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# CONSUMPTION, VULNERABILITY AND SHOCKS IN RURAL ETHIOPIA, 1999-2004

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## *Abstract*

*Improving our understanding of risk and vulnerability is an issue of increasing importance for Ethiopia as it is for much of Africa. A small, but growing, body of evidence, points to the role that risk, shocks and vulnerability in perpetuating poverty. Specifically, uninsured shocks – adverse events that are costly to individuals and households in terms of lost income, reduced consumption, or the sale of destruction of assets – are a cause of poverty. Further, the threat of such events may cause households and individuals to take actions that, while providing some additional protection against shocks, come at the cost of income gains.*

*The paper examines who is vulnerable to different types of shocks in rural Ethiopia. Using the two most recent rounds of the Ethiopian Rural Household Survey, it will characterize the nature, frequency, and severity of climatic, economic, health and other shocks faced by rural Ethiopian households. It will assess the impact of these on levels and changes in measures of household well-being such as food consumption, total consumption, asset holdings and poverty status between 1999 and 2004. To do so, it will draw on conditional convergence models of growth, but applied here at a micro level. The modeling framework will take changes in these outcomes as a function of the lagged outcome and other covariates, a model of conditional convergence. In such models, endogeneity of these lagged outcomes is a real concern. Our data from earlier rounds of the ERHS as well as shocks information on the period prior to 1999 will provide us with instruments and we will test for the validity of these used standard techniques. Further, the paper will explore the differential effects of these initial conditions and shocks by sub-groups based on location, demographic, and wealth characteristics. Doing so will indicate whether the speed of convergence is effected by transitory shocks and will illustrate what types of households are most vulnerable to different types of shocks.*

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## 1. Introduction

Improving our understanding of risk and vulnerability is an issue of increasing importance for Ethiopia as it is for much of Africa. A small, but growing, body of evidence, points to the role that risk, shocks and vulnerability in perpetuating poverty. Specifically, uninsured shocks – adverse events that are costly to individuals and households in terms of lost income, reduced consumption, or the sale or destruction of assets – are a cause of poverty. Dercon (2004) demonstrates that rainfall shocks have persistent impacts on growth; further, he shows that covariates capturing the severity of the 1984-85 famine are causally related to slower growth in household consumption in the 1990s. Hoddinott and Kinsey (2001) and Alderman, Hoddinott and Kinsey (2004) show that rainfall shocks are causally related to reduced human capital formation and that the magnitudes of these effects are meaningful. For example, Alderman, Hoddinott and Kinsey (2004) estimate that children affected by the civil war and drought shocks of the late 1970s and early 1980s in rural Zimbabwe suffered a loss of about 14 per cent of lifetime income.

Further, the threat of such events may cause households and individuals to take actions that, while providing some additional protection against shocks, come at the cost of income gains. In India, Morduch (1990) shows that asset-poor households devote a larger share of land to safer traditional varieties of rice and castor and than to riskier, high-value activities. Dercon (1996) finds that Tanzanian households with limited liquid assets grow proportionately more sweet potatoes, a low-return low-risk crop. A household with average livestock holdings devotes 20 per cent less of its land to sweet potatoes than a household with no liquid assets. The crop portfolio of the richest quintile yields 25 per cent more per adult than that of the poorest quintile. Dercon (2002) summarizes other studies which also point toward the conclusion that household choices that limit exposure to risk come at the cost of significantly lower incomes. But while shocks are perceived to be pervasive in much of Africa, there is surprisingly little quantitative data on their incidence, severity and consequences.<sup>4</sup>

This paper examines who is vulnerable to different types of shocks in rural Ethiopia. Using the two most recent rounds of the Ethiopian Rural Household Survey, it will characterize the nature, frequency, and severity of climatic, economic, health and other shocks faced by rural Ethiopian households. It examines how shocks affect

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<sup>4</sup> World Bank (2004) provides evidence on the impact of various shocks, most notably rainfall and illness on consumption, using cross-sectional data from 1995 and 2000. Dercon (2004), Dercon and Krishnan (2000a, 2000b), Skoufias and Quisumbing (2003) and IDS/SC-UK (2002) also discuss the impact of shocks on household welfare and Yamano, Alderman and Christiaensen (2003) examine the impact of rainfall shocks on child health.

households, assess what shocks have been most important to different groups in Ethiopia and will explore who was worst affected. In addition, it will assess the impact of these on levels and changes in measures of household well-being between 1999 and 2004.

## 2. Data

Ethiopia is a federal country divided into 11 regions. Each region is sub-divided into zones and zones into woredas which are roughly equivalent to an US or UK county. Woredas, in turn, are divided into Peasant Associations (PA) or Kebeles, an administrative unit consisting of a number of villages. Peasant Associations were set up in the aftermath of the 1974 revolution. Our data are taken from the Ethiopia Rural Household Survey (ERHS), a unique longitudinal household data. Data collection started in 1989, when a survey team visited 6 Peasant Associations in Central and Southern Ethiopia. The survey was expanded in 1994 to encompass 15 Peasant Associations across four regions, yielding a sample of 1477 households. An additional round was conducted in late 1994, with further rounds in 1995, 1997, 1999 and 2004.

As part of the survey re-design and extension that took place in 1994, the sample was re-randomized by including an exact proportion of newly formed or arrived households in the sample, as well by replacing households lost to follow-up by those which were considered by village elders and officials as broadly similar to in demographic and wealth terms. The nine additional PAs were selected to better account for the diversity in the farming systems found in Ethiopia. The sampling in the PAs newly included in 1994 was based on a list of all households was constructed with the help of the local Peasant Association officials. The PA was responsible for the implementation of the land reform following the 1974 and held wide ranging powers as a local authority. All land is owned by the government. To obtain land, households have to register with the PA and lists of the households who have been allocated land are kept. For these reasons, these household lists were a good source of information for the construction of a sampling frame. To ensure that landless households were not excluded, the sample was stratified within each village to ensure a representative number of landless households to be included. Similarly, an exact proportion of female headed households were included via stratification.

Table 1 gives the details of the sampling frame and the actual proportions in the total sample and Table 2 provides some basic characteristics of these localities. Using Westphal (1976) and Getahun (1978) classifications, Table 1 also shows that population shares within the sample are broadly consistent with the population shares

in the three main sedentary farming systems – the plough based cereals farming systems of the Northern and Central Highlands, mixed plough/hoe cereals farming systems, and farming systems based around enset (a root crop also called false banana) that is grown in southern parts of the country. Note too that in 1994, the Central Statistical Office collected a data set as part of the Welfare Monitoring System. Many of the average outcome variables, in terms of health and nutrition were very similar to the results in the ERHS, suggesting that living conditions in our sample did not differ greatly from those found more generally throughout rural Ethiopia, see Collier et al. (1997).

