“It is not because countries are poor that they cannot afford good health information: it is because they are poor that they cannot afford to be without it”

Health Metrics Network, World Health Organization, 2005

This briefing note is based on work prepared by Dr Jane Doherty and Staff of the MRC/Wits Agincourt Unit, and is primarily based on the results of the annual census results from 1994 to 2010 and the collection of articles that appear in a special supplement (no. 69 of 2007) of the Scandinavian Journal of Public Health entitled Health, population and social transitions in rural South Africa. The supplement showcases research conducted by a Health and Socio-Demographic Surveillance System in rural South Africa. The supplement was edited by Stephen Tollman and Kathleen Kahn of the School of Public Health (University of the Witwatersrand) and the MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), South Africa. All photos were taken by Paul Weinburg.
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INTRODUCTION
This annual research brief presents health and demographic indicators and scientific results from nested projects derived from the Agincourt Health and Demographic Surveillance System site (Agincourt HDSS), located in the Agincourt area of the Bushbuckridge Local Municipality, Ehlanzeni District, Mpumalanga Province of South Africa.

Purpose of the annual report
This brief aims to provide information useful to various government and non-governmental service providers who may use the data to plan their services. In addition, it will be useful to all researchers and students collaborating with the MRC/Wits Agincourt unit. The information may be used in any way – although it is requested the work is acknowledged as follows: “Annual Research Brief - MRC/Wits Rural Public Health And Health Transitions Research Unit (Agincourt), Vol 1:Nov 2011”. Contact details are on the back of the document should you want to make further requests for information.

WHERE AND WHAT IS THE AGINCOURT HDSS?
The Agincourt health and socio-demographic surveillance system is the research foundation of the MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt). The Agincourt HDSS site, measuring some 420 sq km, extended in 2007, and currently covering 87,040 people living in 14,382 households and 24 villages, lies in South Africa’s semi-arid rural north-east. Part of the Bushbuckridge ‘poverty node’ it has long been a labour sending area with limited employment opportunities despite a population density above 200 persons per sq km. Located only 40km west of the Mozambican border, the area can be regarded as a cross-border region of rural southern Africa – indeed former Mozambicans make up about a third of the Agincourt population.

In the apartheid era, the Agincourt area formed part of the black ‘homeland’, Gazankulu. This legacy shapes the lives of its inhabitants today: farms are too small to support subsistence, land tenure is still under traditional authority, the local economy is not well-developed and many families are dependent on labour migrancy and government social security grants for their livelihoods. Poverty is widespread and the HIV/AIDS epidemic casts its shadow over many of the changes experienced by the community since the first democratic elections in 1994.

WHAT IS A HEALTH AND SOCIO-DEMOGRAPHIC SURVEILLANCE SYSTEM?
Information on health indicators is usually very weak in communities with poor infrastructure and health systems. It is precisely in these communities, however, that good information is required in order to improve health and health equity.

Health and socio-demographic surveillance is a response to this problem. It generates accurate information in communities about which little is usually known. Over a period of time, data are collected through regular visits to households and interviews with household members. These ‘longitudinal’ data allow the analysis of population dynamics as well as health and social change, in order to inform ongoing policy and practice.

Because of the long-term presence of researchers in a community, surveillance systems have to pay special attention to relationships with the community. To this end, the LINC (Learning, Information Dissemination and Networking with the Community) office was established, charged with ensuring partnerships between the unit, the study communities and the local service provider. This and other features make surveillance systems expensive to set
up and complex to run. However, once established, they are powerful mechanisms for generating accurate and relevant information (see Box 1). As a result, the number of surveillance sites around the world has proliferated over the past two decades. These sites are linked through an active global network called INDEPTH. Participation in the network strengthens the ability of sites to articulate and address the essential questions confronting poor communities, especially in rural areas.

Figure 1: Maps of position of Agincourt HDSS in South Africa and in Bushbuckridge Municipality, Mpumalanga Province

1 The International Network for the Demographic Evaluation of Populations and Their Health
An example of population trends that are possible to quantify in demographic surveillance is shown in the two population pyramids in Figure 2. These population pyramids show a rapid transition in the villages in the Agincourt HDSS between 1994 and 2010 from a pyramid typical of a developing nation with a wide base showing a high fertility rate, to a pyramid with a narrower base in 2010 (excluding new villages added in 2007) showing a lower fertility rate, and the 0-4 year olds from 1994 moving up to form the wide mid section of 15-19 and 20-24 year olds in 2010. The result of the large numbers of 0-4 year old females in 1994 reaching child bearing age in 2010 means that there is a concurrent increase in the numbers of 0-4 year olds in 2010. Note also the slight increase in the number of older people in 2010, possibly owing to better access to health care and reduction in poverty probably due to increases in social security. These pyramids serve to show just one trend illustrated by the data emanating from the annual census run by the Agincourt HDSS.

**Figure 2: Population Pyramids Agincourt HDSS 1994 and 2010**

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**Box 1: Benefits of a Health and Socio-Demographic Surveillance System**

- The denominator population of a geographically defined area is reliably known: this makes it possible to calculate reliable rates.
- It is possible to track conditions over time and understand complex, dynamic processes that affect households: this is not possible with cross-sectional studies.
- The site’s research infrastructure can be used as a platform in which to ‘nest’ additional, specialized studies, and established relationships with the community make it easier to engage with the community during future work: this makes the overall research exercise cost-effective.
- As all households and household members are registered, it becomes easier to select relevant participants for research studies (e.g. households which have experienced a recent death).
- It becomes possible to consider the findings generated by different studies together, providing richer insight into the community.
- It is possible to evaluate the impact of interventions.
- Preserving the relationship with the community helps to ensure that research is relevant [1].
THE AGINCOURT HEALTH AND SOCIO DEMOGRAPHIC SURVEILLANCE SYSTEM

Annual Census
The Agincourt HDSS was initiated in 1992 and is a founding member of INDEPTH, the global network of similar sites. Once a year, the Agincourt HDSS carries out a census of all 14 500 households, identifying births, deaths and instances of in- and out-migration. Subsequently, a verbal ‘autopsy’ is conducted by speaking to members of households where a death has occurred: this is done to improve the accuracy of information on the cause of death, as official death certificates are often missing or incomplete. The verbal autopsy is a feature that has enhanced the analytic power of the site immensely. The compilation of an asset register for each house is a further regular research exercise that provides information on the socioeconomic circumstances of households.

