

## Levels and determinants of migration in rural KwaZulu-Natal, South Africa

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### Abstract

*In this paper migration levels, trends and patterns in rural KwaZulu-Natal, South Africa are examined, using data from the Africa Centre Demographic Information System covering the period 2001 to 2007. At any point in time about a third of members in households were non-resident. Approximately 7 percent of the mid-year population migrated annually. Although overall the number of females migrating roughly equalled that of men, males were more likely to migrate for long, and females for short distances. The main reasons for migration were accommodation, employment and education in both sexes. The pattern of migration by age showed two peaks: the first related to movement of young children (for schooling and migration of parents), while the second involved young adults between 20 and 34 and (for employment). Controlling for marital status, never married people were more likely to migrate externally than those who are currently married or widowed/divorced. While uneducated people were more likely to migrate into and out of the area, those with high levels of education were more likely to migrate out of the area. Although people living in large households were more likely to migrate, household socio-economic status measured by asset ownership was not statistically significantly associated with external migration. In conclusion, the most significant factors associated with the high levels of migration in this rural population were age, marital status and education.*

**Keywords:** Migration, in-migration, out-migration, origin, destination, residency

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## Resume

*Cet article analyse les mouvements migratoires dans une localite rurale du Kwa-Zulu-Natal sur la cote Nord-Est de l'Afrique du Sud en utilisant la base de données demographiques du centre de recherche « Africa Centre for Health and Population Studies ». Durant la période allant de 2001 à 2007, près d'un tiers des individus habitant dans la zone de surveillance n'étaient pas résidents. Environ 7 pour cent de la population ont migré annuellement. Bien que globalement le nombre de femmes qui migrent est à peu près égal à celui des hommes, les hommes étaient plus susceptibles de se déplacer sur de longues distances, et les femmes sur de courtes distances. Les principales raisons de la migration ont été la recherche de meilleures conditions de logement, d'emploi et d'éducation pour les deux sexes. L'analyse de la migration par âge montre deux pics: le premier a trait au mouvement des enfants entre 5 et 14 ans (pour la scolarisation et/ou la migration des parents), tandis que le second est liée aux jeunes adultes entre 20 et 34 ans (pour l'emploi). Considérant l'état matrimonial, les célibataires étaient plus susceptibles de migrer à l'extérieur que les personnes actuellement mariées, veuves ou divorcées. Alors que les personnes non instruites sont plus susceptibles de migrer dans et hors de la région, les individus dont le niveau d'éducation élevé sont plus susceptibles de migrer hors de la zone de surveillance. Bien que les personnes vivant dans des ménages de grande taille sont plus susceptibles de migrer, le statut socio-économique des ménages mesurée par la valeur des biens n'a pas été statistiquement significativement associée à la migration externe. En conclusion, les facteurs les plus importants associés à des niveaux élevés de migration de cette population rurale sont l'âge, l'état matrimonial et le niveau d'éducation.*

**Mots clés:** Migration, immigration, émigration, origine, destination, résidence

## Introduction

Migration is an important aspect of South African demography because of its role in regional population redistribution. The population of South Africa is highly mobile; annually more than 10 percent of the South African population migrates within the country (Kok and Collinson, 2006). The causes of high mobility patterns in South Africa have been shaped by the past apartheid policies; the creation of homelands and implementation of the Influx Control and Group Areas Acts resulted in overpopulated homelands and high rural poverty (Kok et al., 2004) with massive migration of able-bodied males to mining and industrial centres (Ndegwa et

al., 2004) while discouraging female and child migrations (Posel, 2004). However, in the post-apartheid period, it was expected that the large population movements would occur. However, the proportions of people moving have not changed much although the reasons of migrations are changing. In this paper, migration patterns in post-apartheid era in a rural place in South Africa are examined.

## Literature review

Despite the massive population movements which were expected after the end of apartheid, migration levels in South Africa have remained stable

between 1975 and 2001 at about 11 to 13 percent (Kok *et al.*, 2003; Kok and Collinson, 2006). However, changes in causes of migration have occurred. Migration for economic gain has remained the predominant reason. However, migrations in search of better infrastructure, social capital and institutional services have become important in South Africa (Cross *et al.*, 1998). Also, the compositions of migrants have changed from being dominated by males of economically-active age groups to include females and young children.

In KwaZulu-Natal, South Africa's largest province, where the research site is located, the main determinants of migration have also undergone changes in recent decades. Cross *et al.* (1998) have suggested that infrastructure and land have joined employment as important reasons for migration in KwaZulu-Natal. Their study showed that in the fifteen years prior to their research, about three million people had migrated in the province and that three-quarters of these migrations were from rural to rural area, with many attracted to rural areas around small towns and secondary cities (Cross, 2001). Thus, the main driving force was towards areas of opportunity, especially in terms of social services like schools and hospitals. Conversely, it means that the "poor and disadvantaged" households would be continuously migrating in search of better social services.

Various forms of migration have different implications for urbanization, population distribution and settlement patterns. It has been observed that in South Africa, people who move from

rural areas to small towns are likely to stay there permanently, while those who move to large towns or metropolitan areas are likely to be temporary migrants (Lehohla 2006). Temporary migration is the dominant form of migration within South Africa. In Agincourt, Limpopo, Collinson has noted that the ratio of permanent to temporary migrations in 2002 in the Agincourt sub-district population was 1 to 2, that is, two-thirds of migratory moves in the rural South African northeast were temporary in nature.

