HIV is leading to increasing numbers of circular migrants who become ill with AIDS while in urban settings and then return to their rural homes to be cared for before they eventually die. This hypothesis would predict that a disproportionately large number of the deaths occurring to recently returning migrants are in the HIV/TB category, and further that this imbalance is particularly pronounced in the second period (1998-2002) when many more people were becoming sick with AIDS. Table 2 lists the number of deaths by sex, period, age and cause category, and Figure 3 summarizes the counts presented in Table 2 to display the percent of total deaths within each sex, period, age-group that are HIV-related according to migrant status category. The fraction of HIV-related deaths in the short-term returning

migrants category goes from nearly zero during the first period to between 10 and 25 percent in the second period, with the largest increase in the 40-59 year age group. Figure 4 presents the percentage of total deaths in each sex, period, age, migrant-status- group that are attributable to HIV/TB. This clearly reveals that HIV/TB is growing rapidly as a cause in all sex, period, age, migrant-status- groups, and that the migrant-status group with the greatest growth in the fraction of deaths attributable to HIV/TB is recently returning migrants – particularly the 40-59 age group for both sexes.

Discussion

The aim of the study is to highlight a phenomenon that has recently been exacerbated by the HIV/AIDS epidemic, namely migrant workers curtailing their employment and returning when ill to their rural homes. This is occurring in a socio-economic context that is characterized by high levels of labor migration among men and rapidly increasing levels among women.

The *healthy worker* hypothesis conceptualizes migrants as possessing higher levels of motivating qualities like education, health or access to resources. A study of migration and child mortality in Agincourt showed that better educated women were simultaneously more likely to become temporary migrants and to experience lower risks of mortality in their children [23]. Another Agincourt-based study of circular migration and socio-economic status showed that temporary migration was positively correlated with ownership of modern assets in the rural household, although negatively related to ownership of livestock assets [6]. Temporary migration thus seems to confer advantages on households but the fact remains that the advantage may be inherent in those persons who are prone to migrate. This bears out the 'healthy worker' hypothesis but with a new and tragic twist – that migrants returning to their rural homes when they are sick or dying creates a health care burden in those rural areas. In fact there is a double loss because dying family members are likely to be the most advantaged in terms of human capital and thus also bread-winners for their households.

Recent literature on the link between circular migration and increased risk of infection with HIV [2, 29] describes the impact of migration on rural, 'sending' communities. It has been assumed that circular migration causes HIV to spread when migrants infected at their place of work return to their rural homes, but in a recent study migrant couples were shown to be significantly more likely to be HIV discordant than non-migrant couples, and in nearly one-third of all HIV discordant couples it was the female partner who was HIV infected [30]. Lurie describes how focusing on migrants as the only high-risk group disregards the situation of the many community members who are not migrants but are nonetheless directly and intimately made vulnerable by migration. This advances our understanding of the impact of migration on HIV transmission by recognizing that migration affects both 'home' and 'away' communities simultaneously. In a similar way the ties between the migrant and 'home' community are key to understand where the burdens of illness and health care are experienced. Communities with high prevalence of absent migrants as well as HIV infection are made vulnerable both to HIV transmission, via the migrant or the home-based partner, and to an increased experience of AIDS-related illness, by compounding the presence of illness in non-migrants with that of short-term returning migrants.

This study shows that in the context of ongoing circular labor migration in South Africa, return migration back to rural homesteads is associated with advancing illness and death, particularly from HIV/AIDS, that is adding an extra burden to families and health systems in rural areas. This *returning home to die* phenomenon is associated with loss of household income (through cessation of remittances), increased household health expenditure (for health care and funerals), and further loss of household (and community) income given the high opportunity cost of caring for a severely ill person. There is also the effect of additional patient and cost burdens being placed on already strained rural health systems.

Public sector services like health, education and social welfare need to respond more

effectively to the special needs of highly mobile populations and their home communities. A prime example is the responsibility facing the public health service; district and provincial systems require extra resources if they are to mount a proper response. This study provides evidence for the argument that the former 'homeland' populations are now supporting a major and growing burden of sickness and death of their members who formerly worked in the metropolitan, mining and formal agricultural areas, and who return to their rural families when they are sick and dying.