Table 1 shows demographic data derived from the 2010 annual census.

Table 1: Agincourt HDSS site Demographic Characteristics, 2010

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009/08/01 to 2010/08/02</td>
</tr>
<tr>
<td>Male Population PY</td>
<td>41641</td>
</tr>
<tr>
<td>Female Population Py</td>
<td>45399</td>
</tr>
<tr>
<td>Total Population PY</td>
<td>87040</td>
</tr>
<tr>
<td>Crude Birth Rate</td>
<td>22.02</td>
</tr>
<tr>
<td>Crude Death Rate</td>
<td>9.69</td>
</tr>
<tr>
<td>Crude Rate of Natural Increase</td>
<td>12.34</td>
</tr>
<tr>
<td>In-Migration Rate</td>
<td>17.52</td>
</tr>
<tr>
<td>Out-Migration Rate</td>
<td>16.79</td>
</tr>
<tr>
<td>Total Fertility Rate</td>
<td>2.36</td>
</tr>
<tr>
<td>Infant Mortality Rate 1q0</td>
<td>35.019</td>
</tr>
<tr>
<td>Child Mortality Rate 4q1</td>
<td>15.332</td>
</tr>
<tr>
<td>Under Five Mortality Rate 5q0</td>
<td>49.81</td>
</tr>
<tr>
<td>Life Expectancy at Birth years</td>
<td>60.17</td>
</tr>
</tbody>
</table>

Additional modules
Additional modules are also added periodically to the census, in the form of one or two page questionnaires. This allows for cost effective data collection of information other than the purely demographic data (births, deaths, in and out migrations) collected annually. Figure 3 shows the additional modules collected so far by the Agincourt HDSS and the years in which they were collected.
Two examples of simple data that can be extracted from the module data are included in Figures 4 and 5 below. Figure 4 shows data from the Socio Economic Status (SES) module and shows how households use of power to cook has changed between 2001 and 2009. The percentage of households using electricity to cook is steadily rising, and the percentage of households using wood to cook is steadily decreasing.

Figure 4: Change in use of power to cook, Agincourt HDSS 2001-2009
Figure 5 shows data from the education module conducted in 2009. Almost 90% of children from ages 8 to 13 were attending school in 2009. However, from age 13 to 18 there is a steep drop out until there were only 70% of 18 years attending school in the same year.

Figure 5: Percentage of children enrolled in schools, Agincourt HDSS 2009

Figures 4 and 5 show very simple data from the additional modules, but researchers also use the module data for more complex analysis, such as showing how socio economic status and education status of mothers could affect the health of children in the study site.

**Specialized nested studies**

Additional specialized nested studies are conducted periodically, and increasingly regularly. Thus, a special set of questions may be added to the survey questionnaires administered during the census (for example, on child health - the Growth studies, epilepsy - the SEEDS study, or stroke - the SASPI study). Alternatively, a new study which a completely different might be conducted on a sample of households (for example, evaluating the impact of conditional cash transfers on adolescent girls’ school attendance and incidence of HIV - the current Swa Koteka HPTN 068 study, or in the past, the RENEWAL study). Additional information on all current nested studies is included later in this report, and a few key results from a previous nested study are included below.

**The RENEWAL Study**

The RENEWAL study investigated the relationship between household experience of the death of a prime-age adult member, household food security, and the use of natural resources in a sample of 290 households. The Agincourt HDSS was used to select a random sample of roughly equal numbers of households that had experienced either 1) an adult death due to HIV/AIDS, 2) a sudden adult death due to some other cause (e.g. heart attack), 3) or no adult death in the last two years. A detailed questionnaire was used to collect data on household use of natural resources and food security among these households.

Households that had experienced the death of a prime-age adult, regardless of the cause, were less food secure than households that had not experienced an adult death over the same period. For most measures of food security, it was the households impacted by a sudden non-HIV/AIDS death that were most severely impacted.
This was probably because such a death was totally unexpected, casting the household into crisis without much time to adapt in the short term. Such people were also more likely to have been a bread-winner before they died, compared to those who died from HIV/AIDS. However, regardless of experience of an adult death, the poorest households were the least food secure.

There was not much difference in the use of natural resources between the three categories of households. However, households that had lost an adult member in the last two years were much more likely than un-impacted households to state that they used a range of natural resources specifically to save money (Figure 7).

The use of natural resources thus potentially buffers households from some of the economic impacts of losing a prime-age adult.

![Figure 6: Percentage of households experiencing food shortages in the last thirty days, 2006](image1)

![Figure 7: Percent of households who used resources specifically to save money, 2006](image2)
HEALTH, DEMOGRAPHIC AND SOCIAL TRANSITIONS IN THE AGINCOURT HDSS: THE EVIDENCE

Over time, the research focus of the site has expanded from basic demographic and health status analysis to comprehensive exploration of the complex health, population and social changes affecting the Agincourt people. A distinctive feature of the Agincourt research is that it is truly multi-disciplinary, drawing on the strengths of different theoretical frameworks and implementing a host of quantitative and qualitative methods.

Now, after 19 years in the field, the Agincourt HDSS is a mature research site with sophisticated data management capacity [3]. It has generated a substantive body of work and achieved international recognition. Some details from the Agincourt work are summarized below.

The Agincourt surveillance site has shown that, since its inception, the community has undergone rapid health, demographic and social change: the supposed transition from diseases of poverty to diseases of affluence has become protracted and, in some cases, inverted; health and health inequity worsened but mortality seems to be decreasing; household composition is fluid and the roles and relationships of household members are changing.

Mortality

When the Agincourt surveillance site was initiated in the early 1990s, death rates were relatively low for a rural area in Africa. Since then, rapidly worsening death rates among young adults and young children saw a reversal of long-term mortality trends in these age groups [4] (See Box 2). However, more recent evidence from the DSS suggests that there might be a reversal in death rates – possibly due to increased access to anti retrovirals (see Figure 8).

