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THE RELATIONSHIP BETWEEN PARENT TEMPORARY MIGRATION AND CHILDHOOD SURVIVAL IN HOUSEHOLDS LEFT BEHIND IN THE SOUTH AFRICAN RURAL SUB- DISTRICT OF AGINCOURT

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(Johannesburg, November 2007)

Abstract

This report examines the influence of parent's migration status on childhood mortality in sending households in the South African rural sub-district of Agincourt. A survival analysis of a cohort of children born in Agincourt between 1 January 1997 and 31 December 2003 was conducted using the Cox proportional hazards model to estimate the influence of parent's migration status on under-5 year mortality. Starting with a baseline census in 1992, the Agincourt Health and Demographic Surveillance System (AHDSS) data are collected and updated every 12 months wherein fieldworkers visit each household at the site to record the vital events, including births, deaths, and migrations that occurred since the previous census. Results of the survival analysis show that children born in households where the father was a temporary migrant while the mother remained at the rural household had a 35% lower risk of death compared to children in households where both parents were non-migrant (RR=0.647, 95% CI 0.439-0.954). The results also reveal that, controlling for parent migration status, children in single-parent (mother only) households had about 28% higher death hazard than children in two-parent households (RR=1.284, 95% CI 0.936-1.673). The findings suggest that temporary labour migration could be a means to improving household incomes and quality of life for children, particularly where the father is a temporary migrant while the mother remains behind taking care of the children. At the same time, children whose fathers are not indicated appear to be worse off whether their parents are temporary migrants or not.

Declaration

I declare that this dissertation is my own unaided work. It is submitted for the degree of Master of Arts in Demography and Population Studies in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other university.

Promise Gumbo

20th Day of November 2007

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Chapter One

Introduction

1.1 Background

South Africa, like many other developing countries, is still experiencing relatively high levels of childhood mortality when compared to the more developed world. One of the United Nations Millennium Goals is the reduction of childhood mortality and South Africa declared its commitment to this goal by, among other things, setting a target to reduce the infant mortality rate to 15 deaths per 1000 live births by year 2015 (South Africa Department of Health, 2004). The infant mortality estimate of 42.5 deaths per 1000 live births (SADHS, 2003) is still almost 3 times higher than the 2015 target and the implication of this significant gap between the actual and targeted rates is that a lot of ground remains to be covered in bringing the levels of child mortality down.

In South Africa, some socio-economic conditions with a negative impact on child survival continue to prevail among large proportions of the population. For example, household environmental conditions are regarded an important factor in child health (Mosley and Chen, 1984) and yet the General Household Survey by Statistics South Africa (2005) reveals that about 12% of households are in informal settlements that are often characterised by over crowding and unhygienic conditions.

Furthermore, about 10% of the households still use the bucket toilet system and about a third use paraffin or wood as sources of energy, both practices that pose a health hazard, particularly among infants and young children.

The South African Department of Health (2004) notes that wide regional variations continue to exist in terms of immunisation coverage with provinces such as Eastern Cape and Limpopo lagging behind. In addition, the health department identifies cases of wasting and stunting among children in some sectors of the population as one of the challenges that requires urgent attention.

Altogether, the health department spells out as one of its objectives the intention to decrease morbidity and mortality rates through strategic interventions. It is in this light that any scientific work that seeks to understand factors related to childhood mortality has a place in the endeavour to enhance childhood survival. Such research is potentially useful in informing the development of appropriate policies, programs and interventions.

1.2 Problem Statement

Following the demise of apartheid in South Africa, there were expectations that the widely documented system of temporary labour migration would decrease to negligible levels or even cease altogether (Posel, 2003). Contrary to this expectation, rural to urban labour migration continues to be a feature of the South African demographic and socio-economic landscapes, with the level

of labour migration from rural African households estimated at 35.8% in 1999 (Posel, 2003).

It is only logical to assume that as they move away from their rural homes in search of employment, some of the labour migrants leave behind young children who, by definition, are largely dependent on their parents' everyday care and support for their general wellbeing and ultimate survival. Engle (1999) defines care as the behaviours and practices of caregivers such as mothers, fathers, and siblings in providing the food, health care, stimulation, and emotional support. All these care practices are considered essential for children's healthy growth and development.

It can therefore be argued that the migration of adult caregivers deprives those children that are left behind of this critical everyday support and care, thus exposing them to higher risks of illness and death. Indeed these are outcomes that have been observed in previous research (Basu and Basu, 1991; Brockerhoff, 1994; Argeseanu, 2003).

On the other hand, some studies have pointed at some positive effects of migration on the health and survival of children in migrant-sending households. In this case, migration is understood to positively affect child health and survival through two main mechanisms of increased income as well as acquisition of new health knowledge (Hildebrandt, 2004). What is evident therefore, and has been emphasised by researchers such as Garenne (2003), is that the relationship between migration and childhood mortality is

complex and dynamic and needs to be tracked and monitored from time to time.

Despite the more-or-less obvious link that exists between labour migration and child survival, there has been an observable shift in the focus of migration related research in South Africa from studying the patterns and dynamics of internal labour migration to an interest on regional and international migration (Posel, 2003). This shift in focus is apparently driven by the influx, both real and perceived, of immigrants from various parts of the continent to work and settle in South Africa.

The 2004 report by the South Africa Cities Network (SACN) also makes reference to the virtual disappearance of questions pertaining to circular labour migration from surveys by Statistics South Africa over the years. This is attributed to the believe that rural to urban migration would assume a permanent rather than circular or oscillatory pattern following the repeal of laws that barred the majority of the country's population from living freely in the cities.

There is substantial evidence, however, in negation of the above assumptions. In addition to Posel's observations cited earlier, data from the 2001 Census shows significant levels of migration from the predominantly rural provinces such as Limpopo, Mpumalanga and Eastern Cape to the more urban provinces of Gauteng and Western Cape. In an analysis of the 2001 Census data and data from the September 2002 Labour Force Survey,

Oosthuizen and Naidoo (2004) found that Gauteng alone received up to 740 500 migrants coming from other regions of the country.

