Striving against Adversity:
the Dynamics of Migration, Health and
Poverty in Rural South Africa

M.A. Collinson
2009
Dedication

To South Africa, and Africa, may she achieve her full potential

To Alison, Keri and Ben, the closest to my heart

To Adazu, who left us just a few weeks back

And to the calm silence, from which potential itself is born
Abstract

Background: The study is based in post-apartheid South Africa and looks at the health and well-being of households in the rural northeast. Temporary migration remains important in South Africa because it functions as a mainstay for income and even survival of rural communities. The economic base of rural South Africans is surprisingly low because there is high inequity at a national level, within and between racial groups. There has now been a democratic system in place for 15 years and there is no longer restriction of mobility, but there remain high levels of poverty in rural areas and rising mortality rates. Migration patterns did not change after apartheid in the manner expected. We need to examine consequences of migration and learn how to offset negative impacts with targeted policies.

Aims: To determine a relevant typology of migration in a typical rural sending community, namely the Agincourt sub-district of Mpumalanga, South Africa, and relate it to the urban transition at a national level – Paper (I). To evaluate the dynamics of socio-economic status in this rural community and examine the relationship with migration – Paper (II). To explore, using longitudinal methods, the impact of migration on key dimensions of health, including adult and child mortality, and sexual partnerships, over a period of an emerging HIV/AIDS epidemic – Papers (III), (IV) and (V).

Methods: The health and socio-demographic surveillance system (HDSS) is a large open cohort where the migration dynamics are monitored as they unfold. They are recorded as temporary or permanent migration. Settled refugees are captured using nationality on entry into the HDSS. Longitudinal methods, namely a household panel and two discrete time event history analyses, are used to examine consequences of migration.

Results: Migration features prominently and different types have different age and sex profiles. Temporary migration impacts the most on socio-economic status (SES) and health, but permanent migration and the settlement of former refugees are also important. Remittances from migrants make a significant difference to SES. For the poorest households the key factors improving SES are government grants and female temporary migration, while for less poor it is male temporary migration and local employment. Migration has been associated with HIV. Migrants that return more frequently may be less exposed to outside partners and therefore less implicated in the HIV epidemic. There are links between migration and mortality including a higher risk of dying for returnee migrants compared to permanent residents. A mother’s migration can impact on child survival after accounting for other factors. There remains a higher mortality risk for children of Mozambican former refugee parents.

Interpretation: Migration changes the risks and resources for health with positive and negative implications. Measures such as improved transportation and roads should be seen as a positive, not a negative intervention, even though it will create more migration. Health services need to adapt to a reality of high levels of circular migration ranging from budget allocation to referral systems. Data should be enhanced at a national level by accounting for temporary migration in.
national censuses and surveys. At individual level we can offset negative consequences by treating migrants as persons striving against adversity, instead of unwelcome visitors in our better-off communities.

_key words:_ migration, temporary migration, permanent migration, refugee settlement, socioeconomic status, HIV transmission, adult mortality, child mortality, returning to die.
Original Papers


# Table of Contents

Abstract ....................................................................................................................................................................................................................................................... i  

Original Papers ........................................................................................................................................................................................................................................... ii  

Foreword ............................................................................................................................................................................................................................................. vii  

Background ......................................................................................................................................................................................................................................... 1  

Introduction ......................................................................................................................................................................................................................................... 3  
  Defining migration ............................................................................................................................................................................................................. 3  
  Determinants of migration ................................................................................................................................................................................................... 4  
  Economic consequences of migration ........................................................................................................................................................................ 7  
  Migration and HIV ............................................................................................................................................................................................................ 9  
  Migration and child mortality .............................................................................................................................................................................. 11  
  Settlement of former refugees ............................................................................................................................................................................. 13  
  Migration and demographic surveillance ............................................................................................................................................................... 15  

Aims .................................................................................................................................................................................................................................................. 17  
  Overall aims .................................................................................................................................................................................................................. 17  
  Specific aims ............................................................................................................................................................................................................. 17  
  Thesis themes ........................................................................................................................................................................................................... 17  
  Conceptual Framework: A dynamic interaction between migration and health ......................................................................................................................... 19  

Data and Methods .................................................................................................................................................................................................................. 21  
  The study population ................................................................................................................................................................................................... 21  
  Health and Socio-Demographic Surveillance System ............................................................................................................................................... 23  
  Definition of a household ................................................................................................................................................................................... 24  
  Definition of a temporary migrant ........................................................................................................................................................................... 24  
  Definition of a permanent migrant ........................................................................................................................................................................... 25  
  Cross sectional census modules .............................................................................................................................................................................. 25  
    Household assets ...................................................................................................................................................................................................... 26  
    Labour force participation .................................................................................................................................................................................... 26  
    Temporary migration ..................................................................................................................................................................................................... 26  
    Other data sources – national census data ...................................................................................................................................................... 26  
    Other data sources – sexual partnerships survey ...................................................................................................................................................... 27  
  Community linkages ......................................................................................................................................................................................................... 29  
  Ethical considerations ....................................................................................................................................................................................................... 29  
  Data quality .................................................................................................................................................................................................................. 30  
  The Data System ........................................................................................................................................................................................................... 31
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Analysis</td>
<td>31</td>
</tr>
<tr>
<td>Data limitations</td>
<td>31</td>
</tr>
<tr>
<td>Representativeness</td>
<td>31</td>
</tr>
<tr>
<td>Selection bias</td>
<td>32</td>
</tr>
<tr>
<td>Geographical limitation</td>
<td>32</td>
</tr>
<tr>
<td>Results</td>
<td>33</td>
</tr>
<tr>
<td>Migration patterns</td>
<td>33</td>
</tr>
<tr>
<td>Migration and socio-economic status</td>
<td>36</td>
</tr>
<tr>
<td>Migration, sexual partnerships and HIV</td>
<td>40</td>
</tr>
<tr>
<td>Migration and child mortality</td>
<td>43</td>
</tr>
<tr>
<td>Settlement of former refugees</td>
<td>45</td>
</tr>
<tr>
<td>Discussion</td>
<td>49</td>
</tr>
<tr>
<td>“Striving against Adversity: the Dynamics of Migration, Health and Poverty in Rural South Africa”</td>
<td>49</td>
</tr>
<tr>
<td>Permanent migration</td>
<td>49</td>
</tr>
<tr>
<td>Temporary migration</td>
<td>50</td>
</tr>
<tr>
<td>Settlement of former refugees</td>
<td>52</td>
</tr>
<tr>
<td>Existing data limitations and proposed solutions</td>
<td>54</td>
</tr>
<tr>
<td>The impact of migration on other health and demographic measures</td>
<td>54</td>
</tr>
<tr>
<td>Conclusion</td>
<td>55</td>
</tr>
<tr>
<td>References</td>
<td>57</td>
</tr>
</tbody>
</table>
Foreword

The Department of Community Health of the University of the Witwatersrand began a constructive presence in rural South Africa in 1982 at a district hospital called Tintswalo in the former Bantustan ‘homeland’ Gazankulu. This remote unit, called the Health Systems Development Unit (HSDU), sought to document the inadequacies of the Bantustan health care system and intervene with appropriate training, programmes and policy development. There was a chronic lack of accurate health information for health systems planning. Information from national censuses could not be trusted due to consistent undercount. Data from health care facilities were inaccurate due to inefficient health information systems, and a strong bias created by the fact that only the better-off or nearby portion of the population used the health services. The need of obtaining reliable information for planning, and addressing the challenges of health reform, notably decentralizing health system management, resulted in the formation of a new research and development initiative in 1992, the Community Practice Project (CPP). The strategy was to demarcate a sub-district field site and introduce/ evaluate local health programmes; in addition to conducting demographic surveillance as a basis for the health and population research.

My own path intersected with this Unit and these efforts in the late 1980’s as I worked as a health information systems developer for the Bantustan government of Gazankulu. I joined the Wits University HSDU in 1989. Under the leaderships of Steve Tollman, Kathy Kahn, John Gear, Roselyn Mazibuko, Shirley Ngwenya, Lauraine Viviane, Masingita Zwane, Thalita Madonsela and Elizabeth Malomane, I was part of the team that started the CPP mentioned above. This became the baseline for the Agincourt Health and Socio-Demographic Surveillance System (HDSS) that is described in this thesis. In 2004, the Unit became recognised as a Medical Research Council Unit with an institutional base in the School of Public Health, University of the Witwatersrand and an operational base at Tintswalo Hospital in Acornhoek. Since 1998 I have been the primary person responsible for overseeing the HDSS, both data and field aspects, and supporting the research lines embedded in the HDSS. In this capacity I have led the developments described in the data and methods section of the thesis. But the work itself has been possible with the autonomous leaderships of Mildred Shabangu, F. Xavier Gómez-Olivé, Rhian Twine and Wayne Twine (and others at Wits Rural Facility) and the hard work of Doreen Nkuna, Violet Chela, Lazarus Mona, Obed Mokoena and the supervisor team, Jeffrey Tibane and the LINC team, and the data team. The data technical leadership has been Samuel Clark and Benjamin Clark, and Kobus Herbst, all mentors and visionaries. The mentorship of Steve Tollman and Kathy Kahn has continued, along with the enduring strength of Steve’s directorship, and all of us supplemented by the demographic training received at the coal-face from Michel Garenne and Samuel Clark. The funders who have invested in the Agincourt Health and Socio-demographic surveillance system are warmly acknowledged for their vision and making the work possible: Wellcome Trust, UK; Medical Research Council, South Africa; National Research Foundation, South Africa; Department of Science and Technology, South Africa; Anglo-American Chairman’s Fund, South Africa; National Institutes of Health and Aging, USA; William and Flora Hewlett Foundation, USA; and, Andrew W. Mellon Foundation, USA. The communities of Bushbuckridge are gratefully acknowledged as active and not uncritical partners and the Mpumalanga Provincial Department of Health and Social Welfare who are also vital partners and stake-holders.
The base institution for this Doctorate is Umeå University, where the Division of Epidemiology has been involved in several HDSS field sites across the globe, bringing technical and scientific rigour to field based health and demographic surveillance. A partnership arose between South Africa and Sweden and to this I owe the institutional support for this PhD. My sincere thanks to my PhD supervisory group who have helped to give shape to the thesis and kept me encouraged along the way. Peter Byass and Gunnar Malmberg from Umeå University, Michael White from Brown University and Kathleen Kahn from the University of the Witwatersrand. The statistical work with longitudinal models was supported by Michael White, Samuel Clark, Philippe Bocquier and David Lindstrom. Thanks and appreciation is also extended to colleagues at Epidemiology and Public Health Sciences/ Centre for Global Health Research in Umeå. Stig Wall, Lars Weinehall, Peter Byass, Anders and Maria Emmelin, Anna-Lena Johansson, and a wide range of colleagues and friends. Other important partnerships that have advanced the Unit and my own scientific development has been four universities in the United States of America: Brown University, Population Studies and Training Center, in Providence, in particular Michael White, but several others listed at the end of the paragraph; the University of Colorado at Boulder, Population Aging Center, in particular Jane Menken and several others; Marta Tienda at the Office for Population Research, Princeton University, both for a visiting researcher residence in 2001 and recent collaborative work in children and migration; and Sally Findley at Mailman School of Public Health, Columbia University, New York. I credit Sally with the framework employed for the analysis displayed schematically as figure 1. Sally, Michael and I worked it out together in Providence but her experience brought the framework the shape it has. I must also thank Martin Wittenberg, Sangeetha Madhavan, Enid Schatz, Nicholas Townsend, Philippe Bocquier, Sharon Fonn, Jane Goodge, Eliya Zulu, Peter Byass, Brent Wolff, Randall Kuhn, Lori Hunter, Susan Short, Mark Lurie, Fred Golooba-Mutebi, Tara Polzer, Paul Pronyk, Julia Kim and James Hargreaves for imparting scientific skills and knowledge, the ideas of which are visible in the thesis.

During the same period the INDEPTH Network came into being with its leadership office in Accra, and from 2003 the Working Group for Migration and Urbanization was underway. I have led this working group together with the recently deceased friend and respected colleague, Kubaje Adazu. I remain the convener of the INDEPTH MUWG and am editing the first multi country volume, described in more detail in the thesis.

I have been a community member of the Bushbuckridge sub-district in South Africa’s rural northeast for over twenty years since I migrated here in 1986. It is where I have spent most of my adult life, built a family and become a person. The university presence is just one strand in the complex web of efforts striving for transformation in this part of South Africa. Its role includes both the documentation of and participation in the demographic, health and settlement transitions underway.

Mark Collinson, Acornhoek, 2009
Background

The study is based in post-apartheid South Africa and looks at the health and well being of households in the rural northeast. Rural settlements link with the urban system and migration spans these domains, but there is also inter-urban and inter-rural migration. Temporary migration is a key migration stream in South Africa because it functions as a mainstay for income and even survival of rural communities. The economic base of rural South Africans is surprisingly low because there is high inequity at a national level, within and between racial groups. Rural livelihoods were severely disrupted by the apartheid system and labour migration became entrenched by a combination of government coercion and industrial recruitment systems. There has now been a democratic system in place for 15 years and there is no longer restriction on mobility, but there remain high levels of poverty in rural areas. Migration patterns did not change after apartheid in the manner expected. There was not a major exodus to the metropolitan areas of families linked to labour migrants. Instead temporary migration itself increased, the participants got younger and the proportion of female temporary migrants grew.

Poverty is still pronounced in the rural areas and the HIV epidemic is advanced. Health problems of the past have not disappeared, but a health transition is underway adding a burden of non-communicable disease. There are some government services and programmes aimed at addressing poverty and developing health systems, but many communities feel neglected by the new democratic government and development has been slow. As interventions and services are developed they need to work in step with household migration strategies. Good evidence is required of the negative consequences of migration to inform people about the risks involved.
Introduction

Defining migration

At its most basic migration implies change. A well known definition is that ‘migration is a change in usual place of residence’ (Bilsborrow 1998). Beyond this there is much less precision on what migration actually means. In a classic paper in 1971 Zelinsky says, ‘What do we mean by migration? No general consensus is likely to come for some time, since we are confronted here by a physical-social transaction, not just an unequivocal biological event.’ (Zelinsky 1971) A definition of migration should include at least two dimensions, namely temporal and spatial, but this may not be enough. The spatial dimension refers to a change in place of residence from a place of origin to a destination. There may be a reference to a spatial boundary called a migration defining boundary which needs to be crossed to satisfy the spatial criterion of the definition. The scale of a migration defining boundary can vary widely, from a national border, used to define an international migrant, to a provincial boundary, used to define an internal migration, or a district boundary used to define the population requiring district services. Attempts to standardise migration definitions in more recent times have tried to limit the migration defining boundary to a political or administrative boundary to make it measureable from standard data sources (Bilsborrow 1998). Even early theorists noted that ‘the chance that a migration will be noted rises as the size of the areal unit decreases’ (Zelinsky 1971). This issue has particularly confounded cross-national comparisons of migration rates (Raymer and Rogers 2006). Zelinsky also highlighted that migration means a change in both spatial and social locus. One last illustrative quote from this paper, talking about migration in the United States forty years ago, ‘Which family is more migratory, the one transferred 3000 miles across the continent by an employer to be plugged into a suburb almost duplicating its former neighbourhood, or the black family that moves a city block into a previously white district?’ (Zelinsky 1971).

The second dimension required in a migration definition is time, captured in the definition above as ‘usual’ residence. A migration is a change from one usual place of residence to another but the adjective ‘usual’ needs definition. It implies that people are mobile and we cannot always expect to find them where they usually reside. There are movements to work as in commuting, family responsibilities that may require a weekend away to visit parents, or recreational trips like going to the coast for a week’s holiday, but we know these are not migration because these don’t change the usual place of residence. For precision there is usually a time threshold defined, Bilsborrow calls it a ‘probationary period’ (Bilsborrow 1998), which a person must cross to be considered a usual resident and therefore a migrant. Examples include ‘four nights out of the previous seven’ used in a national census, or, ‘resident for at least six months’ in a longitudinal data collection initiative.

The complexity of migration definition does not stop there. A person may change their usual place of residence more than once in a given period making migration a repeatable event. What is more, it can be repeated in different ways. One pattern of repeated migrations is step migration (White and Lindstrom 2005), which involves a sequence of moves from smaller to larger places, rather than a single leap from village to metropolis. This may occur because it is easier to make the financial and social transitions required by the move.
Another way of stringing migrations together is oscillation between two or more usual places of residence, for example between a rural home and an urban work place. A pattern of repeated seasonal migrations or routine trips between origin and destination is termed circular migration (White and Lindstrom 2005). Usually this involves rural-to-rural or rural-to-urban circulation. Oucho states that in sub-Saharan Africa circular migration is the dominant form of migration (Oucho 1998). It is also well known in Asia (Hugo 1982). Bilsborrow states that from a migration classification perspective the larger class is temporary migration, of which seasonal migration, labour migration and circulation are sub-classes (Bilsborrow 1998). While he encourages migration scholars to think of circulation as a series of short duration circular moves, for example repeated monthly cycles, this attempt at standardization failed to stick in South Africa where circulation of different kinds has been underway for a century (Collinson et al. 2006; Posel 2006; Wilson 2001). Circulation and temporary migration have been seen as synonymous categories in South African migration literature, of which labour migration is a sub-set. As will be seen later in the thesis (in table 11. Page 45) the periodicity of circulation covers weekly, monthly, quarterly, annual and irregular cycles, but each with the defining characteristic that the migrant remains a de jure member of the origin household while away from home. This occurs because the rural base retains some value that the migrant does not want to lose by moving the whole family out. Theories on the motivations underpinning circulation are described below. Due to the definition of temporary migration it has been necessary to describe non-temporary migration as ‘permanent’, but this classification is unfortunate because they are rarely permanent moves and the degree of permanence is unknowable (Bilsborrow 1998). Nevertheless, this thesis follows the tradition of calling a more-or-less permanent change of residence a permanent migration, with the aim of distinguishing it from temporary migration. There are grey areas between temporary and permanent migration because a move classified as one can become the other by a migrant changing his or her behaviour, e.g. no longer returning home. Nevertheless, the thesis aims to show that despite the fuzzy boundaries it is important to make the distinction between permanent and temporary migration because they have different gender, socio-economic and health implications.