![Figure 8: Trends in life expectancy Agincourt HDSS 1992-2010](image)

Emerging and persistent health problems

HIV/AIDS has become the leading cause of death among young adults and young children and has had a profound effect on fertility, migration and familial arrangements. Research at Agincourt is seeking to understand how the community makes sense of this phenomenon. One study found that community members...
provide cultural explanations for ‘bad death’ (AIDS death): these centre on the erosion of cultural norms and traditions and the consequences for physical health of ‘cultural lapses’ [5]. In this context, scientific explanations and therapies have limited appeal. This is confirmed by another study which found that folk beliefs about illness and its causes deter people from seeking life-saving treatment – such as antiretrovirals – from Western health services [6]. When this is the case, disease transmission remains unchecked.

The HIV/AIDS epidemic has been accompanied by the resurgence of tuberculosis which has also reversed favourable trends since the 1950s. It is a cause for concern that only 70% of prevalent pulmonary TB cases that were identified by an Agincourt study in the permanent population were detected by the health service: 15% were undiagnosed in the community and a further 15% died of the disease prior to diagnosis [2]. Most of these cases had presented repeatedly to the health service.

### Box 2: Mortality in Agincourt

- Death rates increased since the mid-1990s to the mid 2000s.
- Increases were most marked for:
  - young adults between 20 and 49;
  - children under 5; and
  - females.
- There is an increase in mortality amongst older women between the ages of 50 and 64.
- There was been a rapid decline in life expectancy:
  - a 12-year decline in females; and
  - a 14-year decline in males. [4].
- Unpublished results from more recent surveys indicate that there might be a reversal of the increase in mortality

**Non-communicable disease** has placed an additional burden on a community that already suffers from the traditional diseases of poverty. Lifestyle, dietary and occupational changes have made obesity, hypertension and diabetes major public health issues: an unexpected finding is that these problems are most severe in older women [7]. A startling 43% of people 35 and over have hypertension but few are receiving treatment: it is likely that untreated hypertension is a causal factor in the high death rate from strokes. In the absence of health system intervention, Agincourt is likely to be at risk of increasing cardiovascular disease [8].

Indeed, recent data (Figure 9) suggests that the most problematic non communicable disease is in fact cardiovascular disease, and this has persisted over the years of surveillance. The unit and collaborating researchers are currently working with the National Department of Health in order to develop and evaluate an intervention study aimed at reducing the effects of hypertension. It is hoped that this study will go into the field in September 2011.
Malnutrition amongst children is persistent with many children not attaining their potential weight and height. Mortality rates from malnutrition are high at 25%. HIV/AIDS contributes to this problem but one of the Agincourt studies found that many of the traditional risk factors remain important – food insecurity, unhealthy feeding practices, poor access to a quality health system, disruptions to family structure and poor access to child support grants [9]. A striking finding of this research is that the number of women practicing exclusive breastfeeding is low; supplementary foods are introduced early with possibly negative implications for child health.

A separate study explored the social context of children’s nutritional status, identifying parental and residential factors that are important: nutrition is compromised in the absence of a mother within the house and the lack of financial support from a father [10]. Both studies confirmed, for the first time, that children born after other siblings – that is, lower in the birth order - tend to be worse off.

Rapidly changing households

Fertility
In the Agincourt area there has been a consistent decline in fertility over the past 25 years, including amongst adolescents [11]. The net reproduction rate has declined much faster than expected for a rural, African area: Agincourt is one of the first sites in which this phenomenon has been recorded. The reasons for declining fertility are complex, including increased use of contraception. Migration has certainly played a role and HIV/AIDS has probably been responsible for about 20% of the fall.

Adolescent pregnancy is a ‘hot topic’ in South Africa presently. Table 2 tells a very interesting story from the Agincourt HDSS data. Although adolescent pregnancies as a percentage of total pregnancies has indeed risen between 1996 and 2007, the actual rate of teenage pregnancy has decreased rate. Total fertility rate across all women of child bearing age has decreased [11], but it has just not decreased as fast in adolescents. We await data from 2010 to learn more about this apparent trend.
Table 2: Adolescent pregnancy rates Agincourt HDSS site 1996, 2001 and 2007

<table>
<thead>
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<tbody>
<tr>
<td>1996</td>
<td>497</td>
<td>2924</td>
<td>6280</td>
<td>17.0%</td>
<td>7.9%</td>
</tr>
<tr>
<td>2001</td>
<td>422</td>
<td>1946</td>
<td>7106</td>
<td>21.7%</td>
<td>5.9%</td>
</tr>
<tr>
<td>2007</td>
<td>401</td>
<td>1851</td>
<td>7298</td>
<td>21.7%</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

**Household composition**

Over recent years, average household size has decreased, the proportion of female-headed households has increased and the proportion of households with at least one maternal orphan has doubled [12]. Again, migration and HIV/AIDS have probably played an important role in these changes. Contrary to expectations, Agincourt has not yet seen an increase in ‘fragile families’ such as child-headed households or skipped-generation families (where grandparents and children live together in the absence of working-age adults [12]. In fact, national datasets that suggest there is an increase in single person households are not supported by research in Agincourt where there is no evidence of individuals becoming more isolated residentially. On the contrary, it seems more likely that the future, in this region at least, will see an increase in the proportion of three-generation households [13]. Given the importance of the extended family, especially in protecting child health, this is a positive factor.

**Migration**

As intimated already, migration dynamics have important implications for the Agincourt population: ironically, although migration supports livelihoods it can also jeopardize health. Increasing numbers of people are seeking employment outside of Agincourt and increasing numbers of women are included in this migration, changing family arrangements. At the same time, adults who have migrated return to their village when they are seriously ill and eventually die there, mainly from HIV/AIDS and TB. This research challenges notions of the permanency of migration and provides strong evidence of the close ties between rural and urban areas in the form of ‘circular’ migration [14].

