Death and the African Family: the economic impact of adult mortality in South Africa[*]

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Introduction

Extended families can distribute the impact of shocks such as adult deaths across multiple households by pooling resources and by exchanging household members. Consumption smoothing of this sort relies upon kinship and other forms of social networking and is sometimes described as drawing down from stocks of social capital. The transfers of resources that result may have inter-generation distributional consequences if, for example, increasing numbers of children are cared for by older people due to the ill health or death of their working-age parents. In high HIV prevalence societies, such shifts may serve to ameliorate the impact of AIDS-related illness and deaths by dispersing their effects across a wide-ranging network of people and muting the measurable impact that they have on directly-affected households. The consequences of the AIDS epidemic in Africa for households will depend, therefore, on how the demographic and economic dynamics of households interact.

This paper uses longitudinal data from one of the nine provinces of South Africa to examine how adult deaths affect households' economic well-being. It then assesses the extent to which households respond demographically to adult deaths by household fission or moves in or out of other adults or children. Finally, it investigates whether these responses offset the economic impact of adult deaths.

By the middle of 2006, 5.4 million people were estimated to be living with HIV in South Africa, while premature adult mortality is increasing rapidly with an estimated 345,00 South Africans dying of AIDS in 2006 (Dorrington et al., 2006). Containing 20.7 per cent

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of the population, KwaZulu-Natal is the most populous province of South Africa. It is one of the provinces in South Africa most affected by HIV/AIDS with 32% of HIV related deaths occurring in this province. Further, while not the poorest province in the country, around 25 percent of South Africa's 22 million poor are to be found in KwaZulu-Natal, slightly more than the population share of the province (Hoogeven and Ozler, 2004: 39l; Leibbrandt et al., 2005: 18). The province also matches many of the socio-economic characteristics of South Africa in terms of its urban/rural, poor/non-poor and racial compositions.

Most previous studies that have examined the consequences of AIDS-related deaths at the level of the household have found that they have a significant economic impact in terms of the incomes of afflicted households (Gertler et al., 2004; Naidu and Harris, 2005; Yamano and Jayne, 2003; Yamano et al., 2004). Serious illness shocks, including adult death, have also been found to have significant negative impact on food consumption, especially for the poorest (Dercon, 2004; Beegle et al, 2006).

Although suitable data for such analysis are limited in the context of South Africa, a few studies have reported similar findings. In a national, but non-representative, survey, Steinberg et al. (2002:16) note that two thirds of their respondents reported a fall in household income as a result of their actions to cope with the impact of HIV-related illness including the direct loss of earners. Households also reported increased expenditure on health, diverting income away from other requirements. Using the same three-wave panel study as the current paper, Carter et al. (2007) show that deaths of young adults from natural causes (including those from AIDS) between waves two and three had a negative impact on the growth in income of all households, but especially on those households that were modestly well-off (with initial incomes about 1.5 times the poverty line).

The literature has tended not to directly investigate the ways in which adult death translates into a change in economic status though there are some clues. Discussing the impact of malaria, Sachs and Malaney (2002:3) note the costs associated with changes in the behaviour of household members concerning decisions such as schooling, child-bearing, savings and work-seeking are often overlooked when measuring the economic impact of disease. In an agricultural context, Kochar (1995) found that male illness lowered wage income and increase informal borrowing during busy periods, though not in slack periods. In South Africa, Steinberg et al. (2002: 19) report that those households

who had met funeral costs in the year prior to being interviewed had spent an average of 3.5 times their monthly income on funeral costs possibly leading to indebtedness. In Uganda, Menon et al. (1998) find a drop in household ownership of durables.

In addition to impacts on the earnings and consumption of households, some studies have identified other negative outcomes. Yamano and Jayne (2003) find links between adult deaths and the progression through school of children, suggesting that some coping strategies might have inter-generational effects. In Malawi, it has been shown that the death of an adult encourages children to marry earlier, drop out of school to help support the family, and take on informal labor schemes (Munthali 2002). In South Africa, Timæus and Boler (2007) find higher fertility rates among teenage girls who father has died and a negative impact on educational attainment.

