Motivation

- Mozambique’s economy is highly dependent on agriculture
- Estimated HIV Prevalence rate of 13.2% among adults
- Department of Policy Analysis and Department of Rural Extension are assisting in developing the Ministry of Agriculture’s strategy to deal with HIV/AIDS
Motivation (cont)

• Simple economic logic posits that AIDS is associated with labor losses (during illness and with death) and thus labor-saving technology should be the focus of agricultural research and extension

• Questions:
  – What is the effect on agricultural labor (quantity, quality)?
  – Will labor-saving technology in agriculture help address potential constraints?
  – As a result, should Mozambique’s public sector agricultural investments focus on these technologies?

Objectives

1. To evaluate demographics changes in households with a prime-age death, using nationally representative household survey data, to understand HH labor availability
2. To determine the strategies used by households to respond to illness/death
3. To identify implications for design of agricultural programs and policies, in a context of overall policies
Background: Mozambique

- Mainly rural, with 80% of population in rural areas, involved in agricultural sector; 75% of income from agriculture
- Small-scale, subsistence agriculture, with limited market participation and little use of purchased inputs
- Three main regions:
  - South
  - Center
  - North
- Medium/high HIV prevalence: 13.2% nationally
  - High variability (rural/urban; regions)
Methods

- Add demographic and mortality component to TIA 2002 survey:
  - TIA: Nationally representative household survey:
    - Agricultural production, income, assets, market participation
  - Mortality component asked HHs about individuals who died over past ~4 years: year of death, cause of death, etc.
- Use prime age adult deaths due to illness (declared by respondents) as a proxy for HIV/AIDS deaths
  - Prime age adults: 15-49 years
  - Compare “non-affected” HHs with “affected” HHs

Figure 1. Provincial HIV Prevalence Rates for 2002 (Urban and Rural) and Rural Adult Mortality 1999-2002

Age and Sex Distribution of Adults Who Died of Illness Compared to Non-Affected Adults

1. Non-Affected Adults:
   - 15-24 yrs: M=41%  F=42%  Total=41%
   - 25-49 yrs: M=59%  F=58%  Total=59%

2. PA Adults Who Died of Illness:
   - 15-24 yrs: M=21%  F=31%  Total=27%
   - 25-49 yrs: M=79%  F=69%  Total=73%

   → Deceased generally older than general population
   → Deceased men generally older than deceased women

TIA 2002 Rural Mortality Information

Table 2. Distribution of Adults Who Died of Illness Compared to Other Adults, Based on Role In Household And Age Groups

<table>
<thead>
<tr>
<th>Category</th>
<th>% of Non-Affected PA Adults</th>
<th>% of Deceased PA Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head / Spouse</td>
<td>Other</td>
</tr>
<tr>
<td>All PA Adult Age Groups</td>
<td>65 %</td>
<td>35 %</td>
</tr>
<tr>
<td>15-24 yrs</td>
<td>34 %</td>
<td>66 %</td>
</tr>
<tr>
<td>25-49 yrs</td>
<td>86 %</td>
<td>14 %</td>
</tr>
</tbody>
</table>

→ Many who died are not head or spouse
Household Characteristics

• Income and Income/AE:
  – Median values lower for HHs with male death, esp. in Center
  – Generally spread evenly across income quartiles (except male death in Center, more likely in lower 2 income quartiles)

• Cultivated land area:
  – Generally lower among affected households
    • 1.05 ha for non-affected vs. 0.88 for affected
  – % cultivated: Lower, esp. for male death in South and North

• Regional differences in demographics:
  – South: More PA adults in HHs, more elderly, larger HH size (5.5 persons in 2002)
  – North: More “nuclear” HHs, with fewer PA adults, smaller HH size (4.5 in 2002)
  – Center: Basically between the two in terms of PA adults, dependency ratios, etc.