‘Returning home to die’ seems to have increased in recent years, imposing a new burden on families and local health services [15]. Apart from the human suffering involved, there are costs to the household in the form of the cessation of remittances, increased household health expenditure for health care and funerals and the opportunity cost of caring for a severely ill person. Migration patterns like these also foster disease transmission and pose a challenge to health information systems that attempt to track the occurrence of ill-health and utilization of health services.
Throughout the developing world rural households that are unable to sustain themselves with local resources use migration to access opportunities and employment elsewhere [16]. Often people with special skills or higher education use migration to participate in the urban economy and get higher returns for their skills. Poverty is a key feature in South Africa’s rural areas due to half a century of socially repressive laws with geographical policies locating poor families in rural areas [17]. Labour migration was a cornerstone of apartheid, but, nowadays, it is one of the prime strategies used by rural households to kick back against poverty. Despite the removal of apartheid restrictions the level of temporary migration is increasing as described below [14]. Although this means that many people leave rural areas to work in urban settings it does not mean that they become permanently embedded in the city. For many rural residents the trip may be short or long in duration but often involves eventual return to the rural household. Sometimes migrants visit for family events like births, marriages and funerals. Often over Christmas and Easter holidays the rural villages swell with returning migrants coming back to be with family and friends. Sometimes when migrants get sick they return to be cared for by their families [15]. Also, when migrants retire they often return to rural households. Therefore, there are two-way flows between South Africa’s cities and rural areas, which are represented in the data below [18:19]. The dynamic nature of migration in South Africa is often misunderstood and conceived of as a one-way trip to an urban area, so this chapter helps to rebalance some of that misunderstanding.

Migration and households
Migration is generally good for the socio-economic status of the household left behind. Although not all migrants are able to find employment, those that do usually send money back to rural households. This can relieve pressure on household budgets and even translate into more assets. Both male and female labour migration is helpful for the economy of rural households. There is a basic relationship between migration and households, such that it is better-off households that can afford to send a migrant and they usually benefit from the migrant’s remittances, which helps them to remain better-off. However, even poorer households that are able to send a migrant often obtain economic benefit in return [20].

Regarding the health of household members, better income can translate into better health, but there are also health risks and challenges that arise from migration itself. In many parts of southern Africa there has been an important link made between certain forms of migration and HIV transmission. The first issue is the exposure to outside partners due to the break in regular sexual relations which expose the migrant and their home spouse to sexually transmitted illness. In addition, some employments are associated with chronic infectious diseases like tuberculosis in certain mining sectors. HIV and TB are inter-connected chronic infectious diseases that have emerged and spread through migration. On a more subtle level migration can involve social change and moving from a traditional to a more modern setting can change people’s outlooks, diets and life-styles. This can include increased risks of smoking, alcohol use, and in-take of salt, sugar and consuming unhealthy oils. For many migrants there is a background of stress...
associated with disruption from home brought about by migration. If the migration is successful there may be an associated risk of cardiovascular and other life-style related chronic illnesses.

The kinds of interventions that can lessen the health costs of migration include cheaper and safer transport between home and work-place, accessible and affordable services and food availability in poor urban settings, and using patient retained medical records, so that chronic medication can be started in an urban clinic or hospital and continued by the health system in the rural setting if a migrant returns home.

**Trends in migration patterns in the Agincourt HDSS Site.**
Temporary migration occurs when a person migrates from a rural household without the intention of permanently leaving, but remains part of the rural household. Usually, if the migration is successful, some money flows back to the household in the form of remittances. It is not always money that is remitted and migrants are often an important source of food, clothing or other investments in the rural household, like building materials or appliances [21].

Some age-groups in the population are more likely to be temporary migrants. Figure 10 shows the trends in temporary migration for men and women of different age-groups over a sixteen year period. Men aged 30-44 years are the most likely to migrate. Sixty-five percent of men in this age-group migrate. Older adult men also migrate intensively with an average of 55% to 60% of the age-group 45-59 years migrating.

![Figure 10: Trends in proportion of temporary migrants Agincourt HDSS site 1992 -2008](image)

It can be seen that there has been an increase in the number of young male migrants aged 15-29 years. From the early 1990s to the late 2000s the proportion of young men migrating each year has doubled from about 20% (one in five young men) to 40% (two in five young men). Young men are increasingly mobile and move between rural and urban areas.

It can also be seen that women of all adult age groups are increasingly becoming temporary migrants. Women are now much more likely to migrate than in the past, especially young women aged 15-29 years. The reason for women migrating varies. Mostly it is for work on game farms or commercial farms, or to a town or city for domestic work or other jobs. Also, women migrate to sell rural produce in urban areas. For very poor households in the population the income from female temporary migrants is a critical source of income. Young women (and men) also migrate for better education, especially from better off households.
Where do temporary migrants go?
Table 3 shows the types of destinations that men and women are temporarily migrating to. Temporary migration occurs most frequently to destinations in large cities and towns and much less to nearby villages. Shorter distance migration tends to be permanent migration, mainly due to marriage, which is described below in Table 4. Both men and women temporarily migrate to nearby farms, but it is much more likely to be a destination for women. Both men and women temporarily migrate to towns and secondary urban centres, like Nelspruit, Giyani, Witbank and Middleburg, but mostly these are destinations for men. The primary metropolis of Johannesburg/Pretoria/Mid-rand (Gauteng) is the most important destination for temporary migrants, both male and female.

Table 3: Destinations of temporary migrants, by gender, Agincourt HDSS Site, 2007

<table>
<thead>
<tr>
<th>Destination category</th>
<th>male migrants in 2007</th>
<th>percent</th>
<th>female migrants in 2007</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearby village or town</td>
<td>302</td>
<td>3%</td>
<td>302</td>
<td>7%</td>
</tr>
<tr>
<td>Agriculture/game farm</td>
<td>1063</td>
<td>12%</td>
<td>726</td>
<td>17%</td>
</tr>
<tr>
<td>Secondary urban centre (Nelspruit, Giyani, Witbank and Middleburg)</td>
<td>2667</td>
<td>30%</td>
<td>1190</td>
<td>27%</td>
</tr>
<tr>
<td>Other province</td>
<td>549</td>
<td>6%</td>
<td>145</td>
<td>3%</td>
</tr>
<tr>
<td>Primary metropolis (Gauteng)</td>
<td>4208</td>
<td>47%</td>
<td>1999</td>
<td>46%</td>
</tr>
<tr>
<td>Other/ unknown</td>
<td>92</td>
<td>1.1%</td>
<td>29</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8881</strong></td>
<td><strong>100%</strong></td>
<td><strong>4391</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 4: Origins and destinations of permanent migrants to and from the Agincourt HDSS Site, 2007

