

**“Locusts Are Now Our Beef:” Adult Mortality and Household Dietary Use
of Local Environmental Resources in Rural South Africa**

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Abstract (241 words)

There is a lack of research on the association between demographic dynamics and household use of natural resources. Such work is important because within the rural African context, natural resources act as a buffer against household shocks offering both sustenance and income-generating potential. *Aims:* We focus on adult mortality as a household shock, examining use of local environmental resources as related to household dietary needs. *Methods:* We analyze two sources of data collected during May-December 2004 in the Agincourt Health and Population Unit in rural South Africa. Quantitative analyses make use of survey data for 240 households, stratified by adult mortality experience. Qualitative data are presented based on 31 interviews with households having recently experienced an adult death. *Results:* The interviews provide insight into a variety of household-level mortality impacts and also provide evidence of the importance of proximate resources in the maintenance of food security following the loss of an adult household member. Quantitatively, significant differences are found in both patterns of usage of the natural environment as well as levels of food security between mortality-impacted and non-mortality households. Results reveal that the association between mortality and household use of local environmental resources is further shaped by gender of the deceased and time elapsed. *Conclusions:* Adult mortality has important impacts on the maintenance of household food security, shaping time allocation as resource collection responsibilities shift, as well as resulting in the substitution of collected food products for previously purchased goods.

Key words: Adult mortality, food security, HIV/AIDS, natural resources, rural livelihoods, South Africa

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Understanding the complex interactions between humans and the environment within sub-Saharan Africa is critically important given the centrality of the natural environment within rural livelihoods. Indeed, within the rural African context, natural resources act as a buffer against household shocks, offering both alternate means of generating income and meeting dietary needs. Given the continued increase of HIV/AIDS illness and mortality in the region, an increasing number of households are coping with household “shock” in the form of the death of a prime-age adult household member. In this study, we bring together the examination of adult mortality and household use of natural resources particularly as related to meeting household dietary needs. Our analysis is based on quantitative survey data and demographic data from the Agincourt Health and Population Unit’s (AHPU) longitudinal demographic surveillance system (DSS), as well as qualitative data from 31 interviews with mortality-impacted households. Our results are presented in response to two research questions: *1) What is the level of dietary use of the local environment? 2) Does the death of an adult household member change the household’s level of dietary use of the local environment?*

Background

Adult Mortality in the Era of HIV/AIDS:

AIDS is the leading cause of death worldwide for people aged 15 to 49, with 37.8 million individuals (estimate range 34.6-42.3) infected with HIV as of 2003 [1]. While indeed staggering at a global scale, sub-Saharan Africa, with 10% of the world’s population, is home to 70% of all people living with HIV [2].

Within sub-Saharan Africa, the southern region remains the most affected; South Africa is characterized by 21.5% prevalence, a mid-range for the region [2]. Our specific study area is in the Limpopo Province, the most northerly of South Africa's nine provinces, where HIV-related tuberculosis and lower respiratory tract infections are among the leading causes of death [3]. Unfortunately, health indicators suggest that the regional impact of HIV/AIDS is only beginning to be felt. In 2000, 21.5% of deaths in Limpopo Province were attributed to AIDS; it is projected that by 2010, this will rise to nearly 65 percent [4].

Adult Mortality, Food Security and the Natural Environment:

The ways in which adult mortality shapes household dietary use of the local environment is the focus of the effort presented here. We make use of "food security" as an analytical concept, with the term commonly defined as "access by all people at all times to enough food for an active, healthy life" [5]. With specific attention to Africa, Devereux and Maxwell [6] explain that "sub-Saharan Africa is the only region in the world currently facing widespread chronic food insecurity as well as persistent threats of famine." As for South Africa, a recent report by the nation's Human Research Sciences Council [7] suggested that more than 14 million people, or about 35% of the South African population, are estimated to be vulnerable to food insecurity. With a focus on children, one anthropomorphic indicator of malnutrition is the level of stunting, often presented as the proportion of children with height for age under 2 standard deviations from the norm (reference = population median). In 1999, the level of stunting among children in Limpopo Province (23.1%) was representative of the nation as a whole (23.8%) [8]. In their study of food security in rural farming households in north-eastern

Limpopo Province, Leroy et al. [9] found that more than 80% of households had a negative balance of energy, protein and fat intake.