Determinants of migration
Theoretical approaches to understanding migration reportedly lean back to an intervention by William Farr, the forefather of medical statistics, remarking to Ernest Ravenstein that migration appeared to go on without any definite law, as reported by Everett Lee in 1966. Ravenstein’s reaction was to examine the 1881 British census and look for regularities (Lee 1966). His resulting ‘Laws of Migration’ remain the starting point for most theoretical exegeses. The ‘Laws’ cover issues such as distance: migrants generally cover shorter distances, except when travelling to a ‘great centre of commerce and industry’; migration stages: large industrial centres draw migrants from nearby towns, which in turn draw migrants from more remote areas, and the effect ripples outwards; stream and counter-stream: ‘currents of migration produce counter-currents’; urban-rural differences exist in the propensity to migrate (Ravenstein 1885); there is a predominance of females among short distance migrants; the growth of technology leads to increased migration; and, economic motives dominate (Ravenstein 1889) (Lee 1966).

Lee refined and refurbished the theory in 1966 (Lee 1966). He highlights a balance of positive and negative factors at origin and destination driving the migration decision for an individual
actor. The likelihood of migration is mediated by intervening obstacles including distance, immigration laws and other factors. Lee addresses the important issue of migration selection. People have different attributes and as such any balance of factors between origin and destination are subjectively determined. A person’s outlook, skill and health status changes the way local conditions compare to those at destination. As he puts it, ‘migrants are not a random sample of the population at origin’. There is also negative selection, whereby people move because something has failed or they are forced to move. The overall distribution of migration selection is bimodal, and heaped at the positive and negative ends (Lee 1966). This cost-benefit approach is an individual level of analysis and it is given a classical structure by Todaro (Harris and Todaro 1970; Todaro 1969). Further, each person has a life cycle and their needs vary along a life-course. Migration may be a ‘rite of passage’, such that people who enter the labour market or get married tend to migrate from their parental home. Also people who divorce or separate tend to move away. Similarly, retirement is associated with moving back to the community of origin. Since these events happen at particular ages the shape of the age curve is quite regular (Rogers and Castro 1981; Collinson 2009).

Later theoretical work expanded these concepts in a range of important ways (Massey 1990). Firstly, individuals are grouped into households and the household is a key organizing structure for migration. Another meso-level concept is the migrant social network which explains where people go and how the momentum of migration builds over time. Thirdly, the importance of place has come into focus and how political, social, cultural and economic structures and institutions shape the options people face. Lastly, a dynamic perspective is introduced, whereby there are feedback loops such that migration influences households and communities in a way that promotes further migration. Communities also exhibit changing migration propensities and a key factor is the extent and type of previous migration. The theoretical space is now dynamic and multi-levelled. An important theoretical development is that the household is a key unit of analysis.

In the cost-benefit model described above the individual seems to be making the decision to migrate in isolation. As such if they go they are lost to the family, which may be positive because there are less mouths to feed, or negative, because their labour has been removed (Harris and Todaro 1970). In reality, however, decisions are situated in families and social networks. A more dynamic interplay between family and migrant is necessary and household characteristics must be included. Households in themselves are dynamic and can undergo changes in size and structure as people come and go, are born or die. The relative position in household life cycle, as with an individual’s, affects migration rates (Clark, Deurloo and Dieleman 2003; Lee 1966; White and Lindstrom 2005). Household size and composition can be important determinants: the income or employment status of a spouse, or numbers of young children in the household, can impact on the decision to migrate. Critical aspects are whether there is access to child care to look after a migrant’s child (Ardington, Case and Hosegood 2007). Another is socio-economic status, because migration has costs involved in transportation, subsistence, accommodation, job search etc. It is much harder for a poor family to send a migrant, so there is also a selection at a household level because better off households can be more likely to send a migrant and may also have more income due to migrant remittances (Kuhn 2005). In high income societies, marriage, home ownership and large family size are factors associated with low levels of mobility (White and Lindstrom 2005).
The ‘New Economics of Labour Migration’ is a paradigm where it is argued that a household makes strategic decisions with respect to migration, for example sending a young adult male to a city to work (Taylor 1999; White 2009). This is not just for higher income, which would imply that they would choose the destination with highest wages, but is seen as a risk management strategy. Assuming he gets a job the migrant will then participate in a different economy and not be subjected to the same climatic and economic forces as the original household. Destinations offering short-term economic opportunities may thus be chosen above destinations that might produce higher wages. This kind of circulation gives access to resources that would otherwise be hard to access due to the underdevelopment of financial markets, such as insurance or access to credit. Through remittances, the migration increases investment capital for both movers and stayers (Stark and Bloom 1985; Stark and Levhari 1982). Remittance transfers are driven by shared expectations about the obligations of kinship (Massey 1990), and are also economically self-reinforcing (Lucas and Stark 1985).

Theories of transnational migration bring in the importance of social networks to the migration decision and choice of destination. Migrant networks are social ties between household members and previous migrants from the same household, neighbourhood or village. This network provides the social, economic and political solidarity that underpin the flow of information, investment and trade (Faist 2000; Portes 1996). The theory emphasises that most migrants go to where they have most connections (Massey and Espinosa 1997).

Theories of relative deprivation and cumulative causation are further developments that explain migration at the meso-level. In the context of modernisation, relative deprivation occurs when there are previous migrants that have a conspicuous advantage in the origin community. The infusion of money from outside the community increases the sense of relative deprivation among non-migrants (Brettel 1979; Pessar 1982). According to Stark, household well-being and satisfaction arise not only from improvements in absolute socio-economic status, but also through comparison to other households in the community (Stark, Taylor and Yitzhali 1986; Stark and Yitzhaki 1988). The combination of social networks and relative deprivation work together to create a cumulative force that drives and guides migration (Massey 1990). Massey calls this cumulative causation after the concept first introduced by Myrdal in 1957 (Massey 1990; Myrdal 1957).

There are also structural and community (macro-level) factors impacting on migration. The political economy in any location prescribes a set of options available for migrants and may also create an impetus to migrate (Massey 1990; Massey et al. 1998). World systems theory describes how there are specific social and economic transformations that mobilize labour through the creation of geographic inequalities in wealth and opportunity (Portes and Walton 1981). Global capital establishes core and peripheral economies and this structure is maintained by labour market and commodity controls which pressurise migrants to move from weaker to stronger economies. Labour migration in South Africa is a case in point. Burawoy describes how labour migration was enforced under apartheid with specific legal and political mechanisms to regulate geographic mobility. The migrant is deliberately kept powerless in the place of employment and becomes dependent on employment in one place and reproduction in another. Thus, the cost of labour renewal, i.e. bringing up working class children, is borne by the family in impoverished Bantustans outside the remit of the employer or state (Burawoy 1976). Colonial industries of
this type operated in other parts of Africa and have played a major role in shaping the migration patterns seen decades after independence (Oucho and Gould 1993).

Findley highlights other aspects of community factors impacting on migration (Findley 1987). They function additively to change the probability of migration for all community members, such as improved transport systems (a positive community factor), or high unemployment rates on nearby commercial farms (a negative community factor). But, community variables also act through intervening in individual and household factors, as when inequality of access to land affects the likelihood that different households own land, which in turn determines their probability of migration (Findley 1987; Massey 1990; Punpuing and Guest 2009). A community factor that mediates opportunities in this way is gender which greatly influences migration decision making. In South Africa the increase in female labour migration from rural areas after democracy may show that women have become more empowered or that increasing labour market insecurity has forced women to migrate to work to avoid destitution (Posel 2006). Migration networks are often gendered, for example female networks in Mexico are more important for internal, compared to international moves to the United States in which male networks facilitate male migration and female networks female migration (Curran and Rivero-Fuentes 2003).

**Economic consequences of migration**

Migration is fundamentally linked to changes in the socioeconomic status of individuals and households (Guest 2006; White 2009). It is usually seen as a livelihood strategy (Lucas 1997; Quisumbing and McNiven 2007; Stark and Bloom 1985), however not all migrants are successful and the links to socioeconomic status in the sending household depend on whether or not the migrant becomes employed (Aliber 2003; White 2009).

Evidence has built over decades that a large proportion of migrants in Africa remit back to their rural home. For example Adepoju shows in 1974 that approximately 60% of the migrants in Oshugbo (Nigeria) were sending money to their home area (Adepoju 1974), while Johnson and Whitelaw found 89% of migrants sending money out of Nairobi (Johnson and Whitelaw 1974). Gubert shows that 51% of households in a rural Senegalese population receive remittances from migrants abroad (Gubert 2002). Mechanisms were discussed above as theories of New Economics of Labour Migration (Taylor 1999) and Transnational Migration (Kuhn 2005). The NELM posits that in the presence of imperfect markets or credit constraints migration may complement productivity in rural areas by relaxing credit or risk constraints; relative deprivation may serve as a stimulus or trigger for migration. Most authors concur that the relevant level of analysis is the household or community (Azam and Gubert 2006), since investment is required to send a migrant and improve their education prior to migration.

The motivating force that keeps remittances flowing has been a subject of study. There are ties that bind the migrant to the rural household and two positions are prominent. Altruistic theories argue that migrants act to improve the welfare of family members (Agarwal and Horowitz 2002) and the remittances respond to the needs of families. The other is that there are contractual arrangements, also called ‘enlightened self-interest’ (Lucas and Stark 1985), in which remittances represent the outcome of an implicit contract between the migrant and the household. Lucas and Stark examine prevailing motives for remittance behaviour in Botswana and conclude that both occur (Lucas and Stark 1985). Migrants provide an insurance against hard times, as
evidenced by the remittance amount increasing when droughts threaten livestock, thus migrants exhibit altruism (Azam and Gubert 2006). Yet, wealthier families receive more than poorer ones, which they interpret as migrants defending their inheritance, thus self-interest. The same blend of motivations is supported by work in Kenya (Hoddinott 1994). Van Wey explores it in Thailand and finds that both contractual and altruistic motives are important, but they are discriminated by gender and socioeconomic status. Most women and poorer men behave more altruistically while most men and better-off migrants behave more contractually (Van Wey 2004). An added dimension is that migrants may be motivated to remit in order that the sending household retains social standing. Azam and Gubert show that in Senegal this imperative is self-interest because if a household loses social standing the migrant can be expelled from the migrant network in the workplace, which would have consequences for the supports they receive, even far from home (Azam and Gubert 2006).

The key question in the literature is whether households and communities are worse or better off for sending migrants. There is no unequivocal answer and researchers have found support for each perspective in different communities. In a study in 1976, Rempell and Lobdell review fifty studies in developing world settings and show that remittances mostly increase consumption, education and better housing, but development impacts are higher from return migration than from remittances (Rempel and Lobdell 1978). Oberai, Prasad and Sardana claim that remittances raise the incomes of poorer households in India (Oberai, Prasad and Sardana 1989). On reviewing the literature in Thailand, Skeldon shows that the poorest community member tend to be left behind by wealthier out-migrants. The impact of remittances are more positive from international migration than internal, but the impact of internal remittances can also be substantial (Skeldon 1997), a finding confirmed by Kuhn in Bangladesh (Kuhn 2005). Return migrants also contribute to communities through bringing back new ideas and attitudes toward family size (Skeldon 1997), and education (Alam and Streatfield 2009). Skeldon concludes that migration can have negative impacts for sending communities, but the balance is positive. Guest shows that remittances produces income multiplier effect in rural economies and that remittances tend to reduce inequality among rural households (Guest 1998). In South Africa, Leibrandt and colleagues examine this inequity issue by looking at what contribution different types of income make to resolving inter-household inequality in rural areas. Three income types emerge as most influential: remittances from temporary migrants, income from local employment and government grants. Remittances and grants tend to lessen inter-household inequality and are more important at the poorer end of the socio-economic spectrum, while incomes from local employment actually increase inter-household inequality and are more relevant in the upper half of the distribution (Leibbrandt, Woolard and Woolard 2000). At the macro level, in developing countries, Chen and Zlotnik report that net rural-to-urban migration is positively correlated with gross national product growth and indicators of socioeconomic status and health (Chen, Valente and Zlotnik 1998).

The arguments that migration is negative for rural development cover a range of important perspectives. The main issue is that out-migration can exacerbate labour shortages leading to negative net impacts on farm incomes (Lucas 1997; Punpuing and Guest 2009; Quisumbing and McNiven 2007). Migrants may earn less than non-migrants with equivalent qualifications in their place of destination, hence comprising a large segment of the urban poor (Guest 2006).
INTRODUCTION

Lipton builds this case and argues that out-migration increases inter-household inequality, because only the better off households can benefit from remittances (Lipton 1980). Furthermore, dependence on remittances serves as a means of retaining traditional systems in rural areas and therefore serves as a brake for development (Azam and Gubert 2006). Azam and Gubert also argue that although migrant remittances are used for investing in agricultural production, the overall contribution is negative because households that rely on migrant remittances are less driven to farm efficiently. Van Wey reports that that the level of community organisation in Mexico influences whether there are benefits to the whole community from migrant remittances. If community structures are organised they can solicit support for community projects from migrant remittances which otherwise would increase inequity (Van Wey, Tucker and McConnell 2005).

The debate continues and longitudinal data are needed to help resolve it. Typically, inferences about the impact of migration are made from censuses or broad cross-sectional studies, such as the Demographic and Health Surveys or the Living Standards and Measurement Surveys, which have broad population coverage but limited timing or residential histories (White 2009). Without longitudinal data it is hard to disentangle selection from causality, or general development from selective improvement.

Migration and HIV

Historically, for as long as local opportunities have failed to meet the needs of aspirant people there has been out-migration. Shorter reviewed the epidemics of gonorrhea and syphilis in late 18th century France and neurosyphilis in late 19th century Europe in North America and concluded that the context of increased human mobility, especially rural-to-urban migration of men, was the most critical factor in these sexually transmitted epidemics (Shorter 1992). Men would get infected in towns, then pass the infection on to their wives in villages. His aim was to draw a parallel with the contemporary spread of HIV. Migration is linked with HIV in most literature that examines the relationship in sub-Saharan Africa (Decosas et al. 1995; Evian 1993; Lurie et al. 1997b; Nunn et al. 1995; Pison et al. 1993; Quinn 1994). The mechanism of transmission is essentially similar to the spread of syphilis in Europe and America, although recent studies caution us against stereotyping the relationship. The concepts used to explain how migration relates to HIV are selection, contextual factors, and disruption in family networks that expose people to risky sexual partnerships. Parameters include the stage of the epidemic, the migration context and the nature of sexual networks. In South Africa the frequent occurrence of temporary, circular migration set the stage for a rapidly manifesting HIV epidemic.

Selection for temporary migration can be evaluated at a community level. Communities are not equally likely to send migrants. Populations are prone to temporary migration if they are impoverished and have few opportunities for employment. The migrant labour policies in South Africa under apartheid were notorious for establishing a mobility regime that recruited workers for mines and industries from densely settled Bantustans, but otherwise restricted mobility (Crush 2002; Evian 1995; Lurie et al. 1997a). Since the onset of democracy migration has increased, with migrant streams becoming more feminised (Posel and Casale 2002) and younger (Collinson et al. 2006b).

Selection also occurs at an individual level because migrants are typically young, adult males, and the healthiest of these are the most likely to migrate (Garenne 2006; Lu 2008). They may
also be at higher risk of acquiring a sexually transmitted disease due to risk-taking tendencies. Voluntary migration between different social and economic environments requires a certain progressiveness (Moreno 1994). This tendency to take risks in the early part of their life may translate into sexual conduct as well. Temporary, circular migration may continue for several decades with migrants remaining more likely than non-migrants to engage in unprotected sex with outside partners (Brockerhoff and Biddlecom 1999). Women are also selected for age and health, with young women more likely to migrate, but the selection works differently than for men. Permanent migration has marriage as a primary motivation, but economic- or education-related migration is usually made by single or formerly married persons and these women may have increased tendency for unsafe sex. There may also be a reliance on men, usually older men, for sufficient income (Brockerhoff and Biddlecom 1999; Caldwell, Caldwell and Quiggin 1989).