For these reasons, it can be argued that the sampling frame to select the villages was strictly stratified in the main agro-ecological zones and sub-zones, with one to three villages selected per strata. Further, sample sizes in each village were chosen so as to approximate a self-weighting sample, when considered in terms of farming system: each person (approximately) represents the same number of persons found in the main farming systems as of 1994. However, results should not be taken as being nationally representative. The sample does not include pastoral households or urban areas.<sup>5</sup> Also, the practical aspects associated with running a longitudinal household survey when the sampled localities are as much as 1000km apart in a country where top speeds on the best roads rarely exceed 50km/hour constrained sampling to only 15 communities in a country of thousands of villages. So while these data can be considered broadly representative of households in non-pastoralist farming systems as of 1994, extrapolation from these results should be done with care.

### 3. Shocks in rural Ethiopia: a description

In this section, we present data on the distribution of shocks in our rural Ethiopian sample. Our objective is descriptive – we want to understand what shocks occurred, how widespread these were, who was affected by them and what were their consequences. Since this descriptive approach generates a large number of figures and tables, we focus on discerning broad patterns in these data.

We define shocks as adverse events that lead to a loss of household income, a reduction in consumption and/or a loss of productive assets. Data used in this section are based a household-level ‘shocks’ module developed in Hoddinott and Quisumbing (2003) that was field tested and refined to meet the specific circumstance of rural Ethiopian households. The module asks households to consider

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<sup>5</sup> Pastoral areas were excluded, in part, because of the practical difficulties in finding and re-surveying such highly mobile households over long periods of time.

a list of adverse events and indicate whether the household was adversely affected by them. For example, in the Ethiopian version, respondents are asked, "Has this household been affected by a serious shock – an event that led to a serious reduction in your asset holdings, caused your household income to fall substantially or resulted in a significant reduction in consumption?"

Shocks are divided into a number of broad categories: climatic; economic; political/social/legal; crime; and health. Climatic shocks include obvious examples such as drought and flooding, but also erosion, frosts and pestilence affecting crops or livestock. Economic shocks include problems in terms of access to inputs (both physical access and large increases in price), decreases in output prices, and difficulties in selling agricultural and non-agricultural products. Political/social/legal shocks include the confiscation of assets or arbitrary taxation by government authorities, social or political discrimination or exclusion and contract disputes. Crime shocks include the theft and/or destruction of crops, livestock, housing, tools or household durables as well as crimes against persons. Health shocks include both death and illness. In addition, we also consider miscellaneous shocks such as conflicts and disputes with other family members, neighbors or other village residents regarding access to land or other assets. For each shock, we obtain three items of information: when this shock occurred, whether it was confined to this household or whether it was more widespread, and what were the consequences in terms of income, assets and consumption.

Our description of shocks experienced by households in our Ethiopian sample begins with Figures 1 to 5. These enumerate the shocks that occurred between 1999 and 2004. Drought is the most common climatic shock with more than half the surveyed household reporting this as a shock. However, other climatic shocks are common too. For example, more than one household in three reported having been adversely affected by pests or diseases that affected crops in their field, stored crops or livestock. Input (output) shocks were also relatively common, with these also reported by more than (slightly less than) a third of surveyed households. By contrast, political/social/legal shocks were reported to be relatively uncommon in this sample over this period with no single shock being reported by more than 7 per cent of respondents. While crime shocks appear relatively uncommon, the information presented in Figure 4 is slightly misleading in the sense that while few households report any one incidence of crime, a larger proportion of households – just over 20 per cent – report being the victim of some sort of criminal activity. Death and illness are reported by a significant proportion of households; miscellaneous shocks such as disputes appear in this sample to be rare.

Table 3 indicates the extent to which the more commonly reported shocks are idiosyncratic (restricted to this household or this household and some others) or covariate (affecting all households in the village and possibly those nearby). Not surprisingly, drought, input and output shocks are reported to be covariate with 79, 68 and 83 per cent of affected households reporting that the spread of this shock included at least all households in the village. Theft or other crimes, death or illness are described in more than 90 per cent of cases as idiosyncratic with pests and diseases affecting crops or livestock appearing to be a mix of idiosyncratic and covariate shocks.

Table 4 reports the consequences of the most commonly reported shocks. These are divided into five categories: loss of household income; income loss and reduced consumption; loss of productive assets; a combination of asset, income and consumption loss and other (not specified) effects. In somewhat loose terms, Table 4 explores the extent to which certain types of shocks have different effects on households. The rows are ordered so that covariate shocks (drought, input and output shocks) appear first, followed by pests (a mix of idiosyncratic and covariate shocks) and idiosyncratic shocks (crime, death and illness).

While the survey module does not directly ask about the severity of impact, one could infer severity by comparing the percentages of reported impact on income and consumption with those shocks that lead to a loss of productive assets. In this regard, the striking feature of Table 4 is the absence of any obvious pattern of effect. Output shocks are somewhat less likely to lead to asset losses than other types of shocks; this may be due to the incidence of these shocks – see below. A death of a husband, wife or another person is also less likely to lead to asset losses. By contrast, drought, input shocks, pests and illnesses all are associated with loss of productive assets by at least 40 per cent of households reporting being affected by these shocks.

We now consider who is affected by these shocks. While such information by itself cannot be taken as an indicator of vulnerability (because it does not take into account the severity of shocks), it provides some valuable clues as to what types of households are most likely to be affected by different types of shocks.

Table 5 provides an overview of the incidence of shocks, disaggregating the sample by region, by demographic and wealth characteristics. These disaggregations are based on ‘pre-shock’ characteristics. That is to say, we disaggregate the sample by characteristics observed in the 1999 survey round and cross-tabulate these against shocks that occurred between 1999 and 2004 as reported by households in 2004.

Beginning with a regional disaggregation, there are striking differences in the incidence of various types of shocks. (Important caveat – the number of villages in these different categories is relatively small so these results should be treated with some caution.) While drought shocks are relatively common in all regions, there is considerable variation in other types of reported shocks. In particular, households in SNNPR are much more likely to report being adversely affected by pests, by input and output shocks and by illness shocks. Crime shocks are also reported more frequently by households in Oromiya and SNNPR.

In general, the incidence of these shocks does not differ markedly by characteristics such as sex of head (27 per cent of sampled households were female headed in 1999) with the exception of illness shocks which are much more commonly reported by male headed households. There are no marked differences when we disaggregate on the basis of other demographic characteristics (not shown here) such as age of head, household size or dependency ratios. Households headed by individuals who have any schooling (only 17 per cent of household heads have any schooling) were more likely to report being adversely affected by economic shocks affecting input and output markets as well as illness. While this may seem counter-intuitive, it may be that such households are more likely to experience such shocks because they are more likely to be engaged in market transactions. By contrast, there are some significant differences when we disaggregate by land quintiles.<sup>6</sup> Better-off households are more likely to be affected by pest, input and output shocks.

Table 6 considers the consequences of selected shocks by household characteristics. While there are a large number of data points reported here, summarizing them is made easier if we consider arrange the severity of the consequences of these shocks along a continuum, from most severe (shocks that affect a large proportion of the group under consideration and lead to more severe consequences such as asset loss of asset loss plus some other consequence) to least severe (shocks that affect relatively few households in the group under consideration and lead to, relatively speaking, more mild consequences) with shocks having severe impacts on a relatively small proportion of households and shocks affecting a broader swath of households but with milder consequences occupying the middle ground in this continuum. Using this continuum, we see the following:

- While more than half of our sampled households in Oromiya report being affected by drought, they are somewhat less likely than other households to report that this shock led to a loss of productive assets;

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<sup>6</sup> These land quintiles are based on a household's land holdings relative to other households in the same village.