Another gap pertaining to labour migration related research in South Africa is that where data on such migration has actually been collected, the objective of the analysis has largely been to assess the impact of the migrant inflows on the infrastructure of the receiving areas and have not adequately addressed the migration-childhood mortality dynamic. In Gauteng for example, a major net receiver of rural-to-urban migrants, the provincial government has been concerned with the effect of these in-flows on its capacity to deliver services and has therefore previously commissioned impact assessment studies such as the one conducted by Oosthuizen and Naidoo in 2004.

1.3 Justification

As highlighted earlier in this paper, a lot of ground still has to be covered in South Africa in terms of reducing childhood mortality, more so in light of the finding that at about 58/1000, the under-five mortality rate in 2003 remained virtually at the level observed in 1998 (SADHS, 2003).

Reduction of childhood mortality requires that all factors that either militate against or promote child survival are fully understood. While the general factors associated with child survival may be broadly known, courtesy of extensive research in the field of childhood mortality worldwide, the exact character of these factors will vary from one country to another. Even within

the same country, the factors underlying childhood mortality will not be standard across districts and provinces.

In light of the gaps in internal migration related research in South Africa alluded to above, the present study intended to add to the existing body of knowledge on the effects of temporary labour migration by investigating its influence on the survival of children that are left behind as parents and caregivers temporarily move away from the villages to work in the urban and other areas offering employment.

It was considered potentially informative to explore the adult temporary migration-childhood mortality relationship basing on data from Agincourt district in the Mpumalanga province. This is a rural settlement that continues to experience significant levels of adult temporary migration (Collinson et al, 2006), and therefore presents a useful snapshot into the relationship between adult temporary migration and childhood survival in a typical South African rural context.

In summarising the baseline census findings from Agincourt, Tollman et al (1999) raises, among other issues, a question on the consequences of female labour migration on child health. Furthermore, in explaining observed high rates of child death due to kwashiorkor in the same district, Kahn et al (1999) point at the importance of understanding social disruption and its consequences at the family and household levels.

1.4 Research Objectives

The aim of the study was to examine the influence of adult temporary migration on under-5 years mortality in the households left behind in the South African rural sub-district of Agincourt. The primary research objective was to assess the risk of mortality among children in households characterised by adult temporary migration relative to children in households not experiencing such migration.

A secondary objective of the study was to assess the interaction effects on child mortality of adult temporary migration and nationality of the household. The specific objective was to examine whether or not migration affected former Mozambican refugee households differently from original South African households.

The main independent variable in the study was parent migration status where a *temporary migrant* was a father or mother indicated as having lived for less than 6 months in the village over the previous year while a *non-migrant* was a father or mother who had lived more than 6 months of the previous year in the village.

Chapter Two

Literature Review and Theoretical Framework

2.1 Temporary Labour Migration In South Africa

In comparison to the rest of the continent, South Africa arguably has had, and continues to experience, significant and unique patterns of labour migration (Adepoju, 2005). This owes largely to a circular migrant labour system that was institutionalised by the former apartheid system and forced workers to leave their immediate families behind while they moved to work in mines and other industries in places such as Johannesburg (Clegg, 1999; Posel, 2003).

Collinson et al (2006) identify the discovery of minerals and rapid industrialization as being among the key factors that gave rise and sustained this unique pattern of migrant labour. The discovery of diamonds and gold in and around the modern day Johannesburg saw people from all over South Africa and beyond the borders moving into these areas to sell their labour. As a result, South Africa experienced a significantly faster pace of industrialisation compared to the rest of the continent, partly explaining the current estimated 58% level of urbanisation against 34% for the sub-Saharan Africa region (SACN, 2004).

As South African musician and social commentator Johnny Clegg (1989) notes, the circulatory internal migration system became accepted as the norm among the rural black folk where success and social status eventually got to be judged on the basis of a young man's ability to move out of his rural home to work in the towns and mines. The migrant was expected to raise some form of material wealth before returning, years later, to start a family back home and his own sons would then repeat this life path.

This internal migrant labour system could sound like a pattern that systematically occurs in other countries but as Clegg (1989) further explains, this system was unique in that the migrants had no right of permanent residence in their places of work because their right of residence was tied to the job, which itself lasted only 11 months at a time.

What this meant was that rural-to-urban migration in South Africa was circular or temporary rather than permanent in nature as migrants could neither relocate together with their families nor easily decide to cut off ties with their rural households given the un-guaranteed nature of their residence in the towns and surrounding mines.

Despite the hardships associated with such a system, labour migration was a major and, in some cases, the only survival strategy for most. Significant flows of migrant labourers to the then Transvaal were therefore common, with Jeeves (1985) estimating that as many as 200 000 low-wage black labourers were delivered annually to the industry.

The migrant labour system remained firmly in place well into the 1980's and as a result most of the migration research in the 1970's and 1980's focused on the nature and implications of the migrant labour system (Posel 2003). However beginning in the 1990's there was a shift from studying the internal migrant labour system to a greater focus on immigration.

Posel (2003) identifies the belief that temporary migrant labour would not be part of the new post-apartheid South Africa as one of the reasons for this shift in focus. An assumption made was that there would be a mass permanent rural to urban exodus as blacks freely relocated to the cities under the new democratic order (SACN, 2004).

Posel (2003) argues that, instead, temporary labour migration in the country could well be on the increase. This is because it is now not only a male phenomenon but is associated with a rise in female labour migration with as much of 33.7% of the temporary labour migration from rural African households in 1999 occurring among females. Lehohla (2006) echoes the observation that temporary labour migration continues to be a strong feature of the South African demographic and socio-economic landscape, arguing that strong links between large proportions of city and rural dwellers continue to exist.

The view that temporary labour migration could in fact be on the increase rather than on the decline following democratisation would also sound logical even before one looks at the empirical data. Arguably, if there existed

significant rural-to-urban movement under a system that made such movement difficult and unattractive through restrictive regulations, one would expect that the migration patterns would be even more pronounced under a system that allowed free movement. Moreover, economic development in the country remains heavily skewed in favour of the major urban centres particularly Gauteng, which accounts for about a third of the national GDP (GEDA, 2007). It would therefore be expected that people continue to engage in circular labour migration from the rural to urban regions in the country as a means to securing employment and partaking in the country's economic activities.

