



## SHOCKS AND THEIR CONSEQUENCES ACROSS AND WITHIN HOUSEHOLDS IN RURAL ZIMBABWE

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### Rational but harmful

IN MANY DEVELOPING COUNTRIES, a household's assets often perform more than one function. For example, assets such as livestock can be both a store of wealth and the means by which income is generated. Given these roles, selling assets in immediate response to a shock risks permanently lowering future consumption. Consequently, households may choose to "smooth assets" rather than "smooth consumption"—that is, they may choose to retain their livestock assets even though that could mean the family will suffer through a phase of hunger. Both an older, qualitative literature on drought shocks and more recent econometric work find that many households do not draw down assets such as livestock even during disasters such as droughts.

There are, however, a number of limitations with this extant literature. First, it almost always takes the household as the unit of analysis and therefore does not address the importance of intrahousehold allocation. Variations in consumption may not be distributed equitably across household members, which has health and nutritional implications. Second, if there are links between nutrition and productivity (and a growing body of literature suggests that such links exist) then the distinction between "asset" and "consumption" smoothing is overstated. Instead, the true distinction is in household choices regarding which type of capital—physical, financial, social, or human—should be drawn down given an income shock. For example, if it is possible to draw down the health stocks of all or some members of the household without falling below a level of health stock

from which it is impossible to recover, then this may be a rational strategy to follow.

This brief seeks to link the extent to which households smooth consumption or smooth assets, the empirical evidence on the churning of households in and out of poverty, and the possibility that temporary shocks can have permanent consequences.

The research disaggregates the impact of shocks by levels of asset holdings and disaggregates the impact on individual welfare. In this way, we assess the validity of distinguishing between asset and consumption smoothing and provide insights into whether poverty dynamics assessed at the household level provide an adequate picture of the dynamics at the individual level.

#### The Data

**Dates:** 1994-99

**Sites:** Resettlement schemes, Zimbabwe

**Method:** Annual surveys of 400 households, including data on body mass and growth rates.

### Unique data

Our analysis draws on a unique data set from rural Zimbabwe (collected by Dr. Bill Kinsey), where an initial survey of approximately 400 resettled households was undertaken during 1983 and 1984. The households all were in resettlement schemes established in Zimbabwe's three agriculturally most important agro-climatic zones,

corresponding to areas of moderately high, moderate, and restricted agricultural potential. Households were re-interviewed in 1987 and then interviewed annually from 1992 to 1999.

These resettled households were not given ownership of the land on which they were settled but instead were given permits covering residential and farm plots. Each household was allocated 5 hectares of arable land for cultivation, with the remaining area in each resettlement site being devoted to communal grazing land. The Zimbabwean government expected male heads of households to rely exclusively on farming for their livelihoods. Until 1992, male household heads were not

The sample had a number of desirable properties. Approximately 90% of households interviewed in 1983/84 were re-interviewed in 1999. Relocation to the area preceded, by a significant period of time, the drought that occurred in 1994/95. The repeated observations make it possible to control for any correlation between explanatory variables and fixed, unobserved characteristics. Because the survey was conducted at almost exactly the same time each year, seasonal considerations are minimized. The fact that there was little pre-existing non-agricultural activity in the area meant that few households mitigated the drought shock through non-farm income. Because there was little migration from the area, HIV infection seems to play a much smaller part in explaining trends in adult health than might be the case in other parts of sub-Saharan Africa. Furthermore, individual level data are available on anthropometric outcomes, body mass for adults and growth rates for children under six years of age.

As in many other rural areas in developing countries, livestock represent the preferred means of accumulating wealth. Two oxen are needed for ploughing and farmers state that in order to maintain herd size, they need a minimum of two cows or heifers. Consequently, our observations provide a good window into the extent to which there is asset smoothing while the minimum of oxen and cows/heifers needed establishes the threshold.

