THE AGINCOURT DEMOGRAPHIC AND HEALTH STUDY — SITE DESCRIPTION, BASELINE FINDINGS AND IMPLICATIONS

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Objectives. To present baseline results from first-phase demographic and health surveillance in the Agincourt field site, Bushbuckridge. To contrast findings with international data, and comment on their relevance to health development.

Design. Multi-round, prospective community-based study. Baseline census, 1992.

Setting. A subdistrict in South Africa's rural north-east, adjacent to the border with Mozambique.

Subjects. Entire population of the Agincourt subdistrict.

Outcome measures. Baseline variables for each resident included age, sex, months spent at home during 1991, mother alive/dead, highest educational standard achieved, and refugee status. A full demographic profile was constructed.

Results. In 1992 the subdistrict contained 57 609 persons, 26.4% of whom were Mozambican, with a population density of 148 persons per km². Forty-four per cent were under 15 years of age, and the dependency ratio was 93%. Fertility was declining, along with a moderate decline in adult female mortality. The approximate total fertility rate was 4.0; teenage parenting was common and almost 40% of 19-year-olds had at least one child. Over 60% of men and 14% of women in the 30 - 49-year age group were migrants, resulting in a high proportion of single-parent households. Despite improvements, most children experienced delays in reaching primary school, and less than half made the transition to secondary school. Educational levels among Mozambican children were lower than those of local children.

Conclusions. Agincourt contains a complex mix of communities comprising migrant workers, Mozambicans and

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a more stable permanent population. The area shares features with sub-Saharan Africa, although the mortality and fertility transitions have progressed further. Reliable, local information is essential for managing decentralised health systems.

There is a critical need for research and evaluation of local health systems development to inform primary health care-centred health reform in South Africa. To maximise project relevance and accelerate applications to district health systems these efforts should be closely linked to the public health sector, and should operate subject to many of its constraints. Such thinking underlies recent initiatives to pilot district health systems,[1,2] develop approaches for planning primary health care facilities,[3,4] examine South Africa's early experience with decentralisation,[5] and introduce an initiative for subdistrict development.[6]

The Agincourt Community Practice Project was established with a similar motivation.[7] Initiated in 1991 by the Department of Community Health at the University of the Witwatersrand (Wits) and the former Gazankulu and Tintswalo Health Services, in a rural subdistrict of Bushbuckridge in the then north-eastern Transvaal, the project provides a local field site within which to pilot district-level health and development interventions. A simple conceptual framework links health service development (particularly the role of a 'reference' health centre, i.e. one that acts as a support and source of reference for nearby clinics and sub-centres[8]) with investments in community organisation (to strengthen the community-health service interface), both supported by demographic and health information.

Work in Agincourt was influenced by experience in community-orientated primary health care (COPC) that had its origins in South Africa.[9] This approach links primary clinical care and community health through an information base derived from small-scale census studies and accompanying epidemiological investigations.[10] Similarly, in Agincourt population-based information is providing a basis on which to formulate programmes, evaluate their impact and conduct more advanced community-based studies.

This paper presents findings from the baseline census conducted in 1992. The census is the foundation for subsequent demographic and health surveillance, but also contributes descriptive information to inform public sector planning, whether in the health sector, other sectors, or local government. Such information is necessary for a range of purposes, including estimating demand for services, allocating human and material resources, planning logistical support and referral networks, identifying the size and location of vulnerable groups, and evaluating coverage of services or interventions.

PHYSICAL AND SOCIAL FEATURES OF THE STUDY SITE

The social and physical features of Agincourt are inseparable from the circumstances of the Bushbuckridge districts as a whole.

Location

The area lies in the central lowveld some 500 km north-east of Johannesburg. It is bounded by the Drakensberg escarpment and commercial forestry plantations to the west, the Kruger National Park to the east, Hazyview to the south, and the Hoedspruit farming area to the north.

Geography

The area is dry, with a mean annual rainfall of 1 200 mm in the west falling to 500 mm in the east. On balance there is serious water shortage at least one year in three.[11] Agincourt covers an area of 390 km², measures 38 km by 16 km at its widest points, and lies in a dry rainfall area of south-east Bushbuckridge.