The reasons for the continued temporary nature of migration in South Africa are varied. According to Posel (2003), in an environment of increasing labour market insecurity and rising unemployment, the household of origin may provide 'insurance' for work-seekers, care of children, and a preferred place for retirement. Relatively low levels of income per capita may be an important contributory factor to continuing high levels of temporary migration, as may socio-cultural links with rural areas, with migrants retaining special links with their home areas that go beyond economic benefits.

As noted above, the sex composition of internal migrants has changed in South Africa. According to Neves (2008), the changing migratory regimes of the post-apartheid era, have seen formal male labour migration replaced by increasingly informal and feminized migratory trajectories, between both rural-urban and intra-rural locales. Hunter (2006) noted that among the most mobile age group, the early 20s, about 6 out of 10 women and 4.5 out of 10 men changed residency in rural KwaZulu-Natal.

This paper aims to give a descriptive analysis of migration patterns and trends using longitudinal data. Different types of migration are identified and changes of these over time are presented. An additional objective would be to highlight how our knowledge of the determinants and trends of migration would be deepened with the availability of longitudinal data on migration.

## Methods

The Africa Centre Demographic Surveillance Area is located near the market town of Mtubatuba in the Umkhanyakude district of KwaZulu-Natal. The surveillance area covers 438 km<sup>2</sup> and a population of approximately 90,000 resident and non-resident members of approximately 11,000 households (Tanser *et al.*, 2007; [www.africacentre.com](http://www.africacentre.com)). The population is almost exclusively Zulu-speaking. The area is typical of many rural areas of South Africa in that while predominantly rural, it contains an urban township, KwaMsane and informal peri-urban settlements around the town of Mtubatuba.

The area is characterized by large variations in population density (20 to 3000 people per km<sup>2</sup>), as shown in Figure 1. In the rural areas, homesteads are scattered rather than grouped in villages. Most households in the rural area are multi-generational, involving at least three generations, with an average size of 7.9 members. Despite being a predominantly rural area, the principal sources of income for most households are waged employment and state pensions rather than agriculture.

Within the surveillance both changes of residence from one home-

stead to another within the DSA (Demographic Surveillance Area), and arrivals into and departures from the DSA are recorded. ACDIS records household members that migrate singly or as a household, whereby resident members of the household make a change of place of residence on or around the same date. Internal migration is defined as residency changes within the DSA; external migration a change of residency out of the DSA or the reverse. Changes in residency reported at 6-monthly visits are recorded as migration events, including migration from one homestead to another, regardless of distance. The reasons for migration are collected, usually from a proxy responded for those who have migrated out and from the index person for in-migrants. The dataset used in this analysis was created on 29 June 2009, just after the end of the first surveillance round in 2009.

## Definition of terms

The concepts used in the ACDIS have been adapted to reflect the high levels of individual and household mobility, non-resident household members, and membership of multiple households (Hosegood V and Timæus IM, 2005), and are defined as follows:

- Residency: is the period of time during which an individual or household lives in a bounded structure.
- Resident Member: an individual who, in addition to fulfilling the usual criteria for membership, fulfils conditions for residency. This is a member who normally lives at the same bounded structure as the household.
- Non-Resident Member: an indi-

vidual who fulfils the usual criteria for membership but who, specifically, does not fulfil conditions for residency. This is a member who normally lives (or spends most nights) outside the DSA

- Individual External Migration: refers to migrating either into or out of the DSA. Out-migration relates to a previously resident member migrating out of the bounded structure to outside the surveillance area, ending an individual residency at the bounded structure. In-migration relates to an individual migrating into the bounded structure from outside the DSA. The individual may be an already registered (non-resident) member or a new household member. This starts an individual residency at the bounded structure.
- Individual Internal Migration: refers to migration between two places (bounded structures) within the DSA.
- Origin: refers to the bounded structure where the person is migrating from or place if the person is in-migrating from outside the DSA.
- Destination: refers to the specific bounded structure to which a person migrates if located within the surveillance area or place if the migration is external.

Gross migration rates are computed as:  
Gross external migration rates: in-migration events + out-migration events / mid year resident population; expressed per 1000.

Migration effectiveness is computed as the effectiveness of individual migration streams and counter streams

between pairs of origin and destination areas. Effectiveness ratios and indices are expressed as percentages. In the case of area- or stream-specific ratios, the MER assumes values between -100 and +100, while the use of absolute values constrains the system-wide MEI to bounds between 0 and 100. In each case, high (negative or positive) values indicate that net migration is an efficient mechanism for population redistribution, generating a large net effect for the given volume of movement. Conversely, values closer to zero denote that inter-area flows are more closely balanced leading to comparatively little redistribution. In the case of the MER, the sign of the ratio is consistent with the direction of the net migration balance.

Factors associated with out-migration, in-migration and internal migration are estimated using logistic regression. The independent variables comprise various attributes of the individuals and the households of which they are members. The models were run separately for out-migration, in-migration and internal migration since the determinants of out-migration are likely to differ from those of in-migration.