While these surveys were underway, Zimbabwe experienced a drought in 1994/95, with rainfall levels 20-40% lower than long-term averages. This drought led to marked reductions in both crop and total household incomes (see table). The longitudinal nature of the data, the presence of the drought midway through the data collection, and the existence of household and individual level data allow us to address issues not only of poverty dynamics within households, but also the effect poverty dynamics have on the welfare of individual members.

<b>Trends in rainfall and income by agricultural year</b>						
	<b>% of long-term mean rainfall by agricultural year</b>					
<b>Resettlement scheme</b>	<b>92/93</b>	<b>93/94</b>	<b>94/95</b>	<b>95/96</b>	<b>96/97</b>	<b>97/98</b>
Mupfurdzi	117.5	91.2	68.2	101.7	166.4	93.2
Mutanda	106.6	121.4	61.5	118	156.8	113.5
Sengezi	103.5	90.5	80.3	115.1	148.9	94.1
<b>Incomes by crop year</b>						
<b>Gross crop income</b>	5815	4857	1817	6055	Not available	Not available
<b>Total income</b>	6982	6296	4051	8146	Not available	Not available

Note: Income figures are expressed in constant (1992) Zimbabwe dollars.

permitted to work elsewhere, nor could they migrate to cities. Although this restriction has been relaxed, with male heads in some cases being allowed to work off farm, agriculture continues to account for at least 80% of household income in non-drought years.

Villages in the resettlement schemes are small and surrounded by cultivated fields, which has precluded the development of small markets. A striking visual feature is the absence of shops or trading areas. Instead, each scheme has a centrally located “rural service center” where government offices, a health clinic and shops are found. Cattle sales also are held here.

## **Shocks and asset sales**

As mentioned, the third year of our data period (1994/95) was a major drought year, which was followed by a recovery year. With harvesting typically occurring in May and June, the survey took place each year in February and March, a time deliberately chosen so as to interview households at the height of the “hungry season.” Gross crop incomes fell as a consequence of the drought and other income sources only modestly offset this drop.

The drought was associated with a rise in sales of livestock. The percentage of households reporting oxen sales jumped from 15.3 in 1995, to 36.3 in 1996, before

falling to 18.7 in 1997. (Because of the timing of the harvest and interviews, 1996 reflects the adverse consequences of the drought and is considered the “drought year” in the data.) Another way of expressing the findings is in terms of the ratio of sales to prior levels of oxen ownership. Between 1995 and 1996, this ratio more than doubled—from 0.06 to 0.16—before dropping back to 0.097 in 1997.

The research found that sales were strongly affected by pre-drought asset levels. We distinguished between households owning no livestock, households holding one or two animals, and households owning more than two. More than half the households (52.8%) owning more than two oxen sold at least one in the aftermath of drought, compared to 15% of households owning only one or two oxen. The tendency was the same whether a family owned oxen or cows, though the scale was different: over a quarter of households (27%) owning two or more cows made at least one sale compared to 4.6% of households owning one or two cows.

In 1996, 46.9% of all respondents indicated that they sold oxen in order to purchase food, while 50.6% sold cows in order to buy food. This is in stark contrast to non-drought years when other reasons, such as the need to generate cash to pay school fees or purchase agricultural inputs, are considerably more prevalent for selling assets.

These descriptive results are consistent with the argument that assets are used to buffer consumption following a drought shock but that the threat of poverty traps means that only the better-off households are likely to use such a mechanism. Our econometric analysis showed that households with prior ownership of more than two animals were considerably more likely to sell in the aftermath of a negative rainfall shock than households with only one or two animals. Better-off households do indeed draw down assets following an income shock, but the threat of a poverty trap means that less well off households do not do so.

### Whose consumption is being smoothed?

Using anthropometric data on adults and children under six for the same study period of 1994-99, we examined the effects of the shock on the welfare of individuals within the household. An adult individual’s body mass index (BMI) is defined as weight (in kilograms) divided

by the square of height (in meters). Measured yearly, variations in an individual adult’s body mass reflect variations in weight brought about by changes in energy intake, activities and, therefore, energy expenditures or illness.