Administration

Public administration in Agincourt is weak, a combination of the area's fragmented 'homeland' heritage and uncertain political status (contested between the Northern and Mpumalanga Provinces). This has seriously compromised the development of local administrative systems in the early post-apartheid years.

Economy

The limited data available put average household income at about R520.00 per month, with as much as 54% spent on food.[12] Unemployment is estimated at 40 - 50%. Formal sector activity involves migrant men who work on the mines and in larger towns, as well as on nearby plantations and farms. An important source of local employment is the public sector. Informal sector activities are widespread. Pension remittances form an important though under-quantified source of income. Electricity, telephone and water services, though seriously lacking, are benefiting from recent development initiatives.

Water and sanitation

Water problems consistently feature as the community's highest priority, with only 13% stating that water is always available.[13] Most households invest disproportionate effort in collecting domestic water, and little remains for farming. Once on tap, the Injaka dam should substantially improve water storage capacity in the area. Levels of household sanitation are poor,[13] and pit toilets of varying effectiveness are the norm.

METHODS

A multi-round, prospective community-based study covering the entire population of the Agincourt subdistrict. This paper describes the first round census and its results.

Selecting the Agincourt site

Several factors influenced the choice of the Agincourt subdistrict, in particular its location, some distance from any tar road or township settlement; the presence of a health centre with satellite clinics and unrealised potential to function as a referral network; the need to develop rational referral patterns, de-linked from constraints imposed by homeland boundaries; and the presence of large numbers of Mozambicans displaced by the recent civil war. The final decision was reached jointly by the Tintswalo Health Service and Wits University's Health Systems Development Unit.

Conducting the baseline census

A comprehensive description is provided in *The Agincourt Demographic and Health Study: Phase 1*.[7] The manual *A Guide to Training Fieldworkers for Collection of Demographic and Health Information*[14] includes issues such as field team training, mapping procedures, office management, and the process of community feedback, not detailed here.

Fieldwork was conducted between March and September 1992. Progress was satisfactory, although transport difficulties, weak communication links, and limited infrastructure made this a testing experience.

Field team. Ten matric graduates (5 men, 5 women) from villages within the Agincourt subdistrict were recruited from over 50 applicants. An initial week-long training programme covered local health and development problems, the role of health statistics, data collection and the importance of quality control, techniques for village mapping, and role plays in preparation for household interviews. The team was managed by a field supervisor, based at the Agincourt Health Centre, with a dedicated vehicle. She provided logistical and technical support, ongoing monitoring of field operations and quality control.

Village mapping. The site consisted of 20 discrete villages. Existing maps obtained from the department of agriculture were incomplete. Before data collection a procedure was therefore developed to map each village accurately. Every household was numbered and features such as schools, shops, roads and natural geography were all included. The Medical Research Council's malaria research programme has devised a procedure to digitise such maps.[15]

Field team operations. Data collection spanned the period 11 March - 28 September 1992. Working in couples, fieldworkers visited each household in every village, interviewing the most senior adult present. Up to two revisits were conducted where necessary. All household members were systematically recorded according to the following key variables: age, sex, months lived at home during 1991, mother alive or dead, highest educational standard achieved, and refugee status. Progress was carefully monitored by the team supervisor.

Quality control. The field supervisor revisited a 2% random sample of households where she completed a duplicate census form. This was compared with the original interview to assess discrepancies. This information, along with on-site reviews by more senior members of the research team, were used to monitor and guide the work of the field team.

Data entry and information processing

Data capture and validation. Capture was carried out in batch format by a private company in Pretoria. Validation rules were designed to restrict entry to a permissible range of values and fields, and to ensure acceptable relationships between fields (e.g. no one under 10 years can bear a child).

Information processing. This was carried out on a 486 personal computer with 8 megabytes of RAM and a 500 megabyte hard-drive. Entered data were transferred to a Foxpro 2.0 application for DOS, which provided a framework for validation routines. Foxpro's built-in query facility and a Microsoft Excel spreadsheet were adequate for data analysis.