Not all the literature supports the notion that adult death result in either negative demographic or economic impacts. In Tanzania, Ainsworth and Semali (1995) report that households were able to maintain household size and dependency ratios while, in Kenya, Yamano and Jayne (2004) show that only male deaths produced a decline in household size. In Tanzania, Beegle (2005) finds only small and insignificant changes in labour supply of individuals in households where there has been an adult death. She reports an adjustment period where some activities were scaled back, especially agricultural production, but concludes that households did not shift towards subsistence nor did they reduce their diversification of activities. Mather et al. (2004) find unchanged land cultivated, total land area and total income after a death. Moreover, in terms of outcomes, Dercon and Krishnan (2000) find no significant impact on Body Mass Index of survivors after an adult death.

Some of these inconsistent results may arise from the differential capacity of households to recover from the shock. For example, Pitt and Rosenweig (1986) found that, although the immediate impact on total income of an illness of a household member is large, over time the adoption of coping strategies permit households to compensate for the lost income. Lindelow and Wagstaff (2005) and Wagstaff (2005) find that unearned income, largely from remittances, is an important informal insurance mechanisms used by households. Focusing on households engaging in agriculture and using responses to a question on perceived coping strategies, Donovan et al. (2003) describe actions that both sought to maintain labour time (e.g. reducing leisure, labour sharing with other households, hiring labour) and maintain labour intensity (e.g. cultivating a smaller area,

reducing diversification). They briefly mention that households may try to replace the labour that has been lost, seeking new members, and note that this is more likely when the death is that of a woman than a man (Donovan et al, 2003: 7). Several studies find asset shedding, usually through the sale of land, although in some cases, this was more frequently reported when the ill person was a man (Yamano and Jayne, 2004). In the more urbanised environment of South Africa, Steinberg (2002: 21) identify the non-payment of school fees as a coping strategy. However, Gertler and Gruber (2002) conclude that, while families may able to fully insure against minor illnesses, they are less able to insure against illnesses that limit essential living activities.

Although it is often held that afflicted households may adjust household membership as a coping strategy for adult mortality (Over, 1998), the evidence for such demographic responses is mixed (Ainsworth and Semali, 1995; Mather et al, 2004; Yamano and Jayne, 2004). White and Robinson (2000:17) suggest that this shows a 'rebalancing' of dependency ratios after a shock, and it is possible that households may do this in anticipation of the shock.

The analysis presented here builds on the research done previously using the same data from KwaZulu-Natal (Carter et al. 2007). We extend this earlier work to incorporate deaths of middle-aged, as well as young adults, and deaths between 1993 and 1998, as well as 1998-2004, and also to synthesize the model with one proposed by Grimm (2006) which models changes in household expenditure as a function of initial expenditure, demographic events (i.e. births, deaths, and moves in and out), shocks, and a number of control variables.

Data and Methods

The KwaZulu-Natal Income Dynamics Study (KIDS) is a household panel based on 1354 African and Indian households first interviewed in 1993 (May et al. 2000; May et al. 2007). They were revisited in 1998 and again in 2004. The new households of adults with children who move out of panel households are recruited into the study. In 2004 we also followed up children who had been fostered out. The questionnaire used for KIDS is based on that developed for the World Bank's Living Standards Measurement Study surveys (Grosh and Munoz 1996) and each wave of the study has collected detailed information on household income, expenditures and wealth. The study also collects demographic information on both resident and non-resident members of the households, including details of deaths. Although the panel suffered 38 per cent attrition by 2004, its

characteristics remain broadly representative of the African and Indian populations of the province according to the 2001 Census.

The major dependent variables examined in this study are the annual growth rates of per capita household expenditure and of per capita household wealth in between the waves of KIDS. The analysis exploits the fact that one can measure the change in households' economic welfare in the two intervals between the three waves of the study to fit fixed-effects regression models that control for the persistent measured and unmeasured characteristics of panel households. The main regression models are fitted to data that are re-weighted to adjust for attrition using estimates of the probability of response from a logistic regression models that includes as predictors both the explanatory variables from the main model and other variables such as sampling cluster (Rao et al. 2005).

For the purposes of this paper, we describe as an adult anyone aged between 20 years and pensionable age, which in South Africa is age 60 for women and age 65 for men. Although the age of majority is 18 in South Africa, many people aged 18 and 19 are still enrolled in secondary school and few of them have paid employment. We describe adults aged 20 to 44 as young adults and those aged between 45 and pensionable age as middle-aged.