2.2 Migration and Childhood Mortality – Previous Research

That rural-to-urban migration has had a telling impact on various socio-economic factors in South Africa may not be in doubt. Indeed, migration has been labelled the "dependent and independent variable" of development (Fischer et al, 1997). Given that migration has an impact on socio-economic factors, which in turn have an influence on child survival (Mosley and Chen, 2004), the problem as pointed out earlier is that there has tended to be little attention in South Africa on studying the effects of temporary labour migration on childhood mortality.

Most of the available previous studies have either not addressed this enquiry directly or have not done so in a South African context. For example, Thomas (2004) looked at the relationship between child disability and parental

migration status in South Africa while Lu and Treiman (2007) investigated the effect of labour migration and remittances on children's education.

However, Argeseanu (2003) addressed the relationship between migration and child mortality, finding that spending of time away from households by mothers was positively correlated with child mortality, although this association was non-significant.

Several other studies have been conducted in various African contexts, shedding useful insight on the nature of the relationship between migration and child health and survival. In Botswana, Bock and Johnson (2002) found that labour migration had a positive effect on the body size of children left behind, probably owing to the remittances sent back home by the migrant fathers. In Kenya, Konseiga et al (2006) found high levels of mortality among children born to migrant mothers. In Ghana, however, Amankwaa et al (2003) report an opposite effect, finding that rural-to-urban migration improved survival chances for the children.

What is evident from these and other studies on the same subject is that the relationship between migration and child health and survival is neither unidirectional nor caused by the same set of factors in all instances. Consequently, several scenarios emerge on the nature of the relationship between migration and childhood mortality. On one hand, migration has been shown to lead to higher infant mortality (Kanaiaupuni and Donato, 1998), while on the other it has been shown to improve child survival (Hildebrandt and McKenzie, 2002).

In yet another scenario, research has suggested that the relationship between temporary labour migration and childhood mortality could actually be curvilinear, initially depicting a rise in mortality followed by a decline and eventual drop to below pre-migration levels (Hildebrandt and McKenzie, 2002).

It must be noted though that most of the above outcomes have been in relation to cases where entire households have migrated together. As Brockerhoff (1994) points out, unlike children who migrate together with their parents, children who do not migrate and are left behind do not directly experience any of the health related benefits associated with urban residence such as closer proximity to modern health services and facilities. Therefore the situation faced by children that are left behind in the sending households merits separate investigation.

2.3 Migration and Childhood Mortality - Theoretical Framework

It can be surmised that the observed inconsistencies pertaining to the relationship between migration and childhood mortality discussed above are attributable to differences in the specific nature of the underlying geographic, demographic, social, cultural, economic, and other such factors from one setting to another. In other words, notwithstanding the inconsistencies, the general relationship between migration and childhood mortality can still be adequately conceptualised in terms of an analytical framework proposed by Mosley and Chen (1984).

A key feature of the Mosley and Chen model is the proposition that socio-economic factors are at the bottom of observed childhood mortality rates. However these socio-economic factors do not impact mortality directly but operate through the more proximate biological factors to impact childhood mortality. The authors postulate the following proximate factors that have a direct bearing on child survival.

1. Maternal factors such as age of the mother and birth intervals
2. Environmental contamination
3. Nutrient deficiency
4. Injury
5. Personal illness control

The above model appears to lend itself well to a conceptualization of the relationship between temporary labour migration and childhood mortality in the present study. This is because circular labour migration is a phenomenon that has been shown to have significant socio-economic impacts on the sending communities and households (Collinson et al 2006; Bock and Johnson, 2002; Lu and Treiman, 2007). At the same time, child health and survival are attributed to a combination of bio-demographic and socio-economic circumstances (Argeseanu, 2003).

Therefore the question is not so much whether labour migration impacts household incomes, but how this extends to the proximate or biological factors as depicted in the Mosley and Chen framework so as to subsequently have an effect on child survival.

Using this model, some probable influences of circular labour migration on the proximate child survival factors can be envisaged as illustrated below. An important feature of this illustration is the realisation that temporary migration can either aid or hinder the child survival factors. This implies that no ready conclusion can be made about the overall relationship between the two.

Figure 1: Hypothesized effects of temporary labour migration on child survival

Proximate Factors	**Positive effects**	**Negative effects**
Maternal Factors	The absence from the household of the migrant husband or other male sexual partner for extended periods could result in reduced sexual contact and consequently longer intervals between births and follow up pregnancies, thus improving the health of the mother and child.	?
Environmental Contamination	Through remittances from the migrant, the household may afford more environmentally friendly domestic options such as electric instead of paraffin stoves. There could also be better protection from disease vectors such as the use of mosquito nets.	?
Nutrient Deficiency	Remittances may enable the household to afford more nutritional food supplements for the children and mothers thus boosting their general health status.	The absence from the household of the adult migrant, particularly where the migrant is the mother, may result in less responsible eating habits by the inhabitants, including children, left behind.
Personal Illness Control	Newly acquired health knowledge pertaining to better hygiene and preventive measures may be transmitted back to the household by the migrant labourer thus enhancing the survival chances of children in these households.	In the absence of the adult migrant, who is the caregiver, children left behind in the household may not readily seek medical treatment when they fall sick thus reducing their chances of recovery.

Expanding on the personal illness control aspect in the above model, Federman and Levine (1997) postulate that all children are exposed to pathogens in the air they breathe and the water they drink. As a result, all children are bound to get respiratory illnesses such as colds and digestive problems such as diarrhoea from time to time. Whether the resultant illness leads to death or not depends on the child's nutritional status, the child's immunization status, and access to health care after the child becomes sick. All of these factors can be affected one way or the other by adult temporary migration.

2.4 Migration as Deprivation of Parental Care

The characterisation of adult temporary migration as a form of deprivation of parental accessibility for the children left behind is central to any investigation of the relationship between adult migration and childhood mortality. Bock and Johnson (2002) make reference to three dimensions of parental involvement that impact childhood outcomes. The first is parental engagement or the interaction between parents and offspring. The second is parental accessibility that refers to the availability of the parent to provide everyday care. The third is parental responsibility and pertains to the caregiver's ability to recognise and provide for the resource needs of the offspring.