The longitudinal nature of the data is taken into consideration. One observation is created for each person-year of observation. A person-year observation file is created for each year from 2000 (start of the surveillance) to 2007 in which that individual was alive and under observation. The dependent variable records whether an individual migrated [1] or did not migrate at all in a given year [0]. The probability that person  $i$  migrates in a given year  $t$  is modelled as a function of the person's

characteristics  $X_{i,t}$ , the characteristics of the location where person  $i$  resides in period  $t$ ,  $Z_{i,t}$ , and an error term  $\mu_{i,t}$  that varies across individuals and time.  $M_{i,t}$  is an indicator variable that takes a value of 1 if person  $i$  changes place of residence at  $t$  and a value of zero otherwise. Thus, the probability that at time  $t$  a person at risk of changing his place of residence will do so within the year is modelled as:

$$\Pr(M_{i,t} = 1) = F(X_{i,t}, Z_{i,t}, \mu_{i,t}) \quad (1)$$

$$\log \frac{P_{i,t}}{1 - P_{i,t}} = \alpha + \beta' X_{i,t} + \gamma' Z_{i,t} + \delta_t + \varepsilon_i \delta_t + \varepsilon_i \quad (2)$$

The equation models the migration rates, where

$$\log \frac{P_{i,t}}{1 - P_{i,t}}$$

is the probability of either in-migrating or out-migrating to or from the surveillance area. Two models are produced.

The details of explanatory variables are presented below:

**Number of observations:** This variable is used to control for the correlation between person-years for the same individuals.

**Year of exposure: measures trends over time.** Migrations were under-reported in the first year of the surveillance activities (2000), especially out-migrations. In the first year, migrations which occurred before the interviewers visited the households are likely not to be reported. It took six months to com-

plete a round; hence those migrations which occurred at the beginning were likely to be missed if interviews were done later in the round. Thus, the first year of observation has now been excluded in the regressions. The reference year is chosen as 2002, as the DSS system had stabilised by then.

**Age groups** The 0-5 years are children who are very young and are likely to accompany their parents when migrating. The 5-19 age groups are those in school, and the 20-39 are young adults who are likely to be mobile because of they are seeking jobs, additionally women in these age groups are also likely move for marriage or social reasons. The 40-59 are likely to have low migration rates because they have stabilised in their current status, for example jobs or source of livelihood. The 60+ are the elderly who might show slightly elevated rates of migration as they retire and return to rural areas. The reference category is chosen as 5-19 age group.

**Educational categories:** The usual categorisation of education is used. However, primary education is divided into two because over 50 percent of the population fall in this category. Also, people with 5 years or more of primary education are likely to be different than those with lower levels of education. Tertiary education has been combined with secondary because there are very few people in the DSA with tertiary education. Education has been categorised as:

0-None

1-Lower Primary

2-Higher Primary

3-Secondary and higher

The reference category is chosen as 2-

Higher Primary.

**Sex:** Females are the reference category

**Socio-Economic Status:** This variable is created through principal component analysis. The households were divided into 5 equal quintiles according to household possession of about 29 assets; the category which contains the median is used as the reference group.

**Place of residence: categories as urban, peri-urban and rural.**

**Household type:** Nuclear households

are considered as those households where only parents and their children live or one person households. Extended households are those where there are grandchildren or grandparents living in the same household.

## Results

Table 1 presents the number of resident and non-resident members of the population.

**Table 1** Mid-year population by sex and residency

Year	Females				Males			
	Non-Residents		Residents		Non-Residents		Residents	
	N	%	N	%	N	%	N	%
2000	7757	17.85	35,710	82.15	9,059	23.15	30,073	76.85
2001	11,921	25.24	35,307	74.76	12,938	30.61	29,336	69.39
2002	13,311	26.31	37,275	73.69	14,617	32.31	30,625	67.69
2003	12,994	25.90	37,174	74.10	14,365	32.02	30,504	67.98
2004	13,328	28.38	33,633	71.62	14,484	34.31	27,734	65.69
2005	13,437	30.12	31,180	69.88	14,525	36.41	25,373	63.59
2006	13,806	30.55	31,387	69.45	15,360	37.68	25,404	62.32
2007	13,405	29.47	32,089	70.53	15,109	36.68	26,080	63.32
2008	15,948	31.56	34,581	68.44	17,239	37.84	28,317	62.16

At any given point in time except the first year of observation, above a quarter of both males and females are not resident in the surveillance area. The proportion of non-residents during the first year might have been lower since it was the first year of the surveillance and this round could have missed people who were already residing outside the area. The proportion of non-residents has always been higher for males than females, as males have been more involved in labour migration. The non-resident population has been increasing

over time. It can be concluded that labour migration still remains high from rural areas and people still maintain their ties with the rural households, so they move back and forth between the workplace and rural homes. For these reasons information relating to the year 2000 will be excluded from further analyses.

## Types of migrants

The results presented in Table 2 show the patterns of migration of all registered people in and out of the demo-

graphic surveillance area for the period 2001 to 2008.

**Table 2** Lifetime migration types by sex

	Migration category							Multiple moves
	Always non resident	Never migrate d	In-migration (one-time)	Out-migration (one-time)	In and internal	Internal migration	External migration (in-out)	
	Sex							
Female	11.7	28.8	8.4	15.0	8.4	11.0	9.1	7.7
Male	15.9	26.7	8.4	16.9	7.5	9.7	8.2	6.9
All	13.7	27.8	8.4	15.9	8.0	10.4	8.6	7.3
Add up to 100% per row N= 133 778 Female=69 564					Male=64 213			

About 14 percent of the 133,778 registered population were never observed as being resident in the DSA between the start of the surveillance in 2000 and end 2008, although they still held membership in households in the DSA. The always non-resident population was significantly different in terms of sex com-

position ( $p=0.001$ ) with more were males than females. Overall, 28% of people never migrated, and one-time out-migration was nearly double that of one-time in-migration. Migration within the surveillance area was also significant with one in ten persons changing residence.