With regard to HIV/AIDS, as aptly stated by the HSRC [7], “All dimensions of food security – availability, stability, access and use of food – are affected where the prevalence of HIV/AIDS is high.” In general, HIV/AIDS significantly undermines a household’s ability to provide for its basic needs [7, 10]. In a recent discussion of the impacts of HIV/AIDS on household livelihoods, Haddad and Gillespie [11] bluntly state that “HIV/AIDS strips individuals, households, networks, and communities of assets.” Indeed, human, social, financial and physical capital may all be compromised by HIV/AIDS, although especially relevant to this project, the sustainability of natural capital may also be undermined [12]. Research suggests that such threats may take the form of lessened ability of communities and user groups to collectively manage common property resources such as rangelands [11]. Also, agricultural productivity may be compromised as a result of the loss of prime-age labor [10]. Less labor-intensive and less nutritious crops may be farmed, or land may lay fallow thereby threatening tenure [11].

Providing context-specific evidence of the association between mortality and livelihood strategies, Drimie [13] reviewed the effects of HIV/AIDS mortality on rural households in Lesotho, Kenya, and South Africa. He found that HIV/AIDS mortality did indeed reduce household labor and assets and also necessitated the laying fallow of land [13]. Likewise, Yamano and Jayne [14] found that relatively poor, rural households in Kenya which experienced the death of a male head of household between 1997 and 2000 experienced a 68% reduction in net agricultural output compared to other households [14]. Notably, this decline in productivity was not affected by the time elapsed since the

mortality, indicating that these households were unable to effectively cope and recover from the mortality. Importantly, however, statistically significant mortality effects were not found for wealthier households or for those experiencing the death of an adult household member other than the head of household, indicating the importance of recognizing the heterogeneity of HIV/AIDS mortality-affected households [14].

Also, as related to natural capital, and as mentioned, rural livelihoods in the developing world are often characterized by land-based strategies such as crop production, animal husbandry, and natural resource harvesting. Although much emphasis is placed on agricultural production in such contexts, Adams et al. [15] estimated that the 1999 aggregate economic value of land-based livelihoods on communal land in South Africa was US\$2 billion per annum, or around 2.5% of GDP. Such figures dramatically highlight the importance of wild indigenous natural resources in rural livelihoods [16].

This project is designed to help fill a void in the scientific understanding of the linkages between adult mortality, food security, and the natural environment. Important policy recommendations stem from these findings, as food security must be a vital component of any intervention aimed at mitigating the effects of HIV/AIDS on rural communities.

Context & Data

Fieldwork for this project was undertaken during May-December 2004 in the rural northeast of South Africa, in the field site of the Agincourt Health and Population Unit (AHPU) of the University of the Witwatersrand's School of Public Health. The Agincourt field site encompasses 400 sq km, and is approximately 500 km northeast of Johannesburg (see Figure 1). The area includes 21 villages and over 11,000 households.

(Figure 1 about here)

The settlement pattern in the study site is typical of rural communities across most of South Africa, characterized by the presence of large villages each surrounded by cultivated fields and communal land used for grazing and harvesting of natural resources. Homestead yards are generally large (30m x 40m) and include dwellings, animal pens, and gardens used for small-scale cultivation of maize (the staple crop), vegetables, and sometimes fruit. There is widespread poverty and substantial dependence on remittances from a large migrant population. In addition, a significant proportion of households depend on social security grants as the only reliable source of household income. As for physical context, the region is semi-arid (annual rainfall 550-700 mm) and fairly heavily populated (~170 persons per sq km) with household garden plots too small to fully support subsistence agriculture [17]. The vast majority of households are dependent on the natural environment for a wide range of uses including grazing for livestock, fuelwood, wild foods, thatching grass, construction timber, and other domestic products for both consumption and income generation [18, 19]. These natural resources are usually accessed from the village commons. These communal lands fall under communal or customary tenure under the jurisdiction of the local traditional authority, but are essentially open access systems in most cases.

As noted, during the interviews we queried specifically about *marula* (a local fruit), *guxe* (an indigenous annual herb), and several other types of wild herbs and vegetables. The *marula* (*Sclerocarya birrea*), a medium-sized deciduous tree, plays a

central role in the livelihoods of rural households in the northeastern savanna woodlands of South Africa [20, 21, 22]. The fruit are rich in vitamin C [24] and the nut contains 2-3 edible oil-rich kernels which are either extracted and eaten raw or cooked with wild herbs and eaten as a relish [23]. These kernels are an important food supplement especially during the lean winter months [23]. Finally, the bark, leaves and roots of the marula tree are used in traditional medicine for treating ailments such as diarrhea, diabetes and fever [22].