Results

Table 1 presents some basic descriptive information on the KIDS households. The proportion of households in which an adult died doubled from 16 per cent to 32 per cent between 1993 to 1998 and 1998 to 2004 although the interval between the two later waves of fieldwork was only about 35 per cent longer than the interval between the first two waves. The proportional rise in the number of young adults dying has been much larger than that in deaths of the middle-aged.

The reported median monthly expenditure of the households was only slightly above the poverty line of R322 per person per month in 1993 and dropped below the poverty line by 1998. Median household expenditure then grew quite rapidly during the period 1998-2004. The median per capita expenditure of households in which an adult died was about 90 per cent of that in households where nobody died in 1993 to 1998, but only about two-thirds of the median expenditure of households where nobody died in 1998 to 2004. The value of the net savings and property of households in which adults died was about a third greater than that in households where no adults died in 1993 to 1998, but about 5

Table 1: Characteristics of households that did and did not experience adult deaths and of the adult deaths by wave of the study, KwaZulu-Natal Income Dynamics Study, 1993-2004

	1993-1998			1998-2004		
	No adult deaths	1+ adult deaths	Total	No adult deaths	1+ adult deaths	Total
Initial median monthly expenditure per head (2000 rand)	351	315	349	318	216	275
Annual growth rate of pce	-2.5%	-0.9%	-2.3%	4.9%	5.8%	5.2%
Initial median household wealth (2000 rand)	20800	27700	21600	44100	41800	43900
Annual growth rate of wealth	8.8%	3.1%	8.0%	-2.9%	-10.7%	-5.5%
Initial mean household size	6.2	7.6	6.4	6.4	9.4	7.4
Change in household size excluding deaths	-0.05	0.31	0.00	-0.74	-1.86	-1.11
Initial % of residents aged 20 to 59/64	44%	43%	44%	45%	44%	44%
Mean years of schooling of adult residents	7.1	7.0	7.0	8.7	8.0	8.5
Age of household head in 1993	51	55	51	54	57	55
% female of 1993 heads	31%	37%	32%	33%	45%	37%
% of households fostering children out	29%	34%	30%	21%	31%	24%
Number of deaths at ages 20-44		109			367	
Number of deaths at ages 45 to 59/64		67			130	
% adult deaths of women		44%			53%	
Mean years since most recent adult death		2.0			2.0	
Number of households	1011	160	1171	800	384	1184

per cent lower in 1998 to 2004. Moreover, adults in households in which an adult died were less well educated than adults in other households in the second interval between waves of fieldwork but not the earlier interval. Taken together, these indicators suggest, that as adult deaths became more common, they also became increasingly concentrated in relatively low socio-economic status households. Households experiencing adult deaths were less able to accumulate wealth than those with no adult deaths in both periods, but the rate of growth in households' expenditure was not associated strongly with whether any of their adult members died in either of them.

As one might expect, adult deaths are more likely to occur in large households and households with elderly heads. The association between the gender of the household head and adult death operates mainly via age. However, households in which adult deaths occurred contain on average the same proportion of adults as other households. As the mortality of adults have risen, women have come to make up a larger proportion of those dying. The death of adults is associated with other changes in household composition. Between 1993 and 1998 households in which an adult died fell in size by

Table 2: Odds of one or more adult deaths occurring in the household, KwaZulu-Natal Income Dynamics Study, 1993-2004

	Odds ratio	Lower CI	Upper CI
Initial household size	1.09	1.06	1.13
% of residents aged 20 to retirement age	2.67	1.42	5.03
Initial age of 1993 household head	1.01	1.00	1.02
1998-2004 v 1993-1998	1.99	1.53	2.59
Initial log per capita expenditure (2000 rand)	0.71	0.57	0.89
Initial log household wealth (2000 rand)	1.27	1.09	1.48
Urban v rural resident	1.19	0.84	1.69
Metropolitan v rural resident	1.43	1.00	2.05
Indian v African	0.25	0.14	0.44

less than the number of deaths. However, between 1998 and 2004 both groups of households tended to become smaller, with those households in which an adult died losing nearly two further members on average.