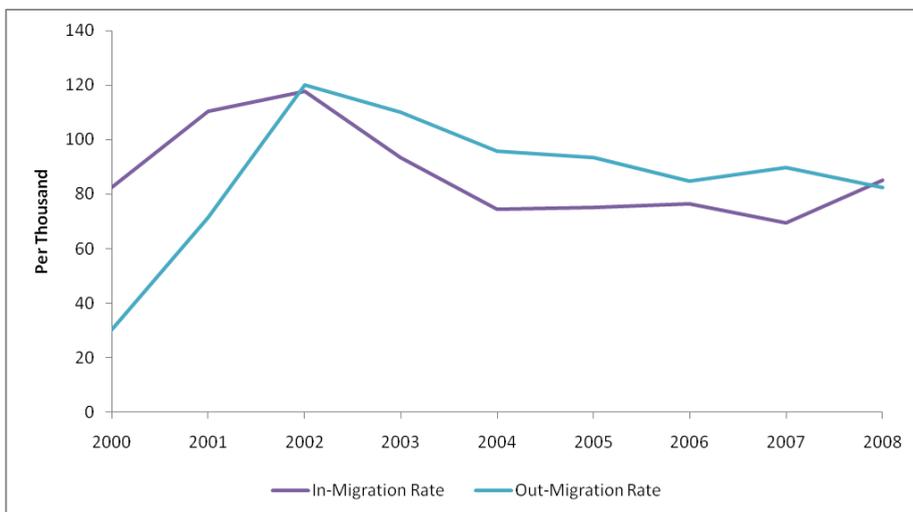
**Table 3** Trends Migration Rates by Year : 2000-2008

Exposure Year	In Migrations	Out Migrations	Exposure Years	In-Migration Rate	Out-Migration Rate
2000	5,343	2,006	64872.61	82.36	30.11
2001	7,717	5,020	69951.93	110.32	71.49
2002	8,781	8,440	74487.94	117.88	120.19
2003	7,152	7,606	76549.13	93.43	110.17
2004	5,819	6,557	78128.79	74.48	95.74
2005	5,907	6,280	78742.07	75.02	93.43
2006	6,109	5,894	79971.64	76.39	84.92
2007	5,650	6,118	81170.93	69.61	89.74
2008	5700	5,656	66914.55	85.18	82.32

Gross annual external migration rates for the period of the surveillance are presented in Table 3 and Fig 1, ranging

from 65 to about 93 per thousand for both males and females.

Figure 1: Trends in In-migration and Out-migration Rates: 2000-2008.



From 2002, out-migration rates have been declining, first sharply between 2002 and 2004, and more gradual thereafter. In-migration rates started declining from 2002. In recent years, both out-migration and in-migration rates have both stabilised at around 60 per thousand.

The age-specific pattern of external migration rates showed a bimodal pattern which is characteristic of migrant populations (Figure 2). The age distribution is similar for all the years of observation and for males and females, with a primary peak among young adults and a lower, secondary peak of young children.

The seasonal patterns of migration are presented in Figure 3. It is clear that most of the migrations occur during the months of December and January. For labour migrants, most industries close

down in December and reopen in January, giving the workers a month long holiday and thus affords them the chance to return to their rural homes. The same happens with schools, which are closed in December and open in January for the long vacation. It can be noted that almost 40 percent of both in and out-migrations occur during these two months.

Over the period 2000 to 2008, the net loss of the population due to migration is 5.8 percent (Table 4), mainly to nearby towns like Richards Bay, Mtu-batuba/St Lucia and Empangeni. However, there is a net gain from other rural areas like Northern Sector, Nongoma, Ubombo and other adjacent rural areas. In relative terms, the metropolitan places like Durban and Johannesburg were attracting migrants from the surveillance area.