Migration mediates a change in environments, Figure 1 page 19, which also changes exposures. Temporary migrants often work and live in cities without their families. The separation can disrupt family life and regular sexual relations. The separation may also produce a void of social control such that migrants are less constrained by social norms (Brockerhoff and Biddlecom 1999; Lurie 2000; Yang, Derlega and Luo 2007). The sex ratio in the work place is very different to normal communities due to labour recruiting practices. Male work environments can be more conducive to casual sex and drinking alcohol than in rural areas (Brockerhoff and Biddlecom 1999; Yang et al. 2007), especially since there can be high levels of anxiety associated with familial disruption (Jochelson, Mothibeli and Leger 1991). Yang, Derlega and Luo show that in China, another context with high levels of temporary migration, the relationship between migration and unprotected sex is driven mostly by the relaxing of social controls, and less by ‘social isolation’ or ‘migrant selection’ (Yang et al. 2007).

Having a migrant partner away from home can also change sexual networks for a spouse or home partner. While community level constraints on behaviour change less for a home based partner than for the migrant, the combination of sexual and financial needs can increase their risk of extra-marital partners. The combination of change in the sexual networks at both ends of the migration cycle, and having sex without condoms, has been documented as the key link to the spread of HIV (Brockerhoff and Biddlecom 1999; Lurie et al. 2003b; Zuma et al. 2003).

Lurie and colleagues studied migration and HIV infection in South Africa in the late 1990’s. They tested a random sample of migrant men (n=196) in their work-place, and followed up their rural partners (n=130). Then they took a sample of non-migrant men (n=64) and women whose partners were not migrant (n=98). HIV test results showed that 26% of migrant men and 13% of non-migrant men were infected with HIV. Being a partner of a migrant was not a significant risk factor for HIV infection. But, for women, having more than one current partner significantly increased their risk of HIV after controlling for migration status (Lurie et al. 2003a). The comparison of HIV status within couples gave the first empirical challenge to the stereotype that male migrants infect their wives on return. Seventy percent of couples were negatively concordant for HIV, 9% were positively concordant, and these were significantly more likely to be migrant couples. But, of the 21% who were discordant, in 71% it was the male that was infected and in 29% the home-based rural spouse was infected, not the migrant. The study did, however, show that migrant men were 26 times more likely to be infected from outside their regular relationships
than from inside (Lurie et al. 2003b). In another study, Zuma and Lurie show that infection by another sexually transmitted disease vastly increases the risk of HIV infection and the risk factors for these are very similar to HIV infection, namely that it is migrant men who are at the greatest risk (Zuma et al. 2005).

Brockerhoff and Biddlecom analysed the Kenyan Demographic and Health Survey in 1993 to examine whether migrants are more likely than non-migrants to have multiple recent partners and not use condoms (Brockerhoff and Biddlecom 1999). Results showed that migration is a critical factor but that the risk varies by gender and the direction of movement. After controlling for factors associated with sexual behaviour, women who migrated between two urban places were much less likely to engage in sexual practices conducive to HIV, but male urban-to-urban migrants experienced twice the risk compared to non-migrants. For women it was the rural-to-rural migrants most likely to have unsafe sex. The authors concluded that this was due to selection and the disruption from normal relationship controls, in particular a lack of family members to negotiate relationships. Newly migrant females in rural areas also have lower access to contraception, another form of disruption.

In summary, southern Africa has high volumes of temporary migration which has contributed to the spread of HIV in the region. Migrants employed by the mines, industrial complexes and commercial farms are often single persons who are at risk of multiple partnerships and sexually transmitted diseases (Garenne 2006; Jochelson et al. 1991; Lurie et al. 1997b; Lurie et al. 2003b).

Migration and child mortality

Child mortality is a prominent indicator of health status. It is sensitive to community and household factors and impacts acutely on the wellbeing of households. Understanding the factors influencing child mortality has been a requirement of medical and social science for many decades, but less is known about behavioural and social determinants of child mortality than about biological ones (Das Gupta 1990). Kanaiaupuni and Donato express a framework for understanding how migration affects child health and mortality by changing economic resources and investment patterns of individuals and communities, altering familial and social networks, and providing new information about health (Kanaiaupuni and Donato 1999). More details are given in a framework by Garenne which expresses that migration and health have a bidirectional relationship that can be positive or negative depending on a range of factors associated with migration (Garenne 2006). These include the physical environment, the disease environment, food availability, access to health services and the training of health personnel, housing, income and education. Behaviour is also mediated by migration in ways that can be deleterious, such as smoking, drinking alcohol, overeating or poor diet, or favourable, such as health awareness, health seeking behaviour and improved diet (Garenne 2006).

A classic model for understanding the interactive impact of social and biological factors on infant and child mortality is that of Mosley and Chen. This model identifies five groups of proximate determinants of child health: factors related to the mother, such as age, parity and birth interval; environmental contamination; nutrient deficiency; injury; and personal illness control (Mosley and Chen 1984). Parity is closely associated with maternal age and has a U-shaped relationship to infant mortality: the risks appear highest among very young and older mothers.
at the first and highest parities (Bross and Shapiro 1982; Murrells et al. 1985). Children with closely spaced siblings tend to suffer higher mortality (Seer et al. 2002) through the depletion of the mother’s physical resources, as well as sibling competition for care and nutrition (Alam 1995; Cleland and Sathar 1984; Hobcraft, McDonald and Rutstein 1984).

Mosley and Chen assert that each of the factors listed above are influenced by socio-economic determinants, which include (1) individual variables such as productivity, as measured by education, occupation, norms and attitudes; (2) household variables such as income and wealth; and (3) community variables such as ecological setting, political economy, and the health system (Mosley and Chen 1984). The framework implies that variation in child mortality between households within a given community can be explained by differentials in socio-economic factors. Caldwell, studying child mortality in West Africa, notes that maternal education explains more variance in child mortality than all other socio-economic measures (Caldwell 1979). Das Gupta argues that in rural Punjab, several biological and socio-economic factors influence child mortality, but there is a residual variation that persists after these factors are accounted for. She identifies a tendency for child deaths to cluster within families after controlling for social and biological variables (Das Gupta 1990, 1997). She posits that this clustering of deaths can be explained by the basic abilities and personality characteristics of the mother, independently of education, occupation, income and wealth.

The utilisation of health services can have a key effect on child mortality, either directly or indirectly. The direct effect is either to improve preventative behaviour, through enhancing knowledge, attitudes and skills, for example through attendance of antenatal clinics, or through direct medical intervention in the case of child illness. But, more important perhaps is the indirect effect that utilisation of health services is an indicator of all round competence in childcare. It requires sufficient care and aptitude to recognize symptoms of ill-health and act on them, and to be motivated to incorporate preventative measures into daily life. These can indicate a propensity to other beneficial behaviours of caregivers such as cleanliness, self-discipline, etc. Health service utilisation is strongly influenced by maternal education (Caldwell 1979), as well as community level factors such as access to services (Rishpon, Epstein and Egoz 1985), quality of care (Rishpon et al. 1985) and transport availability (Aziz, Biloo and Samad 2001). As expressed above these factors are in turn correlated with socio-economic status (Aziz et al. 2001; Caldwell 1979).

The current thesis focuses on mothers and fathers and how their presence or absence influences child mortality. The lack of mother, father or other relatives to provide child care or economic support is likely to affect the child’s probability of surviving to adulthood (Seer et al. 2002). Reher and Gonzáles-Quinones explore mechanisms for explaining the importance of parental presence and absence for the health and well-being of children (Reher and Gonzáles-Quinones 2003). An infant’s birth weight is influenced by the mother’s nutritional status and health. Initially a newborn child depends completely on the mother for nourishment and after weaning mothers tend to control the way infant feeding practices are implemented. Breastfeeding may have a direct effect on infant survival associated with the all round nutritional, hygienic and immunity benefits, as well as the indirect benefit of contributing positively to birth spacing (Lantz, Partin and Palloni 1992; Pinto Aguirre, Palloni and Jones 1998). Mothers are instrumental in ensuring adequate growth for their infants, shielding them from debilitating
INTRODUCTION

infections and nursing them back to full health and nutritional status as they recover (Reher and Gonzáles-Quiñones 2003). The economic contribution of mothers to the living standards of the household is another form of intervention. Fathers share this economic role, though their direct impact on child health is probably much smaller. Reher and Gonzáles-Quiñones suggest that mothers are more important than fathers for the health of their children, but for child development both parents are equally important. They also purport that a mother’s importance for child health can differ by the age and sex of the child (Reher and Gonzáles-Quiñones 2003). Parental presence can be influenced by migration of various types or by death (Townsend, Madhavan and Carey 2006). Death of a mother has a calamitous impact on child mortality (Reher and Gonzáles-Quiñones 2003). The impact of a mother’s migration depends on the type of migration, whether or not the child accompanies the mother, quality of child care available and whether there are economic advantages due to remittances. A father’s death or permanent out-migration can be deleterious for child health but temporary migration can be indifferent because the absence is offset by the presence of the mother (Reher and Gonzáles-Quiñones 2003). Father’s who live elsewhere can remain in touch and contribute to child development after migration particularly through remittances (Townsend et al. 2006).

Kanaiaupuni and Donato examine the impact of migration on child mortality at different stages of migration intensity and remittance levels, using retrospective and prospective data from Mexican rural villages. They conclude that migration is a cumulative process and the mortality impacts vary at different stages of its progression. Communities experiencing intense migration to the United States have higher rates of child mortality compared to communities that do not. This is attributed to familial disruption. Two factors however diminish these impacts and do so increasingly over time. Firstly, migrant remittances accumulate and as they increase child mortality decreases due to improved living standards. Secondly, as migration becomes increasingly institutionalized child mortality risks lessen. Eventually, the findings show benefits of migration for child survival irrespective of household migration experience (Kanaiaupuni and Donato 1999).

Settlement of former refugees

The crossing of Mozambicans into adjacent countries, namely South Africa, Swaziland, Zimbabwe and Malawi, in the mid-to-late 1980s, fleeing from a vicious civil war between government FRELIMO forces and rebel RENAMO forces, has been documented (Dolan et al. 1997; Har-greaves et al. 2004). Refugees from rural Mozambique fled north, west and south, and around 300 000 persons relocated to the northeast of South Africa. Internationally displaced persons are usually regarded as populations at risk of extreme health inequities (Feacham 2000) (Simmonds, Vaughn and William-Gunn 1986; Spiegel et al. 2002). It is also reported that many refugee communities have been living in host countries for more than ten years, with significant numbers of self-settled refugees staying after the conflict is resolved (Jacobsen 2001).

On arrival in the Agincourt sub-district Mozambicans settled mostly in areas demarcated by chiefs on the less habitable outskirts of existing villages, the so-called refugee villages. In the late 1990s Dolan and colleagues describe the situation ten years after the Mozambicans had been settled. The most critical factor impacting on the well-being in the community was lack of legal status. When they arrived their refugee status was not acknowledged, but the South African
authorities allowed them to settle in the former ‘Bantustan’ areas. This placed them in a “legal vacuum” (Dolan et al. 1997) which hampered both aid efforts related to their refugee status, and labour vulnerabilities within their economic lives in South Africa. Refugee villages are environmentally impoverished. Around 74% of households collect water daily and the distance to the water is four times further away than for South Africans, for whom 68% percent of households collect water daily. Concerning sanitation about half of the Mozambique sample have no toilet other than the bush and this is the same for 22% of South Africans. This shows weak infrastructure for both sub-populations but very low indeed for former refugees. The refugee villages showed persistently poor economic status when compared to their host populations (Dolan et al. 1997).

In 1992 group refugee status was granted through UNHCR intervention with South Africa and Mozambique. This did not however resolve the legal vacuum, because identification papers were only awarded to those who wanted to repatriate. While two major programmes were undertaken to support voluntary repatriation, one by the UNHCR in 1993/4 and one by the University of the Witwatersrand Refugee Research Programme in 1997/8, it could be seen in the Agincourt HDSS that repatriation efforts were not well taken up. The data shows that out of the 22,000 settled refugees a net out-migration back to Mozambique was less than a thousand in the 1990s. This movement occurred in the two waves corresponding to voluntary repatriation efforts. The moves were primarily of women and children (Collinson et al. 2000). It became clear that the former refugees opted for life in South Africa rather than back in the uncertainty of their place of origin. In the discussion this is examined in the light of mortality differential between rural Mozambique and rural South Africa which makes it a rational decision to prefer to stay in South Africa (Garenne 2006).

Hargreaves and colleagues report the higher mortality risk for children of Mozambican parents compared to South Africans (Hargreaves et al. 2004). The mortality burden for Mozambicans occurs in the 1–4 year age group because infant mortality does not vary between refugee villages and mixed villages. The parity of mortality rates for infants is partially explained by the benefits of breast feeding. With Mozambican women being less mobile their infants benefit from the protection and nutrition of breast-feeding and the negative environmental factors of the Mozambican settlement types are slightly balanced out. In the age group 1–4 years that modest protection has gone and mortality is significantly higher in the former refugee villages. Mortality in the refugee villages was higher than for Mozambicans living in mixed villages, who had mortality rates closer to the South African host mortality rate. There was a significant difference in infant and child mortality rates between Mozambican refugee children living in recognised refugee settlements and those from homes located in more established, mixed nationality villages. The refugee settlements were worse for infants and children with an adjusted risk ratio (RR) = 1.50, (95% CI: 1.01, 2.22) for infants aged 0–1 and RR=1.34, (95% CI: 0.95, 1.89) for 1–4 year olds (Hargreaves et al. 2004).

Two central constructs relating migration and health in cross-border migration are selection and assimilation (Jasso et al. 2004). These concepts are used in earlier parts of the thesis and they are useful here again. Jasso and colleagues focus on immigrants into the United States from Mexico. They are selected for health and have lower levels of disease especially chronic disease. Migrants are generally positively selected for health although it is not a given. This varies for
migration type and health condition. Acculturation is the process of picking up local ways. The speed at which local norms are picked up is often studied through language, i.e. assessing whether the in-migrant has acquired the capability of speaking the local language. Assimilation is the same idea expressed as changes in the health trajectory of the migrant, after migration has occurred. Do second generation immigrants have mortality rates closer to the host population? Also, the general socio-economic status will improve over time as the settled migrants become more integrated. In the case of cross-border forced migrants, they are negatively selected due to the crisis they faced and positively selected due to the stress of the migration itself which took a toll on the weaker and older migrants. The issues of selection and assimilation of former Mozambican refugees are examined in the discussion section, page 52.

**Migration and demographic surveillance**

Migration is a dynamic phenomenon, fundamentally linked to change and embedded in households and communities that are also changing. Limitations have often been imposed on the study of migration due to the absence of longitudinal data. Studying migration with a cross sectional dataset is like studying the dynamics of a person walking by looking at a photograph, one foot stretched out in front of the other, assuming that the other foot will move forward. A lot can be learned from a cross-sectional dataset, but the dynamics need to be captured in a longitudinal system. The Agincourt Health and Socio-Demographic Surveillance system is such a longitudinal system and provides the data for this thesis, the details of which are given below.
Aims

Overall aims
To better understand the dynamics of migration in rural South Africa in a fifteen year period following the end of apartheid, where, historically, labour migration was imposed and urbanisation suppressed. A longitudinal perspective is used to evaluate the impact of migration on socio-economic change at household and community levels in the communities left behind, and to study health outcomes for individual migrants and their families in this impoverished community.

Specific aims
1. To determine a relevant typology of migration in a typical rural sending community, namely the Agincourt sub-district of Mpumalanga, South Africa, and relate it to the urban transition at a national level – Paper (I).
2. To evaluate the dynamics of socio-economic status in this rural community and examine the relationship with migration – Papers (II) and (III).
3. To explore, using longitudinal methods, the impact of migration on key dimensions of health, including adult and child mortality, and sexual partnerships over a period of an emerging HIV/AIDS epidemic – Papers (III), (IV) and (V).

Thesis themes
The thesis addresses four key themes.
1. Patterns of male and female migration including prevalence and trends of permanent and temporary migration.
2. Migration surveillance as a dimension of demographic and health surveillance in a rural sub-district of South Africa.
3. Migration as a factor impacting on household and community socio-economic status in a rural sending community
4. Migration as a factor impacting on the health of migrants, their partners and children

Table 1 presents a matrix that highlights, by theme, the key points from each paper.
**Table 1: Indicates the key themes of this work and their relation to the five papers presented**

<table>
<thead>
<tr>
<th>Themes</th>
<th>Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Settlement change and health</td>
<td>II. Poverty dynamics and migration</td>
</tr>
<tr>
<td>Male and female migration patterns</td>
<td>III. Male labour migration and HIV risk behaviour</td>
</tr>
<tr>
<td>Data and methods</td>
<td>IV. Returning home to die</td>
</tr>
<tr>
<td>Migration impact on socioeconomic status</td>
<td>V. Parental presence and child mortality</td>
</tr>
<tr>
<td>Migration impact on health</td>
<td></td>
</tr>
</tbody>
</table>

| Settled change and health | male and female migration; settled former refugees. | male labour migration | return migration | parental presence/ absence; settled former refugees |
| settlement change at national and sub-district levels | household-level longitudinal model of migration and socio-economic status (HDSS*) | migration trends; sub-district census of labour force participation (HDSS*); random sample survey of migrant and non-migrant male partnerships | event history analysis: mortality modeled by adult migration status (HDSS*) | event history analysis: child mortality modeled by parental presence and absence (HDSS*) |
| settlement transition matrix (national census 2001), trends in age-sex profiles (HDSS*) | employment patterns of local and migrant males | cost burden on rural households | family formations |
| migration impacts through causality and selection; Role of remittances; grants; local employment | increasing the socio-economic status of rural households | separation of spouses, high risk sexual partnerships and implications for sexually transmitted diseases | health seeking behaviour; social capital in rural households; adult mortality from HIV/AIDS and TB | separation of parents and children; adaptation of settled refugees; child mortality |

*Health and Socio-Demographic Surveillance System
A conceptual framework for the dynamic interaction between migration and health

Figure 1: A conceptual framework for the dynamic interaction between migration and health

Conceptual Framework: A dynamic interaction between migration and health

The conceptual framework is a multilevel analysis of migration and health, with dynamic variables at the community, household and individual levels. It is a dynamic perspective because migration impacts on health and socioeconomic status and as it does it affects the likelihood of further migration, from which it follows that health and socioeconomic status can change again, etc. The questions addressed are ‘what is driving patterns of health and socioeconomic status in the rural north east of South Africa?’, and ‘what role does migration play?’ The framework is pictured schematically in figure 1.