While, as severally argued in this paper, labour migration could be a means to meeting parental responsibility in terms of material provisions, migration could also be a double-edged sword, serving to deprive children of the much needed parental accessibility on the other hand. The parental accessibility

argument is even more pertinent in the case of migrant mothers. Brockerhoff (1995) observes that several studies on child survival focus attention on the role of mothers as they are recognised as the most critical role players in child survival. It is also in this regard that Mary Powers (2001) makes the assertion "*healthy* mothers are children's first line of defence against malnutrition, disease, and death".

There is considerable research suggesting that the assertion by Powers could well be extended to read *"available* mothers are children's first line of defence against malnutrition, disease, and death". In a study conducted in India, Basu and Basu (1991) came to the interesting finding the employment of women from poor households can actually be associated with higher child mortality in the affected households despite its many positive outcomes. They make the point that women's employment has traditionally been studied and found to have positive effects in terms of reducing fertility but that this cannot be said with the same amount of confidence in terms of child mortality.

One explanation that is given by the writers for the higher child mortality risks in households with employed mothers is the little time these mothers have to tend their children. Argeseanu (2003) explains that unless child-care arrangements are made, the absence of mothers may have a negative effect of child survival despite the fact that the mothers are actually earning an income.

In any case, as Amankwaa et al (2003) point out, fostering of young children is not common practice in Africa. Brockerhoff (1994) paints an even grimmer picture, pointing out that even where foster care arrangements are made for children whose mothers migrate, this often results in premature exclusive reliance on weaning foods and/or the mixing of young children with other children, promoting contracting of diseases.

2.5 Migrants' Links with the Sending Households

The exact implications of temporary migration on the proximate factors in the model by Mosley and Chen are not self-evident and are likely to vary from one case to another. For example, the view linking migration to improved child health is premised on the assumption that the migrant labourer will send both remittances and newly found health knowledge back to their rural households. Indeed Collinson et al (2006) found that temporary labour migration was associated with improved economic status in households in the same rural district of Agincourt.

Similarly, Bock and Johnson (2002) in a study among the Okavango Delta communities of Botswana found that remittances by migrant fathers had significant positive effects on the body size of children. However caution needs to be taken so as not to routinely equate migration to improved income for the households left behind. Closer attention needs to be paid to whether labour migrants do retain ties with their households of origin and if indeed they are able to remit some of their earnings in cash or kind.

Posel (2003) alludes to the fact that under the former system of apartheid migrants were more likely to maintain ties with their households of origin because they faced insecure employment opportunities and were moreover not legally permitted to settle permanently in their places of employment. The post apartheid situation is different and the motivation among migrants to stay in touch with their rural households may consequently have changed.

Over and above exploring the likelihood of migrants maintaining ties with their rural households at the motivational level, it is also important to explore it at the practical level by examining if even those migrants that may be keen to remit income back home are actually able to do so. The study on migration to Gauteng by Oosthuizen and Naidoo (2004) gives some indications that rural to urban migration may be no guarantee to improved financial or economic status for the migrants, and by extension for the sending households. This study showed that migrants from other provinces to Gauteng were more often engaged in relatively lower skilled jobs compared to the rest of the Gauteng population. Overall, close to 42% of the migrants were unemployed altogether.

On the other hand, Lehohla (2006) interprets the finding that most migrants tend to live in informal urban settlements as evidence of a conscious choice where the migrants' priorities are to save and send as much of their earnings back home rather than erode these by staying in more expensive accommodation or by upgrading their urban dwellings.

Other than remittances in the form of cash and goods, an important component of the child survival model described earlier is the ability of the migrant to maintain constant communication with their rural households. This would enable, among other things, the transmission and sharing of newly acquired knowledge on hygiene and other information with a bearing on children's health.

The Oosthuizen and Naidoo study cited above found that most migrants lived in informal settlements with no telephone services, thus making the chances of the migrants being cut-off from their rural families high. Even where telecommunication or other channels of information transfer exist, the actual physical visitations by the migrant back to the sending villages are likely to be a more effective mode of maintaining links with those left behind. However regular visits back to the village are not guaranteed. Collinson et al (2006) found that almost half of the temporary migrants from Agincourt did not return to the village regularly.

2.6 Hypotheses

While previous research may have shed inconsistent or even contradictory results, it was hypothesized that the risk of mortality among children in households with temporary migrants would be lower relative to that of children in households without migrants. Among other things, this proposition was based on the fact that Agincourt is a semi-arid district with a climate that does not support meaningful subsistence crop cultivation (Collinson et al, 2001).

Therefore labour driven temporary migration becomes a survival strategy and a major source of resources to be spent on health care as well as health improving nutritious foods in the households. Secondly, research has shown how migration can become an effective source of new health knowledge through information flow between the migrants and members of the households that remain behind, thus altering the health practices of the individuals in these households (Hildebrandt, 2004).

A second hypothesis made was that the importance of temporary migration for childhood survival in Agincourt would be more pronounced in households of Mozambican origin than South African origin households. This prediction was based on a previous finding that households belonging to former Mozambican refugees were generally poorer in terms of household assets (Collinson et al, 2006). An assumption drawn from this was that labour migration became the main livelihood option in these households, without which child survival would be more seriously jeopardized compared to South African households.

Chapter Three

Data and Methods

3.1 Study Design

The study was a secondary data analysis of the Agincourt Health and Demographic Surveillance System (AHDSS). AHDSS is a demographic surveillance initiative of the University of The Witwatersrand covering the sub-district of Agincourt in Mpumalanga Province, about 500 km to the northeast of Johannesburg.

According to Collinson et al (2001) the primary objective of this surveillance system is *"to provide a research infrastructure and longitudinal database for a range of community-based studies on the burden of disease, health-systems interventions, and social-household-community dynamics, to inform decentralized health and social policy"*.

Starting with a baseline census conducted in 1992, the AHDSS data are collected and updated every 12 months. Fieldworkers visit each household at the site and interview the "best" respondent available to record the vital events, including births, deaths, and migrations, that occurred since the previous census (Collinson et al, 2001).

