Perceived HIV Status and Fertility Intentions: Evidence from Rural Mozambique
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Evidence dating back to the early years of the African epidemic shows that HIV/AIDS reduces

fertility at both the individual and the population level (see, e.g., Kaida et al. 2006; Lewis et al.

2004; Zaba and Gregson 1998 for reviews of this literature). Much of this reduction is

attributable to biological and behavioral proximate determinants, including lower fecundability

and greater fetal loss among HIV+ women and lower coital frequency among HIV+ couples due

to illness (Lewis et al. 2004). In addition, recent research has focused on more distal attitudinal

pathways through which HIV might influence fertility. Expanded voluntary testing programs

have increased the number of HIV+ people aware of their serostatus at early stages of infection.

Among these people, HIV infection may affect fertility by influencing desires and intentions for

children. Even people who do not know their status but suspect they are HIV+ may modify their

desire for children in response to fears about the disease. As medical treatments to prevent

mother-to-child transmission (PMTCT) of HIV and highly active antiretroviral therapies

(HAART) to prolong the lives of HIV+ individuals become more available in poor countries, the

associations between perceived serostatus and desire for children may change or weaken.

Women's perception of their own serostatus, their certainty in this assessment, and the

connection between perceived serostatus and desire for children all likely vary according to the

accessibility of HIV testing and treatments for mothers and children. In this paper, we examine

the link between perceived serostatus and desires for children taking into account the availability

of HIV services. Analyses use data from a 2009 survey of rural women in southern Mozambique

and from an accompanying survey of all maternal and child health clinics in the study area. This

extended abstract provides background information; describes the setting, data, and methods; and

presents descriptive statistics for both individuals and clinics and preliminary multivariate analyses of individual data. The full paper will incorporate data from clinics into multivariate analyses.

Background

Previous research has examined the influence of both actual and potential HIV infection on plans for childbearing (Aka-Dago-Akribi et al. 1999; Baylies 2000; Cooper et al. 2007; Emenyonu et al. 2008; Moore et al. 2006; Moyo and Mbizvo 2004; Nakayiwa et al. 2006; Rutenberg, Biddlecom, and Kaona 2000; Trinitapoli and Yeatman 2010; Yeatman 2009a, 2009b). These studies have found mixed results. On the one hand, women express worry about the possibility of bearing HIV+ children, the impact of pregnancy on their own health, and what will happen to their children in the event of their death, resulting in reduced desires for children (Baylies 2000; Yeatman 2009a, 2009b). On the other hand, individuals report a strong desire to bear and raise children, consistent with the high social value placed on children; for some women, fears about actual or potential infection do not affect desires for children (Moyo and Mbizvo 2004; Rutenberg, Biddlecom, and Kaona 2000). In addition, some research has found that HIV+ women want to speed up childbearing in order to have children before their health deteriorates (Trinitapoli and Yeatman 2010). The relative strength of these conflicting feelings varies according to individual and contextual factors. For instance, young women and low parity women are more likely to desire some additional children, but also more likely to reduce their intended lifetime fertility in response to concerns about HIV/AIDS (Aka-Dago-Akribi et al. 1999; Emenyonu et al. 2008). Unmarried women express more confidence in their ability to stop childbearing than married women, who in many contexts report pressure from husbands to have children (Cooper et al. 2007).

Recent years have seen a rapid increase in the availability of HIV testing and treatment in sub-Saharan Africa. At the time of the survey, HIV testing was routine part of antenatal screening in most of Mozambique's urban maternal and child health clinics but was available in only about half of the rural clinics in the study area (Hayford and Agadjanian forthcoming). About 57% of the women in the sample had ever been tested (authors' calculations), but the prevalence of testing varied across the survey area. Access to PMTCT and HAART is also expanding, but these services are even less widespread than testing services. Of maternal and child health clinics in the study area, about 30% offered PMTCT, and HAART was available at about 20% of clinics (Hayford and Agadjanian forthcoming).