On the left side of the diagram, boxes represent the community level factors which constrain or enable health in this population. These are the structural features that shape the everyday options for households and individuals. Examples of constraints include ‘under-development’, which is a legacy of the past that positions the community at the poor end of the national spectrum (Klasen 1997); levels of disease, in which we recognize HIV/AIDS as a key feature (Kahn 2006; Posel, Kahn and Walker 2007), but also increasing levels of chronic disease (Kahn et al. 2007; Thorogood et al. 2007), childhood malnutrition (Madhavan and Townsend 2007; Saloojee et al. 2007), diarrhea and acute respiratory infection (Kahn et al. 2007). A limited labour market is a function of under-development and a major determinant of migration. Gender roles refer to

[Diagram details]

Community Level
Health Constraints and Enablers

Constraints
- Under-development
- Disease levels
- Limited labour market
- Gender roles
- Cultural norms

Enablers
- Health care
- Housing quality
- Education level
- Prior migration

Migration
Migration mediates constraints and enablers, which changes household and individual risks and resources for health (Paper I)

Individual & Household Level
Health Risks and Resources

Risks
- Separation/Disruption
- Exposure
- Retrenchment/Death

Resources
- Assets/income (Paper II)
- Family structure
- Education/knowledge
- Access to care
- Social networks
- Food/nutrition
- Reproduction
- Transportation

Health Consequences of Migration

- Sexually transmitted diseases (Paper III)
- Returning home to die/adult mortality (Paper IV)
- Child mortality (Paper V)

Feedback: health status impacts subsequent health risks and resources
the social position of men and women which place constraints, particularly on women, in terms of ability to migrate, make decisions about health care, access legal support, land ownership, etc. Examples of health enablers at a community level include health systems, adequate or inadequate; housing quality, such as it is; cultural norms, which relate to behaviour expected by community; education levels which are expected to increase the likelihood of migration and improve socioeconomic status and health. Lastly, prior migration is listed because it has a major impact on the likelihood of further migration.

Moving rightward in figure 1 the next box represents migration itself which mediates the constraints and enablers listed above. Migrants are selected for age, health and education, and these factors are linked to socioeconomic and health outcomes. This is part of the dynamic relationship between migration and health. Selection, however, is only part of the story. There is also a drive, or agency, of people who strive against adversity. Migration is a key strategy for people trying to lift themselves and their households out of poverty. Paper (I) presents a typology of migration and embeds it in the national context of settlement change.

There are a series of health risks and resources for household members at any given time and these can be changed by migration. Examples of health risks are exposure to contagion; environmental hazards; or familial disruption, such as the separation of spouses, or of a mother and child. Examples of household socio-economic risks include retrenchment or death of a bread-winner. Resources for health include assets and income that enable household members to eat well, go to school, or reach a clinic if they are sick. Paper (II) is a study of the relationship of migration to household assets. Family structure is a resource through prime age adults looking after children or older members. Spouses can support each other emotionally and also reproduce to add new children to the household. Education is related to behavioural norms including the ability to limit family size, access health care and improve income. Social networks provide possibilities of financial support during transitory shocks, child care and emotional support. This resource can also be a risk because members of the social network may require help or support that drains resources from the household, but usually a balance will hold through households supporting each other and gaining benefit from the mutual support. Family structure can also become a health risk for example due to an abusive spouse or competition for resources.

Migration changes the health risks and resources for the migrant and linked household. Three scenarios are examined due to the strength of their relationship between migration and health. These are listed in the box at the far right and include the risk of sexually transmitted diseases that can increase due to the separation of spouses through migration, paper (III); the return migration of sick and dying migrants, paper (IV); and the health of children when their parents are not present due to death or migration, paper (V). These are health consequences of migration. The feedback loop is included because health or socioeconomic status influences the risks and resources available for households, which can have further impacts on health. In the results section each of these scenarios will be examined.
Data and Methods

The study population

The study population is located in the Agincourt sub-district of the Bushbuckridge district of the Mpumalanga Province of South Africa, some 500km northeast of Johannesburg. See figure 2 for a map of the area. As indicated, the study site is adjacent to the Mozambique border and the area can be considered a border region.

Figure 2: Maps showing the Agincourt study site in the context of Bushbuckridge, Mpumalanga Province, in the northeast of South Africa (source: Benjamin Clark, MRC Wits University Agincourt Unit)

In 2005 the total surveillance population was 70 527 people living in 11 988 households, with a population density of 172 persons per square kilometre. The dependency ratio was high at 0.741 with 11% under five years, 36% under 15 years of age, and 5% over 65 years2. While this is a 'young' population (see population pyramid, figure 3, page 33) there is a gradual aging trend with the percent under 10 years declining and the percent over 65 increasing. The male: female sex ratio in 2005 was 0.92. The main ethnic identity is Shangaan, with some Pedi and Swazi language speakers incorporated. Mozambicans comprise 30% of the total population. Mozam-

---

1 Dependency ratio, using age as a proxy for dependence and economic productivity, has the formula of dependants (aged 0-14 and 60+) in the numerator and economically productive people (aged 15-59) in the denominator.

2 Author’s calculations.
bicans are also Shangaan speaking and are culturally affiliated to the South African host population. They arrived as refugees in South Africa in the late 1980’s as a result of a savage civil war that drove people from their villages. They crossed the border moving west through the Kruger National Park and on arrival dispersed within local settlements or settled on land allocated to them by local tribal authorities. In 1993, group refugee status was granted to Mozambicans who had fled the conflict, yet access to water, sanitation, labour markets and legal rights has been persistently low for most (Dolan et al. 1997). The group has remained vulnerable in many respects, but, nonetheless, uptake to voluntary repatriation programmes has been low (Hargreaves et al. 2004).

The fertility transition in the sub-district is almost complete with Total Fertility Rate (TFR) dropping from 6.0 in 1979 to 2.3 in 2004 (Garenne M. et al. 2006). The TFR was compared to the national level in 1999 and matched well with a TFR of 2.8. The fertility levels have declined proportionately in all age groups, including adolescents in the recent period (Garenne M. et al. 2006). There is still however a high rate of adolescent fertility in the midst of escalating HIV sero-prevalence. Garenne and colleagues have described a bi-modal pattern of age-specific fertility with pre-marital peak around age 18 and a marital fertility peak around age 27 (Garenne, Tollman and Kahn 2000).

Mortality patterns have reversed over the last decade with an overall trend of increasing mortality. An under-five mortality decline started reversing in 1996, and was still increasing a decade later. This has primarily been caused by HIV/AIDS. Mortality has also been rising in the younger adult age group from the same cause. There has also been a rise in mortality in adults over 50, particularly women, due to strokes and congestive cardiac failure (Garenne et al. 2000; Kahn and Tollman 1999; Kahn et al. 1999). The causes of death by age group are revealed by verbal autopsy, a field based interview with the closest care-giver of the deceased to establish the probable cause of death (described further on page 24) (Kahn et al. 2000). In the 2002-2005, the leading causes of death are HIV/TB, diarrhoea, and acute respiratory infections in children under five; accidental injuries, HIV/TB and road traffic accidents in the 5-14 age group; HIV/TB, assault and road traffic accidents in the 15-49 age group; HIV/TB, vascular, and other cardiac disorders in the 50-64 age group; and vascular disease, other cardiac and neoplasms among those sixty five and older (Tollman et al. 2008). In the 15-49 age group HIV/TB comprised 48% of all cause mortality.

Unemployment is high with a strict unemployment rate\(^3\) of 29% for men and 46% for women using data from a labour force participation module in 2004 (see page 26). Formal employment involves mostly migrant men working in the mining sector (gold and coal in particular), in construction and security firms of larger towns, as well as on nearby agricultural and game farms. Women make up an increasing proportion of the migrant labour force, employed especially in domestic work and on farms. An important source of local employment is the public sector, such as teaching, clerical or police work. Informal sector activities are widespread, and include mainly selling fruit, cooked food and snacks. Government pensions are an important

---

\(^3\) The strict unemployment rate has the formula of people over age 18 looking for work, in the numerator, and, either working or looking for work, in the denominator. It does not address underemployment which in this formula will be seen as employed.
source of income for many families. Female headed households constitute 32% of all households. Recent changes in government have affected movement patterns. With more freedom of movement people are tending to move to nearby towns. These towns are becoming development nodes along tarred roads throughout rural areas (Collinson et al. 2000).

Housing structures vary from traditional mud huts to brick dwellings with tin or tiled roofs. Residential plots are too small to support subsistence agriculture, but crops are grown to supplement the family diet. Water is pumped to the main reservoirs without purification. From the reservoirs it is reticulated to the communal taps, which serve as the main collection points for village community members. Water is collected manually by women or children. Water shortage poses a serious problem in most villages. Levels of household sanitation are poor, and pit toilets of varying effectiveness are the norm. Roads are un-tarred and sometimes in poor condition. Public transport is limited to privately owned mini-bus taxis. Electricity and telephone services have expanded in recent years.

Almost all villages have at least one primary school and there is near-universal attendance. Approximately one in two villages has a secondary school which is well attended, but progression is slow and a half of 20 year olds are still enrolled. Rates of illiteracy are declining rapidly over time, but are still high at a population level due to the legacy of underdevelopment. Using a strict illiteracy rate\(^4\), in 2006, for males ages 10-29 years, 1% were illiterate; for the ages 30-59, 20% were illiterate; and for ages 60 and older, 63%. For females, the illiteracy rate for the 10-29 year cohort was 1%; for ages 30-59, 29%; and for ages 60 and older, 78% illiterate\(^5\). Access to education has improved remarkably and become more equal from a gender perspective.

The health system comprises a health centre with six satellite primary health care clinics staffed by nurses. A restricted number of drugs are dispensed from the primary care facilities. Services are free, and include child health, family planning, antenatal care, delivery and post-partum care, minor ailments and chronic disease treatments. Referrals are to two district hospitals, twenty-five and forty kilometres from the health centre. Since late 2005 antiretroviral treatment has been available at the district hospitals (Kahn K. et al. 2007). Traditional healers and faith healers remain popular and are consulted for a range of conditions. Health seeking behaviour is related to perceptions about the cause of the illness (Golooba-Mutebi and Tollman 2007).

Health and Socio-Demographic Surveillance System

In this thesis a health and socio-demographic surveillance system (HDSS) is used to examine migration patterns in relation to socio-economic status, adult and child mortality. The HDSS is a field and computer based operation that routinely updates a population register for the entire, contiguous, sub-district of 70 000 people. An annual update has been made of each birth, death, or migration since the baseline in 1992. The principle is to maintain a dynamic list of all people living, and who have lived, within the geographically defined sub-district (see figure 2, page 23, for the map) (Tollman 2008). A field operation is conducted each year to visit every household in the sub-district (11988 households were visited in 2005). Trained and supervised fieldworkers

\(^4\) The strict illiteracy rate is based on the formula of ‘people that have no school or adult education’ as the numerator and ‘people with no or some school or adult education’, i.e. the population at risk, as the denominator.

\(^5\) Author’s calculations
interview the best respondent available who should be knowledgeable about household events. During this interview the fieldworker verifies existing records, records new data pertaining to individuals or the household, and systematically records the demographic events that have occurred since the preceding year’s census update (Kahn K. et al. 2007; Tollman 2008; Tollman et al. 1999a). This is supplemented by a maternity history of all in-migrant women aged 15-55 years, as well as residence histories, and other modules built into the census. A dynamic household roster showing current members is printed onto each census form in advance of the annual update. Individual attributes recorded at first observation, i.e. baseline, in-migration or birth, include name, sex and date of birth, mother’s identity, mother status, and nationality or refugee status. Relationship to household head is recorded as a time-changing variable. The census update is conducted by four teams of six fieldworkers each with a supervisor who uses GIS\textsuperscript{6}-based maps to ensure that every household is covered. The maps are kept up to date by taking GPS\textsuperscript{7} readings of new dwellings each year. A verbal autopsy is conducted on each death to establish the cause. The verbal autopsy interview is conducted by a trained lay fieldworker in the vernacular, i.e. Shangaan, and assessed by medical practitioners to establish the main cause of death, as well as immediate and contributing causes (Kahn 2006; Kahn et al. 1999; Kahn et al. 2000; Tollman et al. 2008). Thus, a prospective, longitudinal database of demographic events for the entire sub-district population has been established and regularly updated for sixteen years.

**Definition of a household**

The definition of a household in the Agincourt health and socio-demographic surveillance system is a group that resides and eats together, plus the linked temporary migrants who would eat with them on return. This is a de jure household definition that retains links between temporary migrants and their rural household.

**Definition of a temporary migrant**

A temporary migrant is a household member who is away the majority of time, but retains a significant link to their base household. In analysis, a six month per year cut-off point was chosen to differentiate ‘temporary migrants’ from ‘local residents’. Thus, people who are referred to as temporary migrants were absent from the household for more than six months of the year preceding observation, but who considered the index household to be their home base.

Temporary migration status is based on ‘resident months’ status which records the amount of time each person is physically present in the household during the year preceding the census interview. The fieldworker hears the account of a person’s residence pattern and adds together the periods of home residence, rounds this up to a whole number and records it as the number of months that a person was present in the previous year. This ‘resident months’ variable has been updated in successive census rounds in 1992, 1995, 1997, 1999, and annually since then. Based on the ‘resident months’, the fieldworker updates a ‘residence status’ variable, which has four categories, namely, ‘Local resident’, if ‘resident months’ is between six and twelve months; ‘Temporary Migrant’, if ‘resident months’ is less than six and the reason for absence is work-related;

\textsuperscript{6} Geographic Information System

\textsuperscript{7} Global Positioning System
‘Other Temporary Migrant’ if ‘resident months’ is less than six and the reason is not work-related; and ‘Visitor’ is if a person was present at the census but should not be considered part of the household. A child born or in-migrated in the year prior to the census is considered a ‘local resident’ if the household informant considered their residence to be permanent despite the number of resident months.

**Definition of a permanent migrant**

The Agincourt definition of permanent migrant is a person who enters or leaves a household with a permanent intention. This includes people who leave the index household and establish a household or join a household elsewhere. The respondent informs the fieldworker that the migration is ‘final’ (Madhavan, Schatz and Clark 2009). An implication of this definition is that when a field worker encounters a permanent out-migrant the person is removed from the household list, whereas a temporary migrant is not. An out-migrant is removed from a household (social unit) and dwelling (physical structure), and an in-migrant is added to a household and dwelling. Technically, this is done by starting or ending a membership episode in the household; and starting or ending a residence episode at the dwelling. The details of the migration event, e.g. “date of move”, “origin” or “destination”, are captured and stored in the migration table.

**Cross sectional census modules**

Each year special modules are nested within the update round to provide basic information relevant to particular research lines (Kahn 2006). A module usually fits onto one A4 sheet and contains between fifteen and forty relevant variables. The variables are selected due to their salience in current scientific literature, relevance in the local context, and the outcome of extensive piloting. Most cross-sectional modules are repeated to allow for longitudinal analysis, but with different periodicities depending on the expected pace of change. In December 2008 the following cross-sectional module were available: education status (updated 1992, 1997, 2002, 2006), household assets (2001, 2003, 2005, and 2007), labour force participation (2000, 2004 and 2008), temporary migration (2002 and 2007), child social care grants (2002, 2005 and 2008), health care utilisation (2003 and 2006), adult physical and cognitive functioning (2006), food security (2004 and 2007), and vital documents (2005 and 2007). This thesis employs data from three modules in particular, household assets, labour force participation and temporary migration, so these modules are described in more detail below. In addition to the census modules there have been several public health issues examined through screening questions to establish population prevalence rates for particular conditions, for example tuberculosis (1999), stroke (2001), and epilepsy (2008). For these studies a medical assessment team followed the census visit to confirm the diagnosis. Lastly, the core surveillance operation has expanded over the years to incorporate data that add to routine data model. These generally began as cross-sectional modules, expanded into a longitudinal format and eventually became part of the on-going surveillance. These include migration reconciliation (started in 2004), marital status (started in 2005), national identity number (started in 2007), and father status (started in 2007).
**DATA AND METHODS**

**Household assets**
A cross-sectional household asset survey is conducted every second year, i.e. 2001, 2003, 2005, 2007, in which the salient features of assets owned by households are recorded. The questionnaire contains 34 ordinal variables, covering such areas as building materials and structure of the main dwelling, access to water and power supply, and ownership of appliances, transport and livestock. For the analysis in paper (II) an absolute asset indicator is constructed by weighting each asset-variable equally in five sub-indicators, namely ‘modern assets’, ‘livestock assets’, ‘power supply’, ‘water and sanitation’ and ‘dwelling structure’. These sub-indicators are combined and standardised to produce an absolute SES indicator that can discriminate between the poverty level of different households at a given time and between a particular household over a period of time. The SES indicator ranges from 0.75 to 4 from a potential distribution of 0-5.