Specially trained VA interviewers conduct verbal autopsies to determine the most probable cause for all deaths recorded during the census. This involves interviewing a close caregiver to elicit signs and symptoms of the terminal

illness. Three medical practitioners individually review the questionnaire thereafter to assign the most probable cause of death (Kahn et al, 1999). Data quality controls include initial interviewer accompaniment by the supervisor to observe a number of interviews, followed by random duplicate visits.

3.2 Study Population

21 villages and a population of about 70 000 make up the sub-district of Agincourt. A high population density of about 148 persons per square kilometre is noted and about 29% of the population is composed of people of Mozambican origin who initially settled in the area as refugees (Tollman et al, 1999). In 1999 the unemployment rate was estimated at 40-50% and migrant labour in mines, commercial farms, and industries in neighbouring towns is the main source of formal employment (Collinson et al, 2001).

In terms of housing, some of the residents still live in traditional mud huts while water sources are mainly communal water reservoirs from which residents collect water for in-home usage. Sanitation conditions are not adequate, with pit latrines being used in many of the households. Education levels are relatively low with more than 40% of adults aged 25-59 years without any formal education (Tollman et al, 1999).

3.3 Data Preparation

AHDSS data is managed in the form of a relational database where related tables store different aspects of the data. Tables representing individuals, locations, and events are linked to each other. Working from the original dataset provided by the Agincourt Health and Population Unit, Figure 2 illustrates how the data file was prepared for the present analysis. The research objective required that children aged 0-4 years be made the subjects in the study and be linked to their parent information. This process involved first selecting the cohort of interest based on age and then identifying their parents from among the provided cases. These children were then presented as the cases in the SPSS dataset, with information pertaining to their parents appearing across the file among the other variables of interest.

Figure 2: Case matching and file merging

Original data file

Person ID	Age	Migration Status	Education	Mother ID
A	1	Non migrant	0	C
B	2	Non migrant	0	D
C	20	Temporary migrant	Grade 7	E
D	22	Non migrant	Grade 8	F



Data file after matching child to parent information

Child ID	Child Age	Mother ID	Mother Migration Status	Mother Age	Mother Education
A	1	C	Temporary migrant	20	Grade 7
B	2	D	Non migrant	22	Grade 8

While AHDSS commenced in 1992, for the purpose of this report the period 2001 to 2004 was chosen. The amount of data over this period would still be robust enough while also providing the most current information. From an initial cohort of 16328 children born in Agincourt between 1 January 1997 and 31 December 2003 (i.e. who were under 5 years old at the start of the observation in 2001), about 6% were excluded from the study because neither their mother nor father information was provided in the dataset. This selection was necessitated by the fact that migration status, the main independent variable in the study, had to be deduced from the indicated residence status of the child's parent, (i.e. whether the parent was a temporary migrant or non migrant). This reduced the number of children in the survival analysis to 15408.

A combination of factors would explain the incidence of 6% of children with missing parental information. These could range from basic data collection and handling errors to the fact that the information was not available during data collection. Regardless of the explanation, excluding these children from the study potentially gives rise to the possibility of selection bias in the obtaining results and this is noted as one of the limitations in the study.

3.4 Statistical Analysis

The Cox proportional hazards model is a broadly applicable and widely used method of survival analysis that is well suited for investigating time-to-event outcomes (Walters, 2002). This method was used to assess the relative effect of parent's migration status on childhood survival. Before running the Cox regression model, consideration was given to the possibility of parent migration status changing during the period under review, thus confounding the analysis. Two options were explored in dealing with this challenge.

The first option was to use the Cox regression model for time-dependant variables, a somewhat complex process particularly where, as in the present case, the covariate in question can change but is not inherently related to time and has to be first transformed into a logical time related expression (Walters, 2002). The second option, which was eventually used in this analysis, was to first examine the extent to which the migrants were likely to have actually changed their migration status over the study period so as to determine if changing migration statuses was likely to be a major problem in the first place.

To this end, an examination of yearly temporary migration patterns between 2001 and 2004 was conducted, revealing insignificant variations in the overall trends. The proportions of children with at least one migrant parent were shown at 29%, 31%, 32%, and 32% for 2001, 2002, 2003, and 2004 respectively. Further analysis showed that migration patterns did not change dramatically from year to year at the individual level either.

Given the age parameters for the cohort, close to a quarter (23%) of the cases in the analysis were subject to observation over only one of the four years and a change of migration status was not in question for this group. Overall, only 1% of all the parents in the study changed their migration status one way or the other over the four years. This observation enabled utilization, with due caution, of the less complex Cox regression model for time-constant variables.

3.5 Study Variables

The main independent variable in the study was parent temporary migration status. Given that some children had information on both parents provided while others had details of only one parent indicated, several parent-migration status permutations became possible and these categories were:

1. Both parents non-migrant
2. Both parents migrant
3. Father migrant and mother non-migrant
4. Mother migrant and father non-migrant
5. Mother information only - migrant
6. Mother information only - non-migrant
7. Father information only – migrant
8. Father information only – non-migrant

In order to fully understand the influence of adult temporary migration on childhood mortality, it was important to take into account other factors known to impact child health and survival. The following variables were therefore included as controls in the analysis:

Household Origin- Following the civil war in Mozambique, many refugees settled in the site alongside South Africans. The two categories on the household origin variable were whether the household members were Mozambican refugees or South African, the two main nationalities in Agincourt.

Mother's Age – This was age of the mother at birth. Children born to teenage mothers were compared against those born to mothers aged 20-29, 30-39, and mothers aged 40 years or more.

Mother's Education - Children born to mothers without any formal education were compared with children born to mothers educated up to primary school level, high school level, and mothers with higher education.

Household Head Gender - Children born in male-headed households were compared to those born in female-headed households.

The outcome variable in the analysis was whether or not the child died during the observation period. This variable was coded (1) where the child died and (2) where the child survived (reference category). The survival analysis observation time was taken from birth (or date of immigration into the site) until death or the date of the 5^{th} birthday, whichever occurred first. For children who emigrated from the site during the period of interest, the observation time terminated on the date of emigration.