Fig 2: In and Out Migration Rates by Age and Sex for the Period 2000-2008

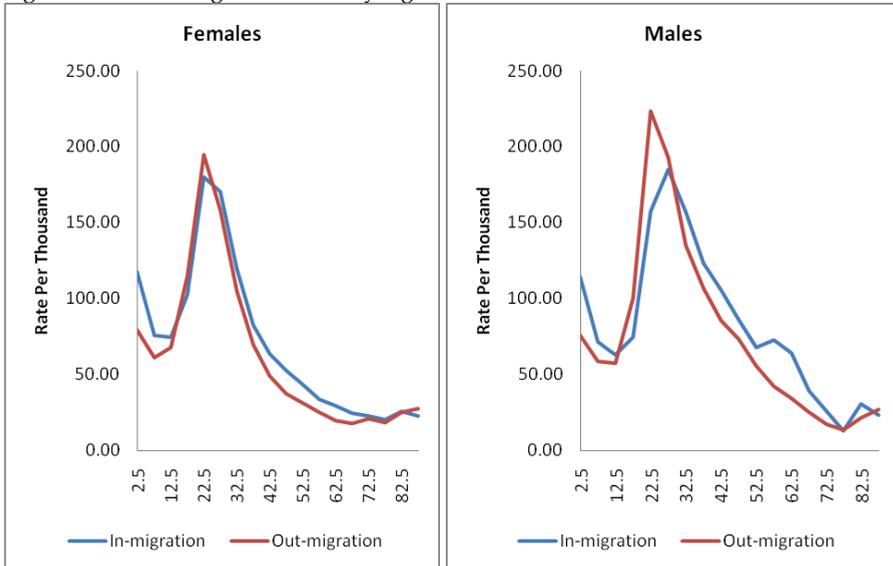
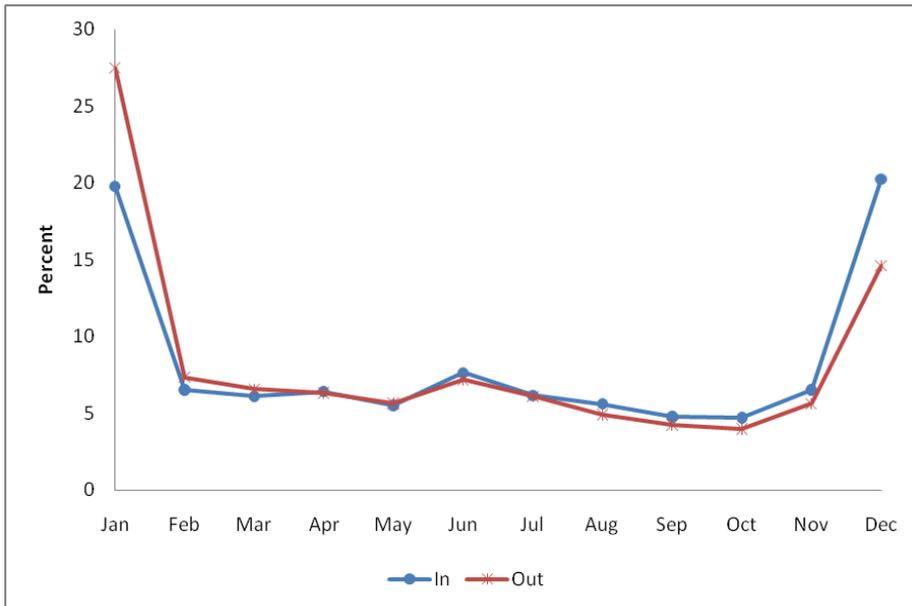


Fig 3: Migration Patterns by Month of Occurrence



**Table 4** Migration effectiveness from origin to destination

Place	Approximate distance from DSA (km)	In-migration (Di)		Out-migration (Oi)		Di-Oi	Di+Oi	MERi (%)
		From X to DSA	From DSA to X	From DSA to X	From X to DSA			
Dukuduku	20	2054	4.46	2234	4.33	-180	4288	-4.20
Durban	200	8054	17.51	11450	22.18	-3396	19504	-17.41
Empangeni	60	7366	16.01	8495	16.45	-1129	15861	-7.12
Other Province	-	480	1.04	538	1.04	-58	1018	-5.70
Other Country	-	390	0.85	287	0.56	103	677	15.21
Other KZN	-	792	1.72	1198	2.32	-406	1990	-20.40
Gauteng	700	3960	8.61	5394	10.45	-1434	9354	-15.33
Hlabisa	50	2426	5.27	2298	4.45	128	4724	2.71
Hluhluwe	50	1759	3.82	1573	3.05	186	3332	5.58
Other Rural	-	1231	2.68	971	1.88	260	2202	11.81
Umfolozu	20	1586	3.45	1548	3.00	38	3134	1.21
Mtubatuba/ St Lucia	5	1476	3.21	2216	4.29	-740	3692	-20.04
Nongoma	60	2289	4.98	2048	3.97	241	4337	5.56
Northern Sector		5061	11.00	3958	7.67	1103	9019	12.23
Richards Bay	60	2308	5.02	2851	5.52	-543	5159	-10.53
Ubombo	120	2896	6.29	2430	4.71	466	5326	8.75
Ulundi/ Eshowe	150	1881	4.09	2141	4.15	-260	4022	-6.46
<b>Total</b>		<b>46009</b>		<b>51630</b>		<b>-5621</b>	<b>97639</b>	<b>-5.76</b>

The migration to and from distant places was very low, with only 12 percent of the out-migrants going to other provinces or countries and 10 percent of the in-migrants coming from other provinces or countries.

Factors associated with migration  
Logistic regression models were fitted

to evaluate the association between the independent variables and each of the components of internal migration (in migration and out-migration), controlling for number of residency episodes. Table 5 presents the descriptive statistics of the variables used in the models.

**Table 5** Descriptive statistics of explanatory variables used in regression models

	<b>In-Migration</b>		<b>Out-Migration</b>	
	<b>Person Years at Risk</b>	<b>Percent Person-Years at Risk</b>	<b>Person Years at Risk</b>	<b>Percent Person-Years at Risk</b>
<b>Age Group</b>				
0-4	161,504	20.41	182,588	21.56
5-19	309,012	39.06	327,300	38.65
20-29	121,302	15.33	125,418	14.81
30-49	120,341	15.21	127,088	15.01
50-64	45,807	5.79	49,104	5.80
65+	33,251	4.20	35,249	4.16
<b>Sex of Respondent</b>				
Female	430,101	54.36	459,921	54.32
Male	361,116	45.64	386,826	45.68
<b>Socio-Economic Status</b>				
SES1	153,475	19.4	163,832	19.35
SES2	162,278	20.51	173,554	20.50
SES3	154,852	19.57	165,936	19.60
SES4	155,227	19.62	166,666	19.68
SES5	165,385	20.9	176,759	20.88
<b>Level of Education</b>				
None	93,466	11.81	98,607	11.65
Lower Primary	278,936	35.25	299,649	35.39
Higher Primary	142,156	17.97	150,164	17.73
Secondary	190,664	24.1	198,966	23.5
Tertiary	14,486	1.83	15,311	1.81
Too Young	71,509	9.04	84,050	9.93
<b>Marital Status</b>				
Civil Marriage	311,778	39.4	324,373	38.31
Never Married	48,760	6.16	52,315	6.18
Traditional Marriage	23,842	3.01	25,621	3.03
Widowed/ Divorced	38,495	4.87	40,943	4.84
Below Age	368,342	46.55	403,495	47.65