- Pest shocks often lead to a loss of productive assets apart from our two Tigrayan villages where pest shocks are reported to be uncommon.
- Death and illness shocks are reported more frequently in SNNPR *and* they are reported to be more likely to lead to asset losses.
- Wealthier households, as measured by land holdings, are more likely to report being adversely affected by shocks but the impact of shocks on income, consumption, assets or combinations of these is more varied. While the rich are better able to weather drought and crime shocks, the impact of other shocks is less varied by wealth and for one shock, reductions in output prices, the richest quintile is most likely to report a loss of productive assets.
- There is no discernable pattern using demographic disaggregations such as sex or schooling of head, which are reported here, or age of head, or household size or dependency ratios, which for brevity are not reported here.

#### 4. Shocks in rural Ethiopia: An econometric assessment

While the discussion in section 3 provides a detailed overview of the types of shocks experienced by households in our sample, it does not give us a quantitative sense of the consequences of these shocks nor does it tell us anything about the persistence of their consequences. Also, there are limits to cross-sectional analysis – it is difficult to tell for example if conditional on location, wealth and other observable characteristics, female headed households are more adversely affected by droughts than male headed households. So in this section, we complement our descriptive analysis with an econometric assessment of the impact of these shocks on one measure of welfare, log per capita consumption.

Our baseline results are reported in Table 7. The dependent variable is the log of per capita consumption. This is constructed in the following fashion. Food and non-food consumption were covered in separate modules in the questionnaire. The section on food asked about 33 specified food items; for each, households were asked about the amounts they had consumed out of purchases, consumption out of own stock and consumption from gifts and wages in-kind in the last week. These consumption levels are valued using prices obtained from local market surveys fielded at the same time as the household survey. Non-food items are limited to non-investment goods so that we include consumables such as matches, batteries, soap, kerosene and the like, clothing and transport but exclude investments in durable goods such as housing.

Different recall periods were used for different items; for comparability all are changed into monthly (30 day) consumption and expressed in per capita terms.<sup>7</sup>

Log per capita consumption ( $\ln pcexp$ ) of household  $i$  in village  $v$  in 2004 is a function of two broad sets of household characteristics: household characteristics observed in 1999 ( $H_{iv, 1999}$ ) and shocks to households experienced between 1999 and 2004 ( $S_{iv, 2004}$ ). In addition, we include a vector that captures such potentially confounding factors such as the month in which the interview took place as well as respondents' subjective perceptions about rainfall in the harvest year just finished ( $X_{iv, 2004}$ ). Vectors of parameters to be estimated are  $\gamma$ ,  $\beta$ , and  $\kappa$ . Denoting  $\varepsilon_{iv, 2004}$  as the white noise disturbance term, we write this relationship as:

$$\ln pcexp_{iv, 2004} = \gamma \cdot H_{iv, 1999} + \beta \cdot S_{iv, 2004} + \kappa \cdot X_{iv, 2004} + \varepsilon_{iv, 2004}$$

Observable household characteristics are characteristics of the head (age, sex and schooling), demographic household characteristics (log size and dependency ratio), and household wealth (land holdings and livestock ownership, the latter expressed in livestock units). Also included are measures of households' networks and connections within the village that may also affect consumption levels: whether the household belongs to an ethnic or religious minority; whether it is related to anyone holding an official position in the locality; and whether a parent of the household head was an important person in the social life of the village. Dummy variables are included for each village so that this is, in effect, a village fixed effects regression.

Given that some shocks are relatively more common than others, we aggregate the data we have on shocks into the following categories, whether the household had experienced, between 1999 and 2004, the following events that had led to a loss of household income, a reduction in consumption and/or a loss of productive assets: a drought; pests or diseases that affected field crops or crops in storage; pests or diseases that affected livestock; difficulty in obtaining inputs or increases in input prices; inability to sell or decreases in output prices; lack of demand for non-agricultural products; theft or destruction of tools, inputs, cash, crops, livestock, housing or consumer goods, death of head, spouse or another person; and illness of head, spouse or another person.

Basic results are reported in Table 7. Observable household characteristics associated with wealth in 1999 (land, livestock and education of the head) are

<sup>7</sup> Dercon and Krishnan (1998) show that earlier survey rounds, using various permutations of adult equivalency does not fundamentally affect the analysis of the determinants of living standards.

positively correlated with consumption levels in 2004. Bigger households and households with higher dependency ratios have lower consumption levels but other demographic characteristics (sex and age of the household head) do not have a statistically significant effect on consumption. 'Connections' appear to help. Households who have relations in positions of power, or whose parents were important in the village, have higher levels of consumption controlling for other household characteristics as do households who are part of an ethnic minority within the village.

The striking feature of the results of the shocks variables is how *unimportant* many of them seem to be. Experiencing a drought at least once in the previous five years lowers per capita consumption by approximately 20 per cent and experiencing an illness which reduces per capita consumption by approximately 9 per cent are the only shock variables that have a statistically significant effect on consumption, and the latter is only significant at the 11 per cent level. Other past shocks have, controlling for a wide range of household characteristics, have no statistically significant impact on current (2004) levels of consumption.

Table 7, however, examines only the average effects of these shocks across all households in the sample. In Tables 8 and 9, we disaggregate households by pre-shock (1999) characteristics and explore the extent to which the impact of shocks differs across different household types. Table 8 disaggregates on the basis of sex of head, education of head and land holdings while Table 9 disaggregates on the basis of location.

Table 8 indicates that drought and illness shocks are more important for certain household types than for others. Female headed households, households where the head has no schooling and households in the bottom three quintiles of land holdings within their villages all report a much bigger impact of drought shocks experienced at least once in the last five years on current levels of consumption. Illness shocks appear more important for richer households (as measured by relative land holdings) and households where the head has no schooling.

Table 9 disaggregates by region. Here there are marked differences, though it should be borne in mind that the number of villages in each region is relatively small and that the initial sampling was stratified by agro-ecological zone, not administrative region. Drought shocks have especially large effects in our two Tigrayan villages as well as in SNNPR. While the results show that drought shocks do not affect current consumption in Amhara, it should be remembered that there is considerable heterogeneity with this region. If we drop one village (Yetmen) where no household

reported experiencing drought in the previous five years, we also find that past drought has a negative effect on current consumption. Shocks associated with reductions in output prices cause lower consumption levels in Oromiya. Falling demand for non-agricultural products adversely affects current consumption in the villages surveyed in Oromiya and SNNPR. Illness shocks reduce current consumption in the SNNPR villages as do pests or diseases that affect crops.<sup>8, 9</sup>

Lastly, Table 10 examines the extent to which shocks have long lasting effects. We take the set of shocks reported in the previous tables and disaggregate them into those that occurred in the previous two years and those that occurred between 2 and five years prior to the 2004 survey. Three past shocks would appear to have persistent effects: droughts, falls in demand for non-agricultural products and illnesses all experienced between 1999 and 2001 are all associated with lower consumption in 2004. Not only do we observe a statistically significant effect of these shocks, recall that we are controlling for a large number of potentially confounding factors *and* the magnitude of these effects is meaningful with each reducing current consumption by between 13 and 19 per cent.

