Poverty and "Witch" Killing in Tanzania

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Abstract

Existing empirical studies are typically unable to sort out the direction of causality between poverty and violent crime in less developed countries. This study uses rainfall variation in a poor rural Tanzanian district – which is plausibly exogenous, and is closely related to income – from a new dataset to estimate the impact of negative income shocks on murder rates, in 66 villages across eleven years. Extreme rainfall leads to a large statistically significant increase in the murder of "witches" – typically elderly women killed by their own relatives, kin, or neighbors – but not in other types of murders. The results are consistent with a model in which households near subsistence consumption drive away or kill elderly household members to safeguard the nutritional status of other household members. The theory is bolstered by the fact that most killings take place in low socio-economic villages during the so-called "hungry season" of the year, and that most victims are from poor households. The results provide novel empirical evidence on the role of extreme poverty as a cause of violent crime in rural Africa.

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1. Introduction

Many observers have noted that poverty and violence seem to go hand in hand in less developed countries. For instance, Mehlim, Moene, and Torvik (2000) and Fajnzylber et al (2002) find a strong negative relationship between economic growth rates and crime across countries, and Collier and Hoeffler (2000) and Fearon and Laitin (2001) have found a robust relationship between low income and the occurrence of civil war. Yet endogeneity and omitted variables complicate the interpretation of these patterns. To illustrate, poverty may lead to more violence if desperate people with "nothing to lose" commit more crimes, but violence may in turn also affect economic productivity, and existing studies are typically unable to deal with this central econometric identification issue.

This paper moves beyond the existing literature by using rainfall variation to identify the impact of income shocks on murder in a poor semi-arid district of western Tanzania.[1] Extreme rainfall – resulting in drought or flood – is plausibly exogenous, and is associated with poor crop harvests and near famine conditions in this region (United Republic of Tanzania 1999: 15). Village-level survey data on murders and rainfall variation for 66 villages over eleven years indicates that extreme rainfall leads to a large and statistically significant increase in the murder of "witches": there are more than twice as many witch murders in years of extreme rainfall as in years of normal rainfall. As discussed below, the victims are nearly all elderly and poor women, often killed by their own relatives or neighbors. The results provide novel empirical evidence on the role of extreme poverty as a cause of violent crime in rural Africa.

The empirical results from Tanzania are consistent with a model of intra-household resource allocation in which households near subsistence levels of consumption drive away or kill elderly household members to safeguard the nutritional status of other household members.[2] The theory is bolstered by the fact that most such killings take place in low socio-economic villages during the

[1] Other social scientists have used rainfall variation to identify important relationships, in studies of consumption (Dercon and Krishnan 2000a, Paxson 1992), child health (Hoddinott and Kinsey 2001, Rose 1999), property rights and institutions (Nugent and Sanchez 1999), and election turn-out (Knack 1994).

[2] This is in contrast to existing economic models of violence between social groups or classes (e.g., Grossman and Kim 1995, Mui 1998). Becker (1968) is the seminal work on the economics of crime.

"hungry season" of the year, and that most victims are from poor households. The outbreak of similar "witch" killings in other poor agrarian societies throughout the world is further suggestive evidence in favor of some underlying economic rationale. Yet it is not possible to rule out a competing theory, namely that vulnerable elderly women are singled out as "scapegoats" by families in need of some explanation for their misfortunes. The concentration of witch murders in villages where most residents follow traditional religions (rather than Christianity or Islam) in this study suggests that "cultural" explanations cannot be dismissed. My own view is that witch killing is the result of the "interaction" of extreme poverty with a well-developed popular discourse on witchcraft.

The paper is structured as follows. Section 2 discusses existing anthropological and historical work on witch killings in western Tanzania and from other parts of the world. Section 3 lays out an economic framework for understanding witch killings. Section 4 describes the survey data used in this project, and Section 5 lays out the empirical estimation strategy. Section 6 presents the empirical results, and the conclusion summarizes the results and discusses implications for public policy.

2. Witches in Tanzania

A belief in witchcraft allows people to make sense of the arbitrary misfortunes that govern their lives, and to pin blame for these events on a particular person rather than on chance (Evans-Pritchard 1937, Ashforth 2002). In particular, African witches – who may be male or female – use their powers to inflict harm on other community members, often people against whom they harbor grudges or envy, and others in their immediate social circle or community (Baxter 1972).