Chapter Four

Results

4.1 Descriptive Analyses

Table 1 presents descriptive statistics on the study population. Of the 15408 children in the analysis, just below half (47.9%) had information on both parents provided. Just above half (51.4%) had only their mother information provided, with just a handful (0.7%) with details of the father only provided.

While these figures could be reflective of the proportion of children living in single-parent households in Agincourt caution needs to be taken in attaching such an interpretation as it is possible that the indicated single parent could be staying with another partner who is not the child's biological parent. This possibility is partially evidenced by the finding that about half of the children with information on mothers only were actually living in male-headed households. Some of these male heads could be grandparents or other male relatives of the mother. Altogether, two thirds (66.6%) of the children in the study were in male-headed households.

In terms of household nationality, close to two thirds of the children (62,8%) were in households of South African origin with the remainder in Mozambican origin households.

Table 1: Proportion of children by parent information, head of household gender, and household origin

	N	Percentage
Information on Parents	**15408**	**100%**
Both parents indicated	7388	47.9%
Mother only indicated	7919	51.4%
Father only indicated	101	0.7%
Household Head Gender	**15408**	**100%**
Male headed households	10265	66.6%
Female headed households	5005	32.5%
Unknown/Queried	138	0.9%
Household Origin	**15408**	**100%**
South African origin households	9673	62.8%
Mozambican origin households	5735	37.2%

4.1.1 Adult Temporary Migration Patterns

For just above half of all the children (51.5%), none of the parents was a temporary migrant while just below a third (31.4%) had at least one parent indicated as a temporary migrant. The migration status of the remainder of the parents (17.1%) was unassigned.

Table 2 presents detailed parent -migration breakdowns and reveals that the most common scenario, involving one in every three children, was the mother only set-up where such mother was a non-migrant. The second most common arrangement, accounting for about a quarter of all the children (24.4%), was where the father was a temporary migrant and the mother was a non-migrant.

As would be expected, the opposite arrangement (i.e. migrant mother and non-migrant father) was relatively rare with only 0.4% of the children in this particular set-up. The likelihood of both parents being temporary migrants was also low (1.0%).

Table 2: Parent temporary migration patterns for the period 2001-2004

	N	As % of all children
All children	**15408**	**100%**
None of the parents migrant	7936	51.5%
At least one parent migrant	4840	31.4%
Other or Unrecorded*	2632	17.1%
Children with information on both parents	**7388**	**47.9%**
Both parents non migrant	2753	17.9%
Both parents migrant	155	1.0%
Father migrant-Mother non migrant	3765	24.4%
Mother migrant-Father non migrant	67	0.4%
Children with information on one parent	**8020**	**52.0%**
Mother information only - non migrant	5138	33.3%
Mother information only – migrant	797	5.2%
Father information only – non migrant	45	0.3%
Father information only – migrant	56	0.4%

* Migration status unspecified/queried or parents classified as “visitors”.

4.1.2 Childhood Mortality Patterns

Out of the 15408 children aged 0-4 years in the analysis, a total of 320 died over the period 2001 to 2004. More than half (52%) of these children died in their infancy, with progressively less dying as age increased. Table 3 shows the yearly child mortality rates presented as the number of deaths in children from birth to 4 years of age per 1000 person-years observed in the under 5 years population. The under-five mortality rate for the respective years is indicated at between 32 and 44 deaths per 1000.

Table 3: Under five years mortality rates* – 2001 to 2004

Year	Number of person years lived	Number dying during the year	Death rate/1000
2001	2186	70	32.0
2002	2075	88	42.4
2003	2018	88	43.6
2004	2254	74	32.8

* Overall Under 5 years mortality rate in South Africa estimated at 58/1000 (SADHS 2003)

A review of cause of death shows that HIV related diseases were the single major cause of death, being indicated for 30.3% of all the 320 children that died between 2001-2004. Although coming as distant second and third respectively, malnutrition (11.3%) and diarrhoea (10.9%) were the other biggest single causes of death.

Other disparate causes of death accounted for about a quarter (24.7%), with the cause of death for the remainder of the cases unallocated (22.8%). An analysis of the cause of death by household migration status does not show any significant differences

Table 4: Distribution of cause of death∗

	Overall		Households without migrants		Households with at least one migrant		Household migration status unknown	
	N	***%***	***N***	***%***	***N***	***%***	***N***	***%***
All causes	**320**	**100%**	**186**	**100%**	**71**	**100%**	**63**	**100%**
HIV related causes	97	30.3%	59	31.7%	17	23.9%	21	33.3%
Malnutrition	36	11.3%	24	12.9%	7	9.9%	5	7.9%
Diarrhoea	35	10.9%	23	12.4%	11	15.5%	1	1.6%
Other causes	79	24.7%	52	27.9%	15	21.1%	12	19.0%
Unknown	73	22.8%	28	15.1%	21	29.6%	24	38.1%

∗Cause of death determined through verbal autopsies as explained under the methods section.

4.2 Relative Child Mortality Risks

4.2.1 Relative Risks by Parent Temporary Migration Status

Table 5 presents the relative child mortality risks obtaining from the Cox regression models. The situation where children stay in households with both parents present (non-migrant) was used as the reference category. In Model 1, the effect of migration on child mortality is assessed without the control variables while Model 2 examines the effects of parent migration taking into account the relative influence of other covariates.

Although not significant, children with both parents migrant tended to have a lower risk of death compared to children who had both parents non-migrant. A more significant positive influence of migration on childhood survival was indicated where the father was a temporary migrant but the mother remained at the village. Children in such an arrangement had an about 35% lower risk of death compared to children with both parents non-migrant (RR=0.647, 95% CI 0.439-0.954).

While it would have been interesting to assess the effect of the opposite arrangement (i.e. where the mother was a migrant and the father a non-migrant), there were few such cases occurring, thus making such analysis statistically unviable.

Notably, children with only their mothers indicated tended to have a higher risk of mortality regardless of their parents' migration status. This is revealed in the finding that children with mothers only indicated and whose mothers were non-migrant had a 28% higher mortality hazard (RR=1.284, 95% CI 0.936-1.673) compared to children who had both parents indicated but also non-migrant. Owing to the limited number of such cases, the relative mortality risks for children with only their father information provided are not reported.