<table>
<thead>
<tr>
<th>Origin and Destination categories</th>
<th>in-migration number</th>
<th>percent</th>
<th>out-migration number</th>
<th>percent</th>
<th>net-migration number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Village to village moves</td>
<td>3792</td>
<td>79.0%</td>
<td>3695</td>
<td>75.8%</td>
<td>97</td>
<td>3.2%</td>
</tr>
<tr>
<td>Bushbuckridge town</td>
<td>315</td>
<td>6.6%</td>
<td>481</td>
<td>9.9%</td>
<td>-166</td>
<td>-3.3%</td>
</tr>
<tr>
<td>Limpopo Province urban</td>
<td>79</td>
<td>1.6%</td>
<td>86</td>
<td>1.8%</td>
<td>-7</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Limpopo Province non-urban</td>
<td>12</td>
<td>0.3%</td>
<td>20</td>
<td>0.4%</td>
<td>-8</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Mpumalanga Province urban</td>
<td>107</td>
<td>2.2%</td>
<td>142</td>
<td>2.9%</td>
<td>-35</td>
<td>-0.7%</td>
</tr>
<tr>
<td>Mpumalanga Province non-urban</td>
<td>87</td>
<td>1.8%</td>
<td>98</td>
<td>2.0%</td>
<td>-11</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Gauteng Province</td>
<td>228</td>
<td>4.8%</td>
<td>261</td>
<td>5.4%</td>
<td>-33</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Mozambique</td>
<td>118</td>
<td>2.5%</td>
<td>43</td>
<td>0.9%</td>
<td>75</td>
<td>1.6%</td>
</tr>
<tr>
<td>Other provinces</td>
<td>54</td>
<td>1.1%</td>
<td>18</td>
<td>0.4%</td>
<td>36</td>
<td>0.8%</td>
</tr>
<tr>
<td>Other neighbouring countries</td>
<td>5</td>
<td>0.1%</td>
<td>6</td>
<td>0.1%</td>
<td>-1</td>
<td>0.0%</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>0.0%</td>
<td>23</td>
<td>0.5%</td>
<td>-22</td>
<td>-0.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4798</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>4873</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>-75</strong></td>
<td><strong>0.0%</strong></td>
</tr>
</tbody>
</table>
**Where do permanent migrants go to and come from?**

It is clear in Table 4 that the largest proportion of permanent migrants move within the sub-district, so-called village to village moves. Seventy-nine percent of permanent in-migrations are from other villages and 75% of out-migrations are to other villages. These proportions differ because there is more movement into the sub-district villages than out of sub-district villages. There is a net in-migration of 3%, so in terms of village-to-village moves, also known as local mobility, the sub-district is gaining people from other villages.

It is noteworthy that nearby towns are attracting people from rural villages. The highest proportion of moves of this kind were to Mkhuhlu, a town that developed in the late 1980’s, on the main road leading to Hazyview. The mechanism involved in this migration has important socio-political implications. Prior to 1986, when the Influx Control laws were abolished, movement between homeland areas was impossible, movement to and from urban areas strictly controlled, and, although less documented, movement within the ‘homeland’ areas was also extremely difficult. Traditional authorities usually aligned with the state in Pretoria, strongly encouraged people to stay within small, well-defined chieftaincies. With the coming to power of the African National Congress in 1994 the Reconstruction and Development Programme was launched and a democratically elected committee placed in charge of community affairs at a village level. In the late 1980’s Mkhuhlu was somewhat larger than a village, with an established hospital, private health facilities, schools and public services. When people arrived to settle in 1994 the elected civic leadership allowed settlement on land that had been previously been held as common grazing land by the traditional authority. Once settlement started the word got around, and the chief could not prevent a flood of families from villages to the newly budding town. The attraction of towns like these remains important and is due to the availability of services, like health and education, and basic comforts like tap-water and electricity. These are sufficient attractions, since employment opportunities in the town remained low [22].

Bi-directional permanent migration to and from Gauteng Province is more balanced than migration to and from nearby towns. There are modest flows from the field-site population to Gauteng (4.8% of moves) and returning from Gauteng to the field-site population (5.4 % of moves).

The rural sub-district of the Agincourt field site is close to the border with Mozambique. The civil war in Mozambique in the 1980’s resulted in the settlements of former refugees in north eastern South Africa. As a consequence of their history they are less able to acquire property, engage in the labour market or access government services, resulting in higher levels of poverty compared to South African households. There are still population flows between the sub-district and Mozambique. In 2007 there was a modest net in-flow of people, with 118 people entering from Mozambique and 43 moving back to Mozambique.

**COPING WITH CHANGE: THE AGINCOURT EXPERIENCE**

Increasing migration and the re-shaping of households are both strategies adopted by the Agincourt community to sustain livelihoods and preserve the integrity of the (extended) family. Detailed research is underway to explore in more detail how households cope with the cost burden of illness [23]. Another study has already been completed on the use of natural resources as a coping strategy following the death of an adult household member. The study found that food security is certainly affected by the death of a wage-earner [24]. The responsibility for collecting natural resources is thereafter shifted among remaining household members.

‘[Zodwa’s] husband had held a good job at a local game reserve, but once he became ill, he no longer worked. She explained that her household had experienced substantial changes in diet: “there is a big change now because we no longer have food, we just get assisted by the relatives ... and we depend more now on the field”.’

[23:171]
members and wild foods tend to substitute for previously purchased goods. This is probably a long-term change in the habits of households and emphasizes the importance of the environment to sustaining livelihoods in rural South Africa.