**Labour force participation**
Labour force participation modules were completed in 2000 and 2004. These record features of labour force participation on all de jure persons in the sub-district aged 10 years or older. The definition of ‘working’ and categories of unemployment were derived by starting with conventional definitions and undertaking a process of discussion and refinement with local field staff and community members. For the study ‘work’ was defined as an activity that brought income or resources into the household from outside. Categories of unemployment included whether a person was looking for a job, subsistence farming, doing primarily home domestic work, a student, not looking for a job, disabled, a volunteer, in between fixed period work, in between occasional work, or other reason. Variables that described either the current job or the previous job (if currently unemployed) were: type of work, sector, type of contract, employer, place of work, place code and tax status. If a person held two jobs the secondary job details were included.

**Temporary migration**
A temporary migration census module was conducted in 2002 and 2007. People who were identified as temporary migrants were entered into the module and a household respondent answered questions about the migration. Key areas included the duration of migration, destination, reasons for migration, return pattern, communication pattern, remittances, linked moves and child care arrangements. Temporary migration is a state of circulation that can be repeated or terminated and a person can be a temporary migrant for many years as long as they remain a part of the linked household. This module is used repeatedly in the results section below to add descriptive detail to the findings in the five papers. A range of tables are provided with statistical tests to examine whether the migration attributes differ by sex of the migrant, or have significant trends over time.

**Other data sources – national census data**
In paper (I) the 2001 national census data is used to compare the findings of the HDSS with national migration patterns. The details of the method are given in the paper, but it is mentioned here as an example of triangulation that expands the utility of the HDSS migration data. In one direction the HDSS adds detail otherwise unavailable in the national census. In the other direction the national picture verifies and contextualizes the sub-district data (Collinson, Kok and Garenne 2006a; Kok and Collinson 2006).
A migration community profile was obtained from Statistics South Africa containing the ‘main place’ of residence and ‘previous place’. A five point settlement typology was built using the fields ‘Geotypes’ and ‘Municipality’ that classified places into metropolitan formal, other urban formal, urban informal, tribal area and formal rural. Each of these settlement types has distinct features and policy relevance in its own right. The settlement typology was applied to both ‘main place’ of residence and ‘previous place’, with the frequency of people in each cell summed from the weighted frequency variable provided by Statistics South Africa.

The migration data from the 2001 census were based on the place of residence at a fixed previous date. A problem with this approach is that persons who had lived in the same electoral ward at the time of Census 1996 as the one in which they were enumerated at the time of Census 2001 were regarded as non-migrants irrespective of where they might have migrated in the five years in between and then returned. Furthermore, temporary migration was not recorded in the census, so there was no way of linking temporary migrants with their original households.

Other data sources – sexual partnerships survey

In paper (III) data are used from a specialised random sample survey conducted to analyse the sexual behaviour of migrant and non-migrant men. The details of the method are given in the paper but it is included here to represent how the HDSS can be used to nest studies within the surveillance framework so as to compare two groups (one exposed and one not). The sample frame consisted of a random selection of 1482 men between ages 20 and 45 listed as de jure residents in the 1999 annual census. To maximize coverage, fieldwork was concentrated during the major holidays and month-ends when migrant workers are most likely to be at home. Interviews were conducted in Shangaan, the local vernacular, by a team of 12 male and 2 female interviewers recruited from local communities. The questionnaire was piloted and revised prior to the main phase of survey data collection. Interviewers worked independently, always outside their own villages. Completed questionnaires left in designated ‘drop boxes’ were collected and checked daily by supervisory staff who made regular unscheduled visits to interviewers in the field. Respondents were asked about patterns of migration in the last year, detailed information on the main sexual partner and the most recent non-regular partner, and knowledge and awareness of HIV/AIDS in addition to background information. Two modes of data collection were employed during fieldwork. Following a face-to-face interview, a self-administered questionnaire adapted for low literacy settings was given to each respondent to complete at the conclusion of the interview. For those unable or unwilling to read for themselves interviewers would read numbered questions aloud, asking respondents to circle icons indicating correct answers without revealing responses to the interviewer. The self-administered form included the relationship questions that were blinded from the interviewer to enable the collection of sensitive information while maintaining confidentiality. The self administered part validated key risk indicators collected in the questionnaire.
Community linkages

The study is based on a partnership between the Agincourt Health and Demographic Surveillance System, the study communities and the local health services. From the outset considerable time has been devoted to explaining the purpose of the surveillance work and its associated projects. A specialized office called the LINC office (LINC stands for Learning, Information dissemination and Networking with Communities) oversees this function. Before any project commences a series of meetings are held in each village with community members and leadership. After each project and census round findings and information are disseminated to the study communities by printed “village fact sheets” and by community meetings. Service providers such as nurses, HIV counsellors and agricultural officers attend the community meetings and use the opportunity to inform and teach community members about key issues. Over the years the community feedback meetings have become well attended and the discourse between community members and project representatives has reached level that shows a high general understanding about the project. Findings are also addressed to provincial and national Departments of Health to bring empirical evidence into the health policy debates.

Ethical considerations

The University of the Witwatersrand’s Committee for Research on Human Subjects (Medical) has reviewed and approved the health and demographic surveillance system research protocol (no. M 960720). The principles of informed consent are fully respected, and the right of refusal to be interviewed, at the individual and household level. Fieldworkers are trained to carefully explain their purpose to the residents of the household and, where a respondent declines to participate, to accept this graciously. The research infrastructure is embedded in the community arising from sixteen years of village meetings and household visits. The nature of the relationship from the outset has been that research findings will be shared on an on-going basis with local communities (see Community Linkages above), and that the project will contribute to identifiable improvements in the area. Also, that field and data entry staff will be recruited from the study villages. This on-going dialogue has contributed substantially to the almost negligible non-response rate during repeated censuses.

A special study like the sexual partnerships survey has its own ethical clearance process and in addition uses the community structures in place for the HDSS. Community leadership is educated about the study by the LINC office and community meetings held to inform people. Before each study interview the goal of the study and rights of refusal are explained to the respondent by the fieldworker. In the sexual partnerships survey an information letter was given and signed informed consent done. Due to the sensitive nature of the questions the fieldworker did not record the responses to questions about partnerships. Instead the responses were written by the respondent on self-completed questionnaires. Symbolic representations enabled a respondent who was unable or unwilling to write to answer by circling symbols. The response sheet was then sealed into an envelope and collected by the Principal Investigator. Care was taken to employ fieldworkers in villages some distance from their home villages to minimise the chance of them knowing the respondent. In this way sensitive questions were managed confidentially.

For protection of all data in the HDSS and nested projects, data are captured in a secure computer room located in the Agincourt village onto a small local area network. The database is secured
using two levels of user access control: a password to log onto the operating system, and a second password to log into the database. A hierarchy of database access exists with only the research manager and data manager having full access. Access to the data is controlled by the unit data manager to make secure, anonymised data available for students and scientists. A data agreement is signed between the two parties to ensure protection and appropriate acknowledgement for the production of the data. Because multiple projects can be undertaken at the same time community research fatigue is managed by maintaining a confidential database of households that have participated in nested studies. Households that have participated in a study are excluding from the sampling frame of other studies for a defined period to minimize repeat visits to the same household.

To support the particularly impoverished or illness-burdened household that a fieldworker encounters in the research, if the fieldworker encounters such a household he or she informs the LINC office which maintains a directory of service-providers, both government and non-government in each village. A person from the LINC office visits the struggling household to establish a support link with a relevant service provider.

Data quality

Fieldworkers are community members selected for skills in languages, numeracy and community involvement and who have completed secondary school or higher. Initiatives to ensure quality occur on several levels in the field and data room. Quality is emphasized during training and a high standard of interview is expected. Procedures include targeted skills development and training before each census, supervised visits on household interviews to improve interviewing skills, and form checking at several levels. The fieldworker checks their own completed census forms at the end of each day, then they check each other’s forms within the team once a week, and errors are either dealt with in the field office or a revisit is done. The forms are controlled by the supervisors who conduct random quality checks and register forms on supervision sheets. Successful forms pass on from the team supervisors to designated “quality checkers” who are based in the central field office. Here a final check is conducted on every form and any forms with errors are returned to the field for resolution. In addition, random duplicate visits are conducted by the team supervisors on 1.5% of the population to assess data quality by comparison with the original interview conducted by the fieldworker.

Data entry is conducted in the central field office in the study area. A further level of checking is done by the computer data entry programme which checks for data consistency as it is captured onto the computer. Data typists enter the form and the data is checked against a series of validation rules that are triggered by the data attempting to enter the database. These errors are assessed by the data supervisor, and returned to the field if necessary.

In the earlier years of the data collection some live births followed by early deaths were probably miscounted. To minimise the missing of neonatal deaths one measure undertaken was to record on the census form the name of the last born child for each woman, which acts as a prompt at the time of the interview to double check that there had been no pregnancy since the birth of the last born child.

An improvement to the migration database initiated in 2004 was the introduction of migration reconciliation. This involves tracking internal migrants who move within the study site to link up the individual’s records at places of origin and destination. The process involves checking
that the person out-migrating is the same person as the one in-migrating. It is also a mechanism for checking the integrity of the database. It aims to erase the possibility of having the same person registered in two places at the same time and also enables people to keep the same unique identifier when they move.

**The Data System**

The Agincourt health and socio-demographic surveillance system is a database that was first held in FoxPro in the mid-1990’s, but was re-written into Microsoft Access 95 with an improved data model in 1996. In 1999 an upgrade was made to Access 97, with a data model brought up to the standards of the INDEPTH population reference data model (Benzler, Herbst and MacLeod 1998). In 2001 the database was upgraded into Microsoft SQL Server. This enables a high standard of database technology, including data protection and improved querying of the database. Data are captured using multiple trained data typists into a custom designed front-end built in Delphi and written to the relational database stored in SQL server. Backups are made daily on the local server and off-site back-ups are made weekly. The standards of data protection are discussed above under ethical considerations.

**Longitudinal Analysis**

Cross sectional data have limitations when it comes to studying dynamic systems like migration, socio-economic status and health. Longitudinal methods, namely event history analysis and household panel designs, are used in this study. In Paper (II) a household panel is derived from the HDSS by creating a database of household/years. For each household/year combination resident household members are evaluated for the value of key attributes and the data aggregated to household level. Some, like absolute SES, or receipt of government grants, are intrinsically household level variables. Factors are allowed to change over time within households and can be measured from the baseline, controlling for other key factors associated with change in the outcome variable.

Papers (IV) and (V) employ discrete-time event history analyses to estimate the likelihood of dying for resident adults, paper (IV), and children, paper (V). This method provides the ability to take into account the duration-specific components of the likelihood of dying and test statistically how this likelihood varies by migration status group. A person time file is constructed that contains one record for each time unit lived by each individual in the population. Values of the analytic variables are defined at the beginning of each person time unit. This enables estimates the hazard of death for adults and children as a function of historical period, sex, age, and migrant status.

**Data limitations**

There are important limitations to the HDSS method that need to be understood when interpreting the data. Issues of representivity, selection bias, and geographical limitation are discussed here.

**Representivity**

The representivity of data can be questioned and this is important when extrapolating the findings to a wider population. In general, the population of Agincourt represents a typical former
‘Bantustan’ area in South Africa’s interior provinces. The findings therefore have value in extrapolating to this context. They also have value as a case study, which provides detailed information on this specific sub-population. Two types of comparative efforts help to inform wider extrapolations. One is comparison with national datasets as mentioned above with relation to fertility (Garenne M. et al. 2006), mortality (Kahn 2006) and migration (Collinson, Tollman and Kahn 2007). The second valuable comparison is to findings from other HDSS sites. The INDEPTH Network is a network of HDSS sites across the developing world. Multi-site studies in which the Agincourt Unit has participated include mortality, fertility and migration. The author is responsible for a study on the impacts of migration in seven HDSS sites described below (see page 54). The multi-site study covers a range of countries and settings, representing diverse socio-economic situations, which enables extrapolation beyond the confines of a particular setting.

Selection bias
This sub-population may have unique features resulting from the presence of the study itself. However, in the dire absence of vital registration and other information sources it is critical to learn what we can from such a sentinel site. A bias arising from the presence of the study may exist and its magnitude and direction should be investigated, but in all likelihood the bias is negligible. A bias exists in the South African context itself, due to the legacy of the apartheid system, which, together with the economic development in and around Johannesburg and the mines, created conditions for significant temporary migration. One argument is that South Africa will be an informative case for migration studies and the key lessons will be easier to isolate. The migration patterns in South Africa may be extreme, but still hold lessons for other countries.

Geographical limitation
The HDSS examines the population dynamics within a discrete geographical area. This population may represent only one node in a migration stream and information about other parts of the stream may be limited. Out-migrants may be lost for follow up rounds. Permanent movement beyond the site boundary implies that the prospective data collection ends at the time it is needed most. Past moves, however, can be examined retrospectively, while the respondent is still in the study site. This bias is also offset by defining temporary migration and maintaining observation of temporary out-migrants while they are out of the study site.

8 The INDEPTH Network for the Continuous Demographic Evaluation of Populations and their Health in Developing Countries is a network of Health and Demographic Surveillance System sites.
Results

Migration patterns
Migration features prominently in the lives of the study population. Several types of migration exist and have different age and sex profiles. Four types of migration discussed in the thesis are: i. temporary migration (20% of the population in 2002), of which circulation to a work place is a prominent example; ii. permanent migration across the sub-district boundary (3% of the population), of which a permanent migration of a woman and her children to a nearby town is an example; iii. local mobility or permanent migration within or between a rural village (5% of the population) of which getting married and joining a husband’s family is an example; and iv. cross border refugee movement, of which Mozambicans fleeing from the devastation of war in the 1980’s is an example. The population contains 30% former Mozambican refugees now considered part of the study population. In 2002, 72% of the population did not migrate at all. The migration type that involves the highest numbers of migrants, crossing the furthest distance, and impacting the most on socio-economic status and health, is temporary migration. For that reason temporary migration is particularly highlighted.

![Figure 3: Population structure in 2002 showing male and female permanent residents and temporary migrants (who spend 6 months of more each year working away from home). Source: author’s computation using the Agincourt HDSS.](image)

The population pyramid in 2002 reflects a population in demographic transition with a wide base in the 10-14 age group but with fewer children aged 5-9 and fewer yet aged 0-4years. This is most likely due to both fertility decline and increasing under five mortality due to HIV/AIDS (Garenne M. et al. 2006; Kahn et al. 2007). The dependency ratio (of youth and elderly compared to prime economic age groups) is 0.7. The overall sex ratio of males to females is 0.91 but declines to 0.55 after age 65 due to higher male mortality in the older age groups.
Temporary migrants who spend 6 months or more in a year away from home occur in all age/sex groups but are highly prevalent for men in the 20-44 year age group and women in the 20-39 year age group. Table 2 shows the percent of each age sex category that are temporary migrant. It is highest between ages 35 and 54 for both sexes and increases significantly in both sexes. For men it increases from 55 to 60% of 35-54 year olds over the five year period; and for women from 21 to 24%, also statistically significant. This table focuses on adult temporary migrants aged 15 and above because they are most likely to be labour migrants and impact the economic and health outcomes of other family members. The overall percent of adult temporary migrants increased from 37 to 41% of adult males and from 15 to 18% of females in the 2002 to 2007 period.

<table>
<thead>
<tr>
<th>Age group</th>
<th>2002: % male temp. migrants</th>
<th>2007: % male temp. migrants</th>
<th>p-value</th>
<th>2002: % female temp. migrants</th>
<th>2007: % female temp. migrants</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-34</td>
<td>32%</td>
<td>37%</td>
<td>0.000</td>
<td>16%</td>
<td>19%</td>
<td>0.000</td>
</tr>
<tr>
<td>35-54</td>
<td>55%</td>
<td>60%</td>
<td>0.000</td>
<td>21%</td>
<td>24%</td>
<td>0.000</td>
</tr>
<tr>
<td>55+</td>
<td>25%</td>
<td>28%</td>
<td>0.004</td>
<td>4%</td>
<td>5%</td>
<td>0.087</td>
</tr>
<tr>
<td>Total 15+</td>
<td>37%</td>
<td>41%</td>
<td>0.000</td>
<td>15%</td>
<td>18%</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2: The percent of each age-sex category that are temporary migrant, with p-values comparing the difference between 2002 and 2007.