Previous research in the study region suggests that over 90% of households seasonally collect marula fruit, collecting an average of 1250 kg of fruit per household per season [23]. In Shackleton and Shackleton's research [25], a total of 74% of households interviewed produced marula beer, while approximately 50% produced marula jam. In addition, marula plant parts were used by 30% of households for medicinal purposes. Besides the domestic uses of marula, the species is also important in enabling households to generate much needed income. For example, Shackleton [25] found that an average of 13% of households in the region sold marula beer, most of these being amongst the poorest households. Of the interviewed households trading in marula beer, 47% had no formal source of income, and over 60% had monthly incomes less than R500 (US\$86) [25].

With regard to local vegetables, we queried about *guxe* (pronounced *gooshee*), a term used locally to refer to indigenous leafy vegetables, mainly in the genus *Corchorus* in the family Tiliaceae [22, 26]. These are erect annual herbs which grow wild, often in disturbed sites such as fields [22, 26]. A total of 41 species of wild vegetables have been documented as being used in the study region, of which *guxe* were the mostly widely

used (90% of households) [26]. These popular wild vegetable species have been shown to be rich in minerals, amino acids and vitamins A and C [22]. *Guxe* is boiled and eaten as a relish with maize porridge [22], the staple in the region and, in their study, Shackleton et al. [26] found that households ate *guxe* between four and five times a week. *Guxe* species were among those which local households tended or nurtured in or near their homesteads, and were reported by users as being drought tolerant [26].

Data on the demographic characteristics of the households used in this study, including the occurrence of mortality, were provided through the AHPU's longitudinal demographic surveillance system (DSS). Since 1992, the AHPU has collected census data at 12-18 month intervals from all 11,000 households in the Agincourt subdistrict. Quantitative data regarding natural resource usage, dietary patterns, and household food security were collected through a module on these issues contained within the 2004 annual census of households in the AHPU. Data were analyzed for a sample of 240 households in 8 villages in the central region of the study site, drawn for a broader study also including issues related to fuelwood and water collection. The sample was stratified by mortality experience, with half of the sampled households randomly selected from those which had experienced the death of a household member aged 15-49 in the 2 years prior to the survey, and half randomly selected from those households which had experienced no such mortality. This mortality age group was chosen to represent those individuals most vulnerable to HIV/AIDS mortality, as well as those who are most economically-productive. The survey data allowed for exploration of covariates as related to household use of the local environment for sustenance. Specifically, we considered household size, household composition (i.e., sex ratio, old or young age

structures), and socio-economic status (SES).ⁱ Household socioeconomic status was discerned from the AHPU demographic surveillance data through an ‘asset index.’ The index is based on an asset register, including the presence of a tap and toilet on the household stand, ownership of appliances (e.g. radio) and equipment (e.g. wheelbarrow), as well as income for a given census year. Values range from 1 (least assets) to 5 (most assets).

Qualitative data were obtained through interviews with members of 31 adult mortality-impacted households included in the survey sample.ⁱⁱ Interviewed households ranged in size from 1 to 18 (mean=7.9). Within each household, 30 – 60 minute interviews were conducted with individuals involved in their households’ resource collection, and the interviewers specifically queried as to changes in the household resulting from the loss of the adult family member within the past 2 years. During the interviews, a native speaker of the local language (Shangaan) acted as translator and for analyses, all interviews were translated and fully transcribed. The results reported here reflect patterns evident within the transcripts as related to our research questions, while the quotes provided have been deemed especially illustrative of these patterns. All names are pseudonyms.

Results

In the presentation of our results, we return to our two research questions. First, we review evidence as to *the level of dietary use of the local environment*.

Dietary Use of the Local Environment:

Both the quantitative and qualitative data provide evidence in support of prior research demonstrating the centrality of the local environment in household diets. The

census module queried as to collection of the broad categories of vegetables, fruits, and insects, while also exploring household dependence upon production from homestead garden plots. In general, our quantitative data provide evidence of the importance of harvesting food from the bush for sustenance (see Table 1). Approximately 67% of the surveyed households reported harvesting wild herbs from the bush, while 27% reported harvesting wild fruit. Additionally, approximately 20% of the surveyed households reported harvesting insects from the bush in order to supplement their diet.

(Table 1 about here)

Our quantitative analyses also suggest many households rely rather heavily on crops grown on homestead plots. Approximately 21% of the surveyed households reported growing maize on a homestead plot, while 58% reported growing other crops on these plots. Of that 58%, approximately 26% reported growing fruit, 40% reported growing vegetables, and 13% reported growing crops other than fruit and vegetables. When asked to specify what “other” crops households grew on their plots, the most common responses were groundnuts and peanuts.