Table 2 presents univariate differentials in the odds that a household experiences an adult death according to a series of characteristics. Unsurprisingly adult death is more common in large households, in households that contain a high proportion of adults, and in households with an older head. The odds of a household experiencing an adult death doubled between 1998 to 2004 and 1993 to 1998. Households' expenditure and wealth tend to cancel out, with a doubling of households' monthly expenditure per head being associated with about a 12 per cent drop in its chances of experiencing an adult death but a doubling of the value of its savings and property being associated with about a 19 per cent rise in its odds of experiencing an adult death. Households residing in metropolitan Durban and Pietermaritzburg in 1993 are more likely to have had an adult member die than households first interviewed somewhere else in KwaZulu-Natal. Households with an Indian head are about a fifth as likely to have experienced an adult death as households with an African head.

The first model in Table 3 presents estimates of the impact of adult deaths on the rate of growth in households' per capita expenditure controlling for time period, the size and composition of the household, its initial net wealth and fixed characteristics, adverse shocks other than death, and the time since the most recent adult death. Trends in expenditure are more favourable in the later period and in households that contain a high

Table 3: Determinants of the annual growth rate in log per capita expenditure, KwaZulu-Natal Income Dynamics Study, 1993-2004

	Model 1			Model 2		
	Coeff.	Lwr CI	Upr CI	Coeff.	Lwr CI	Upr CI
Intercept	1.8087	1.5249	2.0924	1.7734	1.5425	2.0044
Any adult deaths	-0.1694	-0.2866	-0.0521	-0.1810	-0.2881	-0.0739
1+ young adult deaths, 1993-1998	-0.2689	-0.5407	0.0029	-0.0815	-0.3792	0.2162
1+ young adult deaths, 1998-2004	0.2856	0.1415	0.4298	0.2605	0.1447	0.3762
Initial log per capita expenditure (2000 rand)	-0.3633	-0.4681	-0.2585	-0.3677	-0.4515	-0.2839
Young adult deaths 1993-98 * log expenditure	0.0464	-0.0013	0.0941	0.0158	-0.0377	0.0694
Young adult deaths 1998-04 * log expenditure	-0.0544	-0.0806	-0.0282	-0.0522	-0.0727	-0.0318
Initial log per capita expenditure^2	0.0080	-0.0017	0.0176	0.0092	0.0015	0.0169
Initial log household assets (2000 rand)	0.0223	0.0074	0.0372	0.0293	0.0176	0.0411
Adult death * log initial assets (2000 rand)	0.0200	0.0090	0.0310	0.0204	0.0114	0.0294
Initial log household wealth^2	-0.0018	-0.0028	-0.0008	-0.0022	-0.0030	-0.0013
Initial log household debts (2000 rand)	-0.0017	-0.0035	0.0001	-0.0021	-0.0035	-0.0007
Years since most recent death	-0.0370	-0.0630	-0.0110	-0.0338	-0.0569	-0.0107
Years since most recent death^2	0.0059	0.0009	0.0108	0.0055	0.0014	0.0095
1998-2004 v 1993-1998	0.0380	0.0235	0.0525	0.0213	0.0069	0.0357
Mean years of schooling of adult residents	-0.0016	-0.0052	0.0019	-0.0017	-0.0050	0.0015
Initial household size	-0.0007	-0.0032	0.0019	-0.0054	-0.0079	-0.0029
% of residents aged 20 to retirement age	0.0493	0.0101	0.0885	0.0589	0.0172	0.1006
Any serious ill-health	-0.0076	-0.0220	0.0067	-0.0005	-0.0133	0.0123
Any losses of regular jobs	-0.0043	-0.0152	0.0067	-0.0031	-0.0143	0.0080
Any loss or decrease of remittances	0.0260	-0.0199	0.0719	0.0233	-0.0187	0.0653
Any loss of a grant	-0.0274	-0.0655	0.0107	-0.0214	-0.0558	0.0129
Any member abandoned or divorced	-0.0073	-0.0441	0.0294	-0.0025	-0.0431	0.0381
Any thefts, fires or destruction of property	0.0176	0.0040	0.0311	0.0161	0.0028	0.0294
Any major loss of crops	-0.0244	-0.0441	-0.0046	-0.0119	-0.0308	0.0070
Any major loss of livestock	0.0068	-0.0164	0.0299	0.0091	-0.0133	0.0315
Any business failure or bankruptcy	0.0128	-0.0231	0.0487	0.0199	-0.0173	0.0571
Any other bad shit	0.0018	-0.0391	0.0427	0.0220	-0.0112	0.0551
Any split				0.0301	0.0164	0.0438
Any move between communities				0.1725	0.0871	0.2579
Any move * log p. c. expenditure				-0.0214	-0.0365	-0.0064
Any adult man joined				0.0052	-0.0094	0.0198
Any adult man left				0.0166	0.0031	0.0300
Any adult woman joined				-0.0149	-0.0279	-0.0019
Any adult woman left				0.0015	-0.0095	0.0125
Any births				-0.0400	-0.0527	-0.0273
Any child joined				-0.0004	-0.0145	0.0138
Any child left				0.0212	0.0073	0.0351
Any resident child died				0.0583	0.0183	0.0983
Anyone of pensionable age joined				-0.0329	-0.0545	-0.0114
Anyone of pensionable age left				-0.0003	-0.0274	0.0267
Any resident of pensionable age died				0.0062	-0.0153	0.0277
Household provides remittances				0.0782	0.0589	0.0975
Adult death* Household provides remittances				0.0350	-0.0019	0.0719
Household receives remittances				-0.0025	-0.0164	0.0115