Conclusion

The *Apartheid*-linked history of sustaining an adequate supply of low-cost labor in South Africa implies that the rural populations played a crucial role in supporting the growth of the largest economy on the African continent. Long-standing inequities are part of the reason that former homeland communities remain underserved and deeply reliant on circular labor migration. Migration has now brought an attendant health risk of its own. This paper describes the influx of sick and dying migrants moving back to the rural areas from which they migrated. Rural communities are already exposed to multi-partner sexual networks as a result of labor migration. Even without the elevated mortality of returning migrants, an increased mortality burden associated with the HIV/AIDS epidemic is pervasive in the non-migrant community. For this reason, the addition of seriously sick people into the community could not come at a worse time for the resident individuals, households, social networks, community institutions and public services.

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Tables

Table 1: Logistic Regression of Death on Migrant Status and Period: 1992-2002

Migrant Status / Period	O.R.	p-value	C.I.
Female: 20-39			
Resident	reference		
short-term returning	**1.869**	**< 0.000**	**[1.495 – 2.336]**
long-term returning	**2.089**	**0.015**	**[1.151 – 3.791]**
first period: 1992-1997	reference		
second period: 1998-2002	**3.464**	**< 0.000**	**[2.840 – 4.226]**
Female: 40-59			
resident & long-term returning	Reference		
short-term returning	**1.633**	**0.001**	**[1.230 – 2.166]**
first period: 1992-1997	Reference		
second period: 1998-2002	**2.432**	**< 0.000**	**[1.944 – 3.042]**
Female: 60-79			
resident & long-term returning	reference		
short-term returning	1.125	0.581	[0.740 – 1.711]
first period: 1992-1997	reference		
second period: 1998-2002	*1.165*	*0.067*	*[0.990 – 1.372]*
Male: 20-39			
resident & long-term returning	reference		
short-term returning	**1.570**	**< 0.000**	**[1.273 – 1.937]**
first period: 1992-1997	reference		
second period: 1998-2002	**1.953**	**< 0.000**	**[1.647 – 2.317]**
Male; 40-59			
resident & long-term returning	reference		
short-term returning	**1.333**	**0.006**	**[1.086 – 1.635]**
first period: 1992-1997	reference		
second period: 1998-2002	**1.535**	**< 0.000**	**[1.300 – 1.811]**
Male: 60-79			
resident & long-term returning	reference		
short-term returning	**0.720**	**0.008**	**[0.565 – 0.918]**
first period: 1992-1997	reference		
second period: 1998-2002	**1.343**	**< 0.000**	**[1.139 – 1.584]**

The unit of analysis for these regressions is 'person-year'. The regressions predict the annual hazard of death as a function of migrant status and period within each sex-age group. **O.R.** – odds ratio; **p-value** – testing the null hypothesis that (1 - odds ratio) = 0; **C.I.** – 95% confidence interval around the odds ratio.

Table 2: Deaths by Sex, Period, Age, Cause and Migration Status: 1992-2002

				Returning Migrants		
		Cause	Residents	Short	Long	Total
Female	Early Period, 1992-1997	Ages 20-39	HIV/TB	28	1	0	**29**
			NCD	13	2	0	**15**
			External	4	0	0	**4**
			Other	75	0	0	**75**
			Total	**120**	**3**	**0**	**123**
		Ages 40-59	HIV/TB	9	0	0	**9**
			NCD	33	0	0	**33**
			External	10	0	0	**10**
			Other	50	2	0	**52**
			Total	**102**	**2**	**0**	**104**
		Ages 60-79	HIV/TB	9	0	0	**9**
			NCD	97	2	0	**99**
			External	3	0	0	**3**
			Other	148	5	0	**153**
			Total	**257**	**7**	**0**	**264**
	Late Period, 1998-2002	Ages 20-39	HIV/TB	148	27	3	**178**
			NCD	16	1	1	**18**
			External	4	0	0	**4**
			Other	117	19	4	**140**
			Total	**285**	**47**	**8**	**340**
		Ages 40-59	HIV/TB	47	14	0	**61**
			NCD	43	5	0	**48**
			External	3	1	0	**4**
			Other	112	10	1	**123**
			Total	**205**	**30**	**1**	**236**
		Ages 60-79	HIV/TB	6	1	1	**8**
			NCD	93	4	0	**97**
			External	2	0	0	**2**
			Other	155	6	3	**164**
			Total	**256**	**11**	**4**	**271**