The rapid rollout of these services is intended to weaken the association between HIV and fertility intentions, since medical treatments minimize the possibility of mothers' transmitting the disease to their children and reduce the impact of HIV infection on mothers' health. However, previous research shows that the nurses providing HIV testing and treatment services routinely discourage seropositive women from having more children, even where medical treatments are available (Agadjanian and Hayford 2009; Hayford and Agadjanian forthcoming). The increasing diagnosis of HIV infection may therefore lead to stronger antinatalist attitudes among HIV+ women. Little empirical research has examined how the rollout of HIV testing and treatment services affects fertility intentions in high prevalence areas in order to distinguish between these two possibilities.

Hypotheses

This paper will test hypotheses about the association between perceived HIV risk and intentions for future childbearing and the extent to which this association varies depending on certainty of the perception and availability of HIV services.

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H1a: Women who think they are more likely to be HIV+ will be less likely to want children soon (because of worries about their own and their child's health).

H1b: Women who think they are more likely to be HIV+ will be more likely to want children soon (because they want to have children before their health gets worse).

H2: Access to PMTCT will reduce the association between perceived likelihood of being HIV+ and desire to have children soon.

H3: Access to HAART will reduce the association between perceived likelihood of being HIV+ and desire to have children soon.

Results for competing hypotheses 1a and 1b are presented in this extended abstract. The full paper will also test hypotheses 2 and 3.

Setting

This analysis focuses tests these hypotheses using data from Mozambique, a country of some 20 million inhabitants located in southeast Africa. Data come from a representative survey of ever-married women of reproductive age conducted in July 2009 in the rural areas of four contiguous districts (total area 5900 square miles, population 625,000) of Gaza province in southern Mozambique. (The survey is described in more detail in the data section below.) Today, Mozambique is among the world's worst affected countries by the HIV/AIDS epidemic: the national adult prevalence rate among adults aged 15–49 increased from 8.2% in 1998 to 16.0% in 2007 (Ministry of Health 2008). In Gaza Province, where our data were collected, estimated HIV prevalence rose from 19% in 2001 to 27% in 2007, the highest level of any of Mozambique's provinces (Ministry of Health 2005, 2008).

A former Portuguese colony that gained independence in 1975, Mozambique was battered by a civil war for the first decade and a half of its independent existence. Since the end

of the war in 1992 and the deployment of economic structural adjustment programs in the early 1990s, the country has experienced remarkable macroeconomic growth. Yet with an average per capita annual income of $320, life expectancy of 42 years, and female literacy rate of 32%, Mozambique remains one of the poorest and least economically developed nations in the world (World Bank 2009).

Since colonial times, Mozambicans have worked in South African mines, and this legal migration flow continues to date (CEA/UEM 1997; Crush 2001; Crush et al. 1991; First 1983; Harries 1994). The area of our study has particularly high levels of out-migration to South Africa. Migration within Mozambique, particularly from rural to urban areas, has also been growing rapidly (Dow 1989; Jenkins 1993; Knauder 2000). Changing migration regimes have been at the root of transformations of family, kinship, and gender systems. They have also played a significant role in the HIV/AIDS epidemic in sub-Saharan Africa. Although direct evidence linking migration to HIV/AIDS in Mozambique is lacking, higher seroprevalence levels around the transportation corridors and along international borders (Barradas and Arnaldo 2003; Barreto et al. 2002; Raimundo 2004) indirectly support this connection.

There is some evidence that fertility transition has begun in Gaza province. According to the 2003 Demographic and Health Survey (DHS), the most recent DHS for which data are available, virtually all women surveyed in Gaza reported knowing at least one modern method of contraception. At the time of the DHS, about 15% of women of reproductive age were using some form of modern contraception, primarily hormonal methods, and more than three quarters of non-users reported planning future use. Still, desired family size is high (median of 4.3 children), and contraception is largely used for spacing at low parities. Birth rates also remain

high, with an estimated TFR in Gaza of 5.4 children per woman (Instituto Nacional de Estatística and Ministério da Saúde 2005).