Table 3 presents data on the destinations of temporary migrants by sex and year. Males and females have a differential pattern of destination that remains stable over time. Female temporary migrants are more likely to move shorter distances and to nearby commercial farms and game farms (in 2007 12% of males go to farms and 17% of females). Secondary urban places are more likely to attract male than female temporary migrants (in 2007 30% of males and 27% of females). The most popular destination for males and females is the primary metropolis of Gauteng (Johannesburg, Pretoria and Vereeniging). In 2002, 47% of male migrants went to Gauteng and 45% of female migrants and in 2007, 47% of male migrants and 46% of female migrants, a significant sex differential but not a significant trend.

<table>
<thead>
<tr>
<th>Destination category</th>
<th>male migrants in 2002</th>
<th>%</th>
<th>female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>male migrants in 2007</th>
<th>%</th>
<th>female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>nearby village or town</td>
<td>259</td>
<td>4%</td>
<td>254</td>
<td>7%</td>
<td>0.000</td>
<td>302</td>
<td>3%</td>
<td>302</td>
<td>7%</td>
<td>0.000</td>
</tr>
<tr>
<td>same province agriculture/game farm</td>
<td>1,011</td>
<td>14%</td>
<td>644</td>
<td>19%</td>
<td>0.000</td>
<td>1,063</td>
<td>12%</td>
<td>726</td>
<td>17%</td>
<td>0.000</td>
</tr>
<tr>
<td>same province secondary urban</td>
<td>2,229</td>
<td>30%</td>
<td>937</td>
<td>27%</td>
<td>0.000</td>
<td>2,667</td>
<td>30%</td>
<td>1,190</td>
<td>27%</td>
<td>0.000</td>
</tr>
<tr>
<td>other province</td>
<td>351</td>
<td>5%</td>
<td>88</td>
<td>3%</td>
<td>0.000</td>
<td>549</td>
<td>6%</td>
<td>145</td>
<td>3%</td>
<td>0.000</td>
</tr>
<tr>
<td>primary metropolis</td>
<td>3,458</td>
<td>47%</td>
<td>1,552</td>
<td>45%</td>
<td>0.013</td>
<td>4,208</td>
<td>47%</td>
<td>1,999</td>
<td>46%</td>
<td>0.044</td>
</tr>
<tr>
<td>other/ unknown</td>
<td>24</td>
<td>0.4%</td>
<td>2</td>
<td>0.1%</td>
<td>0.007</td>
<td>92</td>
<td>1.1%</td>
<td>29</td>
<td>0.7%</td>
<td>0.032</td>
</tr>
<tr>
<td>Total</td>
<td>7,332</td>
<td>100%</td>
<td>3,478</td>
<td>100%</td>
<td></td>
<td>8,881</td>
<td>100%</td>
<td>4,391</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Destination categories of temporary migrants by sex and year, with p-values showing the sex differential.
Table 4: Reasons for temporary migration by sex and year, with p-values showing the sex differential

Table 4 shows that reasons for temporary migration differ by gender. The p-values in the table show by reason category whether there is a sex-differential in the motive behind the migration. Employment is the key reason for both sexes: 80% of male migrants and 60% of female migrants. More men work than women (p=0.000), and a larger percent of men are looking for work (p=0.000). More than twice the proportion of women migrate for school and studies. A greater proportion of men migrate to look for work than women (7% versus 6% in 2007). A greater proportion of women migrate for family reasons than men (17% versus 1%).

The changing pattern of reason for migration, amongst men, was statistically significant in some important categories. Trends in reason for men show more migrants working and less looking for work over time. The percent of men looking for work showed a declining trend while the percent of migrants employed increased significantly. Female trends in reason for migration are more stable but at a higher than expected level, i.e. 60% of female migrants working and 6% looking for work. Significant changes in the reason for migration among women are that female migrants are increasingly likely to move for accessing better school or study opportunities (p=0.04), and less likely to be migrating for family reasons (p=0.05).

Paper (I) shows that South Africa had a 4.3% increase in the percent urban population between 1996 and 2001 (Collinson et al. 2007). This is a rapid urbanization but a simple percentage point masks the complexity of the urban transition process. Most migration to metropolitan areas comes from secondary urban centres. Net population loss from rural areas was more likely to be secondary urban centres than to the metropolitan areas. Apartheid geography of densely settled rural areas has not resulted in increased permanent outmigration to large urban areas, although some net out-migration to small towns has occurred. The pattern is different for temporary migration, which has shown major increases in males and females in ages 15–54 with the main metropolis being the primary destination.

The empirical evidence shows that big cities are gaining in the share of the population, but mostly through temporary migration from rural areas and permanent migration from secondary urban areas. The relation between rural and urban areas is either permanent migration to smaller settlements or migration to the big city where the migrant retains a rural home. Another key destination category for temporary migrants is secondary cities and towns for males, while female temporary migrants leave mostly for the main metropolis, then nearby commercial farms and game farms. Local mobility (rural to rural permanent migration) occurs by women aged 15-35 and is primarily for family formation or dissolution.
The age-sex patterns of the different migration types are described in paper (I), with reference to national changes in settlement pattern. The migration type that involves the highest numbers of migrants, crossing the furthest distance, and impacting the most in terms of socio-economic status and health is temporary migration. For that reason temporary migration is particularly highlighted in the rest of the thesis.

Migration and socio-economic status

Migration is a key livelihood strategy, a relationship studied in paper (II). It is mostly concerned with household selection, such that where households in the better off half of this generally poor population are more likely to send a male temporary migrant and remain better-off. But there is also a kind of migrant that has to work harder to migrate. These are more driven members of poorer households who are often striving to send home income and bring back ideas from more modern places. The paper explores the hypothesis that temporary migrants have both a causal and an endogenous relationship with socio-economic status in the sending community. Remittances from migrants make a difference to the distribution of resources at a community and household level. For the poorest households the most important factors improving SES are government grants and female temporary migrants, while for less poor households male temporary migrants and local employment are most important. There is a higher proportion of men employed and they also remit more, but among migrants who work, the proportion of women who remit is higher than men. Female remittances are particularly important in the poorer end of the SES distribution.

<table>
<thead>
<tr>
<th>Does the migrant remit?</th>
<th>male migrants in 2002</th>
<th>%</th>
<th>female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>male migrants in 2007</th>
<th>%</th>
<th>female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>remits</td>
<td>3,977</td>
<td>54%</td>
<td>1,522</td>
<td>44%</td>
<td>0.000</td>
<td>4,618</td>
<td>53%</td>
<td>1,816</td>
<td>42%</td>
<td>0.000</td>
</tr>
<tr>
<td>Total</td>
<td>7,332</td>
<td>100%</td>
<td>3,479</td>
<td>100%</td>
<td></td>
<td>8,711</td>
<td>100%</td>
<td>4,310</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Likelihood of remittance, by sex and year, with p-values showing the sex differential

Table 5 shows the percent of temporary migrants that remit has a significant sex differential and is 53% of males and 42% of female migrants in 2007. The trend is not significant.

<table>
<thead>
<tr>
<th>Does the employed migrant remit?</th>
<th>employed male migrants in 2002</th>
<th>%</th>
<th>employed female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>employed male migrants in 2007</th>
<th>%</th>
<th>employed female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remits</td>
<td>3,887</td>
<td>66%</td>
<td>1,465</td>
<td>70%</td>
<td>0.002</td>
<td>4,523</td>
<td>63%</td>
<td>1,716</td>
<td>67%</td>
<td>0.000</td>
</tr>
<tr>
<td>Total</td>
<td>5,888</td>
<td>100%</td>
<td>2,101</td>
<td>100%</td>
<td></td>
<td>7,215</td>
<td>100%</td>
<td>2,571</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Likelihood of remittance from employed migrants, by sex and year, with p-values showing the sex differential

Table 6 shows that the sex difference in likelihood of sending a remittance changes when it is computed conditional on employment. Among the sub-set of temporary migrants who are employed females are significantly more likely to remit (70%) than male (66%). There is also a significant downward trend showing that over time the proportion of employed male and female migrants remitting is decreasing.
We now examine what is remitted. Table 7 shows that it is not only money and that there is a significant sex differential in the type of remittance. Male migrants are more likely to remit money alone (77% versus 60% in 2007; p-value 0.000), while female migrants are more likely to remit money and food. Female migrants are also more likely to remit only clothes or only food. Thus, females’ remittances are more diverse than males’. There is a significant trend in the diversification of remittances from 2002 to 2007, with money being combined more with food and clothes for both sexes of migrants.

Table 8 shows the amount of money remitted by sex and year. It shows a significant gender differential.

Female migrants are much more likely to remit lower amounts and male migrants larger amounts with the cross over at the mode, i.e. R301-500. In 2002, the mean amount for all remittances is R445 and the median is R350, standard deviation R382, with a highly skewed distribution comprising a long right tail and a skewness coefficient of 7.2. Over the period of observation the amounts remitted monthly increase show a significant increase. In 2007, the median is R500, mean R622, standard deviation R728, with an even skrewer distribution, a very long right tail and a skewness coefficient of 11.3. Thus, the range of monthly remittance amounts is increasing over time.
Table 9: Remittance by destination category and year, with p-values showing the trend from 2002 to 2007

Table 9 shows the percent of migrants remitting by destination category. There is a theoretically important differential with migrants on commercial farms and game farms remitting at 76% likelihood, while only 40% of migrants in the primary metropolis remitted. The metropolis is the only category showing declining trend in the percent of migrants remitting over time. Of all destination categories the metropolis has the widest range of reasons to migrate so by headcount there is a smaller proportion of the migrant population working, thus also a smaller proportion remitting.

Table 10: Relation of remittance receiver to the temporary migrant, by sex and year, with p-values showing the sex differential

Table 10 shows that family structures vary widely and this is reflected in who receives remittances from the migrant. The majority of males send remittance to their wives while the majority of females send to their parents or children, and very seldom to their husbands. Siblings receive remittance from both sexes but significantly more from female migrants. There are significant trends in who receives remittances over time, with male migrants men are sending less to their wives and more to parents and siblings and females sending less to their children and more to their siblings and other relatives. Gender roles are entrenched with the most frequent migrant-non-migrant pair being a man remitting to his wife, a pattern occurring since the time of enforced labour migration. There is evidence that this is changing which is most likely due to changes in opportunities for women and also impoverished households sending both male and female mi-
RESULTS

grants. More wives are themselves temporary migrants so husbands are increasingly remitting back to parents and siblings. Adult mortality can also be playing a role in the trend of a wider range of relations receiving remittances from migrants.

In sum, temporary migrants are very likely to remit. More male migrants remit than female, but females have a wider range of reasons for migrating. Amongst migrants who are employed females are more likely to remit than males. There is a range of destinations for migrants from the rural sub-district. The most prevalent destination for both male and female migrants is Gauteng, the main metropolis; however, this destination does not have the highest likelihood of the migrant sending back remittances. This is partly explained by the fact that the metropolis has more attractions for drawing migrants than work alone. This is also best place for the schools and colleges that are attractive for a selected sub-group. Secondary urban centres are the next most important destination for male and female migrants. These are important destinations for remittances with 54% of migrants sending remittances from smaller towns. Commercial farms and game farms also receive a large portion of male and female migrants (12% of male migrants and 17% of female migrants). These destinations are very important for remittances with over three in four migrants remitting from farms. This is partly explained by migration to farms being more employment focused and less for other reasons.

The paper shows that in addition to selection there is also a causal relationship between migration and SES such that sending a migrant is good for SES and losing a migrant, through retrenchment, death or permanent out-migration, is bad for SES. Households that are chronically poor are very unlikely to have either male or female temporary migrants linked to them.

Migration, sexual partnerships and HIV

According to the 2008 update of UNAIDS/WHO Epidemiological Fact Sheet of HIV and AIDS, South Africa has 11.7 percent of its population living with HIV. This is an enormous burden of disease with 5.7 million infected and many times more affected. The adult (15-49) national prevalence rate is 18%, although there is a wide differentiation between different parts of the country with metropolitan areas highest. The first cases of HIV/AIDS mortality in the Agincourt population were diagnosed by VA in 1993 (Tollman et al. 1999b). Since then there has been a catastrophic rise in the number of deaths from this cause, from 71 deaths in the 1992-1994 period to 2304 deaths in the 2001–2003 period, giving a relative risk of 32.3 with p-value 0.000 (Kahn 2006).

The migration pattern has been associated with the spread of HIV. This relationship is examined in paper (III). The key hypothesis is that migrants, both male and female, are more exposed to high risk sex and can infect their spouses or regular partners on return. The work on migration, sex and HIV supports the hypothesis that migration plays an important role in the spread of HIV, but it is not a straightforward relationship. The trends show that connections between migrant and household, as measured by frequency of contact and return visit, seem to be getting firmer, not weaker, over time. Migrants that return more frequently may be less exposed to outside partners and therefore less implicated in the HIV epidemic.

Paper (III), published in 2006, presents evidence from a special survey that interviewed migrant and non-migrant men about their sexual partnerships. Amongst employed men those based in the rural area demonstrated a higher likelihood of multiple partnerships (52%) compared to migrant counterparts (44%), p=0.075, when controlling for whether the man has ever worked
away, as well as age, education, marital status and Mozambican nationality, paper (III). Local, unemployed men (who are mostly in the age group 20-29) report the fewest partners of all. A key stratifying characteristic of migrants was the frequency of return home. The majority of men working in nearby destinations such as game parks or commercial farms report fewer partners then either the long distance migrants (who return once or twice a year), or resident employed men. Migrants are at higher risk of infection, and spousal separation increases the risk of sexual networking in the sending area, which increases risk at both ends of a migration cycle. This supports the hypothesis that migration plays an important role in the spread of HIV, but it is not a straightforward relationship. Migrants who return more frequently, indicating closer links between migrant and rural household may have less risk of outside partnerships and therefore less risk of becoming infected, and possibly passing on, the HIV virus.

Since the pattern of home return for healthy migrants is related to the risk of sexual partners outside of the marital or primary partnership, trends in the pattern of home return by sex are presented in tables 10–12, and previous communication in table 13. These are two key dimensions of links between migrants and home.

<table>
<thead>
<tr>
<th>Duration since last home visit</th>
<th>male migrants in 2002</th>
<th>%</th>
<th>female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>male migrants in 2007</th>
<th>%</th>
<th>female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>1187</td>
<td>16%</td>
<td>575</td>
<td>17%</td>
<td>0.656</td>
<td>2,001</td>
<td>23%</td>
<td>1,121</td>
<td>26%</td>
<td>0.000</td>
</tr>
<tr>
<td>2-4 weeks</td>
<td>1979</td>
<td>27%</td>
<td>858</td>
<td>25%</td>
<td>0.010</td>
<td>2,392</td>
<td>27%</td>
<td>1,164</td>
<td>27%</td>
<td>0.608</td>
</tr>
<tr>
<td>2-4 months</td>
<td>2041</td>
<td>28%</td>
<td>1037</td>
<td>30%</td>
<td>0.034</td>
<td>2,173</td>
<td>24%</td>
<td>1,073</td>
<td>24%</td>
<td>0.974</td>
</tr>
<tr>
<td>5-12 months</td>
<td>1649</td>
<td>22%</td>
<td>818</td>
<td>24%</td>
<td>0.237</td>
<td>1,960</td>
<td>22%</td>
<td>907</td>
<td>21%</td>
<td>0.064</td>
</tr>
<tr>
<td>&gt;1 year</td>
<td>476</td>
<td>6%</td>
<td>191</td>
<td>5%</td>
<td>0.043</td>
<td>355</td>
<td>4%</td>
<td>125</td>
<td>3%</td>
<td>0.001</td>
</tr>
<tr>
<td>Total</td>
<td>7332</td>
<td>100%</td>
<td>3,479</td>
<td>100%</td>
<td></td>
<td>8,881</td>
<td>100%</td>
<td>4,390</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 11: The duration since last home visit by sex and year, with p-values showing the sex differential

Table 11 shows that the duration since a migrant’s last trip home is getting shorter over time. A significantly higher proportion of male and female migrants returned in the previous week in 2007 compared to 2002. The female trend is more pronounced and women have become significantly more likely to return in the last week. All durations longer than 2 months have become less frequent for both sexes of migrant. The mean duration since last visit is shorter for females than males, viz. 100 days for females versus 123 days for males (p=0.002).