Within the multivariate models (see Table 2), it is notable that household size was found to be positively associated with the likelihood of households harvesting both herbs ($b = 0.13, p < .05$) and fruit ($b = 0.14, p < .01$) from the bush. Household size was not, however, found to have an association with the likelihood of growing crops on homestead garden plots. SES, conversely, was not significantly associated with the likelihood of harvesting food from the bush, but was positively associated with the likelihood of

households growing fruit ($b = 0.41, p < .01$) as well as vegetables ($b = 0.25, p < .05$) on these plots, perhaps evidencing the importance of financial capital and access to water in the household's capacity for food production in the homestead. This is in agreement with Dovie et al.'s findings [28] of positive correlation between the direct use value of household crop production and formal wages as well as investment in crop production, in another rural village in the same region. SES was also found to be associated with food security, as higher SES households appear less likely to go without enough food in the past month, and in the past year ($b = -0.21, p < .05$; and $b = -0.29, p < .01$, respectively).

(Table 2 about here)

Interestingly, households characterized by older age structures were more likely to grow "other" crops (not maize, fruit, or vegetables) on their homestead plots ($b = 1.89, p < .01$). As previously mentioned, when asked to specify which "other" crops households grew on their plots, the most common responses were groundnuts and peanuts. These, and "other" crops are generally more traditional crops, and our findings may suggest an attrition in the use of traditional crops by younger generations. Since traditional crops are characterized by greater resilience to local environmental conditions, this transition may be cause for concern due to households' increased vulnerability to food insecurity resulting from droughts, poor soils, and crop pests.

(Table 2 about here)

As noted above, during the interviews, we queried specifically about *marula* (a local fruit), *guxe* (an indigenous annual herb), and several other types of wild herbs and vegetables. Recall that the interviews were undertaken only with mortality-impacted households.

The continuing dietary and cultural importance of marula was clearly demonstrated in our interviews. Of the 31 interviewed households, 27 (87%) reported making use of marula for brewing traditional beer, making jams and/or consuming the kernels.ⁱⁱⁱ Within our sample, the vast majority of marula processing and consumption was for the homeplace, with only two respondents noting that their households sell seasonal marula products for income.

Again, our interviews provided substantial evidence for the continued dietary importance of *guxe*. Only one respondent suggested that they did not harvest *guxe*, while two others reported harvesting only from large gardens as opposed to fields. The remaining households reported collecting wild vegetables regularly for dietary consumption ranging from 3 times per week to daily, although nine households also have smaller homestead gardens from which limited sustenance is supplied.

Adult Mortality and Household Dietary Use of the Local Environment:

With regard to our second research question, we focus on those aspects of the quantitative and qualitative data which provide insight into variation across households that have recently been impacted by adult mortality and those that have not. As shown in Table 2, significant differences did emerge between mortality-impacted households and their non-mortality counterparts in both patterns of usage of the local environment as well as with regard to food security.

With regard to patterns of usage of the local environment, adult mortality was found to significantly decrease the likelihood of households growing maize on their plots ($b = -2.25, p < .05$). Adult mortality was also found to impact food security, with mortality experience significantly increasing a household's likelihood of having gone without enough food at least once in the past month ($b = 1.43, p < .10$). The gender of the deceased was found to mitigate this effect, as households which had experienced a female adult mortality reported going without enough food to eat significantly less often than those households which had experienced a male mortality ($b = -0.97, p < .05$).

The time elapsed since experiencing the mortality was also associated with patterns of usage of the natural environment. Households characterized by more time since the adult mortality were also more likely to supplement their food intake by gathering from the bush – specifically, with a more distant mortality, households were found to gather herbs more often ($b = 0.51, p < .10$). Greater time since mortality was also associated with increased likelihood of growing maize ($b = 0.06, p < .05$) although decreased likelihood of growing other crops ($b = -0.81, p < .05$).

Calculated predicted values, shown in Figure 2, illustrate these relationships more clearly. As can be seen from this table, households experiencing a male mortality were more likely to supplement their food intake from the natural environment than were those experiencing a female mortality. SES was also found to influence the likelihood of households growing crops on their homestead plots, as households with a higher SES were more likely to grow maize on their plots than were those households with a lower SES. The estimations also suggest that households experiencing a male mortality were

also more prone to food insecurity than were those households experiencing a female mortality.