Research at Agincourt has shown how important social grants are for protecting household health against the socioeconomic impacts of change. Pensions received by the elderly benefit two vulnerable groups, the pensioners themselves and their grand-children [25]. It seems that grandparents – especially grandmothers – achieve higher status within the family once they bring in an income through their pensions. They are able to influence household decisions about the allocation of resources and ensure better food security and increased access to schooling, especially for girls. In fact, older women generally provide crucial support – financial, physical and emotional - to adult children who have become ill and to fostered and orphaned grandchildren [26]. These obligations are likely to increase as a result of migration and the impact of HIV/AIDS.

As mentioned earlier, child support grants – for children up to the age of 14 years – have resulted in improved child nutritional status [9]. However, there are many barriers that prevent access to these grants: only a third of South African families living in Agincourt in the lowest socioeconomic stratum had applied at the time of the research [27]. It is the less-impoverished families that make better use of these grants. Barriers to access include lack of the necessary documentation, unmanageable distance to offices and a low educational level of the household head.

**IMPLICATIONS FOR POLICY AND PRACTICE**

The findings of the Agincourt research site throw light on the experience of a poor, rural population. This sort of community is seldom well-researched. The findings are invaluable for understanding priorities for policy and practice locally, as well as in the region.

**Respond to the health transition**

The health system needs to improve its ability to respond not only to the usual conditions of poverty, such as malnutrition and tuberculosis, but also the HIV/AIDS epidemic and increasing hypertension, obesity and diabetes. Removing barriers to access is essential but so, too, is improving the quality of care. Specific actions identified by research at Agincourt include: comprehensive strategies against childhood malnutrition (including better monitoring of children); improved access to antiretrovirals (including for the prevention of mother-to-child transmission); improved case detection of TB; and secondary prevention of hypertension. 

'A return to favourable mortality trends will require not only control of HIV/AIDS and pulmonary TB, but also meeting the challenges of rapid modernization in traditional societies with its numerous health and social consequences, in particular changing diet, changing lifestyle, changing marriage and sexual behaviour, and a variety of new stresses and hazards associated with daily personal and working life.' [11:67]
Allocate resources locally for migrants
Because of economic patterns established under apartheid, former homelands are bearing a heavy burden of sickness and death. In these communities, there is a need to respond more effectively to the special needs of highly mobile populations and their home communities.

Design health promotion strategies that respond to people’s underlying beliefs and norms
People are being deterred from accessing life-saving treatment – such as antiretrovirals and hypertensive drugs - because they have beliefs that contradict scientific explanations. Health promotion strategies need to take this into account and find ways of accommodating these beliefs to enhance access. This is critical for dealing with the HIV/AIDS epidemic.

Exploit natural resources for household survival
Agincourt research has shown that natural food sources help to buffer impoverished households against shocks, both through contributing to diets and providing an opportunity for generating income. Indeed, local vegetation forms an important part of the diet of all households. It is important to improve the productivity of homestead gardens and encourage the cultivation of wild herbs and traditional crops.

Recognize the role of older women
Research at Agincourt has shown that older women play an important role in sustaining the family and improving both health and gender equity. Intervention strategies need to build on this role but also find ways to support the efforts of this sector of the community.

Box 3: Working with the community, service providers and local government to increase access to child support grants
A special module of the 2002 Agincourt census update assessed household access to the government child support grants which had been introduced in 1998. The research found high levels of non-access, especially amongst the poorest households. In 2004, these findings, and an analysis of the main barriers to access, were presented to the provincial and local Departments of Home Affairs, Education and Social Security. This resulted in:
- 2-day mobile Home Affairs and Social Security campaigns in 20 villages, during which 8,000 people applied for identity documents and birth certificates;
- 2 community workshops providing information on services for orphans and vulnerable children;
- the special deployment of 6 child support grant extension officers employed by Social Security;
- a partnership between the research site, another Wits research unit, Home Affairs and the Mozambique Consulate in ongoing planning to assist former Mozambican refugees who are stateless;
- and a partnership between the research site, the local municipality and NGOs to form a multi-departmental district task team on orphans and vulnerable children.

[adapted 4:14]

‘Girls are significantly more likely to be enrolled in school if they are living with a pensioner, an effect that is driven entirely by living with a female pensioner.’ [25:157]
RESEARCH CURRENTLY IN THE FIELD IN THE AGINCOURT HDSS

Unit research is organised into five thematic areas:

Theme 1: Levels, trends and transitions
Theme 2: Child health and development
Theme 3: Adult health and wellbeing
Theme 4: HIV/AIDS and Chronic care
Theme 5: Household response to shocks and stresses

The Agincourt health and socio-demographic surveillance system, part of Theme 1 (see Figure 11), serves as the essential scientific foundation for a programme of advanced research and intervention studies.

Figure 11: Framework for research programme with major research themes and their links

**THEME 1: Levels, trends and transitions**
(Theme leader: Clark with Collinson)

Demographic and epidemiological changes taking place in rural populations need to be understood for health and development planning at district, provincial and national levels. We need to identify the forces driving population change in mortality, morbidity, fertility, migration and socio-economics. The HDSS updates annually individual's residence dynamics including dates of entering or leaving the population (births, deaths, in and out-migrations), pregnancy outcomes, maternity history, relationship to household head, links to parents, marital status, identity document status and national identity number. Research clusters represent collaborations of scientists who use the HDSS to compute and publish trends in mortality, fertility, migration, and socio-economic status.

**Mortality**

Collaborators: Univ Washington, USA; Wits Population Studies; Pasteur Institute, France; Umeå Univ, Sweden

a. Trends in age, sex and cause-specific mortality, including spatio-temporal analyses using GIS data
b. Strengthening verbal autopsy assessment (VA): validation of InterVA, a probabilistic model to assess probable cause of death using VA. Model produces standardised assessments compared to physician
diagnoses, costs less and produces more timely outputs. Work will contribute to WHO efforts to improve cause-of-death ascertainment and make tools available.

c. Estimating and assessing levels and trends in maternal mortality.

Fertility and reproductive health
Collaborators: Wits Population Studies, Pasteur Institute, France, Univ Colorado Boulder, USA; London School of Hygiene and Tropical Medicine, UK

a. INDEPTH - multi-site fertility monograph (Agincourt chapter is authored by Mildred Shabangu, Chodziwadziwa Kabudula, Jill Williams and Michel Garenne)

b. Unit is a member of the Alpha Network, an international scientific network studying HIV in remote populations using HDSS and embedded HIV surveillance data. Emphasis is on adolescent fertility, sexual networks and reproductive health with an aim of strengthening policy in these areas.