RESULTS

Results presented here aim to provide a basic demographic understanding that is targeted towards planning and practice in the health and other social sectors. Comparisons are frequently made between the total population of the area, comprising all who regard the area as home, irrespective of any prolonged absence; and the permanent population, referring to those who were resident for 6 months or more in the year preceding the census (1991).

Detailed analysis of prospective data for the period 1992 - 1995, focused on the key population variables of births, deaths and migrations, is the subject of later work. Information on mortality and fertility presented here shows the possibilities, but also the limits, of what can be obtained from cross-sectional analysis.

Population size and density

The site covers 389 km² and is made up of 20 village settlements containing 8 896 households, with a total population of 57 609 persons. The permanent population constitute 86.1% of the total (49 626), while Mozambicans, largely refugees, make up over a quarter of this figure (26.4%). There are Mozambicans in all villages: in five settlements they constitute over half the inhabitants, and in three villages, essentially refugee settlements, they constitute 80% or more of the inhabitants. Average household size among the local (host) community is 6.2 persons (range 1 - 26), compared with 6.5 among refugees (range 1 - 38). 'Mixed' households, with both local and refugee members, had an average of 8.1 persons (range 2 - 35).

The population density of 148 persons per km² for this area contrasts with 19 per km² in the adjacent Hoedspruit farming

area and 31 for South Africa as a whole.[11] This contrasts with the population density of France (103 per km²), Italy (192) and the UK (235).[16] The Agincourt figure, fairly typical of the former homeland areas of Mpumalanga and Northern Province, therefore blurs conventional distinctions between rural and semi-urban settlement patterns.

Age and sex profile

The population pyramid (Fig. 1) corresponds with the general picture of a developing country. Some 44% of the population is under 15 years of age, which is characteristic of the world's low-income economies and very similar to Lesotho (42%) and Zimbabwe (45%).[16] Fifteen per cent of children are under 5, and 4% of the population is 65 years and older.

While the pyramid confirms a high overall growth rate for the Agincourt population, the similarity in proportions of the 0 - 4 and 5 - 9-year age groups (Fig. 1) indicates a pronounced fertility decline. The dependency ratio, approximately the ratio of youth and elderly to the (potentially) economically active population, is 93%. This corresponds to the average for sub-Saharan Africa in 1990 and is considerably higher than the average for middle- and low-income countries as a whole (67%).[17]
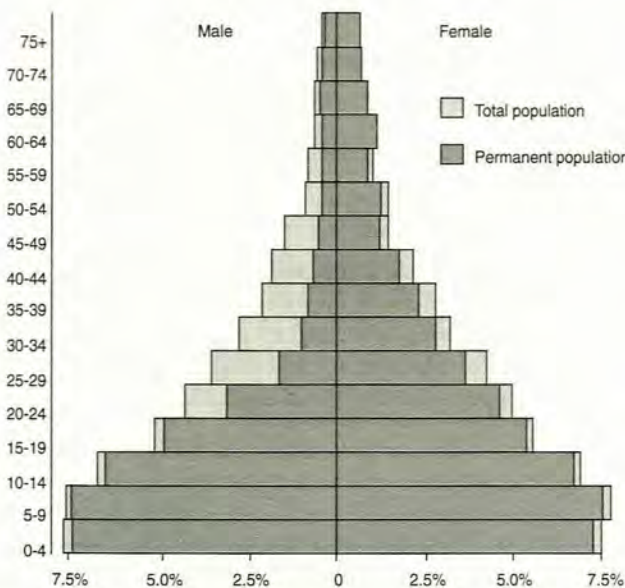

Fig. 1. Population pyramid, Agincourt field site, 1992.