Data and methods

Data

Data come from a 2009 survey of rural women residing in 56 villages of four districts in Gaza province in southern Mozambique. The sample was based on an earlier survey of married women aged 18-40 in 2006. In each district, 14 villages were selected with probability proportional to size. In each selected village (or randomly selected section thereof if a village was large), all households with at least one married woman were canvassed and divided into two groups—those with at least one woman married to a migrant and those with no such women. These two groups were used as separate sampling frames: from each of them 15 households were randomly selected. In each selected household a woman was interviewed (in households classified as migrant, a woman married to a migrant was interviewed). The resulting sample consisted of 1680 women (420 per district, 30 per village), more or less evenly split between women married to migrants and women married to non-migrants. In 2009, a second wave of data collection was carried out among women still living within the study area (N=1314, 78% of the 2006 sample). A refresher sample was randomly selected to replace women lost to followup. The total sample of N=1772 women[1] is therefore representative of the population of ever-married women living in sample villages in 2009.

The survey collected detailed demographic and socioeconomic information, including pregnancy histories, reproductive intentions, husband's migration history, and household

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[1] The 2009 sample was larger than the 2006 sample because of the data collection method. If a woman from the 2006 sample could not be located, a new woman randomly selected in the same community was immediately interviewed for the refresher sample. In some cases the original women was located at a later date (typically in cases where the woman had been absent at the time of the survey or had moved to a nearby village and neighbors had contact information for the woman) and interviewed.

material status. Information on HIV/AIDS awareness and prevention in the survey includes

perceived HIV risk, past testing experience, and knowledge and experience of HAART and

PMTCT. In addition, geographic coordinates of the residence of each respondent were recorded.

Respondents also reported on recent contact with the medical system (births in a medical facility,

family planning counseling, other health services) and named the clinic where they received each

of these services. Respondents can therefore be linked to the clinics where they received recent

services.

In parallel with the individual women's survey, a community survey was carried out in

each of the villages included in the sample and a clinic survey was carried out in all maternal and

child health clinics in the four districts of the survey area. The community survey focused on

village economic and social life, out-migration, and HIV/AIDS issues. The clinic survey took

place in late 2008-early 2009 and collected administrative data on services offered in each

facility as well as information from clinic staff on perceived barriers to testing and treatment

among clients. The location of each clinic was also geocoded.

Dependent variable

The dependent variable in this analysis is whether a woman wants to have a child in the next two

years. Measures of intentions for childbearing in the short term have been shown to be stronger

predictors of behavior than non-time specific (quantum) preferences (Morgan 2001). Two years

is the standard measure for "short-term" used in developing country surveys (e.g., the

Demographic and Health Surveys). The variable is constructed based on two questions. Women

were first asked whether they wanted another child. Those who did were asked how soon they

wanted to have their next child; possible responses were immediately, within two years, more

than two years from now, and a set of "don't know" responses (don't know, up to God, up to

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husband). Women who responded "immediately" or "within two years" to this question (67% of the women who wanted more children) were classified as wanting more children soon. Women who gave any other response to the question about timing or who did not want more children were classified as not wanting children soon.

Independent variables

The main independent variable is a measure of perceived likelihood of being HIV+. All women were asked, "Speaking again about yourself, in your opinion, is it very likely, not very likely, or almost impossible that you have the AIDS virus?" In addition to the listed responses, "don't know" and "knows she is HIV+" were recorded. Women were also given the option to refuse to answer, but all women answered the question. Reflecting the social uncertainty surrounding the AIDS epidemic, a large proportion of women responded "don't know" to this question, even some women who had been recently tested for HIV. "Don't know" responses are therefore treated as a separate category, in addition to "knows she is HIV+", "very likely", "unlikely", and "impossible." Given the growing availability of HIV testing, it might be assumed that women who have been tested know their serostatus and would report either that they know they are HIV+ or that it is impossible they are HIV+. Of course, women may be exposed to infection after being tested. In addition, even women who have been recently tested may be uncertain about their serostatus. The counseling that accompanies HIV tests emphasizes the fact that tests are not sensitive enough to detect infection within a window before the test (typically 4-6 weeks, but possibly up to 12 weeks), in effect introducing uncertainty into the testing process (cf. Trinitapoli and Yeatman 2010). Clinic staff also report that many women distrust the clinics and by extension the results of testing (Hayford and Agadjanian forthcoming).