Migration
Collaborators: Wits Public Health and Population Studies; Brown, Washington & Colorado Universities, USA
Examines impacts of migration trends on livelihoods and health; includes INDEPTH multi-country study.

Socio-economic status
Collaborators: Univ Cape Town; Wits Population Studies, School of Accountancy; Univ Missouri and Maryland, USA
Socioeconomic status indicators are collected during census update rounds. Repeat cross-sectional modules are done and used for longitudinal analyses of livelihood strategies, their outcomes, and how these change in time. In 2009, modules included: asset status, food security, education and labour status.

THEME 2: Child health and development
(Theme leader: Kahn with Pettifor; Theme officer: R Twine)
In rural South Africa, morbidity, mortality and growth failure associated with undernutrition exist alongside female obesity and emerging cardiovascular disease. By tackling proximal issues of infant growth and nutrition, and social/emotional development, we aim to impact more distal outcomes including cognitive development, educational attainment, HIV infection, adult vascular risk and economic productivity.

Project Ntshembo: Improving the health and nutrition of adolescents and their infants to reduce the intergenerational risk of metabolic disease
Collaboration with Birth-to-Twenty, Oxford and Cambridge Unvys, UK; Umeå Univ, Sweden, Univ of North Carolina, Chapel Hill, USA
Project aims to promote adolescent health as a critical pathway to improve intrauterine and infant growth and thereby interrupt the intergenerational transfer of metabolic disease and HIV/AIDS. This will be achieved by innovative community-based interventions targeting female adolescents prior to and during pregnancy, and in the postnatal period. In 2010, funds were obtained from the British MRC to conduct the baseline survey from July to December 2011 and follow up assessments over 5 years. Pilot work in May/June 2011 focused on physical activity, beliefs and practices regarding childbirth and the postpartum period, and the availability and distribution of food vendors.

Child and adolescent growth studies
Collaboration with Birth-to-Twenty
Studies seek to document and understand the double burden of undernutrition in children (particularly stunting) and overweight/obesity in adolescents, particularly girls. One PhD was completed in 2010; another, on the association of nutrition on body composition and metabolic disease risk, is ongoing.
Kulani Child Health and Resilience Project – evaluation of Soul Buddyz/SNOC
Collaboration with Soul City and Oxford Univ, UK
School-based, cluster-randomised trial to evaluate an established school-based intervention by an NGO, Soul City, to provide emotional/social support to pupils 10-12 years and enhance their ability to cope and learn in an environment of chronic adversity. Baseline study in 2009 examined rates of anxiety, depression and post-traumatic stress disorder, and environmental factors (parental death or migration, poverty) associated with these symptoms. During 2010 there was ongoing monitoring of NGO intervention and the end-of-intervention survey took place in October 2010. Data entry is almost complete. Analysis of baseline data has commenced, and analysis of qualitative data on school management systems is complete.

SARI/ROTA - Severe Acute Respiratory Infection (SARI) and Rotavirus diarrhoea surveillance
Collaboration with NICD and the Respiratory and Meningeal Pathogens Research Unit, Wits
Aims to describe trends in numbers of SARI and diarrhoeal cases at 4 sentinel surveillance sites. Data will inform health policy on SARI and diarrhoeal disease management, prevention and control, and assist in planning for future influenza pandemics. Project will contribute to assessment of influenza, pneumococcal conjugate and rotavirus vaccine strategies, reflecting on recent introduction of rotavirus & pneumococcal vaccines into the national Expanded Programme on Immunisation. Surveillance system in two district hospitals in Bushbuckridge (and other sites in South Africa) was set up in 2009 and data collection continues.

PCV - Pneumococcal Conjugate Vaccine Introduction
Collaboration with Respiratory and Meningeal Pathogens Research Unit, Wits
Study to examine the effect of pneumococcal conjugate vaccine immunization upon nasopharyngeal ecology of Streptococcus pneumonia in vaccinated and non-vaccinated individuals at household level. In 2009, nasopharyngeal swabs were taken, and questionnaires completed, in 600 households. There was no fieldwork in 2010, but there is a further survey currently underway.

Conditional Cash Transfer Study and Community Mobilisation (Swa Koteka)
Collaboration with University of North Carolina, USA, University of San Francisco, USA and Wits Reproductive Health and HIV Institute
Study to determine effects of a multi-level HIV prevention intervention to jointly address structural and social factors contributing to young women’s increased vulnerability to HIV, through providing cash transfers to families of young women conditional on her attending school. Goal is to reduce young women’s HIV risk by keeping her in school through improving her family’s economic resources. This intervention will be complemented by a community-level mobilization intervention, One Man Can run by Sonke Gender Justice focused on young men. Currently 1932 of the required population sample of 2660 HIV –ve young woman has been recruited.

THEME 3: Adult health and wellbeing
(Theme leader: Tollman; Theme officer: Gómez-Olivé)
Dynamics of a protracted health transition are reflected in the disease burdens affecting rural adults.

Epidemiology and treatment of epilepsy in sub-Saharan Africa (SEEDS)
Collaboration with KEMRI/Wellcome Trust, Kilifi and University College, London
Study will establish burden, risk factors and outcome for active convulsive epilepsy (ACE) in Agincourt and four other African INDEPTH sites. Aims to develop interventions to reduce incidence and mortality from epilepsy, and
to provide insight into management of a non-infectious chronic illness that spans all age groups. In 2010, three
data collection rounds were completed to identify new cases. There is close interaction with health services in
the study area with nurses providing information on patients’ clinic attendance. Study participants/patient
satisfaction is high since they are receiving improved health care including surgery for a brain tumour with
consequent health and social improvements. One MSc dissertation will be submitted in Feb 2011.

Cost evaluation of epilepsy treatment is part of PRICELESS study. In 2010, data entry was completed and data
cleaning commenced, 5 potential publications were identified and 1 PhD is to be nested in the work.