**Men and women.** The drought appears to have had no effect on men’s BMI, while women appear to have been adversely affected, with their BMI falling, on average, by 3.1% in one year (see table). Yet women also appear to recover quickly. In households that sold livestock, the fall of women’s BMI was smaller *and* their BMI recovered quickly the following year.

Changes in livestock, when treated as endogenous, raise the BMI of women but not of men. This deserves

Adult body mass and drought shocks						
	Year observed					
	1994	1995	1996	1997	1998	1999
<b>Mean body mass index, men</b>	21.7 (99)	21.4 (158)	21.4 (188)	21.5 (222)	21.5 (229)	21.0 (208)
<b>% change from previous year, men</b>		-1.38	0	0.47	0	-2.33
<b>Mean body mass index, women</b>	22.2 (242)	22.2 (281)	21.5 (288)	22.1 (323)	22.1 (341)	21.8 (328)
<b>% change from previous year, women</b>		0	-3.15	2.79	0	-1.36
<b>Agricultural year</b>	<b>92/93</b>	<b>93/94</b>	<b>94/95</b>	<b>95/96</b>	<b>96/97</b>	<b>97/98</b>

further comment in light of recent findings that in the very different environment of semi-arid West Africa, livestock transactions do not appear to play a major role in household consumption smoothing. We hypothesize that livestock holdings are working through two channels. First, this may capture a wealth effect—livestock are a relatively liquid store of wealth whose real value has been maintained in the Zimbabwean context of persistent inflation. Second, livestock, especially oxen, can substitute for a wide variety of labor tasks. Although ox-plowing rather than manual hoeing comes most readily to mind, oxen can also be used to pull carts that carry firewood and water, an activity regarded as a woman’s responsibility in the survey area. Not only does animal haulage reduce human energy expenditures, it also allows greater



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quantities of wood and water to be collected during a single trip.

**Children.** The drought did not have a statistically significant effect on the growth rates of older pre-schoolers, yet it did lower annual growth rates of children aged 12-24 months. Four years after the drought, that latter group remained shorter than children who had not experienced a drought when they were 12-24 months of age. The impact is greatest among children living in households with livestock holdings below the median in 1995—and 78% of households with two or fewer oxen had livestock holdings below the median. These households were *not* selling livestock in the aftermath of the 1994/95 drought even though they had assets that they could have sold. Children younger than two lost 15-20% of their growth velocity, and those residing in poor households, including households that did not sell assets, are likely to have suffered a permanent loss in stature, schooling and earnings.

Other research has shown that children who were adversely affected by the 1982-84 drought in Zimbabwe had permanent reductions in attained height in young adulthood and poorer educational attainments. The same long-term costs can be expected of the children affected by the 1994/95 drought in terms of lowered stature and poorer educational attainments. These factors can, in turn, carry costs in terms of foregone earnings.

### Poverty and household dynamics

The findings speak to many current issues in the study of poverty dynamics. Drought shocks do cause *some* households to draw down assets, yet different households may indeed respond differently to income shocks depending on the level of their asset holdings. The term “consumption smoothing” seems too broad as it implies that all household members’ consumption may, or may not, be smoothed after a shock. The term also implies an attempt to preserve assets, but consumption is an input into the formation and maintenance of human capital. The

preservation of physical assets by these Zimbabwean households led to a temporary reduction in women’s health and a (likely) permanent reduction in the human capital of children unlucky enough to be caught in the aftermath of the 1994/95 drought.

The analysis reveals that households with higher levels of asset holdings may choose to cope with a shock by selling some assets in order to buy food. This decision does not necessarily carry with it a cost to the family’s future earnings or consumption. Nor does it necessarily preclude the household’s ability to recover these assets at a later time. Meanwhile, the poorest families face a starker decision, with potentially more drastic consequences both in the immediate and long term. Without a “surplus” of livestock to sell, these families generally seem willing to hang onto their livestock even though this means they must endure short-term hunger. As our analysis shows, however, such a strategy may also quite likely carry with it a long-term harmful effect for the most vulnerable members of the family, the youngest children.



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