The completed paper will also include measures of accessibility to HIV-related medical services to test whether these services mediate the relationship between perceived HIV status and fertility intentions. Measures will include distance to the nearest clinic that offers HIV tests, whether the nearest clinic or the clinic the respondent most uses offers testing, whether the nearest/most used clinic offers PMTCT, and whether the nearest/most used clinic offers HAART. These analyses are discussed in more detail in the "next steps" section.

In addition to these main independent variables of interest, control variables related to both perceived HIV status and fertility intentions will be included in all models. These variables are age, education level, household economic status, religion, husband's migration status, parity and timing of last birth, self-reported health, and recent (past three years) HIV testing. For the most part these measures are straightforward and are taken directly from survey questions. However, household wealth is notoriously difficult to measure in developing countries. We use a combination of variables measuring household resources: whether the household has electricity (from a generator or from the grid), whether the household owns cattle (a traditional measure of wealth in southern Mozambique), and an index variable indicating ownership of selected consumer goods (radio, bicycle, car or motorcycle). Also, the effect of men's migration status on both perceived HIV risk and fertility intentions is likely to vary depending on the husband's experience of migration (see e.g., Agadjanian, Yabiku, and Cau forthcoming). To capture some of this variation, husbands are classified as "successful" or "unsuccessful" migrants depending on their wife's response to a question about whether the household is better off or worse off since the husband migrated.

Methods

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The analyses presented here use logistic regression to model the dichotomous outcome (wanting a child soon). The analytic sample consists of all women without missing data on dependent of independent variables (N=1756). Analyses to be completed later are discussed in the "next steps" section.

Preliminary results

Table 1 shows bivariate associations between perceived likelihood of being HIV+ and desire to have a(nother) child in the next two years. Overall, 36% of women in this sample want to have a(nother) child soon. The association between fertility intentions and perceived HIV status is curvilinear. Both women who know they are HIV+ and women who say it is impossible they are HIV+ are less likely to want a child soon (34%) than the sample average. Women who say they don't know how likely they are to be HIV+ also have lower fertility intentions (34%). Women who say it is very likely or not very likely that they are HIV+ have slightly higher fertility intentions than average (38% and 39%, respectively, say they would like to have a child in the next two years).

Women who say it is either very likely or unlikely that they are HIV positive differ in sociodemographic characteristics from women who are either more certain (know they are HIV+, say it is impossible) or less certain (don't know) about their serostatus. Table 2 shows the distribution of perceived HIV status according to a range of economic and family status characteristics. In discussing these results, we focus on the percent of women responding that it is unlikely that they are HIV+ because these women's responses were most different from the sample average of women who wanted a child soon. Age, education, and household economic status are weakly associated with perceived HIV status. There is more variation in perceived status by religion, family structure, and health. A higher proportion of women who belong to an

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organized religion say they are unlikely to be HIV+ than women who report no religion. Women who have no children also have high proportions reporting "unlikely"; this association may be linked to age, since young women report "unlikely" at slightly higher levels than older women. Fewer unmarried women than married women say it is unlikely that they are HIV+, primarily because more unmarried women know they are HIV+. Since these data are collected from ever-married women, women who are currently unmarried are either divorced or widowed; HIV/AIDS can be a cause of marital dissolution in this setting. Women who have had children recently answer "unlikely" more often than women whose most recent birth was earlier. Women with earlier births report both that they know they are HIV+ and that it is impossible they are HIV+ – that is, more certain answers – more often. As might be expected, women who have had recent HIV tests fall into both the "knows HIV+" and "impossible HIV+" categories more frequently than women who have not been tested.

To assess the contribution of the variation shown in Table 2 to the association shown in Table 1, we estimate multivariate models. Results from a logistic regression of desire to have children within the next two years on perceived HIV status and other sociodemographic characteristics are shown in Table 3. Consistent with the bivariate results shown in Table 1, women who think it is unlikely they are HIV positive are more likely to want to have a child in the next two years than women who think it is impossible (b=0.43, OR=exp(0.43)=1.5). The differences in childbearing intentions between women who know they are HIV+, women who think it is likely they are HIV+, and women who don't know how likely it is they are HIV+ and the omitted category are not statistically different from zero.