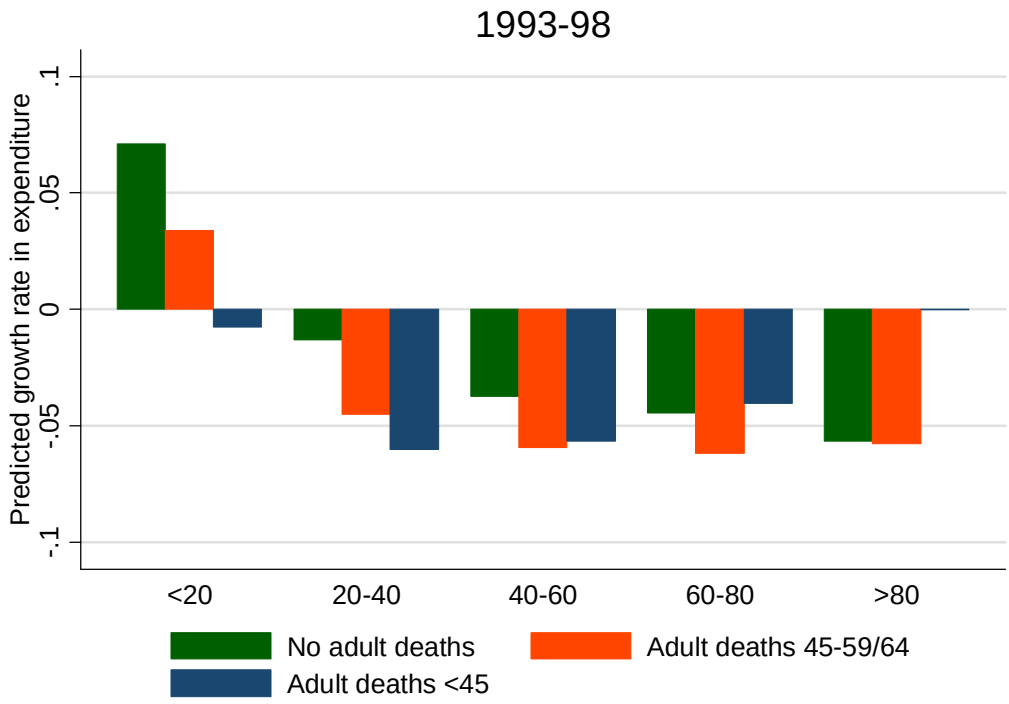

Figure 1: Impact of adult deaths between the 1993 and 1998 waves on the rate of change in *per capita* household expenditure by quintile of per *capita* household expenditure in 1993, KwaZulu-Natal Income Dynamics Study

proportion of adults. They are not affected significantly by initial household size or by the average number of years that its adult members spent in school. The quadratic term for years since death suggests that the impact of an adult death continues to rise for about three years after the death but that households make up the deficit by about six years after the death (although very few deaths in our study occurred more than five years before the following round of fieldwork).