Somewhat surprisingly, the large falls in grain prices observed in Ethiopia in 2001 do not appear to affect consumption. However, this price shock is likely to have had a larger effect on households in grain-surplus areas.<sup>10</sup> To investigate further, we re-estimated this model, restricting the sample to three villages (Yetmen, Sirbana Godeti and Trirufe Ketchma) which historically have been grain surplus villages. We do find evidence of a persistent effect of the output price shock. In these three villages, households reporting that they had been adversely affected by falls in output prices between 1999 and 2001 have per capita consumption levels in 2004 approximately 28 per cent lower than comparable households not reporting this shock.

In addition to asking households about individual shocks that had adversely affected them, households were also asked to enumerate the three most important adverse

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<sup>8</sup> We note the slightly odd result that these pest shocks appear to *increase* consumption in the Tigrayan and Oromifa villages, though the effect is well-measured. It is possible that pest shocks are associated with years in which rainfall is relatively more plentiful and that in these areas, the positive effect of more plentiful rainfall outweighs the negative effects of the pests.

<sup>9</sup> Interpretation of the results for illness in SNNPR is slightly tricky. Malaria is endemic in much of this region and so these regression results may be capturing, in part, a greater likelihood of being ill. Also, permanent crops such as enset and coffee are more common and the cropping season is generally longer than it is in other parts of the country. So an alternate explanation is that there is a longer period of time in the agricultural year when illness will affect productive activities in agriculture.

<sup>10</sup> In a related exercise, we explored whether the fall in international coffee prices had a similar adverse effect on households in coffee growing areas but could find no evidence of such an effect in our sample.

shocks that they had experienced over the previous five years. These are summarized in Table 11; they provide one way of checking the validity of the econometric results.<sup>11</sup> Virtually all households (95%) reported a most important shock, 85% reported a second most important shock and 62% reported a third most important shock. The most commonly reported “worst shocks” are drought (47 percent), death (43 per cent) and illness (28 percent). When we disaggregate by degree of importance of these worst shocks, we see that these same three shocks were always listed as being the most important adverse shocks experienced by these households. Two, drought and illness, also appear as shocks that adversely affect current consumption. While death shocks do not appear to have an effect on consumption, Table 4 indicates that – unlike other shocks - households often reported that the death of a husband, wife or another person had an “other effect” (other than an effect on income, consumption or productive assets) on households.

Input and output shocks, pests affecting crops and crime are all reported by between 11 and 14 per cent of households. Other shocks are less frequently reported. Strikingly, policy shocks (land redistribution, state confiscation of assets, resettlement, villagization or forced migration, bans on migration, forced contributions or arbitrary taxation) which featured so prominently in earlier rounds of the ERHS have substantially diminished in importance. Only 7 per cent of households reported being adversely affected by such policy shocks compared to 42 per cent who reported being affected by these prior to 1994 (Dercon, 2002, Table 1).

## 5. Conclusions

Ethiopia is a shock-prone country. Virtually all households report being adversely affected by shocks between 1999 and 2004. Drought shocks and illness shocks are the most important shocks in the sense that households report these as being especially important *and* controlling for other household and village characteristics, they are associated with lower levels of per capita consumption. The magnitudes of these effects are non-trivial. Experiencing a drought at least once in the previous five years lowers per capita consumption by about 20 per cent and experiencing an illness reduces per capita consumption by approximately 9 per cent.

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<sup>11</sup> We briefly note two other robustness checks. We re-estimated these regressions using the change in consumption between 1999 and 2004 as the dependent variable and including lagged (1999) consumption as a regressor, instrumenting this covariate with other observed household characteristics. We also estimated our model as a village fixed effects regression so that the shock variables captured the presence of a shock relative to the mean incidence of the shock within the village. Qualitatively, these produced results comparable to those reported here.

Other shocks are more important for certain types of households and for certain localities than for others. Female headed households, households where the head has no schooling and households in the bottom three quintiles of land holdings within their villages all report a much bigger impact of drought shocks experienced at least once in the last five years on current levels of consumption. Illness shocks appear more important for richer households (as measured by relative land holdings) and households where the head has no schooling. Households in SNNPR appear to be more badly affected by a wider variety of shocks than households in other regions with falling demand for non-agricultural products, illness shocks and pests or diseases that affect crops all reducing per capita consumption in 2004.

Some shocks appear to have long lasting effects. Households reporting have been adversely affected by drought, illness or (in the case of grain surplus villages) output price shocks between 1999 and 2001 had significantly lower levels of consumption – between 13.7 and 28 per cent – when observed several years later in 2004.<sup>12</sup>

The importance of different types of shocks appears to be changing. Dercon (2002) reports that in the 1990s, drought and policy shocks were the predominant adverse events reported by these households. While drought remains important, policy shocks such as land redistribution and arbitrary taxation are now much less important than they were while death and illness shocks are now much more important.

Hoddinott and Quisumbing (2003) note that understanding shocks and their consequences is a necessary (though not sufficient) step to the design of programs and interventions designed to blunt their pernicious effects. Specifically, they note that assessing vulnerability to shocks requires answering four interlinked questions: (1) Who is vulnerable? (2) What are the sources of vulnerability? (3) How do households cope with risk and vulnerability? and (4) What is the gap between risks and risk management mechanisms? This paper provides direct evidence on questions (1) and (2) as well as showing that the inability of households to insure against or mitigate these shocks has led to subsequent reductions in household welfare. Companion work by Gilligan and Hoddinott (2004, 2005) and Hoddinott, Dercon and Krishnan (2005) provides evidence on (3) and (4).

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<sup>12</sup> Dercon (2004) reports similar results, showing that drought shocks experienced in the 1980s were causally associated with slower growth in the 1990s.

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**Table 1: The distribution of households in the Ethiopian Rural Household Survey by agro-ecological zone**

	Population share in 1994	Sample share in 1994	Number of villages
Grain plough complex: Northern Highlands	21.2%	20.2%	3
Grain plough complex: Central Highlands	27.7	29.0	4
Grain plough: Arsi/Bale	9.3	14.3	2
Sorghum plough/hoe: Hararghe	9.9	6.6	1
Enset (with or without coffee/cereals)	31.9	29.9	5
Total	100	100	15

**Notes:**

Percentages of population share relate to the rural sedentary population; they exclude pastoralists who account for about 10 percent of total rural population. 2.