Male	**Early Period, 1992-1997**	**Ages 20-39**	**HIV/TB**	33	1	0	**34**
			NCD	6	0	0	**6**
			External	37	0	0	**37**
			Other	110	4	0	**114**
			Total	**186**	**5**	**0**	**191**
		Ages 40-59	**HIV/TB**	44	2	0	**46**
			NCD	47	0	0	**47**
			External	22	0	0	**22**
			Other	109	8	0	**117**
			Total	**222**	**10**	**0**	**232**
		Ages 60-79	**HIV/TB**	39	1	0	**40**
			NCD	62	2	0	**64**
			External	14	0	0	**14**
			Other	151	5	0	**156**
			Total	**266**	**8**	**0**	**274**
	Late Period, 1998-2002	**Ages 20-39**	**HIV/TB**	110	33	0	**143**
			NCD	6	0	0	**6**
			External	32	2	0	**34**
			Other	124	21	4	**149**
			Total	**272**	**56**	**4**	**332**
		Ages 40-59	**HIV/TB**	81	29	1	**111**
			NCD	23	4	1	**28**
			External	14	3	1	**18**
			Other	116	30	2	**148**
			Total	**234**	**66**	**5**	**305**
		Ages 60-79	**HIV/TB**	27	4	1	**32**
			NCD	62	15	4	**81**
			External	1	1	0	**2**
			Other	130	28	7	**165**
			Total	**220**	**48**	**12**	**280**

12.0 percent of all deaths 20-79 in 1992-2002 do not have a coded cause. These deaths (354 of 2,952) are classified in the "other" category. There are an additional 664 deaths for which it was not possible to assign a cause, making up 22.5 percent of the total 2,952. These deaths are also in the "other" category.