Health and well being of ageing populations in Africa and Asia
Collaboration with INDEPTH sites, WHO, Umeå Univ, Sweden, Harvard and Colorado Unv, USA
Under Agincourt leadership, eight INDEPTH sites applied a short version of the WHO-SAGE instrument,
adapted to routine surveillance, to adults 50+ to assess baseline measures of physical and cognitive function and
establish cohorts of older adults in African and Asian settings. Comparative work sets out to test hypotheses
including: Poor self-rated general health (SRGH) is associated with premature mortality, and Individual SRGH
correlates with household characteristics such as wealth, presence of labour migrants, and loss of a prime-age
adult. In 2010 analyses examining mortality outcomes were undertaken on the longitudinal dataset. During the
2010 census update a 2\textsuperscript{nd} round of data collection on adult health and aging was undertaken.

Health Care Utilisation: A module on health care utilization of people 50 years and older was conducted during
the 2010 census update round. Data entry was completed; analysis will be undertaken in 2011 and data will be
compared with data from the SAGE Long survey in 2006.

**THEME 4: HIV/AIDS and Chronic care**
(Theme leader: Tollman with Gómez-Olivé)
Immediate and longer-run community impacts of HIV/AIDS cannot be overstated. Evaluation of HAART delivery
will support provincial and national efforts and provide evidence on delivery models, coverage and
individual/population impacts.

**HIV/NCD prevalence study**
Collaboration with Wits Public Health, Colorado and Washington Universities, USA
Study to measure HIV prevalence, biomarkers for non-communicable chronic diseases (mainly cardiovascular
and diabetes) using dried blood spots, physical measurements including blood pressure and anthropometry, and
lifestyle and sexual risk behaviours. Fieldwork commenced in Aug 2010 after community entry and training. An
on-site post-doctoral fellow is responsible for managing day-to-day fieldwork. The sample consists of 7,428
people aged 15 years and older from all villages in the study site. Data collection finished end-Junel. Laboratory
results were returned on a weekly basis and those who wanted their HIV result went to the health centre. Blood
pressure, cholesterol and glucose results were given at the household with referral to nearest health facility for
all abnormal results. Funds will be sought for a further round of HIV and NCD testing and for conducting the
cBED assay. Results of this study will be available at the end of 2011.

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2 Ifakara (Tanzania), Nairobi (Kenya), Navrongo (Ghana), Matlab (Bangladesh), Purworejo (Indonesia), Filabavi (Vietnam), Vadu (India) and
Agincourt
3 SAGE: Survey on Adult Health and Global Aging
**Chronic care**
A major effort addressing weaknesses in chronic care systems – and emphasizing *commonalities* in management of both chronic infectious and non-communicable diseases – is planned. Research will be facilitated by the clinic-HDSS link.

1. A partnership with the National Department of Health Chronic Disease Directorate has been established to develop, implement and test an integrated chronic disease package at primary care level. In 2010 meetings were held in the Mpumalanga Dept of Health and the Agincourt Health Centre, with follow-up discussions in Johannesburg in January 2011.

2. Cost evaluation of epilepsy treatment will be conducted under the PRICELESS initiative.

**THEME 5: Household response to shocks and stresses**
(Theme leader: Collinson with W Twine)
Rural households remain under pressure. Sudden shocks, whether job loss or death of a breadwinner, can destabilise households; similarly, protracted stresses such as drought or chronic illness can undermine coping capacity and livelihoods. Key to understanding how to improve health and social development is to examine the strategies employed by households to gain livelihoods and cope with shocks and stresses. The sustainable livelihoods framework has been used in this theme with four productive research clusters:

*The Natural Environment, Vulnerability and Resilience*
**Collaboration with APES, Wits and Colorado University, USA**
Previous work showed that food security is threatened by adult mortality. We examine (i) how natural resources are used to offset adversity, (ii) influence of climate change on environment (temperature, humidity, rainfall monitoring introduced). In 2010 an NRF-funded project undertook the baseline of a cohort study of 600 households within the HDSS to examine household livelihood strategies and outcomes.

*Social Connection, Vulnerability and Resilience*
**Collaboration with Maryland, Missouri, Colorado and Brown University, USA**
The life-cycle of households are changing due to changing migration patterns and increasing mortality of prime age adults. Qualitative studies are triangulated with surveillance-based analyses to investigate changing household structure and composition. Changing social roles of fathers, mothers and older adults are examined as well as the importance of links to social networks beyond the household. With NIH funds, we examine the measurement of social connections (type, number and qualities of people’s relationships) through analyses of ethnographic and HDSS data.

*Migration, Livelihoods and Health*
**Collaboration with Brown University, Wits Demography and Population studies and INDEPTH**
Migration brings risks and gains to health and wellbeing, affecting both the migrant and those who remain. The HDSS has highlighted high levels of temporary migration which are increasing for younger women. Outcomes for children’s health and household poverty are key research areas. Collinson was lead editor of a 2009 peer-reviewed volume involving INDEPTH multi-country work; a second phase is underway. Grants awarded in 2010: (i) Center for AIDS Research (CFAR), USA, for work on migration, HIV and socioeconomic change in South Africa; (ii) Economic & Social Research Council (ESRC), UK, to assess impact of internal labour migration on patterns of intergenerational support and the health and well-being of children and older people in China and South Africa.
Socio-economic dynamics

Collaboration with Washington University, USA; School of Accountancy, Wits

The HDSS meticulously tracks socio-economic status of households and uses this data to examine the dynamics of household poverty and its relations to migration and other household livelihood strategies.

CONCLUSION

In the words of Professor Fred Binka, Executive Director of INDEPTH Network in Accra, “Never before has the need for demographic and health data been so urgent in Africa. The emergence and re-emergence of infectious diseases such as HIV/AIDS, malaria and tuberculosis, coupled with the rapid transition to non-communicable diseases, is transforming African population and household structures in unprecedented ways. Unfortunately, for millions of people living in the world’s most impoverished settings, there is little or no information on their lives. Demographic surveillance brings welcome relief to this data void.” [21:3]

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**Book chapters**


**Editorships : books**


**Editorships: journals**

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**Web-based data publishing**


**Letter**

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