**ARCH Test:**

F-statistic	0.924087	Probability	0.344633
Obs*R-squared	0.958461	Probability	0.327575

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/07/06 Time: 11:34

Sample(adjusted): 1973 2002

Included observations: 30 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008049	0.003378	2.382679	0.0242
RESID^2(-1)	0.178525	0.146815	1.215986	0.2341
R-squared	0.031949	Mean dependent var		0.009820
Adjusted R-squared	-0.002625	S.D. dependent var		0.014457
S.E. of regression	0.014476	Akaike info criterion		-5.568306
Sum squared resid	0.005868	Schwarz criterion		-5.474893
Log likelihood	85.52459	F-statistic		0.924087
Durbin-Watson stat	1.991150	Prob(F-statistic)		0.344633



**Table 2: Characteristics of the sample sites**

Survey site	Location	Description	Main crops	Perennial crops?	Mean Rainfall mm
Haresaw	Tigray	Poor and vulnerable area.	Cereals	no	558
Geblen	Tigray	Poor and vulnerable area; used to be quite wealthy.	Cereals	no	504
Dinki	N. Shoa	Badly affected by 1984/85 famine; not easily accessible even though near Debre Berhan.	Millet, teff	no	1664
Debre Berhan	N.Shoa	Highland site. Near town.	Teff, barley, beans	no	919
Yetmen	Gojjam	Near Bichena. Ox-plough cereal farming system of highlands.	Teff, wheat and beans	no	1241
Shumsha	S.Wollo	Poor area in neighbourhood of airport near Lalibela.	Cereals	no	654
Sirbana Godeti	Shoa	Near Debre Zeit. Rich area. Much targeted by agricultural policy. Cereal, ox-plough system.	Teff	no	672
Adele Keke	Hararghe	Highland site. Drought in 1985/86	Millet, maize, coffee, chat	yes, no food	748
Korodegaga	Arssi	Poor cropping area in neighbourhood of rich valley.	Cereals	no	874
Turfe Kechemane	S.Shoa	Near Shashemene. Ox-plough, rich cereal area. Highlands.	Wheat, barley, teff, potatoes	yes, some	812
Imdibir	Shoa (Gurage)	Densely populated enset area.	Enset, chat, coffee, maize	yes, including food	2205
Aze Deboa	Shoa (Kembata)	Densely populated. Long tradition of substantial seasonal and temporary migration.	Enset, coffee, maize, teff, sorghum	yes, including food	1509
Addado	Sidamo (Dilla)	Rich coffee producing area; densely populated.	Coffee, enset	yes, including food	1417
Gara Godo	Sidamo (Wolayta)	Densely packed enset-farming area. Famine in 1983/84 and malaria prone.	Barley, enset	yes, including food	1245
Doma	Gama Gofa	Resettlement Area (1985); Semi-arid; experienced droughts throughout the 1980s; remote.	Enset, maize	yes, some	1150

**Sources:** Community survey ERHS, Webb and von Braun (1994), Bevan and Pankhurst (1996).

**Table 3: Extent of shocks by selected shocks, Ethiopia**

	Households reporting this shock	How widespread was this shock?				
		Only affected this household	Affected some households in this village	Affected all households in this village	Affected this village and nearby villages	Affected areas beyond this kebele
		Idiosyncratic ←-----→ covariate				
Drought	52%	6%	15%	32%	26%	21%
Pests or diseases affecting crops or livestock	38	20	29	25	18	8
Input shocks (price increase or difficulties in access)	35	13	18	27	23	18
Output shocks (price decrease or difficulty making sales)	29	6	12	36	33	14
Victim of theft or other crime	22	77	14	4	3	1
Death of husband, wife or another person	35	80	10	5	4	1
Illness of husband, wife or another person	39	83	9	5	3	0

**Notes:** 1. Data are taken from the Ethiopian Rural Household Survey, round 6. 2. 1368 households provided reported information.

**Table 4: Severity of shock by selected shocks, Ethiopia**

	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
Drought	25%	32%	21%	20%	1%
Input shocks (price increase or difficulties in access)	26	31	17	23	3
Output shocks (price decrease or difficulty making sales)	33	32	10	22	4
Pests or diseases affecting crops or livestock	24	35	20	19	2
Victim of theft or other crime	31	26	24	19	1
Death of husband, wife or another person	25	15	15	19	26
Illness of husband, wife or another person	29	21	20	24	7

**Notes:** 1. Data are taken from the Ethiopian Rural Household Survey, round 6. 2. 1368 households provided reported information.



Table 5: Characteristics of households affected by shocks, 1999-2004

	Drought	Pests	Input shocks	Output shocks	Crime	Death	Illness
<b>By region</b>							
Tigray	87%	6%	8%	0%	8%	25%	8%
Amhara	38	24	12	6	8	30	23
Oromiya	56	26	21	20	25	31	22
SNNPR	50	48	44	52	21	41	46
<b>By demographic characteristics</b>							
<b>Sex of head</b>							
Female	57	25	20	16	15	24	16
Male	49	32	25	26	17	36	32
<b>Schooling of head</b>							
None	54	29	22	21	17	34	27
Any schooling	41	35	35	37	21	31	37
<b>By wealth characteristics</b>							
<b>Land holdings, 1999</b>							
Poorest quintile	56	23	18	16	14	30	22
2 <sup>nd</sup> quintile	56	33	30	29	20	32	35
3 <sup>rd</sup> quintile	47	32	24	25	17	35	25
4 <sup>th</sup> quintile	48	35	29	24	16	34	32
Richest quintile	57	33	23	20	23	34	30

**Notes:**

1. Data are taken from the Ethiopian Rural Household Survey, round 6.      2. 1368 households provided reported information.

Table 6a: Impact of selected shocks on different household types: Drought shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	87%	29%	29%	27%	16%	0%
Amhara	38	28	31	24	15	2
Oromiya	56	26	43	9	21	0
SNNPR	50	22	26	25	25	2
<b>Sex of head</b>						
Female	57	29	32	17	21	0
Male	49	24	33	22	20	0
<b>Schooling of head</b>						
None	54	25	32	21	20	1
Any schooling	41	24	32	21	21	2
<b>Land holdings, 1999</b>						
Poorest quintile	56	31	30	19	19	1
2 <sup>nd</sup> quintile	56	23	31	20	23	2
3 <sup>rd</sup> quintile	47	24	40	16	20	0
4 <sup>th</sup> quintile	48	20	30	22	25	3
Richest quintile	57	27	35	25	13	0

Table 6b: Impact of selected shocks on different household types: Pest shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	6%	40%	30%	0%	30%	0%
Amhara	24	22	27	30	17	3
Oromiya	26	35	24	23	19	0
SNNPR	48	21	41	16	19	2
<b>Sex of head</b>						
Female	25	30	35	16	17	1
Male	32	23	35	22	19	1
<b>Schooling of head</b>						
None	29	25	34	19	20	2
Any schooling	35	19	40	24	15	1
<b>Land holdings, 1999</b>						
Poorest quintile	23	30	33	20	16	1
2 <sup>nd</sup> quintile	33	26	34	21	17	2
3 <sup>rd</sup> quintile	32	21	40	21	18	1
4 <sup>th</sup> quintile	35	17	33	23	24	3
Richest quintile	33	27	40	16	17	0

