HIV-related deaths and economic shocks: does survivors' consumption recover over time in KwaZulu-Natal?[*]

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Extended Abstract

Introduction

AIDS-related death represents a long-term shock episode that is characterised by a series of events that occur as illness progresses (Carter, May et al. 2007). Recent research on the impact of HIV and AIDS on rural livelihoods in Sub-Saharan Africa has highlighted the heterogeneity of impacts of HIV and AIDS morbidity and mortality on households' demographic and economic resources (Gillespie 2006).

This paper explores the temporal dimension of the impact of adult deaths (defined as deaths at 15-59 years) on survivors' consumption differentiating by cause of death and sex of the deceased member. The socio-economic impacts of an adult death have been found to be dependant on the characteristics of the dead person (gender and position in the household) (Mather, Donovan et al. 2005). Effects can also be heterogeneous when the deaths occurred at different times in the past and as such affect welfare differentially (Yamano and Jayne 2004; Carter, May et al. 2007).

The relevant AIDS impact literature seems to have largely neglected the distinction between immediate (or short-term) impacts and the impact ex-post coping strategies i.e. between long/medium-term and short-term mortality impact, mostly because of the lack of temporal depth in existing longitudinal studies (Beegle and De Weerdt 2008). The empirical evidence is in fact mostly on short-term impacts.

In South Africa, Carter et al. (2007) use a study with three waves of data (1993/1998/2004) to explore the economic impact of premature adult mortality in KwaZulu-Natal over time. The authors evaluate the economic trajectories (proxied by total household expenditure per capita) of AIDS-affected households and find that impacts are heterogeneous conditional on households' characteristics with wealthier households being most affected in the short-term by AIDS-related deaths. Recovery occurs with time.

Grimm (2006), analysis of the consumption of surviving household members after a death in the household in Indonesia is the only one that looks at the distinction between immediate impact and impact ex-post coping strategies. The author finds that adult deaths led to a reduction in household wealth but also to an increase in consumption during 3/5 years following the death. However, the long-term impact exhibited the opposite sign (growth in per capita consumption was positively associated with a death in the household). He suggests that this was because households were more conscious of the direct costs of mortality such as the funeral costs and the loss of income, than potential savings resulting from the decline in the number of consumers in the household.

Beegle et al (Beegle, De Weerdt et al. 2008) analyse the Kagera data from Tanzania. Their paper specifically addresses the question of whether prime age death has an impact on consumption growth per capita (the growth of household per capita expenditure) over a longer period (1991-2004). They only find an impact on consumption in the first 5 years after the death occurred; after that, the estimates

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become smaller and the results insignificant. The authors interpret this "lack of persistence" (Beegle, De Weerdt et al. 2008) as suggestive of a "recovery in consumption". However, this is not a strong finding because the authors are unable to control for other shocks that may also have impacted on consumption.

Aims

This paper contributes to the literature on this topic by estimating the gross impact of adult deaths by cause on per capita consumption (expenditures) while addressing the problem of the endogeneity of adult deaths to consumption. AIDS deaths are potentially endogenous either because of simultaneity (reciprocal causation) between adult deaths due to AIDS and household economic outcomes (Bachmann and Booysen 2006; Chapoto and Jayne 2008) or because of omitted variable bias (unobserved heterogeneity).

The paper also contributes to existing studies by differentiating impact by time since the adult death: whether survivors' households recover from past mortality shocks depends on the success of their economic and demographic responses (Grimm 2006). It may vary according to the research context.

Data

The data used for this study come from the Africa Centre Demographic Surveillance System. The latter is a large longitudinal database which has collected detailed demographic data (fertility, mortality, migration, household membership) every six months on more than 11,000 households and 85,000 individuals in a rural sub-district of Northern KwaZulu-Natal since the beginning of 2000 (Hosegood and Solarsh 2005; Hosegood and Timaeus 2005; Tanser, Hosegood et al. 2007). In addition, socio-economic information on employment, income and expenditure is collected almost every year via the household socio-economic modules (HSE). This paper will analyse three socio-economic waves (HSE) of the ACDIS data, specifically HSE 2 (collected during 2003-2004); HSE 3 (2005) and HSE 4 (2006) – see table 1.

The study population includes all non-resident individuals reported by household informants to be household members, as well as residents. Verbal autopsies are used to determine causes of death.

Methods

The longitudinal dimension of the data offers an opportunity to overcome both the inherent limitation of cross-sectional studies (i.e. their inability to separate cause from effect) and also to disentangle short-term from medium-term impacts of AIDS deaths on household survivors' consumption. The data provide three waves of socio-economic data (HSE 2, 3, 4) and around 16 rounds of demographic data. It is possible both to distinguish short-term (HSE 2 to 3 and HSE 3 to 4) and medium-term (HSE 2 to 4) economic impacts and look at longer-term demographic processes.

Panel data models, specifically fixed effects and two-stages least square estimators and used to address the potential endogeneity of adult deaths and dynamic panel data estimators such as Arellano-Bond and Blundell-Bover are employed to cope with biases arising from the temporal auto-correlation of household consumption (Wooldridge 2002).

Our model aims to estimate the impact of adult deaths, differentiated by cause, on household welfare proxied by per capita consumption controlling for time-varying demographic and economic endowments. Demographic and (other) economic endowments are determinants. Although the analysis is differentiated by cause of

death, special attention is given to mortality due to HIV-related causes including tuberculosis.