Introducing some control variables in Model 2 did not markedly alter the hazard ratios for children by the migration status of their parents although the positive effect of the father migrant/mother non-migrant set up was more pronounced, reducing the hazard by about 42% (RR=0.582, 95% CI 0.390-0.870).

4.2.2 Relative Risks by Other Child Mortality Covariates

Looking at the influence of other variables in the analysis shows that origin of the household had a significant effect on child mortality, with children born in Mozambican origin households facing a 40% higher risk of death compared to children born in South African origin households (RR=1.399, 95% CI 1.116-1.753). In terms of gender of the head of household, a significant effect can be observed, with the death hazard for children in female-headed households indicated at about 28% higher than that of children in male-headed households (RR=1.275, 95% CI 1.001-1.625).

As would be expected based on previous research, the age of the mother at birth was a significant factor in determining the risk of mortality. Increasing age above teenage motherhood progressively reduced the death hazard up to about age 39 but showed an increase thereafter. Specifically, children born to mothers aged 20-29 had an about 37% lower hazard than those born to mothers below 20 years (RR=0.665, 95% CI 0.494-0.897). Being born to a mother aged 30-39 lowered the hazard even further (RR=0.589, 95% CI 0.402-0.863) but being born to a mother aged 40 years or above increased the hazard somewhat, though not significantly so.

The level of maternal education had a significant effect on the probability of child mortality. The influence of education appeared to operate incrementally with rising levels of education. Primary school level education among the mothers did not significantly alter the child mortality risks, but a significant reduction can be seen at levels of education above high school where the hazard was lower by up to 50% compared to mothers with no formal education (RR=0.496, 95% CI 0.265-0.927).

Table 5: Relative Risks by Parent Temporary Migration Status and Other Child Mortality Covariates

	Relative Risk for Children (0-4years old)	
	Model 1	**Model 2**
Parent's Migration Status		
Both parents non –migrant (ref)	1.00	1.00
Both parents migrant	0.632 (0.154 –2.592)	0.638 (0.154-2.637)
Father migrant –Mother non-migrant	0.647** (0.439-0.954)	0.582** (0.390-0.870)
Mother migrant –Father non-migrant	N/A	N/A
Mother only indicated – non migrant	1.284* (0.936-1.673)	1.100 (0.785-1.540)
Mother only indicated – migrant	1.321 (0.798-2.188)	1.248 (0.739-2.106)
Father only indicated – non migrant	N/A	N/A
Father only indicated – migrant	N/A	N/A
Other / Unrecorded	1.323 (0.920-1.903)	1.249 (0.857-1.821)
Origin of Household		
South African origin households (ref)	-	1.00
Mozambican origin households	-	1.399** (1.116 –1.753)
Gender of Household Head		
Male headed households (ref)	-	1.00
Female headed households	-	1.275** (1.001-1.625)
Gender Unknown	-	0.961 (0.238-3.877)
Mother's Age		
<20 (ref)	-	1.00
20-29	-	0.665** (0.494-0.897)
30-39	-	0.589** (0.402-0.863)
40+	-	1.368 (0.905-2.068)
Age Unknown	-	N/A
Mothers Education		
No formal education (ref)	-	1.00
Primary school	-	0.798 (0.573-1.112)
High school	-	0.728* (0.527-1.006)
Higher education	-	0.496** (0.265-0.927)
Unknown	-	0.767 (0.454-1.295)
-**2 Log Likelihood**	5949.150	5908.235
Df	8	11

*p<0.1,**p<0.05

4.2.3 Influence of Temporary Migration by Household Origin

Having found overall significant differences in child survival outcomes by parent temporary migration status and household origin, an examination was made to determine whether or not migration actually affected child survival differently in South African origin households compared to households belonging to former Mozambican refugees. Table 6 presents the outcome of this analysis where in Model 1 the effects of temporary migration within households of South African origin is tested and in Model 2 the same is repeated but with non-migrant households of Mozambican origin as the reference category. In both cases, gender of household head, mother age, and mother education are introduced as controls.

Having at least one temporary migrant within the household lowered the death risk for children in both South African and Mozambican households. Temporary migration appears to have the same positive effect in both household types and reduces the death hazard by the essentially the same margin. Migration reduced the death hazard by about 34% in South African households (RR=0.658, 95% CI 0.443 – 0.976) and by 35% in Mozambican households (RR=0.652, 95% CI 0.437 – 0.973).

Overall, the analysis shows a generally higher death hazard among children in Mozambican households compared to children in South African households regardless of migration status. However there is no significant difference in the extent to which temporary migration reduces child mortality in either household type.

Table 6: Relative effects of temporary migration by household origin

	Relative Risk for Children (0-4years old)	
	Model 1	**Model 2**
Gender of Household Head		
Male headed households (ref)	1.00	1.00
Female headed households	1.364**(1.085-1.715)	1.364**(1.085-1.715)
Gender unknown	1.009(0.250-4.067)	1.009(0.250-4.067)
Mother's Age		
<20 (ref)	1.00	1.00
20-29	0.676**(0.504-0.907)	0.676**(0.504-0.907)
30-39	0.575**(0.393-0.840)	0.575**(0.393-0.840)
40+	1.312(0.869-1.980)	1.312(0.869-1.980)
Age Unknown	N/A	N/A
Mothers Education		
No formal education (ref)	1.00	1.00
Primary school	0.765(0.51-1.062)	0.765(0.51-1.062)
High school	0.685**(0.498-0.943)	0.685**(0.498-0.943)
Higher education	0.485**(0.259-0.906)	0.485**(0.259-0.906)
Unknown	0.757(0.449-1.279)	0.757(0.449-1.279)
Effect of temporary migration in South African households		
South African households without migrants (ref)	1.00	-
South African households with at least one migrant	0.658** (0.443 –0.976)	-
Mozambican households without migrants	1.423** (1.060-1.911)	-
Mozambican households with at least one migrant	0.927(0.631-1.364)	-
Household migration status unknown	1.330*(0.968-1.828)	
Effect of temporary migration in Mozambican households		
Mozambican households without migrants (ref)	-	1.00
Mozambican households with at least one migrant	-	0.652** (0.437-0.973)
South African households without migrants	-	0.703** (0.523-0.944)
South African households with at least one migrant	-	0.462**(0.306-0.698)
Household migration status unknown	-	0.935(0.662-1.321)
-2 Log Likelihood	5917.908	5917.908
Df	14	14

*p<0.1,**p<0.05

Chapter Five

Discussion and Conclusions

5.1 Discussion

This paper has examined the influence of adult temporary migration on under-five mortality in Agincourt, a rural district in South Africa. The focus was on the survival patterns of children that are left behind as their parents engage in labour related circular migration as opposed to children who migrate together with their parents.