Table 6c: Impact of selected shocks on different household types: Input shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	8	60%	13%	13%	14%	0%
Amhara	12	24	35	19	19	3
Oromiya	21	32	42	9	18	1
SNNPR	44	23	28	19	27	3
<b>Sex of head</b>						
Female	20	33	32	18	17	2
Male	25	25	32	17	24	1
<b>Schooling of head</b>						
None	22	27	31	18	22	2
Any schooling	35	24	31	15	25	4
<b>Land holdings, 1999</b>						
Poorest quintile	18	27	34	13	19	6
2 <sup>nd</sup> quintile	30	26	24	27	22	2
3 <sup>rd</sup> quintile	24	29	36	15	20	0
4 <sup>th</sup> quintile	29	26	31	12	27	3
Richest quintile	23	25	35	18	21	1

Table 6d: Impact of selected shocks on different household types: Output shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	0%	-	-	-	-	-
Amhara	6	29%	20%	14%	37%	0%
Oromiya	20	56	22	9	12	1
SNNPR	52	29	34	9	23	5
<b>Sex of head</b>						
Female	16	30	28	14	25	3
Male	26	34	33	8	20	4
<b>Schooling of head</b>						
None	21	34	31	10	22	3
Any schooling	37	30	33	9	21	7
<b>Land holdings, 1999</b>						
Poorest quintile	16	30	38	8	22	3
2 <sup>nd</sup> quintile	29	30	24	12	26	8
3 <sup>rd</sup> quintile	25	36	43	6	15	0
4 <sup>th</sup> quintile	24	37	26	10	21	6
Richest quintile	20	39	23	12	26	0

Table 6e: Impact of selected shocks on different household types: Theft shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss: asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	8%	14%	28%	29%	29%	0%
Amhara	8	28	11	28	30	3
Oromiya	25	38	23	25	24	0
SNNPR	21	27	32	21	19	1
Sex of head						
Female	15	37	21	29	13	0
Male	17	29	28	23	20	1
Schooling of head						
None	17	31	27	23	19	1
Any schooling	21	32	22	25	19	1
Land holdings, 1999						
Poorest quintile	14	31	19	22	26	1
2 <sup>nd</sup> quintile	20	33	27	27	13	0
3 <sup>rd</sup> quintile	17	26	25	32	18	0
4 <sup>th</sup> quintile	16	33	27	21	16	3
Richest quintile	23	30	37	15	17	0

Table 6f: Impact of selected shocks on different household types: Death shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss: asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	25%	19%	3%	6%	8%	64%
Amhara	30	20	9	20	20	31
Oromiya	31	34	19	13	18	22
SNNPR	41	24	18	14	24	20
Sex of head						
Female	24	28	17	12	18	25
Male	36	24	15	14	19	28
Schooling of head						
None	34	28	14	14	19	25
Any schooling	31	15	20	13	16	35
Land holdings, 1999						
Poorest quintile	30	29	15	7	18	32
2 <sup>nd</sup> quintile	32	24	20	13	22	22
3 <sup>rd</sup> quintile	35	20	12	20	15	33
4 <sup>th</sup> quintile	34	25	14	15	19	27
Richest quintile	34	24	17	17	21	22

Table 6g: Impact of selected shocks on different household types: Illness shocks

	Households reporting this shock	Loss of household income	Income loss and reduced consumption	Loss of productive assets	Asset loss; asset loss and income loss or reduction in consumption	Other effects
<b>By region</b>						
Tigray	8%	67%	0%	17%	0%	16%
Amhara	23	18	21	28	28	11
Oromiya	22	50	19	12	13	6
SNNPR	46	24	22	19	29	6
<b>Sex of head</b>						
Female	16	29	21	20	22	8
Male	32	29	20	18	25	8
<b>Schooling of head</b>						
None	27	28	22	20	23	7
Any schooling	37	28	16	20	28	9
<b>Land holdings, 1999</b>						
Poorest quintile	22	32	30	12	21	5
2 <sup>nd</sup> quintile	35	26	15	21	29	9
3 <sup>rd</sup> quintile	25	27	23	23	22	4
4 <sup>th</sup> quintile	32	27	20	21	22	10
Richest quintile	30	33	18	21	21	7

**Notes:**

1. Data are taken from the Ethiopian Rural Household Survey, round 6. 2. 1368 households provided reported information.



Table 7: Impact of shocks and other covariates on (log) consumption per capita, 2004

Covariate	Estimated coefficient	t statistic (absolute value)
Shocks in prior five years		
Drought	-0.196	2.69**
Pests or diseases that affected field crops or crops in storage	-0.029	0.40
Pests or diseases that affected livestock	0.013	0.19
Difficulty in obtaining inputs or increases in input prices	0.036	0.75
Inability to sell outputs or decreases in output prices	-0.077	1.15
Lack of demand for non-agricultural products	-0.131	1.13
Theft or destruction of tools, inputs, cash, crops, livestock, housing or consumer goods (crime)	0.036	0.55
Death of head, spouse or another person	0.025	0.63
Illness of head, spouse or another person	-0.096	1.64
Other controls		
Female headed, 1999	-0.012	0.21
Log age head, 1999	0.097	1.37
Head has schooling, 1999	0.096	2.28**
Log household size, 1999	-0.287	7.65**
Dependency ratio, 1999	-0.039	2.60**
Household in second land quintile, 1999	0.056	0.91
Household in third land quintile, 1999	0.149	1.65*
Household in fourth land quintile, 1999	0.153	2.33**
Household in top land quintile, 1999	-0.031	0.37
Livestock units, 1999	0.029	3.24**
Member, ethnic minority	0.169	2.52**
Member, religious minority	0.078	1.04
Relative holds official position in PA	0.125	3.00**
Mother or father was important in social life of village	0.161	3.20**
R <sup>2</sup>	0.33	
Sample size	1290	

**Notes:**

1. Standard errors are robust to locality cluster effects. \* Significant at the 10% level; \*\* significant at the 5% level. 2. PA dummies, month of interview dummies and perceptions of rainfall in previous harvest year are also included but not reported.