Demographic changes: Difference in differences

• Compute the change in HH composition from 1999 (prior to death) and 2002 (after death) for affected HHs
• Compute change in HH composition for nonaffected HHs (excluding those with either illness or death)
• Compute the difference between the two, to net out possible trends in time

\[ \Delta X_{a_i} = X_{a_i,1999} - X_{a_i,2002} \]
\[ \Delta X_{n_i} = X_{n_i,1999} - X_{n_i,2002} \]

\[ \text{DID} = (\Delta X_{a_i} - \Delta X_{n_i}) \]
Table X. Difference-in-Differences in Household Composition 1999-2002, by Gender of Deceased Prime-age Adults

<table>
<thead>
<tr>
<th>Household Composition</th>
<th>Male PA death ΔXM - ΔXO</th>
<th>Female PA death ΔXF - ΔXO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household Size</td>
<td>-1.11 - 11.26</td>
<td>-1.34 - 9.36</td>
</tr>
<tr>
<td>Male adults</td>
<td>-0.99 - 21.43</td>
<td>0.01 0.18</td>
</tr>
<tr>
<td>Female adults</td>
<td>-0.01 - 0.11</td>
<td>-0.92 - 14.25</td>
</tr>
<tr>
<td>Boys</td>
<td>0.00 - 0.07</td>
<td>-0.06 - 0.77</td>
</tr>
<tr>
<td>Girls</td>
<td>-0.21 - 3.43</td>
<td>-0.20 - 2.82</td>
</tr>
<tr>
<td>Young Children</td>
<td>0.05 0.57</td>
<td>-0.14 - 1.71</td>
</tr>
<tr>
<td>PA adults</td>
<td>-0.98 - 12.70</td>
<td>-0.81 - 9.90</td>
</tr>
<tr>
<td>Elderly adults</td>
<td>-0.02 - 0.30</td>
<td>-0.09 - 1.39</td>
</tr>
<tr>
<td>Household Size (AE)</td>
<td>-1.04 - 17.31</td>
<td>-0.87 - 9.01</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>0.54 5.12</td>
<td>0.23 1.71</td>
</tr>
</tbody>
</table>


ΔXM= Change HHs w/male death ; ΔXF= Change HHs w/female death; ΔXO=Change Other HHs

Demographic changes: Compared to nonaffected HHs

- For all HH with a death:
  - Significant change in HH size and in adult equivalents (reduction rather than growth)
  - Loss of an adult, not fully recovered
  - Decline in young girls (rather than growth in number of young girls)

- Cases of male death vs female death:
  - Loss of adult male not recovered, but loss of adult female partially recovered
  - Loss of adult males resulting in significantly higher dependency rate; with adult female death, relationship less strong
Summary on Demographics and Demographic Changes

• Affected HHs are generally not more likely to be poor in income or land than non-affected HHs
  – Some categories of HHs may have more difficulties than others
    • HHs with male death and few remaining adults
• Some HHs show signs of probable labor constraints
  – Higher dependency rates
  – Increase in households with only 1 adult present
• Other HHs show signs of dealing with labor loss partially through bringing in new members
  – Particularly true in cases of female death

Strategies to Mitigate the Effects of a Prime-Age Death on Agricultural Activities

• Open-ended question to respondent: maximum of three responses allowed in reference to each deceased individual
• Actual Question: “Identify the 3 most important strategies undertaken by your household in order to minimize the effects of the death (departure) of this person on your agricultural and livestock activities”
Strategies

• Post-coded adjustment strategy groups:
  – Labor replacement
    • Hire labor, work more, children in field
  – Reduce area cultivated or labor used
    • Less land cultivated, less weeding
  – Asset reduction
    • Sell livestock, other assets
  – Child-related strategies (may be underestimated)
    • Take children from school, send away
  – Consumption reduction strategies
    • Poorer quality diet, fewer meals
  – No strategy identified

Figure 2: Response to Adult Death by Illness by Region
Figure 3: Response to Departure, Illness, and Death by Illness of a Prime-Age Adult

Figure 4: Strategies in Response to Prime-Age Adult Death From Illness, by Gender of Deceased
Who is Adopting Which Strategies and What is Associated With This?