(Figure 2 about here)

The interview data provide a more nuanced understanding of household coping strategies in response to an adult mortality. These data clearly reveal that patterns of changes with regard to the use of local resources are related to the role of the deceased in the household economy. If the deceased were a resource collector, for example, but did not engage in income-generating work outside of the household, their collection duties were typically taken on by other household members. Importantly, shifts in collection duties, such as the gathering of fuelwood, often had implications for diet as time available for tending household gardens and/or gathering wild edibles declined. As an example, following the death of her sister, Tintswalo and her younger brother spend more time collecting fuelwood. When asked what she is unable to do as a result of increased collection time, Tintswalo notes *“hoeing the field”* as one particular forgone activity.

The interviews suggest that similar opportunity costs arose when the deceased contributed wages to the household. Specifically, in some cases where the lost income had been used to purchase requisite resources, household members were now required to collect these on their own. As stated by Ntombi, the death of her self-employed household *“brought a lot of changes. The first thing being changes on the diet and the second thing is that we are no longer able to buy fuelwood and water, so it requires us to do that by our own hands.”* Her household’s longer-term human capital has also been compromised since *“eventually his son had to drop out of school to look for a job.”* As

noted, these increases in collection time entail opportunity costs, including reduced time for schooling and, in some cases, for household chores such as tending gardens. Indeed, Joseph used to tend his garden which provided important sustenance to the household, but since the deaths of both his parents, he no longer has the time. When asked if he now buys what he used to grow, Joseph agrees “*yes, I buy them now*” thereby resulting in decreased fiscal resources for other household needs.

As another example of impacts of lost wages, Tsakani’s employed adult son recently passed away. He worked regularly and, as explained by Tsakani, “*would remember us every month end, buying groceries and a sac of maizemeal [a local staple]...*” Since his income has not been replaced, she explains that “*there is a serious gap now.*”

As suggested by Tsakani’s story, the strongest associations between mortality and shifts in the dietary use of the natural environment appear in cases where the lost income had been used specifically to purchase groceries. Our interviews suggested that edibles collected from the local environment often replaced previously purchased goods. As clearly articulated by one respondent whose household had lost its primary wage earner, “*locusts are now our beef.*” To further illustrate these associations, following are insights by Zodwa, Triza, Elliott and Meslina, each offering brief descriptions of their household’s increased dependence on wild sustenance following adult mortality experience.

Zodwa collects wild vegetables from behind the road on communal property for her 12-person household. She explains that the land “*is for everybody because when I plough it I can as well collect vegetables from it.*” Her household has no regular income,

but she buys maize meal, sugar, and soap with money from relatives. Her husband held a good job at a local game reserve, but once he became ill, he no longer worked. She explains that her household has experienced substantial changes in their diet since “*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.*”

Triza’s deceased husband also worked long distance on a contract basis, regularly remitting “*some money which we used for groceries.*” She has since found a job as a domestic worker, but explains that “*it used to be very hard because we had nothing to keep us surviving we relied [on wild vegetables] on a day-to-day basis because in the past we used to buy chicken, wors [sausage] and fish.*”

Elliott explains that his wife passed away and he also recently lost his job. Elliott substantiates the fact that purchased food is often forgone once wages are lost “*yes, we stopped purchasing because you only do that when you have money ... sometimes we buy [food], but most of the time we rely on the garden.*”

Finally, Meslina lost her sister who was a waitress at a local game reserve. Her sister’s income was of great importance to their 7-person household and Meslina specifically noted the changes in diet in her description of household-level impacts. “*We used to buy groceries like beef and chicken but now we can only afford mixed portions no longer tinned stuff and other things. So you find that we rely on the field or borrow some money from neighbors.*” When asked which strategy they most often take, she explains that “*I may want to rely on asking money but when it comes to returning it, you find it is too difficult. I work on a budget that is why we rely on vegetable collection.*”

Conclusions and Discussion

Of course regardless of cultural context, the death of a productive, adult household member has important impacts on those remaining. Still, in poverty-stricken households, impacts may be especially severe given persistent struggles to meet day-to-day needs; Basically, the loss of an adult household member is but one of multiple vulnerabilities faced by these households. Although the current study is limited in its inability to compare the impacts of mortality to those resulting from other forms of transition, such as migration and job loss, we argue that our results provide important insight of relevance to the formulation of HIV/AIDS mitigation policies.

Specifically, the survey data and personal stories revealed above provide evidence in support of earlier work on various household impacts of adult mortality. As suggested by prior research, adult mortality was indeed found to impact households' human, social, financial, and physical capital. The interview results suggest that households are often impacted through the loss of income from employed family members. In addition, lost human capital often results in lowered household productivity, while individual household members' time allocation often shifts as the labor of healthy individuals is diverted to different household chores.