Table 8: Impact of shocks by household characteristic on (log) consumption per capita, 2004

	Female headed households	Male headed households	Head has no schooling	Head has some schooling	Household is in bottom three land quintiles	Household is in top two land quintiles
Drought	-0.442 (3.63)**	-0.094 (1.02)	-0.208 (2.57)**	-0.164 (1.81)*	-0.205 (2.41)**	-0.145 (1.03)
Pests or diseases that affected crops	0.017 (0.14)	-0.026 (0.29)	0.016 (0.22)	-0.255 (2.95)**	-0.018 (0.23)	-0.039 (0.51)
Pests or diseases that affected livestock	-0.076 (0.39)	0.049 (0.64)	0.021 (0.26)	-0.014 (0.20)	-0.053 (0.65)	0.051 (0.49)
Difficulty in obtaining inputs or increases in input prices	0.012 (0.09)	0.046 (0.92)	0.054 (0.91)	-0.045 (0.55)	0.035 (0.66)	0.079 (0.74)
Inability to sell outputs or decreases in output prices	0.031 (0.13)	-0.060 (1.14)	-0.092 (1.13)	-0.030 (0.31)	-0.063 (0.49)	-0.156 (1.57)
Lack of demand for non-agricultural products	-0.191 (0.66)	-0.173 (2.24)**	-0.175 (1.30)	0.238 (0.79)	-0.100 (0.81)	-0.279 (1.70)*
Crime shocks	0.181 (1.21)	0.001 (0.10)	0.017 (0.21)	0.072 (1.17)	-0.010 (0.15)	0.122 (1.01)
Death of head, spouse or another person	-0.184 (1.52)	0.061 (1.42)	0.038 (0.75)	-0.057 (0.94)	0.036 (0.71)	0.048 (0.74)
Illness of head, spouse or another person	-0.138 (0.78)	-0.069 (1.05)	-0.139 (2.33)**	0.079 (0.78)	-0.066 (0.94)	-0.154 (2.24)**

**Notes:**

1. Specification as per Table 7.2. Standard errors are robust to locality cluster effects. \* Significant at the 10% level; \*\* significant at the 5% level. 3. PA dummies, month of interview dummies and perceptions of rainfall in previous harvest year are also included but not reported.

Table 9: Impact of shocks by region on (log) consumption per capita, 2004

	Tigray	Amhara	Oromiya	SNNPR
Drought	-0.472 (2.48)**	-0.027 (0.33)	-0.247 (1.83)*	-0.314 (2.29)**
Pests or diseases that affected crops	0.485 (1.62)	-0.021 (0.20)	0.190 (1.75)*	-0.183 (2.28)**
Pests or diseases that affected livestock	-0.104 (0.24)	0.039 (0.34)	0.024 (0.22)	0.007 (0.07)
Difficulty in obtaining inputs or increases in input prices	-0.068 (0.26)	0.010 (0.08)	0.053 (0.49)	0.033 (0.31)
Inability to sell outputs or decreases in output prices	-	- 0.066 (0.34)	-0.193 (2.04)**	-0.053 (0.56)
Lack of demand for non-agricultural products	-	0.171 (0.76)	-0.363 (1.97)**	-0.321 (1.83)*
Crime shocks	0.087 (0.39)	-0.164 (1.67)*	0.053 (0.53)	0.010 (0.11)
Death of head, spouse or another person	0.237 (1.45)	0.117 (1.72)*	-0.039 (0.42)	-0.017 (0.22)
Illness of head, spouse or another person	-0.139 (0.53)	0.018 (0.21)	-0.014 (0.14)	-0.218 (2.75)**
R <sup>2</sup>	0.33	0.24	0.40	0.30
Sample size	140	408	350	392

**Notes:**

1. Specification as per Table 7. 2. Standard errors are robust to locality cluster effects. \* Significant at the 10% level; \*\* significant at the 5% level. 3. PA dummies, month of interview dummies and perceptions of rainfall in previous harvest year are also included but not reported.

**Table 10: Impact of shocks by timing of shock on (log) consumption per capita, 2004**

Covariate	Estimated coefficient	t statistic (absolute value)
Drought, 2002-04	-0.163	2.46**
Drought, 1999-2001	-0.137	2.72**
Pests or diseases that affected crops, 2002-04	-0.006	0.07
Pests or diseases that affected crops, 1999-2001	-0.052	1.05
Pests or diseases that affected livestock, 2002-04	-0.002	0.18
Pests or diseases that affected livestock, 1999-2001	0.022	0.24
Difficulty in obtaining inputs or increases in input prices, 2002-04	0.055	0.63
Difficulty in obtaining inputs or increases in input prices, 1999-2001	0.001	0.02
Inability to sell outputs or decreases in output prices, 2002-04	-0.187	2.23**
Inability to sell outputs or decreases in output prices, 1999-2001	-0.026	0.36
Lack of demand for non-agricultural products, 2002-04	-0.037	0.19
Lack of demand for non-agricultural products, 1999-2001	-0.195	2.28**
Crime shocks, 2002-04	-0.018	0.36
Crime shocks, 1999-2001	0.083	0.99
Death of head, spouse or another person, 2002-04	0.043	0.69
Death of head, spouse or another person, 1999-2001	-0.001	0.02
Illness of head, spouse or another person, 2002-04	-0.019	0.32
Illness of head, spouse or another person, 1999-2001	-0.151	2.33**
R <sup>2</sup>	0.34	
Sample size	1290	

**Notes:**

1. Specification as per Table 7. 2. Standard errors are robust to locality cluster effects. \* Significant at the 10% level; \*\* significant at the 5% level. 3. PA dummies, month of interview dummies and perceptions of rainfall in previous harvest year are also included but not reported.

**Table 11: Household self-reports of the worst shocks experienced between 1999 and 2004**

<b>Most commonly reported worst shocks</b>	
Drought	46.8%
Death of head, spouse or another person	42.7
Illness of head, spouse or another person	28.1
Inability to sell outputs or decreases in output prices	14.5
Pests or diseases that affected crops	13.8
Crime	12.7
Difficulty in obtaining inputs or increases in input prices	11.3
Policy/political shocks (land redistribution, state confiscation of assets, resettlement, villagization or forced migration, bans on migration, forced contributions or arbitrary taxation)	7.4
Pests or diseases that affected livestock	7.0
<b>Most commonly reported worst shocks by degree of importance</b>	
<b>Most important shock</b>	
Drought	32.6%
Death of head, spouse or another person	26.1
Illness of head, spouse or another person	8.0
<b>Second most important shock</b>	
Death of head, spouse or another person	14.8
Drought	13.6
Illness of head, spouse or another person	12.3
<b>Third most important shock</b>	
Illness of head, spouse or another person	12.2
Death of head, spouse or another person	8.1
Drought	8.0

**Notes:**

1. Data are taken from the Ethiopian Rural Household Survey, round 6. 2. 1371 households provided reported information. 3. In response to the question, "what were the three most important shocks to affect this household", 95% of households reported a most important shock, 85% reported a second most important shock and 62% reported a third most important shock.