Figures

Figure 1: Life Table Probability of Dying by Sex, Period, Migrant Status and Age

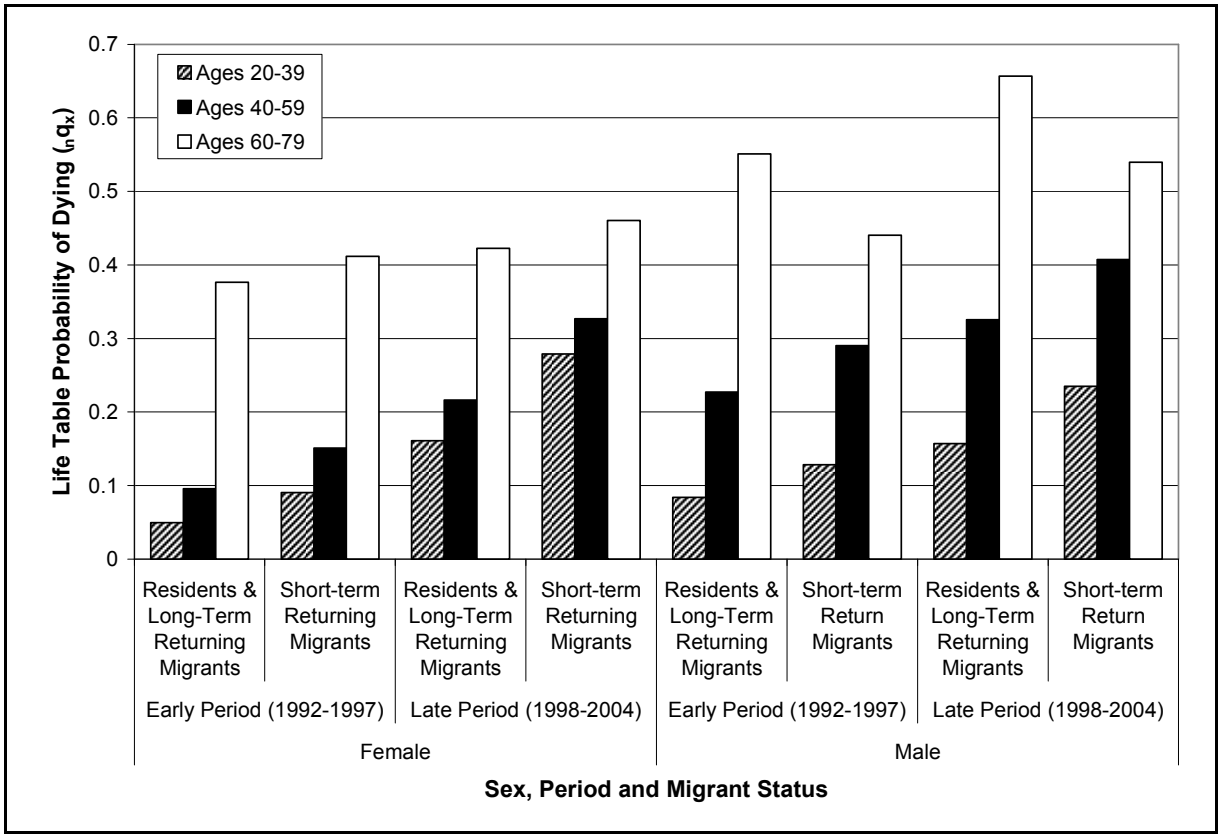

Figure 2: Difference between Life Table Probabilities of Dying by Sex, Period and Age: Short-term Returning Migrants - Residents and Long-term Returning Migrants