Witchcraft beliefs are strong in the Sukuma region of western Tanzania (and in the neighboring Nyamwezi region), where a large proportion of the population has never converted to Christianity or Islam and instead practices traditional religions. In our study area, Meatu District in Shinyanga Region, over sixty percent of 2001 household survey respondents claimed to follow traditional religions (*hamna*

dini in Swahili, literally "no religion"). The region is poor for Tanzania and has low levels of educational attainment relative to the rest of the country. Mesaki (1994: 49) writes:

> Belief in witchcraft is rooted in the whole Sukuma system of knowledge and morality. … [When] misfortunes strike, such as the loss of livestock or a poor harvest, explanation may be found in strained relationships with living people or perhaps the spirits of the dead. … [W]itchcraft in Sukumaland may be held responsible for almost any calamity or misfortune such as sudden storms on the lake, the sudden death of a health person, miscarriages and infertility, the failure of rain, death from snake bite, losing one's way, and various diseases.

Government statistics show a rise in "witch" killings in western Tanzania since the late 1960s, and some authors have tied this increase to the radical economic and social transformations that accompanied independence, including the villagization and collectivization movements pursued by Julius Nyerere's socialist regime (Abraham 1987). In the aftermath of villagization (Mesaki 1994: 55):

> [T]he new villages have been in many ways a recipe for conflicts arising from land shortage, reduced soil fertility, inequalities, divorce, and infant mortality, and … such conflicts are often expressed in Unyamwezi and Sukumaland in the idiom of witchcraft.

The Tanzanian government reported that 3,072 accused witches were killed in Sukumaland from 1970 to 1988, more than two-thirds of the national witch murder total. According to these figures, approximately 80 percent of the victims were women, and the median age was between 50 to 60 years old, quite an advanced age for Tanzania where life expectancy is approximately 50 years.

Residents of western Tanzania and anthropologists who study the area claim that relatives, kin, and neighbors are usually behind the murders. The relationship between women and their mothers-in-law is especially prone to mutual witchcraft suspicions in Sub-Saharan Africa (Ashforth 2002). The following 1991 account of a seventy year old woman who fled from her home (near our study area), and lived homeless near the railway station in the regional capital, suggests that the within-household struggle for resources after negative shocks is a prime motivation for the killings (Mesaki 1994: 59):

> I ran away from Rusule in Shinyanga District after being suspected of being a witch. … There were many deaths in the family … then rumour began to spread in the village that I was the one who killed them … [M]y own children started to hate me, … some of them started taunting me as a witch. I tried to explain but they did not give me the chance to vindicate myself. I knew what would befall me in view of what had happened to others previously, for they were brutally

> killed. Thus, when … one of the grandchildren whispered to me that they were about to kill me, I left the same evening. … They had discussed the issue in front of the children and this saved my life. I have lived in this camp for three years now, and though I love my family, there is no way of going back to face certain death.

Many women are not so fortunate, and are brutally massacred in their homes, usually by young men with machetes. The government and churches have made largely unsuccessful efforts to stop the killings. Although public witchcraft accusations have been illegal since the British Witchcraft Ordinance of 1928, and the law remains largely unchanged to the present day (Green 1994: 23-24), it simply pushes witchcraft accusations "underground" but has not eliminated them. In the 1970s, the Shinyanga regional government pursued an aggressive program to prosecute individuals suspected of carrying out witch-killings in Sukumaland, arresting 897 individuals. Yet the project was ultimately called off after at least twelve suspects died in police custody, and "as a result the remaining suspects were set free, whereupon the killings (which had subsided) resumed again" (Mesaki 1994: 57). Only seven of 1622 individuals arrested in connection with witch killings were successfully convicted in court during the 1970s and 1980s, and since then the conviction rate has fallen even lower, largely because of a lack of witnesses (this is unsurprising given the complicity of relatives and neighbors). Tanzanian President Mwinyi addressed a 1987 rally in Meatu – our study area –with the following statement (Mesaki 1994: 58):

> You are killing innocent women, some of them your own mothers, grandmothers or old people who have all along taken good care of you: how come they suddenly become witches? Do (you) pay them back by killing them?