Figure 1: Households reporting climatic shocks between 1999 and 2004, Ethiopia

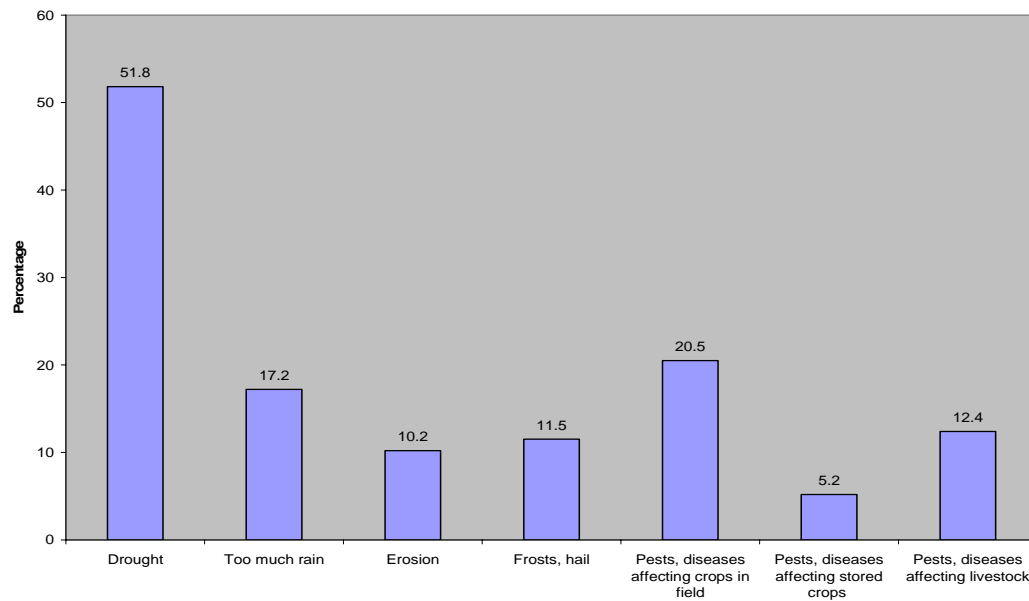
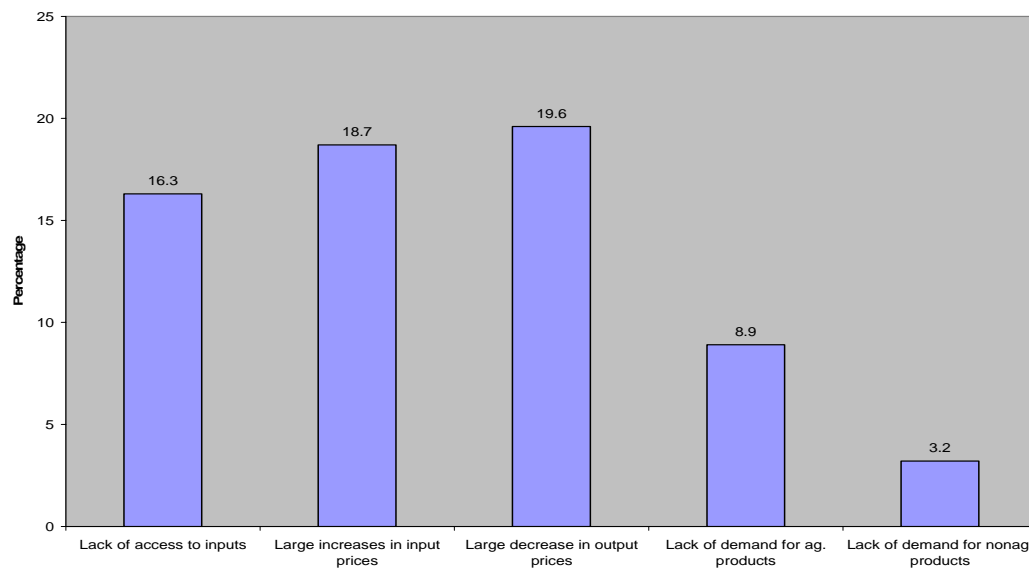


Figure 2: Households reporting economic shocks between 1999 and 2004, Ethiopia



**Figure 3: Households reporting political/social/legal shocks between 1999 and 2004, Ethiopia**

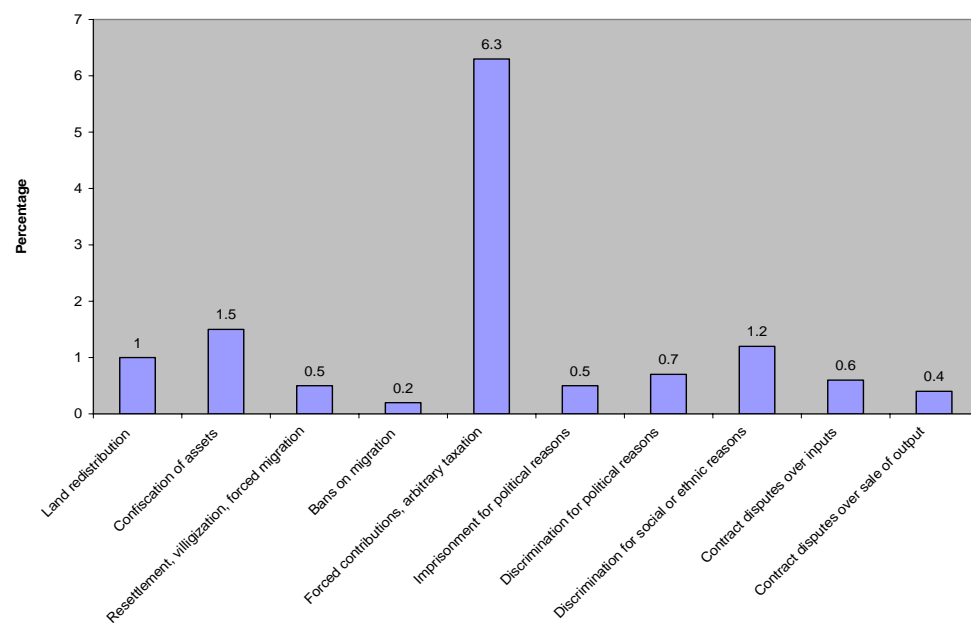


Figure 4: Households reporting crime shocks between 1999 and 2004, Ethiopia

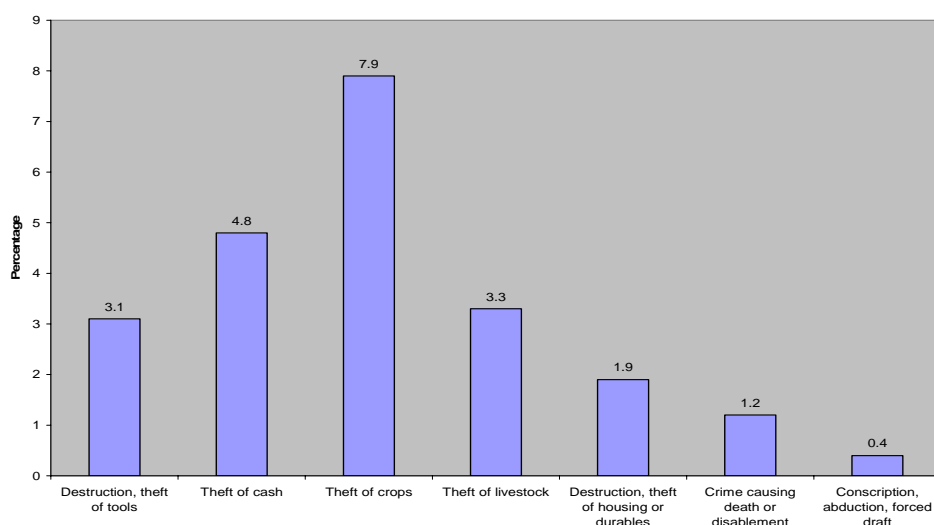


Figure 5: Households reporting death/illness/conflict shocks between 1999 and 2004, Ethiopia