Basic descriptive analysis was done as a means of understanding the underlying circumstances of the study population. The outcome of this analysis shows that a large proportion (51%) of children in Agincourt had details of only one parent (predominantly the mother) provided. This, to some extent, is reflective of the prevalence of single-parenthood at the site as previously reported by Tollman et al (1999).

Another key descriptive finding was that just below a third (31.4%) of the children had at least one parent as a temporary migrant. This is markedly lower than the household temporary migration estimate of 55% in the same district in 2001 (Collinson et al, 2006). However this discrepancy is not surprising given that in the present case, the analysis was confined to parents with children below age 5 and did not include the entire adult population.

Probably due to similar age and gender related selection biases, there was a stronger representation of children born in former Mozambican refugees households (37.2%) against the reported 29% prevalence of such households in the entire study site.

A total of 320 under five deaths over the four-year period (2001-2004), computing to a mortality rate of about 43/1000, appears low compared to a national estimate of 58/1000 (SADHS, 2003). However this figure is consistent with 216 under five deaths and an even lower mortality rate reported by Kahn et al (1999) which was recorded in the same study site (Agincourt) over a similar time-span (1992-1995).

Notably, kwashiorkor continues to be a major cause of death among children aged 0-4 years, accounting for about 11.3% of the observed deaths. This represents a minor reduction from the 15% of deaths due to the same cause found by Kahn et al (1999). However combining the number of deaths due to kwashiorkor and the other major cause, diarrhoea, shows a more considerable reduction at about 22% as compared to more than a third recorded in the 1992-1995 period.

Central to the study was the examination of the influence of adult temporary migration on childhood survival and results of the survival analysis are indicative of a positive influence of adult circular migration on the survival of children that are left behind. This is particularly true where one of the parents (the father) engages in circular labour migration while the mother remains

behind with the children. This finding makes sense in that children in such a set-up can be viewed as being able to enjoy the documented positive effects of labour migration such as improved household incomes via remittances and health knowledge transfers (Hildebrandt and McKenzie, 2002), while at the same time continuing to enjoy the positive benefits of regular care giving by their non-migrant mothers (Basu and Basu, 1991; Engle, 1999).

In view of previous findings that most of the rural households in South Africa with labour migrants tend to receive remittances, (Posel, 2003; Lu and Treiman, 2007), it can be concluded that improved childhood survival outcomes as observed in this study are due to remittances that flow back to the migrant -sending households. Indeed, in an analysis of data from the same surveillance site Collinson et al (2006) found that temporary labour migration was correlated with household socio-economic status as measured by possession of modern assets and consumer durables.

However, other factors that are in themselves associated with both migration and childhood mortality cannot be totally discounted, particularly those that were not controlled for in the present analysis. Among the plausible explanations is that those who tend to migrant are persons with a better economic status to start with (Skeldon, 1997)

The study reveals generally lower survival chances for children in Mozambican origin households compared to their counterparts in South African origin households regardless of the temporary migration status of their parents. This is also true for children with only their mothers' details indicated who appear to face a higher mortality risk compared to children with both parents whether their parents are temporary migrants or not. Mozambican households in Agincourt are generally poorer in terms of assets (Collinson et al, 2006) while single motherhood is believed to disadvantage children by placing too much child-caring responsibilities on the shoulders on one parent (Nobles, 2006)

On the premise that remittances from migrant labour would be more solely relied on for household upkeep among former Mozambican refugees, it had been predicted that the effects of temporary migration would be more pronounced for children in these households than those in South African households. However the study fails to find any significant difference in the nature and extent of the influence of temporary migration on child survival in either household type. It would therefore appear that the observed differences in child mortality hazards between the two household segments are attributable to other differentiating factors.

5.2 Limitations

The study was based on analysis of data from Agincourt sub-district and while there is no reason to assume that socio-economic and demographic factors in this district will differ markedly from other black rural South African settlements, some degree of caution is still needed in generalizing the findings to the rest of rural South Africa. In order to enable analysis based on the migration status of parents, some children whose parent information was missing had to be dropped from the study, giving rise to the possibility of selection bias in the obtaining results. Infants were included in the analysis of the relationship between temporary migration and childhood mortality but as Brockerhoff (1994) warns, early infant mortality is known to be more biologically than socio-economically determined.

5.3 Conclusions

This analysis has shown the positive influence adult temporary migration on child survival. Traditionally among South African rural households, it is the husband who tends to be a temporary labour migrant while the wife remains at the rural household and the study has indicated that it is this type of arrangement that brings the most migration related benefits to children. Although some strong argument may exist on the dangers of temporary labour migration on the health of the migrants and their partners (IOM, 2002; Lurie et al, 2003; Nankoe, 2002), it is noteworthy that the same arrangement does carry some positives for child survival.

In the case of children that are left behind at the sending households as opposed to those who migrant alongside their parents, it arguably is not the act of migrating itself that promotes child survival but the improved household economic status owing to remittances that flow back as a result of the labour migration. It has been shown that economic development is generally accompanied by improved socio-economic status at the household level and all this improves childhood survival (Strulik, 2003; Federman and Levine, 2005).

At a practical level therefore, it can be concluded that if potential migrants were able to engage in viable economic activities in and around their own neighbour-hoods they would be able to earn the needed income without having to migrant to the cities. In the long term, such decentralisation of economic activity and the accompanying improved household level incomes could, through the same pathways discussed in this paper, lead to improved child health and survival in these rural households.

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