The impact of adult deaths on trends in household expenditure are conditional on both the age of the adult who dies and the initial standard of living of the household. Figures 1 and 2 present fitted estimates of the rate of growth of households' expenditure for five quintiles of initial household expenditure based on the first regression model in Table 3. Even after allowing for households' fixed characteristics which exacerbate existing income differentials, the data exhibit a strong pattern of regression to the mean in both 1993-98 and 1998-2004, suggesting that poverty in South Africa has a substantial transitory component. Between 1993 and 1998 the reduction in household expenditure in households that experienced an adult death, compared with households that did not, was

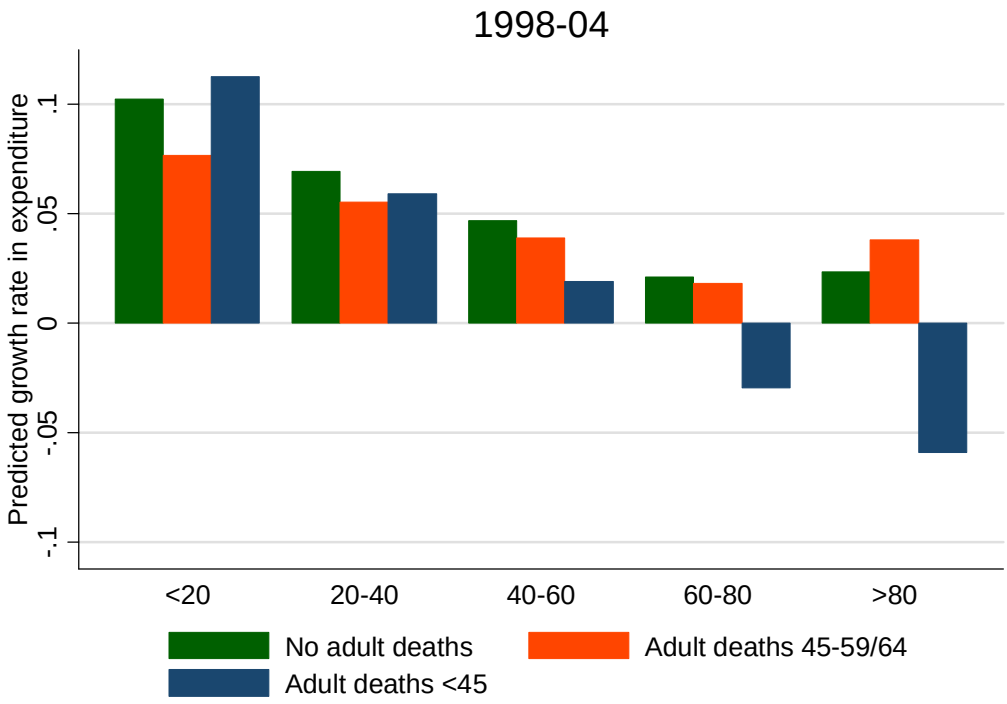

Figure 2: Impact of adult deaths between the 1998 and 2004 waves on the rate of change in per capita household expenditure by quintile of per capita household expenditure in 1998, KwaZulu-Natal Income Dynamics Study

largest in poor households (see Figure 1). The impact of the death of a young adult may have been more severe than that of a middle-aged adult for households in the lower half of the expenditure distribution but less severe (and even actually beneficial) for households in the top half of the expenditure distribution although these differences are not statistically significant. Between 1998 and 2004 the impact of middle-aged deaths on the growth in household expenditure, relative to its growth in households where no adult died, resembled that in the earlier period but was slightly more muted. However, as the mortality of young adults rose, their deaths ceased to have a substantial impact on expenditure in poor households and instead had severe implications for the growth rate in expenditure in non-poor households (see Figure 2).