• 1-Hire labor or increase use of mutual help (Annex Tables 7 & 8)
  – This strategy more likely with male death than female death (**)
  – Compared to those who don’t use strategy, users have higher income per capita, higher land/AE, more AE’s, and larger decline in HH AE’s

• 2-Increased use of child labor
  – More likely with death of HH head/spouse (*)
  – Users have lower income per capita, more total land/AE, and larger decline in AE
Who is Adopting Which Strategies and What is Associated With This?

• 3-Reduce area cultivated--most common strategy but still only 44 % of cases
  – More likely with male death, particularly male head/spouse (**)
  – Users have lower income per capita, lower AE’s (*)
• 4-Reduce labor spent on weeding
  – More likely with death of male head/spouse compared to female head/spouse (*)
  – Users have lower income per capita, lower AE (*); higher land/AE
• 5-Reduction of cash, livestock, or other assets
  – More likely with female death (*) or death of head/spouse (*)
  – Users have slightly higher income
• 6-Send children away
  – More likely with female death (*), especially death of a head/spouse (**)
  – Users have higher income, lower land/AE, lower AE’s
• 7-No strategy declared
  – Very unlikely with death of male head/spouse (**)
  – More likely that no strategy was declared by HH with death of other member (**) or female (*)
Table 8. Probit Estimates of Marginal Effect on Reported Use of Strategy “Reduction in Area Cultivated” by Households with a Prime-Age Adult Death due to Illness

<table>
<thead>
<tr>
<th>Factors</th>
<th>Use of Strategy “Reduction in Area Cultivated” (Yes=1, No=0)</th>
<th>Mean Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.312*** (3.30)</td>
<td></td>
</tr>
<tr>
<td>Central Region</td>
<td>0.172* (1.73)</td>
<td>0.438</td>
</tr>
<tr>
<td>North Region</td>
<td>0.535*** (4.83)</td>
<td>0.207</td>
</tr>
<tr>
<td>2002 HH Total Area / AE</td>
<td>0.013 (0.43)</td>
<td>0.635</td>
</tr>
<tr>
<td>2002 HH Total Income / AE</td>
<td>-0.000 (-1.01)</td>
<td>2198</td>
</tr>
<tr>
<td>% change in HH Adult Equivalents 1999-2002</td>
<td>0.449** (2.40)</td>
<td>0.168</td>
</tr>
<tr>
<td>Deceased was Male Head/Spouse</td>
<td>0.238** (2.20)</td>
<td>0.138</td>
</tr>
<tr>
<td>Death occurred in 1999 or 2000</td>
<td>0.089 (1.17)</td>
<td>0.406</td>
</tr>
<tr>
<td>Principal access road to village is paved</td>
<td>-0.197** (-2.14)</td>
<td>0.245</td>
</tr>
<tr>
<td>Factory in village</td>
<td>0.383** (2.26)</td>
<td>0.057</td>
</tr>
<tr>
<td>Hammer Mill in this village or adjoining village</td>
<td>-0.124 (-1.47)</td>
<td>0.471</td>
</tr>
<tr>
<td>Principal village water source is outside of village</td>
<td>-0.061 (-0.64)</td>
<td>0.183</td>
</tr>
<tr>
<td>Ln(Agricultural Population Density)a</td>
<td>-0.112 (-1.15)</td>
<td>0.182</td>
</tr>
</tbody>
</table>

* (# prime-age adults in village / total village area cultivated)
*** significant at the 0.01 level
** significant at the 0.05 level
* significant at the 0.10 level
Coefficients calculated as dF / dX (z stat in parentheses)

N = 212
LR chi2(12) = 49.5
prob > chi2 = 0.0000
Log Likelihood= -118.0
Psuedo R2 = 0.173

Implications For Ministry of Agriculture for Policy and Programs?