The association between perceived HIV status and childbearing intentions is robust to a range of sociodemographic controls. In particular, the association is not mediated by the number

or age of living children, it is not mediated by self-reported health status, and it is not mediated by women's experience with HIV testing. Control variables are associated with the desire to have a(nother) child soon as would be expected. The more living children a woman has and the younger her youngest child is, the less likely she is to want another child soon. In addition, unmarried women are less likely than married women to want another child soon. Good health (as measured by self-reported health) and household prosperity (as measured by having electricity and having a successful migrant husband) are positively associated with intention to have another child soon.

The finding that women who think it is unlikely they are HIV+ have higher odds of wanting children soon than either women who know they are HIV+ (who want to stop childbearing) or women who think it is impossible they are HIV+ (who are willing to delay childbearing) is consistent with previous research showing that uncertainty about HIV status is associated with preferences for faster timing to next child (Trinitapoli and Yeatman 2010). Women may want a child soon to demonstrate their good health to themselves as well as others, or because they fear their health will deteriorate and want to complete childbearing as fast as possible. Women who answer that it is very likely that they are HIV+ may already be showing symptoms and therefore not want children soon. It is not clear why women who say they don't know how likely it is they are HIV+ are not also more likely to want children soon.

Discussion and next steps

These findings have shown an association between perceived serostatus and fertility intentions. The results can be construed as supporting both Hypothesis 1a (women who think they are HIV+ will be less likely to want children soon) and Hypothesis 1b (women who think they are HIV+ will be more likely to want children soon). Rather than competing, these hypotheses appear to

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describe associations at different points on a scale: women who suspect they are HIV+ are more likely to want children soon, but women who are more certain that they are infected are less likely to want children soon.

We hypothesize that these associations are moderated by access to HIV treatment services: where PMTCT is available, women should be less worried about transmitting possible infection to their children; where HAART is available, women should be less worried about the consequences of childbearing for their own health. The full paper will incorporate information about access to these services into analyses. Separate analyses will be conducted to assess the moderating effects of 1) PMTCT services and 2) HAART services. For each set of analyses, access will be measured in two ways. First, we will include a variable indicating the distance to the nearest clinic offering the service (PMTCT or HAART). This variable will be based on data from the clinic survey showing availability of services and geocode data from both the individual and clinic services indicating the distance between respondents and clinics. Second, models will account for whether the respondent has visited a clinic with PMTCT or HAART services in the past year. This measure will combine data from the individual survey (for information on clinics the respondent has visited) and from the clinic survey (availability of services). Because the clinic data was collected in late 2008-early 2009, information on availability of services may not be accurate at the time of the respondent's visit. To match the time of respondent's visit with services available at that time, we will use information from the clinic survey on when existing services were introduced and planned timing for the introduction of new services.

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Table 1: Percent of women who want to have a(nother) child in the next two years

	% who want child soon	N
All women	36	1756
Perceived likelihood of being HIV+:		
Knows HIV+	34	38
Very likely	38	47
Unlikely	39	545
Impossible	34	372
Don't know	34	753

Table 2: Perceived likelihood of being HIV+ according to sociodemographic characteristics

	N	Knows HIV+	Very likely	Unlikely	Impossible	Don't know
			Perceived likelihood of being HIV+: Percent responding			
All women	1756	2.2	2.7	31.0	21.2	42.9
Age						
20 and under	18	5.6	5.6	33.3	22.2	33.3
21-25	410	1.5	3.7	34.2	23.7	37.1
26-30	522	1.9	3.1	31.4	21.5	42.2
31 and over	806	2.6	1.9	29.2	19.9	46.5
Education						
No education	482	3.1	2.1	30.1	21.2	43.6
1-4 years	773	2.3	1.8	29.9	20.7	45.3
5 years or more	501	1.0	4.6	33.7	22.2	38.5
Household economic status						
Possessions index=1	732	2.7	2.6	30.3	19.4	45.0
Possessions index=2	418	1.0	2.9	32.8	19.6	43.8
Possessions index=3	441	2.5	2.5	30.6	23.4	41.0
Possessions index=4	165	1.8	3.0	30.9	27.9	36.4
Doesn't have electricity	1093	2.4	2.7	29.7	21.3	43.9
Has electricity	663	1.8	2.7	33.2	21.1	41.2
Doesn't own cattle	1182	2.0	2.5	31.9	20.3	43.3
Owns cattle	574	2.6	3.0	29.3	23.2	42.0
Religion						
No religion	131	0.8	5.3	19.9	21.4	52.7
Mainline Protestant	508	1.8	2.2	32.9	20.1	43.1
Zionist	664	2.7	2.7	32.1	21.7	40.8
Other religion	453	2.2	2.4	30.7	21.9	42.8
Husband's migration status						
Not a migrant/not married	1077	2.3	2.0	31.6	22.7	41.4
Successful migrant	394	1.8	4.6	31.0	17.0	45.7
Unsuccessful migrant	285	2.1	2.5	29.1	21.8	44.6
Family status						
No living children	76	0.0	2.6	36.8	27.6	32.9
One living child	231	3.5	4.3	27.7	28.1	36.4
Two living children	387	3.4	3.1	30.2	19.1	44.2
Three living children	404	1.2	3.0	33.9	17.6	44.3
Four living children	658	1.8	1.7	30.2	21.6	44.7
Married	1617	1.7	2.7	31.4	21.5	42.7
Unmarried	139	7.2	2.2	26.6	18.7	45.3