Quality of age reporting

Age is a critical variable in virtually all longitudinal studies and much cross-sectional work. Where vital registration is deficient, it can be extremely difficult to obtain accurate responses.[18] The misrecording of age is a function of two separate processes: misreporting and digit preference by community members, and defective questioning by
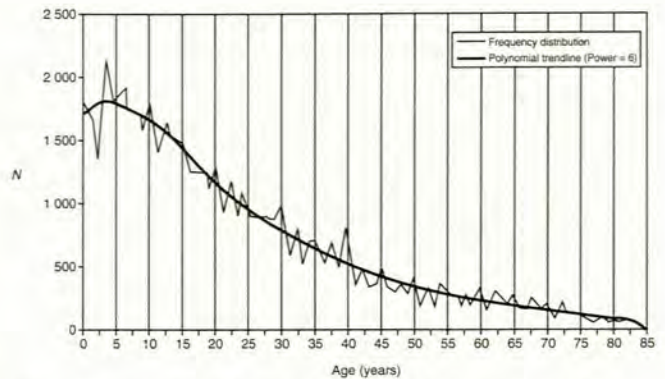

Fig. 2. Frequency distribution of total population by age (note age heaping at ages ending in '0' and '2').

fieldworkers. Review of Fig. 2 shows mild-to-moderate 'age heaping' at ages ending in '0' and '2', as well as at ages 3, 24, 45, 54 and 68 years, although there is no evidence of this at ages ending in '5', as has been noted elsewhere.

Adult female mortality

The maternal orphanhood method, based on the pattern of survival of mothers as reported by their children, is an indirect demographic technique for estimating adult female mortality from census data.[19] Applied to the Agincourt data, this suggests a moderate decline in mortality among adult women between the years 1977 and 1983. In 1983 female life expectancy was 67.6 years at birth and 54.8 years at age 20, compared with 65.0 and 53.5 years in 1977.[7] It is difficult, however, to make definitive estimates without knowing the underlying pattern of mortality. In fact, analysis of prospective data for the period 1992 to 1996, still ongoing, indicates that the steady decline observed during the 1980s is not maintained in the 1990s.

Fertility

Table I presents selected fertility indicators for the Agincourt population. Both the crude birth rate and general fertility rate describe the pattern expected in a lower middle-income country. Note, however, that both indices are underestimates as the numerators include only the number of surviving children under 1 year old, and not infants who died before the census. Full maternity histories conducted during the second-round census will allow for more accurate calculation.

Biological mothers aged 40 - 44 have an average of four children still living with them. Since a proportion of children live apart from their biological mothers, this figure provides an underestimate for the total fertility rate (TFR). It is considerably lower than the 1992 average for sub-Saharan Africa (TFR = 6.5), but higher than that for less-developed countries as a whole (TFR = 3.6).[17]

Teenage parenting is common in Agincourt. Sixteen per cent of 17-year-old, one-quarter of 18-year-old, and nearly 40% of

Table I. Selected fertility indicators, Agincourt 1992

Indicator	Value
Child/woman ratio	622 children aged 0 - 4 yrs/1 000 women aged 15 - 19 yrs
Approximate crude birth rate using < 1 yr as numerator	31.3/1 000 of the population
Approximate general fertility rate using < 1 yr as numerator	127.9/1 000 women aged 15 - 49 yrs
Women of childbearing age (15 - 49) as percentage of all women	46.8%
Women aged 15 - 19 with own children living with them (%) (approximate rate of teenage parenting)	15.5%

19-year-old girls (37.5%) have at least one child. There is a clear association between lack of formal education and motherhood among teenagers ($P < 0.001$, χ^2 test); however, different levels of formal education do not appear to exert a major influence on the likelihood of pregnancy.[7] The approximate rate of teenage parenting, obtained by computing the proportion of female teenagers aged between 15 and 19 with their biological children living with them, is 15.5%, compared with 17.7% for Namibia in 1992.[20]

Household composition

Migrant labour (and hence the need for cash income) is the primary influence on household composition because of the potential loss of at least one parent from the household. This can be gauged by contrasting the extent of single parenting in the permanent population when compared with the total population (Table II). The proportion of households where children have only a single parent or guardian rises fourfold from some 9% in the total population to 39% in the permanent population ($P < 0.001$). Three-quarters (73.4%) of these households are headed by single women. There is a similar increase in single-person households from around 50% in the total population to 65% in the permanent population ($P < 0.001$).

Migrant labour

A migrant worker was defined as someone who had lived and worked away from their home in the study area for more than 6 months in the past year. The term included those who returned home over weekends.