Of particular relevance given the aim of the current project, we also find evidence of changes in households' use of local natural capital. As related to dietary needs, additional household responsibilities sometimes yield decreased time to tend gardens and fields. In other cases, however, households respond to an adult mortality with an increased reliance on gardens and fields, as these sources of sustenance must replace previously purchased goods. Interesting, such dependence is particular strong even after

several years since the household's mortality experience, thereby suggesting increased dependence on the bush is **not** only a short-term coping strategy. Indeed, both the quantitative and qualitative data provide substantial evidence of the centrality of local vegetation in household diets and maintenance of food security. In this way, our findings support the assertion of Haddad and Gillespie [11] that these resources are critical to household food security in such communities, through both direct provisioning and as sources of household income. Our results also suggest that within the rural African context, natural resources act as a buffer against household shocks since mortality-impacted households often experience increased dietary dependence on local vegetation. Households experiencing an adult mortality – particularly a male mortality – were significantly more prone to food insecurity than were the non-mortality households.

The associations revealed by this study have important implications with regard to both science and policy. Regarding science, most research relating adult mortality, HIV/AIDS and the environment has focused on impacts of natural resources important for cultivation and animal husbandry [28], with little insight into the role of the natural environment as a buffer with regard to nutrition. The results presented here suggest that examination of “natural capital” as related to food security represents an important arena for continued research.

Regarding policy, increased understanding of the interrelations between the local environment, food security, livelihoods and adult mortality would better inform programs to improve resilience and decrease vulnerability of rural African households. In particular, early evidence suggests improved productivity of homestead gardens,

including the cultivation of indigenous wild herbs and traditional crops, could ease some food insecurities.

Additionally, our findings suggest that the specific interventions suited for each household may vary based on the role of the deceased within the household, as, for example, households may cope differently with the death of a wage-earner as opposed to a resource collector. Likewise, households experiencing the death of a male household member and/or a breadwinner may be most vulnerable to food insecurity. Further, documentation of the role of the local environment provides important foundation for conservation policy particularly since “food security is sustainable only when the natural resource base is not undermined.” [29]

Indeed, a more general aim of this work has been to contribute to research on the association between demographic dynamics and household use of natural resources in less developed regions. We contend that an enhanced understanding of the complex interactions between humans and the environment is especially important given the centrality of the natural environment within rural South African livelihoods.

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ⁱ Households were considered “young” or “old” if at least one-third of their members were aged less than 15 or more than 60 years, respectively.

ⁱⁱ No interviews were undertaken with non-mortality households and, as such, the qualitative data do not allow for control group comparison. Within the present analyses, these data supplement the quantitative contrast between mortality and non-mortality households undertaken with the survey data.

ⁱⁱⁱ The discrepancy between survey and interview data on fruit harvesting is likely due to seasonal variation in marula availability. The surveys queried about fruit harvesting, in general, and was not undertaken during marula season. As such, harvesting of marula is likely under-reported.

Figure 1:

Study Region,

Agincourt Health and Population Unit, Limpopo Province, South Africa

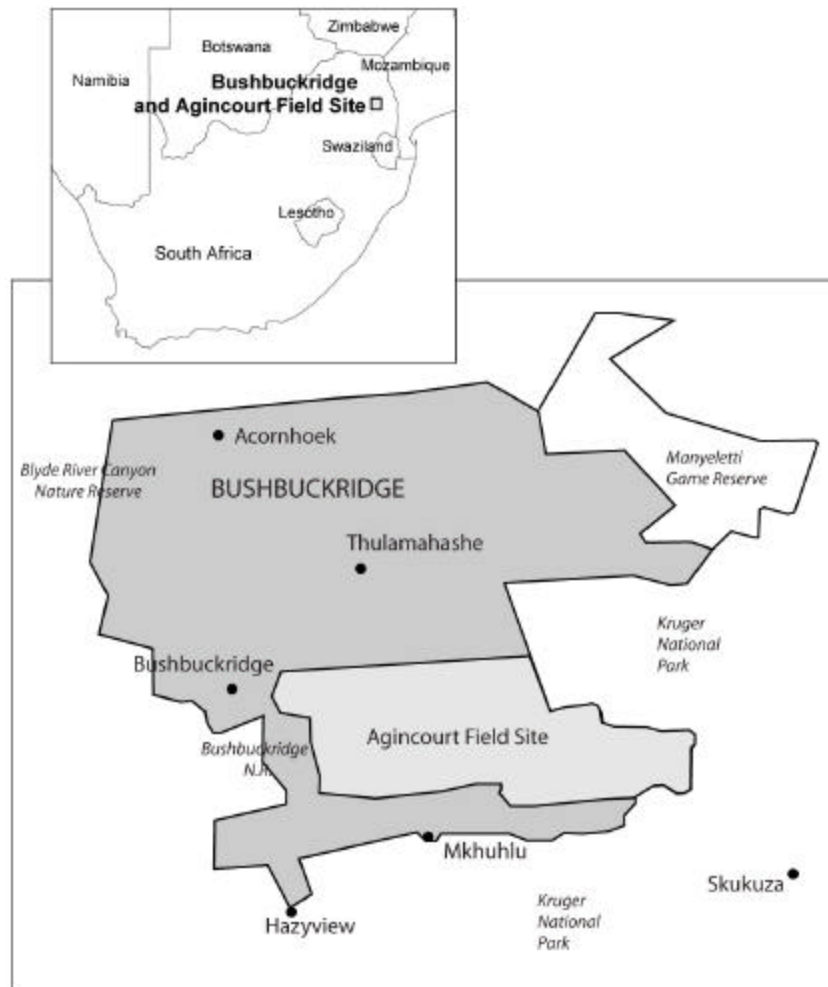


Table 1: Descriptive Profiles of Incorporated Variables, Study Households, Agincourt Health and Population Unit, Limpopo Province, South Africa

	<i>Proportion/Mean</i>		
	<i>All HHs</i>	<i>Non-mort</i>	<i>Mort</i>
<i>Food Acquisition</i>			
Gather food from bush			
Gather herbs	0.67	0.65	0.68
Gather fruit	0.27	0.27	0.27
Gather insects	0.20	0.18	0.21
Grow crops on own plot			
Grow maize	0.21	0.24	0.19
Grow crops other than mealies	0.58	0.56	0.61
Grow fruit	0.25	0.22	0.29
Grow vegetables	0.40	0.41	0.39
Grow other foods	0.13	0.08	0.17 **
Food security			
Not had enough food to eat in last month	0.37	0.36	0.38
Not had enough food to eat in last year	0.41	0.40	0.43
<i>Household Characteristics</i>			
Household size	6.64	6.75	6.54
Composition			
Sex ratio (male:female)	0.82	0.94	0.70 **
Young age structure	0.70	0.71	0.70
Older age structure	0.10	0.07	0.12
Socio-Economic Status			
Possessions index	3.21	3.11	3.30
Mortality Variables			
Adult mortality	0.53		1.00
Adult female mortality	0.24		0.41
Years since death			0.95