Youngest child born 2009	185	1.1	2.7	36.8	20.5	38.9
Youngest child born 2008	444	2.0	1.6	34.5	20.7	41.2
Youngest child born 2007	365	1.1	3.3	31.0	20.3	44.4
Youngest child born 2006	224	3.1	5.4	25.9	19.2	46.4
Youngest child born before 2006	538	3.0	2.0	28.4	23.4	43.1
Health						
Ok or poor health (self-reported)	439	6.6	3.2	26.9	16.9	46.5
Good health (self-reported)	1317	0.7	2.5	32.4	22.7	41.7
No HIV test in past 3 years	888	0.3	2.7	28.6	17.3	51.0
Had HIV test in past 3 years	868	4.0	2.7	33.5	25.2	34.6

Table 3: Logistic regression of desire to have another child within the next two years on perceived HIV status and other variables

	b	SE	
Intercept	1.85	0.34	***
Perceived likelihood of being HIV+ (omitted=impossible)			
Knows HIV+	0.25	0.42	
Very likely	-0.17	0.38	
Unlikely	0.43	0.17	*
Don't know	0.14	0.16	
Age (omitted=26-30)			
20 or less	-0.15	0.54	
21-25	0.07	0.16	
31 and over	0.12	0.15	
Education (omitted=no education)			
1-4 years	-0.08	0.15	
5 or more years	-0.16	0.17	
Household economic status			
Material possessions index	-0.02	0.07	
Household has electricity	0.36	0.14	**
Household owns cattle	-0.06	0.14	
Religion (omitted=no religion)			
Mainline Protestant	-0.82	0.24	***
Zionist	-0.50	0.23	*
Other religions	-0.42	0.24	
Husband's migration status (omitted=not a migrant)			
Successful migrant	0.45	0.15	**
Unsuccessful migrant	-0.38	0.17	*
Family status			
Number of living children	-0.73	0.06	***
Unmarried	-1.22	0.25	***
Birth of youngest child (omitted=2005 or earlier, no children)			
2009	-1.06	0.26	***
2008	-0.70	0.18	***
2007	-0.34	0.18	
2006	0.18	0.19	
Health			
Good health (self-reported)	0.33	0.14	*
Had HIV test in past 3 years	-0.06	0.13	

N=1756 ever-married women of reproductive age living in rural Mozambique in 2009 with no missing data on independent or dependent variables. *: p<.05; **: p<.01; ***:p<.001.

Table 4: Availability of HIV testing and treatment at surveyed MCH clinics in rural Gaza province

Services offered	Number of clinics
Clinics providing HIV tests (all provide family planning counseling for HIV+ women)	**29**
Testing only	3
Testing and PMTCT but not HAART	16
Testing, PMTCT, and HAART	10
Clinics not providing HIV tests	**23**
Family planning counseling for HIV+ women	10
Referrals to other clinics for HIV+ women	3
No special counseling or services for HIV+ women	10

Sample: All maternal and child health clinics in 4 districts of Gaza province, Mozambique, November 2008-January 2009.