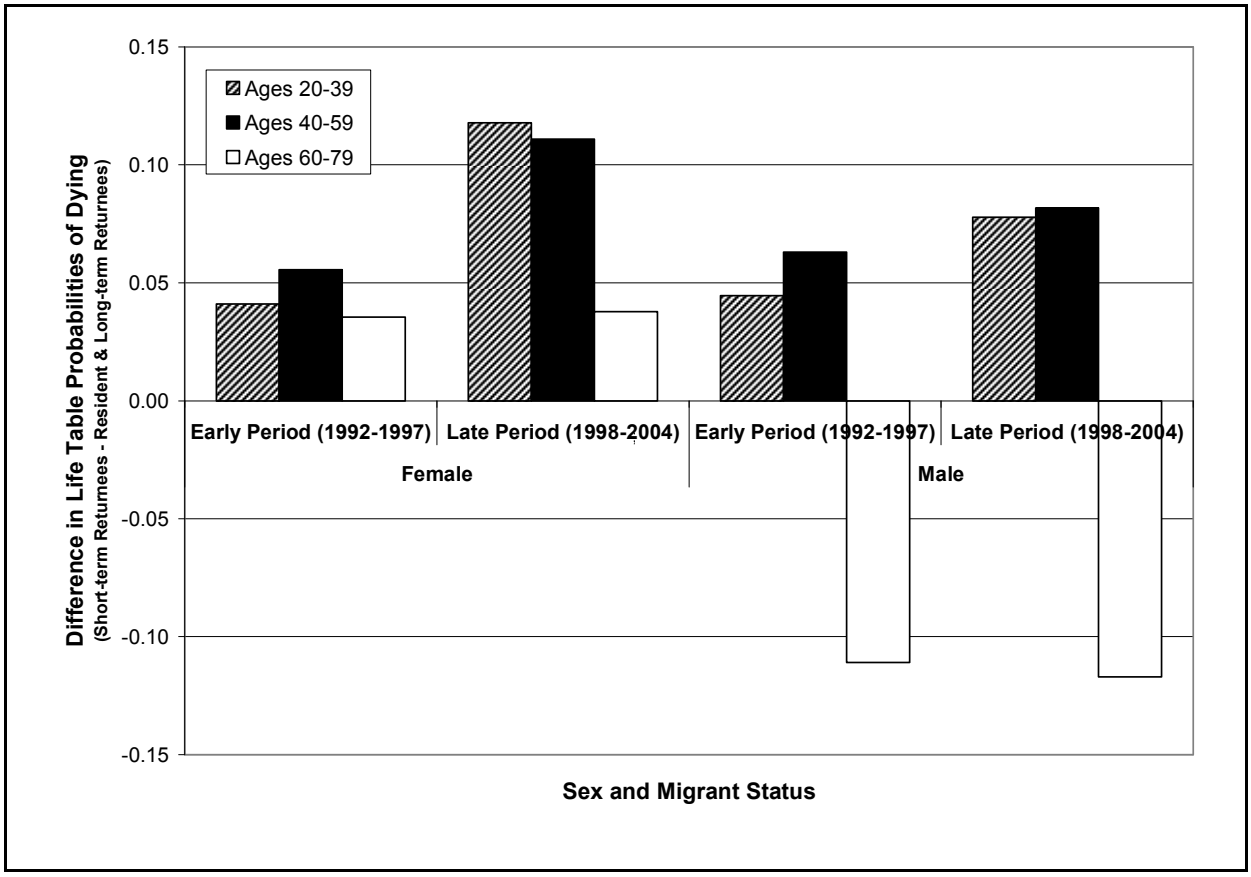

Figure 3: Percent of HIV Deaths by Sex, Period, Migrant Status and Age (Sums to 100% across Resident Statuses within each Period)

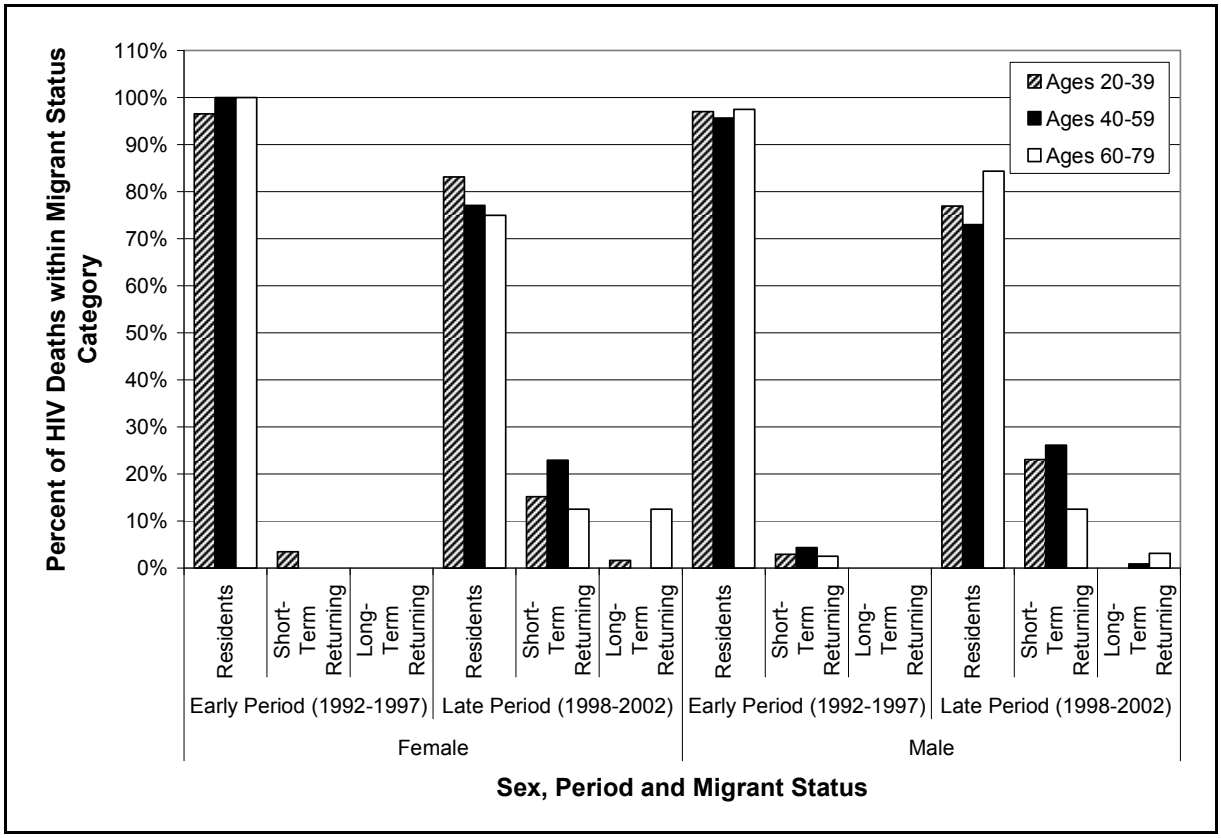

Figure 4: HIV Deaths as a Percent of Total Deaths in Each Migrant Status Category by Sex, Period and Age