The rise of witch killings in the region has also been tied to the resurgence of a traditional pre-colonial local political institution, the male elders council, called *Sungusungu*. The *Sungusungu* first appeared in western Tanzania as a response to widespread cattle rustling and theft that exploded during the economic crisis of the early 1980s. They are popularly credited with having put an end to disorder in rural areas by organizing patrols of young men to punish suspected thieves and recover stolen property (Abrahams and Bukurura 1992: 94-95). In many villages, the *Sungusungu* also organize mutual

insurance and emergency credit schemes for village residents, and are entrusted with raising funds for local development projects.

In addition to these development and police activities, the all-male *Sungusungu* consider combating witches central to their overall mission of promoting village security. They have been implicated in many witch killings, as well as in the expulsion of suspected witches, after receiving "credible" information on the witchcraft activities of a particular individual, usually from a traditional healer hired by relatives of the "witch" (Abrahams 1994). A recent news report confirms that witch killing is generally viewed as a form of public service: "In the Sukuma community, if you kill a witch it is not really considered a crime. It's like you are doing something for the community" (BBC 2002). Witchcraft is a tangible reality for many Tanzanians, and its perpetrators are viewed as criminals just as dangerous as ordinary thieves and murderers.

2.2 Witch Killing in Other Societies

Witch killings related to within-household conflicts over resources are not unique to rural Tanzania. Attacks follow a similar pattern in poor and semi-arid northern Ghana, where thousands of women have been attacked and driven from their villages in the past decade, often following struggles over resources with other household members (BBC 2001, EWD 2002). Witch killings of elderly women have also recently been documented by women's rights groups in Kenya, Mozambique, and Uganda, as well as in Zimbabwe, where "old widows in rural areas, especially those living alone risk being branded as witches, abused, and stoned. Chased from villages they die from malnutrition and exposure" (EWD 2002). Hundreds of suspected witches have also been killed in South Africa's poor Northern Province during the past decade (Ashforth 2002).

Similar attacks are documented in Bihar, the poorest state in India (EWD 2002):

> [I]n tribal communities, widows are sometimes killed as witches. The underlying motivation is economic: the accusers tend to be the male relatives, brothers-in-law or step-sons who want to control the land. It is reported that in the Jharkland region of Bihar, of 95 [murder] cases …

> over a 30-year period, 46 were witch killings of which 42 of the victims were [female] widows. … The violence to widows – being usually hidden within the family – has not been addressed.

In the Andean region of South America, indigenous communities punish suspected witches with expulsion or execution, and as a result a significant community of expelled witches has developed in the Bolivian city of Santa Cruz (Von Cott 2000). Yet it is not only witches who are sometimes killed in these communities after negative income shocks; "there are also cases where the community practice is to kill or abandon infant twins or babies born handicapped, female or to large families, as well as old or very sick people, because they are considered to be a burden on the community" (Von Cott 2000: 222).

There are also parallels between witch-killings in Europe and North America during the 16th to 18th century – during which at least 40,000-50,000 individuals were murdered as witches (Rowlands 1998) – and contemporary Tanzania. In both cases, most victims were women – at least three-quarters in both settings (Rowlands 1998: 300) – predominantly poor and elderly, and often widows (Oster 2002). Witches in early modern Europe were credited with power over weather, crops, and health (Behringer 1999: 339). Many of Europe's leading ecclesiastical and political authorities openly opposed witch killings in their territories, but the killings occurred nonetheless, though typically in the poor and outlying agrarian regions rather than in cities. In response to the reluctance of central authorities to punish suspected witches, some central European communities began vigilante witch hunts independent of the authorities, in a striking analogy to the *Sungusungu* (Behringer 1999: 341). There is recent historical evidence that periods of extreme weather – mainly low temperatures and high precipitation – that lowered crop yields was a proximate cause of witchcraft accusations in Europe and North America during this period, including the Salem witchcraft trials, which occurred during years of particularly unfavorable climatic conditions. In a detailed historical study of witch killings in central Europe, Behringer (1999: 344) documents multiple instances in which extreme weather set off witch hunts.[3]

[3] Oster's (2002) recent longitudinal analysis finds evidence that large temperature fluctuations were associated with witch killings across Europe during this period, echoing Behringer (1999).

3. Within-Household Resource Allocation and Witch Killing

This section lays out a stylized framework of witch killing, which emphasizes the importance of within-household conflict over resources in the aftermath of negative income shocks.[4]

There are four main assumptions. First, resource allocation choices are made entirely within the household, abstracting away from community-wide insurance networks. This is a reasonable starting point for years of extreme rainfall and generalized local crop failure, when such networks are weakened or break down. Second, and crucially, there is one individual in the household – called the "patriarch" – who determines resource allocation within the household. Third, there is a minimal level of food consumption needed to maintain life and below which an individual is certain to die of starvation or disease. Of course, in reality there is no single sharp starvation threshold, but similar results hold if the mapping from consumption to survival is sufficiently convex at low consumption. Fourth, individuals within the household are identical except in terms of future economic production, and the elderly have lower future production than either young adults or children on average.