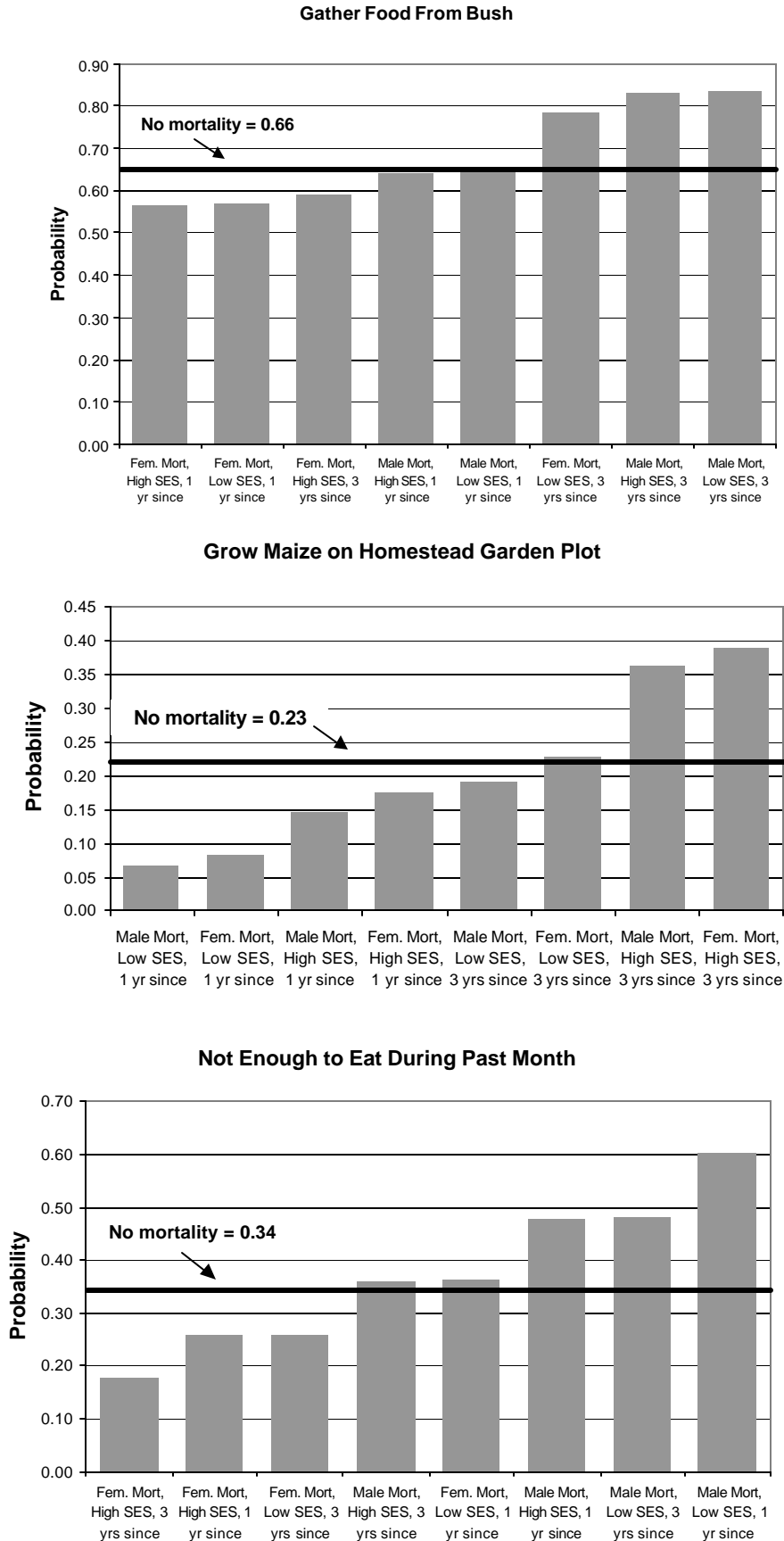
*** p<0.01; ** p<0.05; * p<0.1

Table 2: Multivariate Estimations of Use of Local Environmental Resources as Related to Food Security, by Household Adult Mortality Experience, Sampled Households, Agincourt Health and Population Unit, Limpopo Province, South Africa

	Gather food from bush	Crops gathered from bush			Crops grown on own homestead garden plot				Food Security	
	<i>1=yes</i>	<i>Herbs</i>	<i>Fruit</i>	<i>Insects</i>	<i>Maize</i>	<i>Fruit</i>	<i>Vegs</i>	<i>Other</i>	<i>NOT enough to eat in past month</i>	<i>NOT enough to eat in past year</i>
Baseline models with household characteristics										
Household size	0.13 **	0.13 **	0.14 ***	0.07	0.07	-0.10	0.04	0.08	0.06	0.06
Household composition										
Sex ratio	-0.15	-0.15	-0.14	-0.20	-0.03	-0.23	0.27	0.22	0.10	0.21
Young age structure	0.32	0.32	0.04	-0.22	0.15	-0.17	0.44	-0.20	-0.03	0.14
Older age structure	0.16	0.16	0.39	-1.70	-0.36	0.15	0.21	1.89 ***	0.64	0.63
SES										
Possessions index	-0.02	-0.02	-0.08	0.04	-0.06	0.41 ***	0.25 **	-0.11	-0.21 **	-0.29 ***
Constant	-0.18	-0.18	-1.62 ***	-1.57 ***	-1.66 ***	-2.07 ***	-2.08 ***	-2.44 ***	-0.43	-0.14
R-squared	0.04	0.04	0.03	0.03	0.02	0.05	0.05	0.06	0.02	0.04
N	238	238	238	238	238	238	238	238	224	223
Separate models with mortality experience added										
Adult mortality within past 2 years	-0.57	-0.57	-0.57	-1.37	-2.25 **	-0.57	0.14	1.46	1.43 *	0.57
Mortality*female interaction	-0.32	-0.32	-0.08	-0.02	0.23	0.38	0.29	0.43	-0.97 **	-0.89 **
Mortality*SES interaction	-0.01	-0.01	0.13	0.22	0.22	0.21	0.12	0.20	-0.13	-0.09
Mortality*years since death interaction	0.51 *	0.51 *	0.09	0.48	0.60 *	-0.05	-0.40	-0.81 **	-0.24	0.19
R-squared	0.05	0.05	0.04	0.05	0.04	0.06	0.06	0.12	0.05	0.05

*** p<0.01; ** p<0.05; * p<0.1

Figure 2: Predicted Values for Three Outcome Variables Reflecting Use of Local Environmental Resources and Food Security, by Household Mortality Experience.*



*Other variables held constant at mean values.