<b>Place of Residence</b>				
Peri-Urban	234,363	29.62	250,059	29.53
Rural	504,939	63.82	541,628	63.97
Urban	51,915	6.56	55,060	6.5
<b>Type of Household</b>				
Nuclear Household	219,807	27.78	233,374	27.56
Extended Household	571,410	72.22	613,373	72.44
<b>TOTAL</b>	<b>791,217</b>	<b>100</b>	<b>846,747</b>	<b>100</b>

**Table 6** Determinants of In-migration

	O.R.	95% CI	O.R.	95% CI
Number of observations	0.791***	0.789 0.794	0.752***	0.748 0.755
<b>Year of exposure</b>				
2001	0.755***	0.725 0.785	0.725***	0.696 0.756
2002 (Ref)	1.000		1.000	
2003	1.080***	1.040 1.121	1.134***	1.091 1.178
2004	1.041***	1.002 1.081	1.153***	1.109 1.199
2005	1.012***	0.974 1.052	1.196***	1.150 1.244
2006	1.004	0.967 1.043	1.226***	1.180 1.275
2007	1.051***	1.012 1.090	1.333***	1.283 1.385
2008	1.246***	1.202 1.291	1.641***	1.581 1.703
<b>Age Group</b>				
0-4			0.390***	0.372 0.409
5-19			0.747***	0.725 0.771
20-39			1.000	
40-59			0.617***	0.592 0.643
60+			0.343***	0.317 0.370
<b>Sex of respondent</b>				
Male			0.998	0.979 1.018
Female (Ref)			1.000	
<b>Socio-economic status</b>				
SES1			1.069***	1.036 1.104
SES2			1.022	0.991 1.055
SES3(Ref)			1.000	
SES4			1.009	0.979 1.041
SES5			1.084***	1.051 1.119

**Educational level**

None	1.000		
Lower Primary	1.165***	1.118	1.214
Higher Primary	1.077***	1.030	1.127
Secondary and Higher	1.316***	1.260	1.374
Too Young	0.901***	0.861	0.942

**Marital Status**

Never Married	1.000		
Married	0.628***	0.601	0.657
Widowed/Divorced	0.629***	0.585	0.676
Below Age	0.713***	0.688	0.740

**Place of residence**

Peri-Urban	1.054***	1.031	1.078
Rural	1.000		
Urban	0.874***	0.839	0.910

**Type of household**

Nuclear Household	1.000		
Extended Household	1.020	0.999	1.043

Migration patterns have varied over time (Table 6), with the adjusted risk ranging from 0.75 in 2001 to 1.25 in 2008. This pattern is contrary to the results from univariate analysis which suggested a decline since 2002. However, when out-migration is examined in Table 7, it shows a decreasing trend over the period.

The association between age and migration was similar for both in and out-migration, except for the 20-39 year olds. The adjusted probability to in-migrate is highest for people aged 20-39 or 5-19 year olds, while for out-migration the probability is highest for those aged 5-19 years only. Thus, mostly children in the school-going ages and young adults, who are in economically active ages and looking for jobs or already working, are the ones who are likely to move into the area, but, only

the school-going children are likely to move out of the surveillance area, possibly because they want to learn elsewhere.

Gender was only significantly associated with out- but not in-migration, with males more likely to out-migrate than females.

Socio-economic status was not significantly associated with either in- or out-migration. Associations between migration and educational status varied: in-migration was more likely for those with lower primary or secondary or higher education, out-migration was more likely for those with secondary education and those with no schooling. Never married people were more likely to report any migration. Currently and ever married were less likely to be involved in migration.

**Table 7** Determinants of Out-Migration

	O.R.	95% CI		O.R.	95% CI	
Number of Observations	0.825***	0.822	0.827	0.795***	0.792	0.798
<b>Year of Exposure</b>						
2001	0.556***	0.536	0.576	0.536***	0.517	0.556
2002 (Ref)	1.000				1.000	
2003	0.982	0.951	1.013	1.013	0.981	1.045
2004	0.865***	0.838	0.894	0.931***	0.901	0.962
2005	0.837***	0.810	0.865	0.953***	0.921	0.985
2006	0.733***	0.709	0.758	0.857***	0.828	0.886
2007	0.732***	0.709	0.757	0.884***	0.854	0.914
2008	0.697***	0.674	0.720	0.866***	0.836	0.896
<b>Age Group</b>						
0-4				0.985***	0.946	1.025
5-19				1.208***	1.177	1.239
20-39 (Ref)				1.000		
40-59				0.431***	0.410	0.453
60+				0.224***	0.203	0.246
<b>Sex of Respondent</b>						
Male (Ref)				1.000		
Female				1.084***	1.065	1.103
<b>Socio-Economic Status</b>						
SES1				1.017***	0.989	1.047
SES2				1.018***	0.989	1.046
SES3(Ref)				1.000		
SES4				0.989	0.962	1.017
SES5				1.041***	1.012	1.071
<b>Educational Level</b>						
None (Ref)				1.000		
Lower Primary				0.761***	0.735	0.788
Higher Primary				0.804***	0.774	0.836
Secondary and Higher				1.081***	1.042	1.122
Too Young				0.590***	0.568	0.612
<b>Marital Status</b>						
Never Married (Ref)				1.000		
Married				0.523***	0.500	0.547
Widowed/Divorced				0.563***	0.523	0.606