There is no strategic behavior, just a single resource allocation decision of the patriarch, who divides total household income among members of the household to maximize a household utility function.[5] Income is a function of rainfall in the period, and is significantly lower in years of extreme rainfall (leading to drought or flood). The patriarch maximizes the sum of future household production, taking into account the survival of household members (individuals who consume less than the subsistence level perish) and subject to a household budget constraint. The consumption of individual i in household h and village k during period t is represented as C_{ihkt}, and the probability of survival is a

[4] The framework is related to Rosenzweig and Schultz (1982), who examine within-household resource allocation across boys and girls as a function of local labor market conditions in India. In contrast, the model does not resonate with Becker's (1981) seminal work on within-family resource distribution. Becker shows that even selfish individuals are likely to act in a restrained manner toward other household members due to the redistributive actions of the benevolent household "dictator". The model in the current study examines a situation of extreme resource scarcity where this breaks down. The framework is agnostic about the impact of income shocks on other crimes, including non-witch murders.

[5] This simple within-household framework is also potentially relevant for understanding within-household allocation issues during famines, such as the massive Ukrainian Famine of 1932-1933 and Chinese Famine of 1958-1961 (J. Becker 1996).

function $s(C_{ihkt})$ of individual consumption; the future production of individual *ihk* in period *t* is represented by V_{ihkt}; an indicator variable for extreme rainfall in village *k* in period *t* is R_{kt}, and household income Y_{hkt} is decreasing in extreme rainfall, and is also a function of other household or village socioeconomic characteristics, X_{hkt}. The patriarch's maximization is:

$$\underset{\{C_{ihkt}\}}{Max} \sum_i s(C_{ihkt}) \cdot V_{ihkt} \quad \text{s.t.} \quad \sum_i C_{ihkt} = Y_{hkt}(X_{hkt}, R_{kt}) \qquad (1)$$

There are two cases. In years of *regular rainfall*, there is likely to be sufficient income to sustain all household members above subsistence. In years of *extreme rainfall*, crops are likely to fail, in which case there may not be sufficient household income to sustain all household members. Thus the patriarch chooses the individual with the lowest future production to be reduced to zero consumption, and concentrates all resources on survivors. Reducing someone to zero consumption can be thought of as literally starving them to death, driving them out of the household and community, or murder. There are likely to be disproportionately many witch killings in poor areas, where more households live near subsistence consumption even in years of regular rainfall. The elderly have the lowest future income of all household members, and by the logic of the model are thus most likely to be reduced to zero.[6]

The targeting of elderly women rather than elderly men for "witch" killings may result from the unequal distribution of power across men and women in rural Tanzania, since the decision of whom to target for zero consumption has political as well as economic dimensions. Most importantly, men are more likely to be family "patriarchs" than women in this area, and may be unlikely to sacrifice themselves in difficult years. Local leaders in both the *Sungusungu* and the Village Council are almost entirely male, and this means that elderly men – most of whom serve on the *Sungusungu* – provide households with valuable access to political power, but women do not. Patrilocal marital exogamy is

[6] Differential food consumption by age is not included in the model, but it could easily be incorporated.

practiced (women move out of their natal village upon marriage) and this further contributes to the social marginalization of women, and perhaps makes them more vulnerable to attack.[7]

Elderly women's fate is an extreme manifestation of pervasive gender inequality in East Africa, across age groups. Wandel and Homboe-Ottesen's (1992) study in nearby Rukwa region finds that women bear the brunt of food insecurity: while men largely maintain their weight throughout the harvest cycle, adult women lost an average of 3.1 percent of their body weight during the hungry season even in relatively good harvest years, and children in low socioeconomic status households also showed substantial deterioration in nutritional status. Dercon and Krishnan (2000b) reach a similar conclusion regarding the relative bargaining power of men and women in rural Ethiopian households, with men once again securing the lion's share of resources in low income years.