In Agincourt every facet of rural community life is affected by migrant labour. Fifty per cent or more of all men between the ages of 25 and 59 are migrant workers; this figure rises to 60% for those aged between 30 and 49 years. Some 14% of women aged 30 to 49 are migrant workers. These women deliver, on average, one child less than their non-migrant counterparts.[7] Although substantially fewer migrant workers have secondary or tertiary education, the overall patterns are not clear-cut. Many selection biases are associated with both migration and education, and further investigation is needed for a satisfactory understanding.

Educational attainment

The importance of education and science-based knowledge in enhancing the health and coping strategies of communities cannot be over-estimated.[16] Table III gives a detailed description of educational attainment in the Agincourt community at the time of the baseline census.

In the 25 - 59-year age group, assumed to represent all who had concluded contact with the formal school system, over 40% had received no formal schooling, 6% had completed secondary school (Standard 10), and only 3% had proceeded to some form of post-secondary level education.

Table II. Household composition contrasting total and permanent populations

Type	Total population				Permanent population			
	No.		%		No.		%	
Households with children		7 644		85.9		7 572		87.7
Single guardian/parent in household	670		8.8		2 957		39.1	
Other households with children	6 974		91.2		4 615		60.9	
Households without children		1 252		14.1		1 064		12.3
Single-person households	625		49.9		693		65.1	
Other households without Children	627		50.1		371		34.9	
Total households		8 896		100		8 636		100

Table III. Highest education level achieved, by age group, Agincourt, 1992

Age group	6 - 9 yrs		10 - 14 yrs		15 - 24 yrs		25 - 59 yrs	
	No.	%	No.	%	No.	%	No.	%
None	1 259	25.4	398	5.1	1 229	10.6	7 337	42.5
Sub A (7 yrs)	1 598	32.3	471	6.0	146	1.3	350	2.0
Sub A (8 yrs)	1 248	25.2	1 055	13.4	329	2.8	780	4.5
Std 1 (9 yrs)	623	12.6	1 528	19.4	521	4.5	1 051	6.1
Std 2 (10 yrs)	188	3.8	1 640	20.9	789	6.8	1 129	6.5
Std 3 (11 yrs)	38	0.8	1 216	15.5	902	7.8	948	5.5
Std 4 (12 yrs)			804	10.2	1 090	9.4	1 074	6.2
Std 5 (13 yrs)			472	6.0	1 233	10.6	866	5.0
Std 6 (14 yrs)			188	2.4	1 196	10.3	672	3.9
Std 7 (15 yrs)			59	0.8	1 070	9.2	494	2.9
Std 8 (16 yrs)			12	0.2	959	8.3	525	3.0
Std 9 (17 yrs)			11	0.1	1 202	10.4	490	2.8
Std 10 (18 yrs)			3	0.0	831	7.2	981	5.7
Higher					103	0.9	551	3.2
Total	6 928		7 857		11 600		17 248	

Among those aged between 15 and 24 — the group that should have experienced at least some secondary education — almost all (90%) had attended primary school, with only 46% successfully making the transition to secondary school. However this could be an under-estimate as a result of youth of secondary-school age leaving the area.

Over 85% of 10 - 14-year-olds were enrolled in primary school and some had proceeded to secondary school. Most youngsters, therefore, do enter the formal school system. However enrolment is frequently delayed, with some 25% of 6 - 9-year-olds not having completed Sub A.

In summary, the great majority of children reach primary school, although their enrolment age is delayed. Less than half are making the transition from primary to secondary school, and only a small minority benefit from any form of post-secondary education. Nonetheless levels of education have improved over the past few decades.[7] 'Primary net enrolment' (defined, according to United Nations conventions, as the percentage of primary school-age children who are enrolled in school) in Agincourt is 70% contrasted with 54% in Malawi, 70% in Lesotho, 80% in Zambia and 100% in China (1990 data).[16] The adult literacy rate is 66% among local people, falling to 24% among the refugees. (Literacy was computed as the percentage of persons 15 and older with at least 4 years' formal schooling. Functional literacy may be somewhat lower than these figures suggest.)