Below Age	0.470***	0.455	0.485
<b>Place of Residence</b>			
Peri-Urban	0.930***	0.911	0.949
Rural (Ref)	1.000	1.000	
Urban	1.110***	1.071	1.151
<b>Type of Household</b>			
Nuclear Household (Ref)		1.000	
Extended Household	1.043***	1.022	1.063

**Table 8** Determinants of In-Migration by Sex

	Males			Females		
	O.R.	95% CI		O.R.	95% CI	
Number of Observations	0.745***	0.741	0.749	0.761***	0.756	0.766
<b>Year of Exposure</b>						
2001	0.766***	0.725	0.809	0.680***	0.640	0.723
2002 (Ref)	1.000			1.000		
2003	1.140***	1.082	1.202	1.130***	1.068	1.196
2004	1.183***	1.122	1.248	1.125***	1.062	1.192
2005	1.209***	1.146	1.275	1.192***	1.125	1.263
2006	1.215***	1.153	1.281	1.254***	1.185	1.328
2007	1.345***	1.277	1.417	1.338***	1.265	1.416
2008	1.643***	1.562	1.729	1.668***	1.579	1.762
<b>Age group</b>						
0-4	0.397***	0.372	0.424	0.381***	0.355	0.410
5-19	0.835***	0.801	0.870	0.646***	0.616	0.677
20-39 (Ref)	1.000			1.000		
40-59	0.555***	0.524	0.587	0.664***	0.624	0.706
60+	0.300***	0.270	0.333	0.349***	0.310	0.392
<b>Socio-economic status</b>						
SES1	1.071***	1.025	1.119	1.062***	1.014	1.113
SES2	1.016	0.974	1.060	1.028	0.982	1.076
SES3(Ref)	1.000			1.000		
SES4	1.002	0.960	1.045	1.013	0.969	1.060
SES5	1.104***	1.058	1.152	1.047***	0.999	1.097
<b>Educational level</b>						
None (Ref)	1.000			1.000		
Lower Primary	1.117***	1.055	1.182	1.232***	1.161	1.308

Higher Primary	1.011	0.951	1.074	1.161***	1.087	1.241
Secondary and Higher	1.202***	1.134	1.274	1.448***	1.359	1.544
Too Young	0.936***	0.880	0.995	0.840***	0.786	0.898
<b>Marital status</b>						
Never Married (Ref)	1.000			1.000		
Married	0.512***	0.482	0.545	0.835***	0.780	0.895
Widowed/Divorced	0.666***	0.613	0.724	0.732***	0.614	0.873
Below Age	0.653***	0.621	0.686	0.791***	0.750	0.835
<b>Place of residence</b>						
Peri-Urban	1.078***	1.046	1.112	1.020	0.986	1.054
Rural(Ref)	1.000			1.000		
Urban	0.925***	0.877	0.976	0.790***	0.742	0.842
<b>Type of Household</b>						
Nuclear Household (Ref)	1.000			1.000		
Extended Household	1.022	0.992	1.053	1.024	0.992	1.057

**Table 9** Determinants of outmigration by sex

	Males			Females		
	O.R.	95% CI		O.R.	95% CI	
Number of Observations	0.783***	0.780	0.788	0.809***	0.804	0.813
<b>Year of Exposure</b>						
2001	0.538***	0.512	0.566	0.534***	0.506	0.562
2002 (Ref)	1.000			1.000		
2003	1.032	0.988	1.078	0.994	0.949	1.041
2004	0.929***	0.887	0.972	0.938***	0.894	0.984
2005	0.907***	0.866	0.950	1.012	0.965	1.062
2006	0.809***	0.772	0.848	0.920***	0.876	0.966
2007	0.854***	0.815	0.895	0.930***	0.885	0.977
2008	0.823***	0.785	0.863	0.931***	0.885	0.978
<b>Age Group</b>						
0-4	0.958	0.906	1.013	1.021	0.963	1.081
5-19	1.254***	1.210	1.299	1.153***	1.111	1.196
20-39 (Ref)	1.000			1.000		
40-59	0.397***	0.370	0.425	0.444***	0.414	0.477
60+	0.264***	0.235	0.298	0.134***	0.112	0.161
<b>Socio-Economic Status</b>						
SES I	1.016	0.976	1.057	1.019	0.978	1.062