- Inclusion of demographic/death enquiry section in TIA 2002 provides estimates of rural mortality rates and enables analysis of affects on households and their responses, even if not perfect
Conclusions

• Affected households in many cases look like other Mozambican households; only some affected hhs are ex post in the poorest category
  – PA male head/spouse death, with nuclear family, leaving just 1 PA adult female to support hh
• HHs most likely to need assistance may be most unlikely to adopt new agricultural technology
• Greatest time savers (especially for women) may be interventions in water, fuel search and food processing/preparation
• Animal traction, weed control and other technologies may help increase agricultural productivity may be good, but the justification is not based on HIV/AIDS

Conclusions (cont.)

• Heterogeneity of strategies indicated suggests that simple economic logic fails to capture all the dynamics occurring in these households
  – Intra-household labor allocation important
  – Capacity to bring in new members or hire labor makes a difference
• Poverty is widespread in Mozambique – need to evaluate interventions based on a broader set of criteria than just HIV/AIDS
• The rural area hardest hit by HIV/AIDS is the South, where agriculture is secondary to other activities and has the lowest potential
Conclusions (cont.)

• Strategies of hhs will depend on various factors:
  – HH demography both before and after death
  – HH assets/resources and income sources
  – Intra-household allocation of labor
  – Extent to which other hhs in community, extended family are directly hit by HIV/AIDS
  – Strength of social networks in rural communities
  – Extent of HIV in rural areas

• Thus, interventions cannot be designed based solely on research in other contexts
  – Time Use Studies particularly important, as well as demographics

Thank you

Muito Obrigado

This research is funded by USAID/Maputo & USAID/Washington.
Implications For Policy & Programs

• Heterogeneity of spatial and socioeconomic characteristics of affected households & individuals
  – Provincial and/or regional differences in mortality rates suggest need for geographical targeting
  – Preponderance of PA deaths among non-HH heads/spouses implies some targeting emphasis on young adults if rates of increase in prevalence are to decrease
  – Wide levels of income and literacy among affected individuals requires appropriate and targeted education materials/strategies.

Implications For Policy & Programs - III

• Households with adult death shocks suffer loss of labor, assets, and knowledge
  – Some affected households are reducing area cultivated and/or reducing labor inputs (weeding) which will likely reduce productivity
  – No signs of large shifts in cultivation to labor-saving crops, etc.
Heterogeneity in adjustment strategy responses by characteristics of affected households and deceased members

- This suggests caution in diversion of agricultural/livestock research funds to just labor-saving crop and input technologies
- The loss of family labor due to a death in the household does not mean that ag. labor necessarily becomes the household’s principal production constraint – some HH’s are able to replace ag. labor
- In addition, not all affected HHs reduce area cultivated – less than half HH’s indicate reduction in cultivated area or labor applied as an adjustment strategy

Labor-saving innovations and investments that would reduce labor demands on women’s HH activities (gathering cooking fuel / water, food processing) would likely be more beneficial for the majority of affected households than labor-saving crop/input technologies

- In addition, these innovations would benefit ALL rural HHs -- especially the poorest -- not just the affected

MADER must work to preserve balanced attention to non-affected as well as affected households

- The principal problem for the rural economy is that rural incomes of non-affected HH’s remains very low, especially in lower income quartiles
- agriculture research and extension funds are scarce; overall productivity growth is needed for all rural households
Implications For MADER: Land, Food and Other Policy & Assistance to Affected HHs

• Households with a female death seem to be better able to replace labor than those with a male death
  – Some focus on households with a male illness or death
  – Consider home-based care and assistance for ill people combined with health care training for potential care givers
  – However, it is essential to target food assistance to reach the most vulnerable yet avoid market disincentive for non-affected households

• Households with a male death are more likely to reduce area cultivated
  – Critical to secure land rights for widows and/or her children so that HH assets are not further reduced and to allow secure land rental as an income strategy

• Consider using nutrition supplements and ARVs to keep people active as long as possible