The period of the year during which women are likely to be especially vulnerable to witch attacks in rural western Tanzania is the "hungry season". The agricultural year in rural Tanzania can be crudely divided into two periods: the post-harvest period from August to January – during which food is relatively plentiful – and the "hungry" period from February to July during which food becomes increasingly scarce, before the next harvest. The 2001 Household survey data (described below) indicates that most household food stores from the previous harvest are depleted by January or February depending on the crop, after which time many households dip into their limited savings[8], sell assets, or labor on other farms in order to eat. The tough food consumption choices need to be made during the hungry period once households have run out of other options.

3.1 An Alternative View

Other studies have emphasized that witches serve an important social role as scapegoats for local misfortunes (Abrahams 1994, Behringer 1999). Since scapegoating is most likely to emerge in periods

[7] There are nearly equal numbers of women and men aged 50 years and above in this area, according to the 2001 data, so it cannot simply be the case that elderly women are disproportionately targeted among the elderly because they are much more numerous.

[8] The financial infrastructure is poorly developed in Meatu district, with only one active bank branch.

of severe economic insecurity, negative income shocks can be thought of as the underlying cause of witch killings in a reduced-form sense, even if scapegoating is its proximate cause. Thus, the two explanations for witch killings – poverty and scapegoating – are not necessarily in conflict, and in practice it is difficult to distinguish them empirically. A belief in witchcraft may alleviate the social stigma and psychological trauma associated with the murder of a close relative or neighbor as a "witch", allowing killers to justify their actions within the community's prevailing moral system. The model presented above highlights economic motivations behind witch killings, but in no way seeks to diminish the importance of explanations grounded in scapegoating, cultural traditions, or psychological motivations, all of which should be seen as complements to economic theory.

4. Data from Tanzania

Data collection for the two survey instruments – the 2001-2002 Meatu, Tanzania Village Council Survey and the 2001-2002 Household Survey – was carried out in two waves by ICS Africa field staff, with the cooperation of Meatu District Council government authorities. The Village Council Survey was administered in all 71 villages, and has resulted in a unique village-level dataset in a rural African setting. We relied both on interviews with Village Council members and local administrative records for the survey data. The main focus of the survey was local public goods provision and demographic information, but we also collected retrospective village histories. Five villages are missing data for at least some survey component, reducing the sample to 66 villages.

We asked the Village Council the following question: *"Has this village faced any natural disasters or calamities in the past ten years? (Prompt: For example, drought, famine, floods, locusts.)"* There was generally consensus on what constituted a "natural disaster or calamity" among the village officials, five to fifteen of whom typically attended village council interviews. We also collected information on outbreaks of livestock epidemics and human disease epidemics.

Unfortunately, precise village level rainfall measures (in millimeters of rain) do not exist for these villages. However, we did obtain annual rainfall data over six years from the rainfall station in the district capital (the only regular rainfall station in the district), and compared these figures to Village Council reports from villages in the same administrative ward as the capital, to validate the accuracy of the Village Council rainfall information. The correlation between millimeters of rainfall and average reported flooding in these five villages is over 0.8 (and highly statistically significant), and the correlation between millimeters of rainfall and reported drought is -0.6 (marginally statistically significant), and a similarly strong pattern holds for days of rainfall.[9] Appendix Figures 1(a) and 1(b) illustrate the strong positive relationship between village rainfall reports and actual rainfall in the capital. In the analysis, we restrict attention to the Village Council rainfall reports.

In a separate section, we asked Village Council members about murders in the village during the previous ten years, and if so, the number and years of the murders. The collection of crime data in each village, in the presence of a large number of local officials, is a strength of the current project, since village-by-village interviews are likely to yield more reliable crime data than official government statistics in rural East Africa. Murders are sufficiently rare events that they are widely remembered, and there was typically a high level of consensus across Village Council members on the events. There was also a remarkable openness to discuss witch killings, and the interviews raised no obvious concerns about data reliability. (Recall that witch murders are rarely if ever punished in Tanzania.)[10]

If a witch killing had ever occurred in a village, we then collected information on the personal characteristics of the latest victim, including gender, age, ethnic group, and property ownership, as well as the month of the murder. The number of witch attacks by year was also collected. Retrospective questions on other crimes (e.g., property crimes) were not included in the survey because it was felt that recall data would not be as reliable as for murders and witch attacks.

[9] Mean rainfall in the Meatu district capital (Mwanhuzi) from 1996 to 2001 was 633 mm and 45 days of rain.