SES2	0.999***	0.961	1.038	1.036	0.996	1.078
SES3(Ref)	1.000			1.000		
SES4	0.995***	0.957	1.035	0.977	0.939	1.017
SES5	1.112***	1.069	1.156	0.952***	0.913	0.992
<b>Educational Level</b>						
None (Ref)	1.000			1.000		
Lower Primary	0.771***	0.734	0.810	0.753***	0.717	0.792
Higher Primary	0.765***	0.725	0.807	0.846***	0.800	0.895
Secondary and Higher	1.002	0.952	1.054	1.185***	1.123	1.251
Too Young	0.634***	0.602	0.667	0.530***	0.501	0.560
<b>Marital Status</b>						
Never Married (Ref)	1.000			1.000		
Married	0.423***	0.398	0.451	0.723***	0.676	0.772
Widowed/Divorced	0.554***	0.509	0.602	0.642***	0.534	0.772
Below Age	0.491***	0.469	0.513	0.451***	0.431	0.472
<b>Place of Residence</b>						
Peri_Urban	0.957***	0.930	0.985	0.894***	0.867	0.921
Rural (Ref)	1.000			1.000		
Urban	1.153***	1.099	1.210	1.034***	0.979	1.092
<b>Type of Household</b>						
Nuclear Household (Ref)	1.000			1.000		
Extended Household	1.043***	1.014	1.072	1.056***	1.026	1.086

People living in rural areas were less likely to migrate than those in urban areas. Urban areas were less likely than peri-urban areas to see in-migrants, but more likely to see out-migrants. Associations with type of household and migration were similar across all three types, with migration more likely from extended households.

An investigation into the gender-effects on migration is made by fitting models for males and females separately. These are presented in Tables 8 and 9. For both in-migration and out-migration, all the variables exhibit similar patterns with the general models presented in Tables 6 and 7. Thus, migration determinants tend to be simi-

lar for both males and females in this area, which tends to dispute the notion that migration determinants are different for males and females.

## Discussion

Our findings confirm continued high levels of population mobility in rural areas, with only a quarter of the population not having changed their place of residency since the start of the surveillance in 2000. Since 2004, migration rates stabilised with out-migration rates at 65 per 1000 mid-year population per year and in-migration rates at 61 per thousand per year. Migration patterns are spatially clustered by place of origin and destination with places near the

surveillance area contributing strongly to the number of migrants.

Female migration has increased over time and the rate of female migration almost equalled that of male migration; determinants of female and male migration are similar. However, females tend to migrate for shorter distances than males. Children have been noted to move to different households between term and holiday times. Migration also tends to be concentrated in poor and multi-generational households. Lastly, migration tends to be selective by level of education.

High migration rates in rural KwaZulu-Natal have been noted in other studies (Collinson *et al.*, 2006), and the district where the study site is located, Umkhanyakude, ranks the 17th district or metropolitan municipality among all local authorities in the country in terms of high net out-migration of people between 2001 and 2006 (Office of the Presidency, 2006). Migrations amongst this population are usually for short distances with a predominance of rural-to-rural migration within KwaZulu-Natal (Cross, 2001).

Of the 82,559 people registered in the surveillance area as at 1 July 2000, 20 percent were non-resident at that time, rising to 34 percent by 2008. Non-residential household members are an integral part of rural households because they share a sense of belonging together and maintaining social bonds through responsibility for, or dependence on, other household members. The rationale for including non-resident household members in ACDIS has been discussed elsewhere in particular given their importance in understanding the influence of migration in demographic,

health and economic outcomes many ways (Hosegood and Timæus, 2002; Hosegood *et al.*, 2005). However, there are a number of possible reasons why people continue to migrate temporarily within South Africa, retaining membership in, and ties with, their households of origin, especially rural areas, including increasing labour market insecurity and rising unemployment (Posel, 2004).

A significant number of children were involved in migration in this study, with schooling an important reason. During term time, children are more likely to reside with relatives who stay near schools. Previous studies in the same population, examining the impact on households of HIV have shown increased migration of children before or following the death of a parent as households seek to cope with the consequences of ill-health, death and orphanhood (Ford and Hosegood, 2005). However, many children were simply migrating in order to accompany their highly mobile parents or carers.

The concentration of migration among youths has been noted in other studies of migration in Africa (Oucho, 1998). Migration of young adults is mainly related to seeking better opportunities and better accommodation, employment, education and social services. Overall, males and females were equally migratory, although women were predominantly involved in local and short distance migration while males were involved in long distance migration to areas like Durban and Gauteng. Collinson *et al.* (2006) also noted a significant increase in female migration in the Agincourt Surveillance Site in South Africa.

Most of the migrants are originating from multigenerational households, which are likely to be large. There are possible explanations. From the new household economic theory argument, large households would benefit (and can afford to) by sending some of their members away to look for jobs outside, so that they could remit resources. Ardington et al (2009) shows that households where there are old age pensioners who are receiving grants are likely to result in the migration of adults. According to Ardington et al. (2009) "the pension's impact is attributable to the increase in household resources it represents, which can be used to stake migrants until they become self-sufficient, and to the presence of pensioners who can care for small children, which allows prime-aged adults to look for work elsewhere".

The high mobility of the population in rural KwaZulu-Natal could have significant implications for HIV dynamics, with HIV prevalence and incidence remaining high in the study area (Tanser et al. 2007, Bärnighausen et al. 2008). Migration may be associated with the likelihood of acquisition of infection, especially early in the epidemic (Lurie, 2001). Adult mortality, especially of household heads, may result in the dissolution of households and consequently the migration of the surviving members to join other households (Hosegood, McGrath, et al. 2004). On the other hand, people who are sick, whether with HIV or other diseases, may return to the rural areas and households of origin for care, support, treatment and even to die (Clark et al. 2005, Welaga et al. 2009).

In addition to further exploration of

the associations between HIV dynamics and migration, migration patterns outlined in this paper may have important demographic and health implications worth investigating, for example, the impact on fertility and mortality. Also, we found migration rates which were very similar for males and females; more research on female migration will help in understanding how the determinants differ from that of male migration.

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