The model of interest is the following linear dynamic panel data model:

$$PCE_{h,t} = \alpha + \beta PCE_{h,t-1} + \delta Z_{h,t} + \gamma AIDSdeaths_{h,t} + \xi Otherdeaths_{h,t} + \phi X_h + u_h + \varepsilon_{h,t}$$

where *h* stands for household (*h*=1 , ….,12032) and *t* for time (*t* =1, 2, 3) i.e. HSE 2, 3, 4. AIDS adult deaths are endogenous to the model. Adult deaths are disaggregated by sex as the literature has underlined the importance of differentiating mortality impacts by gender (and also position) of the deceased member (Mather, Donovan et al. 2005). The dependent variable $PCE_{h,t}$ is the log per capita consumption. and $PCE_{h,t-1}$ is the lagged value of the dependent variable. It is also endogenous to the model. $Z_{h,t}$ is a vector of time-variant household characteristics (i.e. household size, number of individual in-migrants, out-migrants, proportion employed, proportion aged 15-65, proportion female, maximum level of education in the household, age of head, age squared, education of head, sex of head, number of assets). $Otherdeaths_{h,t}$ is a vector of time-variant mortality variables by cause (excluding AIDS deaths) and are considered exogenous (i.e. adult deaths from injuries, non-communicable and communicable diseases). X_h is a vector of time-constant household characteristics. u_h is household-specific and time-constant random error component assumed to be normally distributed with zero mean and variance σ_ε^2. It may be correlated with all or part of the regressors. $\varepsilon_{h,t}$ is the time and household specific error term, assumed to be normally distributed and uncorrelated with the regressors across households and waves and uncorrelated with u_h.

Preliminary results

Preliminary results (Table 2) indicate that AIDS deaths might not be endogenous to consumption. In the final model of interest, previous consumption has a positive effect on current consumption indicating divergence in the ACDIS sample (the poor get poorer and the rich get richer, last column in Table 2). This is in line with pooled ordinary least squares (OLS), but in contrast with fixed effects (FE) and two-stages least squares (2SLS) models, which indicate instead convergence (the poor get richer and the rich get poorer).

Recent men's deaths due to AIDS have a negative effect on current consumption ranging from 2% to 6%, while earlier adult deaths decrease current consumption by 8 to 7%. Thus, there is no evidence of any recovery in consumption for survivors' households over the periods of time observed here. Women's deaths due to AIDS do not significantly affect consumption (although they have a negative coefficient).

Conclusions

The added value of this analysis is to estimate the gross effects of adult mortality by cause of death and gender, controlling for short and medium-term impact of AIDS deaths and correcting for the presence of auto-correlation bias. A homogenous model is estimated that assumes that the effects of mortality do not vary by households' initial conditions and therefore are the same across all households.

Substantive results indicate that recent and earlier adult men's deaths due to AIDS have a negative effect on household consumption that women's deaths have no significant impact, which could reflect the characteristics of the area.

From a methodological standpoint, it is difficult to obtain unbiased estimates of the impact of AIDS mortality on welfare. As the paper shows their complex inter-relationships are not adequately taken into account in standard regression models (OLS/FE/2SLS). This is due to the presence of a number of econometric issues: the presence of potentially endogenous regressors (i.e. reverse causality, measurement error, omitted variable bias), and the temporal autocorrelation of household welfare.

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Table 1: Sample description, visit dates, rounds and number of households.

	Visit date	Rounds	HH
HSE 2	Feb 2003-Aug 2004	8,9,10	10821
HSE 3	Jan-Aug 2005	12	9769
HSE4	Jan-Aug 2006	14	9383

Source: Own calculations based on the ACDIS data.

Table 2: Comparison of different estimators, pooled OLS, Fixed effects, Fixed effects/two-stages least squares, Blundell-Bover estimator (system GMM).

	OLS_rob	FE_rob	2SLS	System-GMM
PCE t-1	**0.141**	**-0.290**	**-0.288**	**0.185**
No. Assets	**0.089**	**0.066**	**0.067**	0.000
hhsize	**-0.067**	**-0.076**	**-0.083**	**-0.059**
hhsize t-1				0.044
Prop females	**0.039**	0.018	0.059	
% Employed	**0.157**	**0.079**	**0.103**	**0.985**
Prop. of Adults	**1.113**	**1.045**	**1.088**	
F. Deaths(15-59) Comm.	0.025	0.005	0.078	0.043
F. Deaths(15-59) Non-communicable diseases	**-0.082**	**-0.087**	-0.079	-0.027
F. Deaths(15-59) Injuries	**0.151**	**0.182**	0.111	-0.008
F. Deaths(15-59) AIDS	**0.024**	**0.017**	-0.653	-0.031
F. Deaths(15-59)t-1 AIDS				-0.001
M. Deaths(15-59) Comm.	**0.042**	**0.103**	-0.009	0.018
M. Deaths(15-59) Non-communicable diseases	-0.009	0.005	-0.095	-0.016
M. Deaths(15-59) Injuries	-0.018	-0.036	-0.032	-0.062
M. Deaths(15-59) AIDS	**-0.043**	-0.021	-0.477	**-0.064**
M. Deaths(15-59)t-1 AIDS				**-0.079**
TIME	YES	YES	YES	YES

Source: Own calculations based on the ACDIS data.
Significant coefficients are in bold. Preliminary analysis.