The second model presented in Table 3 examines to what extent other demographic changes moderate the impact of adult deaths on households' standard of living. Many of the demographic changes considered are associated with the economic fortunes of the household, including household fission, migration of the household, and moves in and out of individuals in particular age-sex groups. The birth of children has an adverse

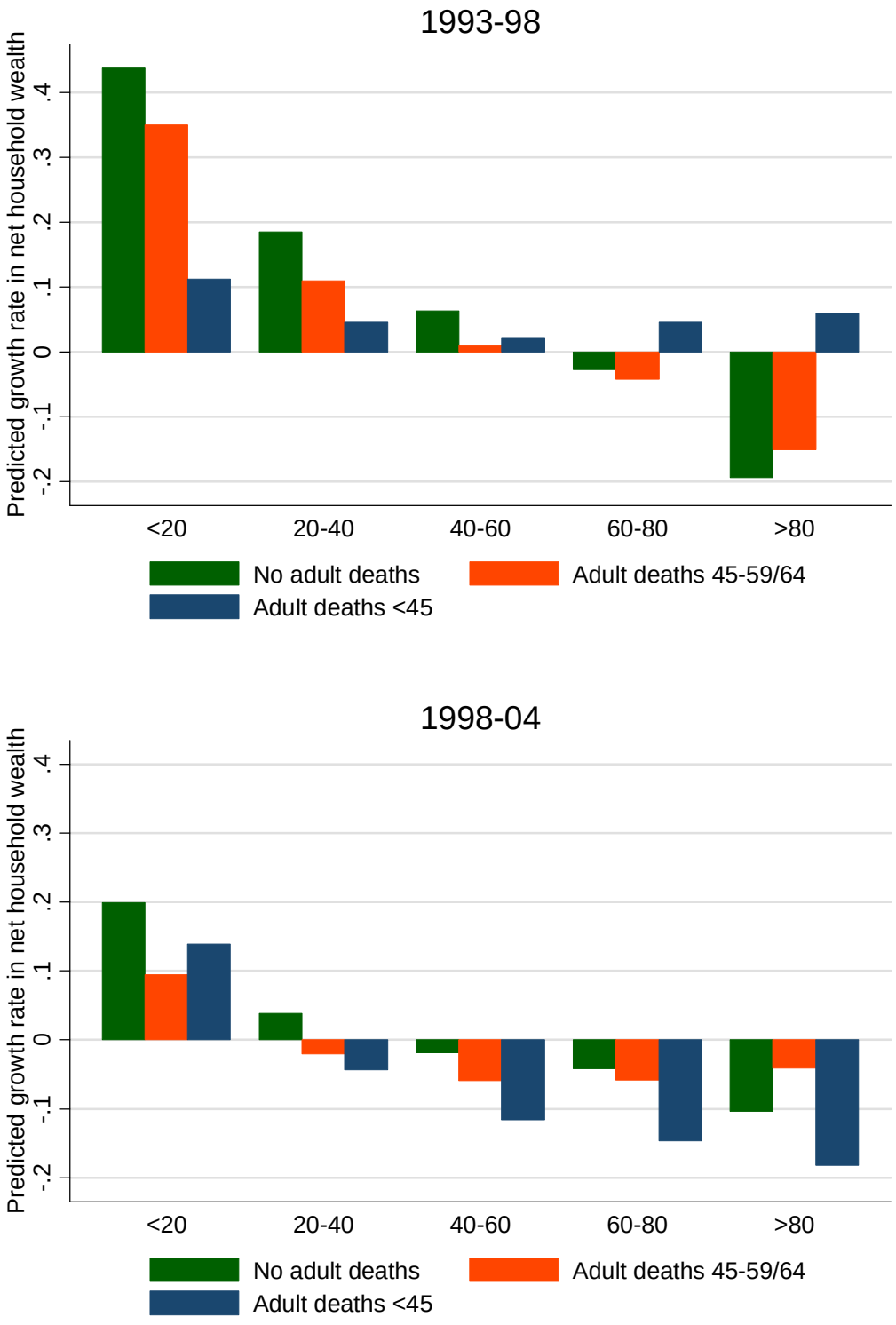

Figure 3: Impact of adult deaths between successive waves on wealth accumulation by initial quintile of net household wealth, KwaZulu-Natal Income Dynamics Study, 1993-1998 and 1998-2004

impact on household expenditure per head, while the death or fostering out of children is associated with more favourable trends in household expenditure. Introducing these demographic controls has very little impact on the coefficients relating to adult deaths, young adult deaths in 1998-2004, and initial household expenditure. Thus, these results indicate that changes in the demographic composition of households due to fertility and mobility, as well as mortality, have important consequences for households' socioeconomic status. They provide no evidence to support the idea that households in KwaZulu-Natal successfully manipulate their membership as a coping strategy to offset the impact of adult deaths.