<table>
<thead>
<tr>
<th>Pattern of return</th>
<th>male migrants in 2002</th>
<th>%</th>
<th>female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>male migrants in 2007</th>
<th>%</th>
<th>female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>little but regular</td>
<td>1,331</td>
<td>18%</td>
<td>779</td>
<td>22%</td>
<td>0.000</td>
<td>2,120</td>
<td>24%</td>
<td>1,217</td>
<td>28%</td>
<td>0.000</td>
</tr>
<tr>
<td>frequent</td>
<td>2,175</td>
<td>30%</td>
<td>888</td>
<td>26%</td>
<td>0.000</td>
<td>3,512</td>
<td>40%</td>
<td>1,659</td>
<td>38%</td>
<td>0.051</td>
</tr>
<tr>
<td>irregular</td>
<td>3,453</td>
<td>47%</td>
<td>1,666</td>
<td>48%</td>
<td>0.441</td>
<td>3,016</td>
<td>34%</td>
<td>1,403</td>
<td>32%</td>
<td>0.021</td>
</tr>
<tr>
<td>almost none</td>
<td>296</td>
<td>4%</td>
<td>99</td>
<td>3%</td>
<td>0.002</td>
<td>89</td>
<td>1%</td>
<td>27</td>
<td>1%</td>
<td>0.024</td>
</tr>
<tr>
<td>other/ unknown</td>
<td>77</td>
<td>1%</td>
<td>47</td>
<td>1%</td>
<td>0.170</td>
<td>144</td>
<td>2%</td>
<td>84</td>
<td>2%</td>
<td>0.223</td>
</tr>
<tr>
<td>Total</td>
<td>7,332</td>
<td>100%</td>
<td>3,479</td>
<td>100%</td>
<td></td>
<td>8,881</td>
<td>100%</td>
<td>4,390</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 12: The pattern of home return by sex and year, with p-values showing the sex differential

9 Human Immuno-deficiency Virus (HIV)
Table 12 shows that the patterns of return vary by sex and are also changing significantly. Return patterns “little but regular” refers to Christmas, Easter and maybe additional school holidays. This pattern is the hallmark of formal contracts and is increasing for both sexes. This may indicate a higher risk of HIV exposure for the migrant and home partner. The “frequent return” category refers to weekends, month ends or month ends plus holidays” this category is also increasing significantly for both sexes. The “irregular pattern” is significantly declining over time and so is the pattern of almost no contact. These may indicate less risk for HIV exposure.

These changes indicate that labour migrants are becoming more closely linked to rural homes between 2002 and 2007. As time passes more people have become migrants and the new migrants are much more likely to remain linked to the rural household while they are away. This is partly explained by Infrastructure changes, improved transport and better labour conditions for the employed migrants after democracy was achieved.

<table>
<thead>
<tr>
<th>Previous communication</th>
<th>male migrants in 2002</th>
<th>%</th>
<th>female migrants in 2002</th>
<th>%</th>
<th>p-value</th>
<th>male migrants in 2007</th>
<th>%</th>
<th>female migrants in 2007</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>3486</td>
<td>48%</td>
<td>1644</td>
<td>47%</td>
<td>0.778</td>
<td>5749</td>
<td>65%</td>
<td>2892</td>
<td>66%</td>
<td>0.194</td>
</tr>
<tr>
<td>2-4 weeks</td>
<td>1760</td>
<td>24%</td>
<td>838</td>
<td>24%</td>
<td>0.925</td>
<td>1410</td>
<td>16%</td>
<td>677</td>
<td>15%</td>
<td>0.498</td>
</tr>
<tr>
<td>2-4 months</td>
<td>1110</td>
<td>15%</td>
<td>542</td>
<td>16%</td>
<td>0.552</td>
<td>801</td>
<td>9%</td>
<td>386</td>
<td>9%</td>
<td>0.667</td>
</tr>
<tr>
<td>5-12 months</td>
<td>676</td>
<td>9%</td>
<td>337</td>
<td>10%</td>
<td>0.437</td>
<td>732</td>
<td>8%</td>
<td>365</td>
<td>8%</td>
<td>0.887</td>
</tr>
<tr>
<td>&gt;1 year</td>
<td>300</td>
<td>4%</td>
<td>118</td>
<td>3%</td>
<td>0.078</td>
<td>189</td>
<td>2%</td>
<td>70</td>
<td>2%</td>
<td>0.037</td>
</tr>
<tr>
<td>Total</td>
<td>7332</td>
<td>100%</td>
<td>3,479</td>
<td>100%</td>
<td></td>
<td>8,881</td>
<td>100%</td>
<td>4,390</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 13: The duration since previous communication between migrant and home by sex and year, with p-values showing the sex differential

Table 13 shows that there is no sex difference in the duration since previous communication between the migrant and their household when the duration is less than a year. There is a long tail in the male distribution with the mean for males 64 days and females 48 days p=0.029. However, there is a large and significant reduction in the duration since last communication. The mean time (for both sexes) since last communication has decreased from 67 to 52 days (p=0.031).

Cell-phone ownership has increased dramatically over the observation period and can be attributed to the more frequent contact between temporary migrants and their rural homes.

Further evidence of the link between migration and mortality is given in paper (IV) which examines the hypothesis that return migration to rural households is associated with advancing illness and death, particularly from HIV/AIDS; adding a burden to families and the health system in rural areas. A longitudinal (event history) analysis was used to investigate the risk of dying for returnee migrants compared to permanent residents or returnees from more than five years ago. Analyses were carried out for an earlier (1992-1997) and a later period (1998-2004). Controlling for period we found that recently returned migrants have a significantly higher risk of dying, with odds ratios between 1.1 and 1.9 depending on age and sex category, compared with residents or long –term returnees. An exception is male returnees aged 60-79 years, who show a lower mortality than the residents. They have the double advantage of being positively selected on the basis of health as out-migrants (healthy migrant hypothesis) and have survived the selection process that has eliminated less health male migrants over their working lives. They may also be less likely to be HIV infected due to their older age.
The study demonstrates a rapid spread of the HIV epidemic in the study population. Residents in the sub-district are increasingly dying of HIV and TB, but the short-term returning-migrants experience an even greater increase. Female temporary migration may be fewer in number but like male migrants they have a risk of HIV infection associated with their migration status. The greatest difference between short-term returning migrants and resident is for younger women (aged 20-59) in the later period (1998–2004). This may reflect the rapid increase of HIV prevalence on young women and also their susceptibility to having high risk sexual encounters while away from home.

In summary, temporary migration is linked to the rapid spread of the HIV epidemic. Data for male temporary migrants shows that the risk of outside partners is high for all males, but it is not labour migrants alone who are at highest risk. Locally employed men showed the highest risk. Among migrants the frequency of home visit discriminates the risk of outside sexual partners. New data on the trends in visit patterns and frequency of communication shows that migrants are visiting and communicating more regularly in 2007 than in 2002. This adds a modicum of hope that the role of migration in the spread of HIV may lessen over time, especially if stronger links between migrants and their home translates into fewer outside sexual partners.

Migration and child mortality

Family configurations matter for children and are strongly affected by migration. This section examines whether children accompany parents when they migrate; whether destination category matters for children accompanying adults, and where children stay when the parent migrates. In table 14 we examine whether children accompany their parents when they are temporary migrants and if it changes over time. Fathers are very unlikely to take children with them, 2% of migrant fathers do so in 2002 and 4% in 2007 (p=0.010). Mothers are more likely to have accompanying children and the trend is stable with 11% of migrant mothers in 2002 and 10% in 2007 bringing a child with them.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>7161</td>
<td>3106</td>
<td>8565</td>
<td>3967</td>
<td>0.000</td>
<td>98%</td>
<td>96%</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>171</td>
<td>373</td>
<td>316</td>
<td>423</td>
<td>0.000</td>
<td>2%</td>
<td>4%</td>
<td>0.000</td>
</tr>
<tr>
<td>Total</td>
<td>7332</td>
<td>3479</td>
<td>8881</td>
<td>4390</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 14: The likelihood of a migrant being accompanied by a child, by sex and year, with p-values showing the sex differential

Table 15 examines whether there is a difference in the likelihood of a child accompanying a parent (mostly a mother) by type of destination and whether it is changing in time. The destination to which children are most likely to accompany a parent is the primary metropolis of Gauteng, where 7% of migrants have accompanying children. The trend is stable. It is seen above that Gauteng is the destination with the most varied reasons underpinning adult temporary migration, ranging from education, and visiting family. Migrating to a nearby village, town or commercial farm has a low likelihood of a child accompanying an adult (3%) and the trend is stable. The only destination category that shows an upward trend is a child accompanying a migrant to a secondary urban setting in another province which increases from 3 to 6% (p=0.048).
Table 15: Migrant accompanied by child by destination category, sex of migrant and year, with p-values showing the trend between 2002 and 2007

The odds are overwhelmingly high that temporary migrants leave their children behind when they go. Tables 15 and 16 examine where the children stay when the migrant parent leaves. The numbers are higher because this table counts children, whereas the previous two counted migrant parents and some migrants have more than one child. Table 16 shows that children are almost entirely likely to stay in the same household when their parent leaves, slightly more so for the father than the mother. Children are most likely to stay with their mother when the father migrates and with their grandmother in the same household when the female migrant leaves. This pattern has a stable trend.

Table 15: Migrant accompanied by child by destination category, sex of migrant and year, with p-values showing the trend between 2002 and 2007

Table 16: The place where children stay when left by a migrant parent, by sex of migrant and year, with p-values showing the sex differential

Table 17 examines whether there is variation by migrant destination in where the child stays when the parent migrates. There is almost no variation. When migrants move to Gauteng their children may stay in the household of a relative, but this occurs less than 2% of cases and is stable over time.

Table 17: The place where children stay when left by a migrant parent, by destination of migrant and year, with p-values showing the trend between 2002 and 2007
The health of children is a sensitive indicator of well-being for the household and community as a whole. In paper (V) the hypothesis is examined that the configuration of the household has an impact on child mortality, net of classical risk/protection factors such as socio-economic status, mother’s education, access to clean water, household size, child’s age and sex, and time period. The results show an important relation of family configuration to child mortality. The presence and absence of fathers plays a significant role, but varies by the type of father’s migration. When he leaves permanently it is equivalent to him being dead and, controlling for other factors and family configurations this results in a 90% higher risk of mortality. This result impacts on 48% of children in the community. It shows the importance of discriminating temporary from permanent migration because when fathers are temporary migrants there is no risk of higher child mortality compared to households where the child co-resides with both mother and father. Mothers are very much more likely to be physically present with their under five children, but if not there is a significant difference between whether she is a temporary migrant, lives elsewhere or is dead. Temporary migration is 250% worse for child mortality, while maternal orphanhood results in more than a five-fold increase in child mortality. If a mother lives elsewhere the increase in child mortality is double, but the confidence intervals are so wide that the result is not significant. This category is inconclusive because there are two main types of configuration where the mother lives elsewhere and they can have opposite effects. A child who is fostered and lives with a relative can be in a healthier situation although that is by no means certain. Children whose mothers leave the household on a permanent basis are at higher risk. So, the category of mother living elsewhere need more research to disentangle the different influences on their well-being.

An important finding in Paper (V) is that children of former Mozambican refugees show a significantly higher risk of mortality (34%) even after all the other risk factors and family configurations have been controlled for. Settlements of Mozambican former refugees continue to be extremely poor. There remains a higher mortality risk for children of former Mozambican parents. Other work shows that mortality rates are much lower than those for rural Mozambique, but remain higher than the host South African population (Garenne 2006).

The physical migration process has attendant risks for women who are pregnant at the time of migration, and if a child was born just before migration this also carries a risk associated with a disruption in the support networks available for newly migrant women. Once a child is six months old it is modestly protective for a woman to migrate. This relates to the healthy migrant hypothesis whereby migration selects positively for a range of characteristics that cannot be observed, but tend to make migrants more engaged and healthy people.

**Settlement of former refugees**

Figure 2 in the Paper (II) presents a multi-variate analysis showing which households are most likely to be chronically poor. Chronically poor households are those that do not transition above an imputed poverty-line for three observations over a five year period (2001-2005). The most critical identifying feature of chronically poor households is being a Mozambican household compared to being a South African one (odds ratio of 4.8), as identified by nationality of headship. The importance of this factor dwarfed conventional measures of stratification such as having local employment (odds ratio of 2.7) and other factors such as gender of the head, presence
of temporary migrants and household size, which each had an odds ratio between 1 and 2. While controlling for other factors related to poverty, there was an almost five-fold higher risk if the household head is a former refugee Mozambican. Results in Paper (V) similarly shows a differential of child mortality that attributes a higher risk associated with being in a Mozambican household. Again, this risk remains evident in a multivariate analysis after controlling for the conventional factors associated with child mortality. The point is that there are risks of adverse outcomes in poverty and child mortality that impact the whole community, but in addition to these there is a burden on households headed by former refugees.

This section adds descriptive detail about poverty and migration for Mozambican households compared to South African. Three tables are presented using data from the HDSS. Firstly, the distribution of household socio-economic status by quintile is presented for Mozambican and South African households. Secondly, trends are examined in the likelihood of Mozambican and South African households being in better-off half of the SES distribution over time. Thirdly, migration patterns are examined by nationality of household head to determine whether there are differences.

<table>
<thead>
<tr>
<th>Household head nationality</th>
<th>SES quintiles</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Mozambican</td>
<td>49% (1619)</td>
<td>25% (817)</td>
<td>14% (456)</td>
<td>9% (284)</td>
<td>4% (137)</td>
</tr>
<tr>
<td>South African</td>
<td>13% (1049)</td>
<td>20% (1658)</td>
<td>21% (1727)</td>
<td>22% (1830)</td>
<td>24% (2020)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 18: The proportion of the sub-population of Mozambican headed households, compared with the proportion of South African households in each wealth quintile, with p-values showing the comparison of Mozambican and South African proportions in each quintile.

Table 18 shows the household SES distribution with 1 being the poorest and 5 being the least poor in the population. Almost half of the Mozambican households live in the poorest quintile, whereas just over one-in-eight (13%) of the South African households are in this quintile. The second poorest quintile also had a significantly higher proportion of Mozambican compared to South African households. Then, the odds cross over and South African households are more likely to be in the better-off quintiles. The gap between Mozambican and South African households gets wider as the quintiles get higher. In other words, as the level of socio-economic status increases the difference between Mozambican and South African households also gets higher.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent in better-off half</td>
<td>61%</td>
<td>58%</td>
<td>0.000</td>
<td>22%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Table 18: The trend in likelihood of South African households being in the better-off half of the distribution, compared with Mozambican headed households, with p-values showing the significance of the trends in each sub-population.

To assess trends in the relationship between nationality of household head and poverty, a binary variable is used, which is negative if the household is in the lower half and positive if the household is in the better-off half of the SES distribution. The results are shown in Table 18. The trends
move in opposite directions for South African versus Mozambican households. Mozambican households are increasingly likely to be in the better-off half and South African households are increasingly not. The binary variable divides the household population into two halves so a significant increase in one group’s share implies a significant decrease in the other’s share. The data show a trend of lessening inequity between the two sub-populations. The gap is closing although it is still extremely wide. This is examined in the discussion below as evidence of adaptation of the settled former refugee population, which gradually brings the socio-economic status of the Mozambican households closer to the South African households over time.

### Table 19: Comparing the likelihood of different migration types in South African versus Mozambican households in 2003, with p-values representing the difference between nationalities of household head.

<table>
<thead>
<tr>
<th>Household migration status</th>
<th>South African headed household</th>
<th>Mozambican headed household</th>
<th>chi square value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male temporary migrant</td>
<td>49</td>
<td>56</td>
<td>46.2</td>
<td>0.000</td>
</tr>
<tr>
<td>Female temporary migrant</td>
<td>30</td>
<td>21</td>
<td>105.9</td>
<td>0.000</td>
</tr>
<tr>
<td>Male permanent in-migrant</td>
<td>4</td>
<td>3</td>
<td>4.4</td>
<td>0.035</td>
</tr>
<tr>
<td>Female permanent in-migrant</td>
<td>9</td>
<td>9</td>
<td>1.6</td>
<td>0.212</td>
</tr>
<tr>
<td>Male permanent out-migrant</td>
<td>1</td>
<td>1</td>
<td>0.0</td>
<td>0.949</td>
</tr>
<tr>
<td>Female permanent out-migrant</td>
<td>2</td>
<td>2</td>
<td>0.2</td>
<td>0.693</td>
</tr>
</tbody>
</table>

Once a former Mozambican household has moved into the sub-district they become part of the demographic surveillance as with any other household, and their subsequent migrations are tracked over time. Table 19 examines whether different migration types are conducted by persons living in South African or Mozambican households. The categories of migrations examined are temporary and permanent, male or female, with permanent migration being either in or out. For permanent migration there is almost no difference between Mozambican and South African households. The most frequent permanent migration category is female in-migration which occurs in 9% of Mozambican and 9% of South African households in one year. Permanent out-migration categories are much lower but also equal in the sub-populations. Male in-migration is significantly lower for Mozambicans compared to South Africans (3% versus 4%, p=0.035). Temporary migration on the other hand shows significant sex differences between the Mozambican and South African sub-populations. Overall, the proportion of households with any temporary migrant is similar, i.e. 79% of South African and 77% of Mozambican households have a linked temporary migrant. But the gender-balances are very different. Significantly higher proportions of Mozambican households have a linked male temporary migrant (56% versus 49%, p=0.000), whereas significantly lower proportions of Mozambican households have a female temporary migrant (21% versus 30%, p=0.000). The transition to gender equity in temporary migration remains slower for the Mozambican households compared to the South Africans.