Up to the age of 18 the educational attainment of girls fully matches that of boys; indeed girls tend to perform slightly better, with a greater proportion attaining their expected level of education at any given age. Between the ages of 20 and 34, however, a greater proportion of men reached the last year of high school (Standard 10).

The level of education among Mozambican youth is considerably lower than that of the local population (Fig. 3). For example, 17-year-old refugees completed an average of 4 years of schooling compared with approximately 7.5 years for local youth of the same age. In 12 of the 20 study villages, refugee children made up more than half of the children with no formal education.
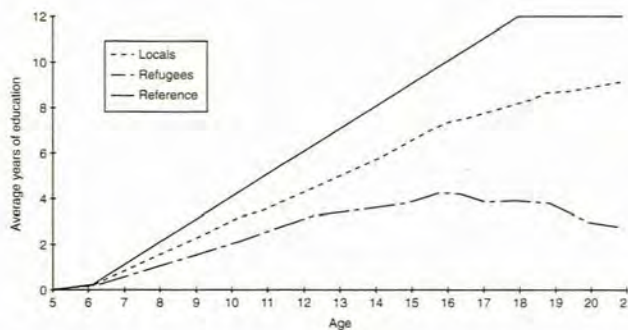

Fig. 3. *Average number of years of education completed by refugee status and age.*

DISCUSSION

These results describe the complexity of present-day rural South Africa. Three distinct communities coexist in Agincourt: the permanent population of the area, consisting of women, children and the elderly, together with adolescents and a minority of men; migrant workers, who constitute the majority of economically productive men, and a minority of women; and Mozambicans, formerly refugees. Social interaction between these groups is dynamic, reflected, for example, in intermarriage between the refugee and host population, with the children of such unions now part of the local community. Taken together, this poses significant challenges to health

policy and practice, especially in this era of AIDS, the brunt of which, given South Africa's decentralising system of government, will devolve to provincial and district levels.

Migrant labour among men, and its destructive consequences for rural family life, is generally acknowledged. Female migrant work, however, is less well recognised and poses important questions: is it increasing; how does it differ from the male pattern; what are its consequences for child health and child care; to what extent does it impact on women's health?

If the Mozambicans are accepted as permanent members of the Agincourt community, able to contribute to local and even regional development, a targeted effort to address their particular health and educational needs becomes an issue for the district health service and local government. More broadly, the unusual situation in Agincourt provides an opportunity to contrast the evolving health status among self-settled refugees with that of their host population. This can inform an important policy debate, namely whether international relief efforts should continue to emphasise parallel health programmes or be redirected towards strengthening local capacity and infrastructure.

How typical are the Agincourt findings? Certainly the emerging demographic and health picture can contribute to understanding health and social conditions across parts of Northern Province, Mpumalanga and North West. It will be helpful to contrast the Agincourt findings with those from the University of the North's Dikgale site near Pietersburg.[21] Beyond this the extent of true correspondence can only be established with further empirical work. While more detail is needed, these data point to a mortality and fertility transition that has progressed substantially further than most of rural sub-Saharan Africa. Despite similarities it is therefore important not to underestimate important differences in health and social development, particularly as South Africa's support to countries further north expands.

Baseline findings provided the basis for a process of feedback and dialogue with village communities and local health services. Efforts to link these two groups by discussing the implications of the results for health provision had varied success. Information on teenage motherhood provoked heated debate among villagers, and was the only discussion in which women asserted themselves. Overall, the experience reinforced our view that for effective local action (a key element in health promotion initiatives), health issues must be understood in their local context. Whether the issue is teen parenting, adolescent sexual activity, or educational achievement and school dropout, the active involvement of affected communities is central to their resolution.

It is apparent that reliable local information is essential for the management of decentralised public sector systems such as the district health system. In Agincourt/Bushbuckridge and elsewhere there has been a complete dearth of such

information. The argument advanced here — little different from the South African experience with designated 'health recorders' in the 1940s[22] — is that adequately trained local personnel can competently collect demographic, health and other data of relevance to health care. There is much to justify local governments acquiring this capacity. The recently completed national census, although critical, serves a different purpose and cannot substitute for this information.

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