Using a similar model, we also examine how adult deaths affect the value of households' assets and debts. The results are broadly supportive of those based on trends in expenditure (see Figure 3). In 1993-98 adult deaths affected asset poor households more severely than wealthier households. Young adult deaths, in particular, had a severe impact on asset accumulation in the poorest households but were associated with further increases in wealth when they occurred in the 20 per cent of households in the panel that were relatively well-off. The impact of middle-aged deaths on trends in wealth in 1998 to 2004 was similar to the earlier period. Deaths of young adults in this period, which were far more common than in the earlier period, had a negative impact on asset accumulation at all levels of initial wealth. They led to absolute dis-saving in all but the poorest households, with the asset losses that resulted from them being substantially greater in better-off households than poor ones.

Discussion

Assessment of the socioeconomic consequences of AIDS and other adult deaths for households is methodologically challenging (Beegle and de Weerdt, 2008). One short-coming of many studies of this question is that they lack comprehensive socioeconomic data. Other studies rely upon cross-sectional data and provide information on respondents' retrospective perceptions of how they have been affected by the loss of members of their household rather than on actual events. Even when panel data are available, their value may be limited by their recruitment strategies, including the selection of the comparison group, by the outcome variables that are available, by the limited time for which the panel has been followed up, and by attrition. Developing an adequate analytical strategy for assessing the impact of deaths is also problematic, particularly in terms of accounting of both observable and unobservable household

characteristics. Although no observational study can hope to resolve all of these issues entirely, KIDS is one of the more powerful datasets currently available with which to address the question.

The results presented in this paper demonstrate that asset poverty and income poverty are related to adult deaths in complex and differing ways. Studies that use asset indices as their indicator of socioeconomic status are unlikely to be a good guide as to how adult deaths affect income poverty. Our results also show that, not only do the households in which adult deaths occur differ in their socioeconomic characteristics from households which do not experience deaths, but that the impact of an adult death is conditional on those initial socioeconomic characteristics. Thus, one is unlikely to be able to infer anything about the impact of AIDS deaths from cross-sectional data. In addition, if we refit the model in Table 3 using straightforward multiple regression rather than fitting a fixed-effects model to control out the persistent characteristics of households, the results suggest that adult deaths have no significant impact on the growth rate in household expenditure in this population. Households in which adults die differ from households in which they do not in important ways that are not captured by conventional indicators of a poverty and financial and human capital. Thus, even longitudinal studies that have collected just two waves of data are at risk of reaching misleading conclusions about the economic impact of adult deaths.

The results presented here are rather robust to the other changes in the specification of the regression model that we have investigated. We reach very similar conclusions whether or not the data are re-weighted to adjust for attrition and whether we model growth in expenditure per person or a measure of adult-equivalent expenditure, adjusted to allow for differences in the size and age structure of households. Modelling the ratio of expenditure per person in successive waves or the percentage increase in expenditure per person between successive waves also leads to similar conclusions to modelling the annual growth rate in expenditure per person.

The main cost involved in any premature death is the loss of life that directly results. However, if a death cannot be prevented, it becomes important to understand its consequences for surviving members of the household. This analysis demonstrates that the economic implications of adult deaths vary according to the characteristics both of the person who dies and of their household. Deaths in very poor households have different implications from those in less poor households and deaths of middle-aged adults have

different implications from those of young adults. Moreover, the finding that the impact on households of the death of young adults changed radically between the mid-1990s and the years around 2000 as mortality in this age range rose, suggests that AIDS and other causes of death have different consequences. This could be either because AIDS deaths are typically preceded by much longer periods of ill-health than other deaths of young adults, for example from injuries, or because young people who die from AIDS have markedly different characteristics from those who die of other causes.

Additionally, it seems unlikely that the findings of research in any one African country will be applicable to the whole of the region. Agriculture plays a minor role in the livelihoods of most poor households in South Africa and the government's system of mean-tested welfare grants aims to protect those who are too old, young, or sick to work from destitution. In this context, adult deaths do not seem to be catastrophic for poor households. As AIDS has driven up the mortality of young adults, their deaths have come to hit non-poor households more severely. Thus, in South Africa the benefits of the economic expansion of the last decade have gone largely to those relatively well-off households in which no young adults died.

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