In summary, Mozambican former refugee headed households are likely to be exceedingly poor, although there is evidence of adaptation and some closing of the gap between poor South Africans and even poorer Mozambicans. In terms of settlement transition, there are high levels of temporary migration in Mozambican households, but a significantly higher male to female ratio of temporary migrants.
Discussion

“Striving against Adversity: the Dynamics of Migration, Health and Poverty in Rural South Africa”

The title of this thesis references the themes that link the papers together. The ‘dynamics’ refer to the contextual features, household structure, health outcomes and socio-economic conditions that change as a result of migration. It also relates to the capacity of health and socio-demographic surveillance systems (HDSS) to empirically capture these changes. In a cross-sectional study we are aware of migrations that have occurred prior to observation, but the HDSS captures them as they occur and can relate them to past, present and future household experiences and structural realities. Expanded to a sub-district scale this provides a good opportunity to examine the dynamics of these phenomena. Migration has been shown to be a multifarious phenomenon comprising several key ‘types’ with different causes and consequences, which can differ by the gender of migrant within the same type. The type of migration observed is constrained by what the data allow. We see a stepping up from the sub-district to a national census for a perspective on national settlement change in a critical period of South Africa’s history, namely, the decade and a half following the onset of democracy. The wider perspective, however, comes at the cost of a migration typology, so the rest of the thesis digs back into the sub-district data to examine the typology of migration, including refugee settlement, permanent and temporary migration. Migration and health is studied using the dynamic, longitudinal data at a time when HIV AIDS mortality has reduced life expectancy by 12 years. Poverty is a key feature in South Africa’s rural areas due to a century of socially repressive laws. Labour migration was a cornerstone of apartheid, but, nowadays, the more diversified forms of temporary migration are key strategies used by rural households to kick back against poverty, thus ‘striving against adversity’.

Permanent migration

Permanent migration changes a person’s usual place of residence in a more permanent fashion. It does not necessarily break ties with the former household but it does change the de jure household membership to the place of destination. We have seen several features of its dynamics. At a national level the key migration is from one urban place to another, and while the net-migration tends to change the settlement distribution towards larger cities there is also a counter-flow so the secondary cities also receive in-migrants form larger urban areas. At the sub-district level the most prevalent pattern of permanent migration is within the same village or to an adjacent village. Thus, local mobility is the most frequent permanent migration. Rural villages are experiencing net population loss to nearby towns, expressly for improved services like water supply, schools and health care. The pattern of settlement change seems to be one of step-migration where people who leave rural areas move to larger, but not the largest, places, thus reducing the extent of social and economic change accompanying the move. This implies that the migration component of urbanisation will mostly be from urban to urban moves. It also means that permanent migration is more likely to follow one of the earliest identified laws of migration that distance is inversely related to the likelihood of migration. The key drive underlying permanent migration is family formation or dissolution. With respect to poverty the study shows that permanent migra-
tion within the sub-district is not related to socio-economic change and it does not characterise households in chronic poverty. People in chronic poverty still migrate to get married or divorced.

Permanent migration brings people together into unions but temporary migration is more likely the strategy used to access work and education opportunities once the household has been formed. At a later stage in a household life-cycle a temporary migrant can return to the rural household, which could be a permanent retirement or returning home to be with family members when very sick or possibly dying. From the point of view of children the permanent out-migration of a child’s father tends to have a negative health outcome and is a frequent occurrence in this population. The permanent outmigration of a mother is also bad for children but is a much rarer event. Children’s migration is an important area of study but outside the scope of this thesis.

Temporary migration

Temporary migration is the focus of the study because it is highly prevalent and has important impacts on social change, economic status and a range of health outcomes. We have seen that despite the removal of apartheid restrictions the level of temporary migration is increasing, especially among your adults and increasingly among women.

Temporary migration is linked to socio-economic status and health but not in straightforward ways. There is a positive association with socio-economic status which works through selection and a causal relationship which depends on the economic situation and composition of a household. The first level of selection occurs because at a national level the population is poor, remote and underserved by utilities such as schools, health care, water, sanitation and decent roads. As people reach a stage in their lives when goods are services are needed that cannot be found locally because of general underdevelopment they are likely to migrate. Selection then determines who is most likely to migrate and age is a critical factor. Young adults are most likely to migrate and this is the same pattern throughout the developing world. Circular temporary migration implies routinely moving from home to workplace and can continue for many years. For men the age pattern of high circular migration is 20 to 59 years and for women 20 to 49 years.

Gender is important because males have a tradition of migrating to work and are usually the main earners in families, but there is in addition a positive selection towards educated young women migrating to access opportunities and gain more freedom from the traditional rural society. One of the main changes in migration pattern since the onset of democracy is that younger men and women in the 20-25 age group are increasingly likely to migrate.

Theory predicts that the unit of decision making is the household rather than the individual and households send the most capable person to earn money in a distant labour market and remit. The endogeneity created by this is that better off households are more likely to send migrants since they can overcome the costs of migration and also may have more connections in certain destinations (such as a city suburb) or work sectors (such as a game farm or commercial farm). In return the migrant remits a portion of his or her salary and that becomes an income for the rural household. Thus households that send a migrant also benefit and this mutual reinforcement keeps households on better socio-economic tracks than those who cannot afford to send a migrant. Households in the poorer half of the population are also stratified, with some
transitioning out of poverty and others remaining in chronic poverty. Female migration is a key strategy for poorer households. Female migrants are more likely to come from female-headed households which are more likely to be in the poorer half of the socio-economic spectrum. For the poorest households the most important factors improving SES are government grants and female temporary migrants, while for better-off households male temporary migrants and local employment are the most important factors.

The socio-economic impact of migration over and above selection arises from the relationship between migration and SES. A positive increment in SES derives from increasing the number of temporary migrants in the household and a downturn in SES is associated with decreasing the number of temporary migrants. This highlights the importance of temporary migration as a livelihood strategy. Households can lose temporary migrants through retrenchment, permanent out-migration, for example in a desertion scenario, or death of a temporary migrant. All of these events happen and as adult mortality has increased from the HIV epidemic it has contributed a tragic twist that the people most at risk of infection and death have been the positively selected temporary migrants who were household bread winners. The number of temporary migrants can diminish in a household in different ways and these tend to be socio-economic shocks to households. Households in chronic poverty are likely to be those that had male or female temporary migrants and then lost them.

Migration rates are high due to general impoverishment, but positively selected households have temporary migrants and are better off. Thus, there is a clear positive association between migration and SES. Papers (I) and (III) have demonstrated that migration is a risk factor for increased likelihood of high-risk sexual partnerships which places households of origin at risk. Thus, a positive SES selection has become a negative sexual health risk. One of the key factors driving this is the selection itself, which means that the migrants at an individual level may have more risk-taking tendencies. Another factor is spousal separation, which results in sexual relations outside marriage or long term committed relationships. Thirdly, the change in context mediated by the migration is different for males and females, but both are at risk of outside sexual partnerships. For both sexes this can be related to lax social controls away from the more conservative rural environment. In addition women can be exposed to transactional sex, or having boyfriends for economic reasons, and men exposed to environments where risky behaviour is condoned or encouraged. The finding in this thesis is that migrant men who visit home more frequently are less likely to have outside partners. While rates of outside partnerships is high for all men this is a hopeful finding, particularly because with improved long distance transportation and more conducive work contracts, migrants appear to be visiting home more regularly. If awareness of personal risk expands and factors conspire to link migrants and their homes more closely it is possible that the risk associating migration with HIV will diminish over time. Time will tell. This is a different conclusion to much of the literature linking migration and HIV transmission which puts the blame on the migrant and relates frequent returns home with an increased risk of spreading the disease in the rural area. For this reason policies have often aimed for less migration in order to lessen risk. This thesis argues the other way round. Since temporary migration is inevitable, more contact is needed between the migrant and their rural home. The finding that more frequent returns home to rural households is occurring is to be welcomed and encouraged.
The last issue to discuss in relation to temporary migration relates to child health. Literature has high-lighted disruption or separation as one of the mechanisms through which migration impacts on the communities left behind. The separation between fathers and children when the mother is at home does not impact on children’s risk of mortality if they are temporary migrants because the benefit of the remittance income outweighs the loss of parental care. This does not hold for female migration. When mothers migrate there is the potential of increased burden of health and even mortality of children, irrespective of the father’s migration status. The appointed care-giver may not pick up the signs of illness as quickly, nor make as much effort to get the child to health care. There may be risk of injury that increases due to less vigilant observation of children’s behaviour. In the longer run there may be nutritional deficiencies associated with non-biological parenting that can make children more prone to ill-health.

Temporary migration is the most beneficial and the most harmful form of migration, an intensity which is higher for women than men although it affects both sexes. Whether positively selected or striving against the adversity, driven people migrate, but there are higher risks attendant on temporary migration than any other migration. The risks for men are particularly sexually transmitted diseases, workplace infections and injuries. Women increasingly face these risks too, but in addition may be forced to migrate under more impoverished conditions. Women’s migration is riskier as evidenced by the consequences on child mortality, but the income for poor rural households is an important reward. We see that working women migrants are more likely to send remittances than migrant men. It is women’s migration more than men’s that works to close inequity by providing livelihoods for the most impoverished households.

Settlement of former refugees

It is within some of the poorest populations of the world that forced migration can occur due to conflict or environmental hazard. Thus, there is a negative selection at work in forced migration. In the time of civil war the whole population age structure moves and not just the prime age adults. Whole villages can be forced to migrate which is a different pattern to the positive health selection that characterises young people leaving a stable home and staying linked while they are away. Health selection becomes more positive as the risks and barriers to migration are higher because more vitality is required to overcome the obstacles. By the time the refugees had settled in South Africa the degree of positive selection had increased due to the ardours of the journey impacting more severely on the frail migrants.

The negative selection, severe disruption, compromised legal status and unhealthy environments at their destination add up and former refugees that have settled in rural South Africa have higher child mortality than their hosts. The findings in Papers (II), (V), and in the results section above show the burden of poverty and ill-health in the former refugee settlements. The child health burden remains high despite two decades since original in-migration from Mozambique. The division of the population into wealth quintiles shows a high proportion of the former refugee households in the poorest quintile. There is poor infrastructure, livelihoods have been severely disrupted and there is a deprivation associated with lack of integration and legal status. Settled former Mozambicans in South Africa remain a vulnerable group. This begs the question: why did they not take up the offer to repatriate back to Mozambique?
Poverty and remoteness are problems for former Mozambican households, but some early indicators of assimilation are in place. The question of assimilation looks at whether the health trajectories of the in-migrants adapt to become like the hosts once they have arrived in the new conditions. There has been modest improvement albeit from a very low base. Evidence of assimilation include the fact that children born to Mozambican parents living in mixed communities had a better survival chances than those born in former refugee villages (Hargreaves et al. 2004). Movement out of the former refugee villages was associated with an improvement in child mortality rates.

Mortality data also support the decision of former refugees to stay in South Africa because the right comparison group is not the host population but the origin population, i.e. people living in rural Mozambique. With infrastructure collapse in the civil war and underdevelopment, mortality rates are still high in rural Mozambique. The refugees had a higher under five mortality rate (64 per 1000) compared to South African children (48 per 1000), but the mortality conditions are better than their counterparts who remained in Mozambique with even higher mortality rates of (201/1000) (Garenne 2006). The refugees that crossed into South Africa have reduced their mortality since becoming settled. Persons who migrated within the study site i.e. out of former refugee villages, also gained a further health advantage. Thus, despite negative selection and vulnerability there has been assimilation from a health perspective.

A comparison of migration rates between the Mozambican and South African households also shows assimilation. Permanent migration patterns are very similar in the Mozambican and South African households. Temporary migration rates are the same, i.e. both high, but with significant sex differences. The Mozambican temporary migrants men are much more likely to leave the spouse behind in the rural area, while South African women are encountering more of the modern discourse, experiencing new gender roles and using the existing migrant networks to access education or work opportunities in cities or farms. Mozambican households in South Africa are constrained by the same environment as the poor South Africans, making the patterns of migration similar in the South African and Mozambican households. As with the South African households it would be the relatively better off households that could send a temporary migrant. Also, risks of sexually transmitted disease and sick migrants returning home to die exist for settled refugee households.

Former refugee households are a vulnerable group that remains chronically poor and needs to be properly integrated. Ensuring the rights of the former Mozambicans is an important challenge to local authorities and communities. Groups identified as the vulnerable in South Africa are the rural poor, people with disabilities, retrenched farm workers, cross border migrants, the street homeless, AIDS orphans and households with AIDS sufferers (Aliber 2003). For these vulnerable groups there needs to be ongoing research conducted so that an appropriate policy response can be made. It is vital to see that impoverished communities like Agincourt are not homogenous. Structural, social and cultural barriers prevent an equal flow of access to resources for former refugees. Their assimilation should be encouraged and accepted, while the legal issues hanging over former refugees needs to be resolved.
**Existing data limitations and proposed solutions**

National data needs to show temporary migration patterns. The national perspective is important because policy makers need to understand how settlement patterns are changing over time and what the implications are for social change, poverty and health. We have seen however that national datasets are hampered in migration monitoring because it is hard to pick up temporary migration. This means that some key policy issues are missed at a time when it is critical to see how the dynamics work. High levels of HIV and temporary migration mean that the health services remote from the main centres are very likely to pick up a lot of HIV illness. Also, rural households are burdened by the loss of a bread winner and the return migration of a sick household member. Censuses and national surveys should be adapted to pick up circular migration to enable better planning.

Health and socio-demographic surveillance can help to establish the dynamics of migration which can be triangulated with the national picture. The limitation of the HDSS is one of representivity and it is not clear that policy makers can infer national trends from sub-district data. There are however analytic approaches that help to resolve some of the representivity issues. The findings from HDSS are rendered more informative when combined with findings from other HDSS sites. The INDEPTH Migration and Urbanisation Working Group (MUWG) is an example of where HDSS data are being used from seven HDSS sites in six countries in sub-Saharan Africa and Asia to look at health and socio-economic implications of migration using longitudinal data. The author of the present thesis is also co-editing the book that presents this work which will be published a few months after the thesis. The framework presented in the thesis has been helpful for integrating the findings from the seven HDSS sites. In fact, the framework used in the thesis was first developed for the multi-country study. The first MUWG book, “The Dynamics of Migration, Health and Livelihoods: INDEPTH Network perspectives”, aims to be part of a foundational contribution of longitudinal HDSS data to the studies of health and socio-economic implications of migration.

**The impact of migration on other health and demographic measures.**

Aside from the direct impact of migration as a livelihood strategy for rural households there is a technical corollary that makes it vital for public health scholarship to take careful note of migration in a small area population like a HDSS, or other cohort study designs. The issue of selection described above implies that attrition through migration is not a random process and therefore demographic and health measures conducted in a society may over- or under-estimate key phenomena. As migrants enter and leave the HDSS they change the population at risk. The out-migration of women in their most fertile years may imply that their births are not captured in the surveillance population which can lead to an underestimation of fertility measures like TFR. Also, as described above, in-migrant adults having a higher risk of mortality compared to the resident population. They are also exposed to different environmental conditions. Therefore, mortality measures may be inflated by their inclusion. Knowledge about the composition of migration streams and adjusting demographic rates for attrition is an aspect of public health and demography that is underdeveloped and will rely heavily on migration data from longitudinal studies.
Conclusion

Data are often inadequate to study the longitudinal dynamics of migration, socio-economic status and health, but the HDSS data can make a contribution. Using the analytic framework, migration is a prominent life choice in this population that changes the settings in which the life of migrants and their households are played out. Migration mediates different settings and there are consequent changes in the risks and resources for health. There can be positive or negative influences on health. The main positive impact is through income, because migrants remit. The likelihood of a household sending a migrant is affected by household selection, as well as striving against adversity, where driven individuals migrate to create income for an otherwise impoverished household. The key negative impacts examined in this thesis are in the domain of health. The risks that accompany the changing of settings through migration lead to morbidity through sexually transmitted diseases, family and health system's burden of palliative care for migrants returning home to die, and child mortality impacted by mother's temporary migration. For settled former refuges there is only very modest integration and the sub-group remains at higher risk of poverty and child mortality in the one to four year age group.

There are positive and negative implications of migration. If the negative issues are addressed and the positive ones enhanced then migration will affect change in more positive ways. An ultimate goal of development should be to enable people to access the markets for education, employment and health closer to home. This will improve the negative consequences of separation, especially of spouses, and of mothers and children. Until this development occurs we can expect migrants to remain connected to their origin households and therefore we should enable the interaction between migrants and their homes. Measures such as improved transportation and roads should be seen as a positive, not a negative intervention, even though it will create more migration. Although migration has been blamed from the spread of HIV through the risk of multiple partnerships, there seems to be safer migration and this is the type where there is more contact between home and away places. Remittances could be enhanced by making it safer and easier to transfer money back to rural homes. Since cell phones have become ubiquitous this technology could be used for money transfers.

Health services need to adapt to a reality of high levels of circular migration. This starts with budgetary allocations that have been apportioned according to the de facto population distribution given in national census data, to account for sick migrants returning home to die. Information systems are needed so that clinicians in district hospitals can access basic patient records from urban environments. Health care services in working environments can provide referral letters for persons with chronic illness in case they need to receive medication in rural settings. Generally, barriers to health care should be low so that migrants of all types can access preventative and curative services. Family and extended family networks are needed to support children while the migrant is away. More frequent encounters between migrant and home is important, which can be achieved with better road and transport networks.

Poorer parts of the world will continue sending migrants to better-off parts, be it a town, city or another country. Usually poor migrants are positively selected sojourners who are vital for the economic wellbeing of the households and communities left behind. To plan for this situation data are needed at a national level, so it is recommended that national censuses and surveys ac-
count for temporary migration when collecting information about household membership; otherwise the implications for sending communities will remain lost to policy makers. At an individual level we can offset many negative consequences by treating migrants as people striving against adversity, rather than as unwelcome outsiders in our better-off communities.
References


REFERENCES


REFERENCES