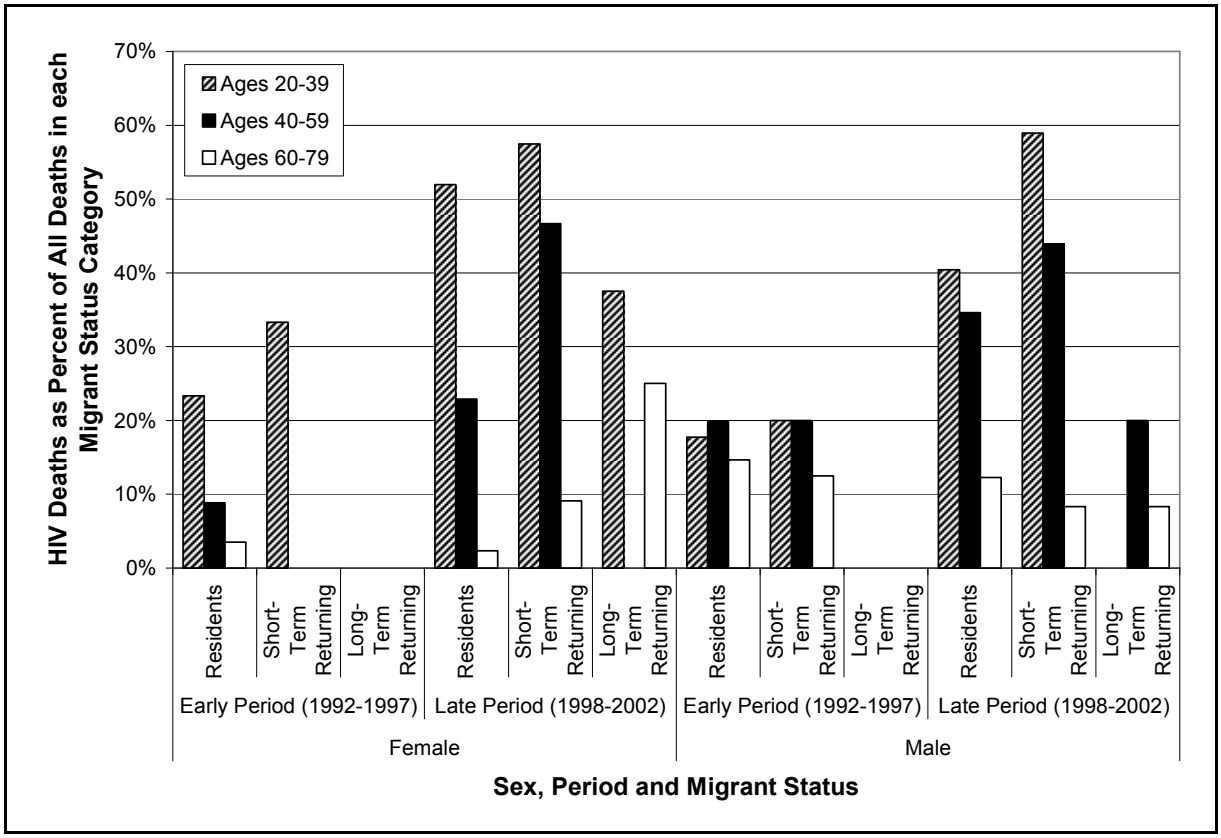

Figure Captions

Figure 1: The life table probability of dying (${}_nq_x$) is greater for short-term (recently) returned migrants in all sex-period-age categories. There are large increases in the risk of dying with age and in the second period for both sexes.

Figure 2: The absolute difference between the life table probabilities of dying of recently returned migrants and all other people is large and positive in all sex-age categories except for males 60-79 years. The largest differences are for females 20-59 in the second period 1998-2004.

Figure 3: The distribution of HIV/TB deaths among migrant status categories within each sex-period category is displayed. Comparing the second to the first period clearly reveals a shift in the distribution of HIV/TB deaths across migrant status categories with a much larger fraction of HIV/TB deaths among recently returned migrants in the second period 1998-2004 for both sexes and all ages, but most notably for ages 40-59.

Figure 4: Within each sex-period-migrant status category the percent of all deaths that are HIV-related is displayed. This percentage increases between the first and second periods for all sex-migrant status categories. By far the largest increases are for young (20-59) recently returned migrants, and especially for females.