[10] Regarding the possibility that rainfall reports would somehow contaminate murder reports, or vice versa, by making particular years especially salient, there is no compelling reason why witch murders would be over-reported in years of extreme rainfall but not in years of other calamities (for example, disease epidemics), and we do not find a strong correlation between murders and other local calamities (see Table 5).

The 2001-2002 Household Survey was administered to 15-20 households from each village in Meatu District. Households were randomly chosen from the Tax Register to be surveyed, and a random neighbor of each sampled households was also surveyed, in order to obtain a representative sample of village population. In all, 1293 households were surveyed in 2001. The Household Survey collected detailed socioeconomic, migration, and demographic information, as well as a consumption expenditure module for a subset of households. The principal food crop in the district is corn (maize), which is grown by 84 percent of households, while the main cash crop is cotton, grown by 64 percent of households. Only two percent of households use irrigation rather than rain-fed agriculture, and six percent have a household member with a salaried formal sector job.

The Household data indicates that extreme rainfall leads to sharp income drops in Meatu district. Regressing average village income in 2001 (from the consumption expenditure survey) on an indicator for extreme rainfall in that year, as well as on geographic division indicators and other village characteristics – including average educational attainment, proportion of households growing a cash crop, proportion ethnic Sukuma, proportion who follow traditional religions, number of households in the village, and the density of women's groups – indicates that average income is approximately 37 U.S. dollars lower – nearly 20 percent of average income – in villages experiencing extreme rainfall, and this effect is statistically significant at 90 percent confidence (results not shown). Ideally, we would have income data for each village in each year of the study, and would employ an instrumental variable approach to identify the effect of income on murders (using rainfall as an instrument for income in the first stage). However, in the absence of longitudinal income data, we instead focus on the reduced-form impact of extreme rainfall on murder, as discussed in the following section.

5. The Estimation Strategy

There is longitudinal data for the 66 villages with complete survey information over eleven years, 1992-2002. M_{kt} is the number of witch murders in village k during year t. The number of murders is a

function of X_{kt}, village socioeconomic, demographic, and disease characteristics collected in the 2001-2002 surveys (described above), as well as of an indicator variable for extreme rainfall, R_{kt}, which takes on a value of one if a drought or flood occurred in village k during year t according the Village Council reports and zero otherwise. To the extent that extreme rainfall reports are "noisy", this would attenuate coefficient estimates toward zero and yield lower bounds on the true rainfall effects. The idiosyncratic village-year disturbance term, ε_{kt}, is included in all specifications, and we allow regression disturbance terms to be correlated across years for the same village, but to be independent across villages. The basic estimation equation becomes:

$$M_{kt} = \alpha_1 + X_{kt}'\beta_1 + \gamma_1 R_{kt} + \varepsilon_{1kt} \qquad (2)$$

Other dependent variables include the number of non-witch murders in a year, the total number of murders in a year, and the total number of witch murders and attacks, as well as murder rates. Ethnographic evidence from Tanzania asserts that witch killings may occur after a series of unexplained deaths of people or livestock, and to explore this possibility we also include controls for disease epidemic years in certain specifications. We also interact village explanatory variables – for example, the proportion of people who follow traditional religions in the village, average education levels, the proportion of Sukuma individuals, and the density of women's community groups – with the extreme rainfall indicator variable to test whether villages with particular characteristics are particularly prone to witch killings in years with extreme rainfall.

Village-level fixed effects (α_i) capture time-invariant omitted variables – most obviously geographical factors – that could be correlated with both rainfall and with murder, as in Equation 3, and now X_{kt} includes only time-varying village characteristics, such as disease outbreaks. This yields our best empirical specification:

$$M_{kt} = \alpha_{2i} + X_{kt}'\beta_2 + \gamma_2 R_{kt} + \varepsilon_{2kt} \qquad (3)$$

The possibility of food relief in famine years somewhat complicates the interpretation of the coefficient estimate on extreme rainfall. The 2001 survey indicates that 73 percent of villages in Meatu district had received some free food aid from the Tanzanian government or a non-governmental organization in the recent past (although we unfortunately do did not collect information on the precise years of relief), highlighting the chronic food insecurity in this district. The provision of relief supplies improves income and blunts the within-household resource conflicts that I argue above are an underlying cause of witch murders. This biases the coefficient estimates toward zero, in which case they should again be interpreted as lower bounds on the effect in the absence of relief aid.

There are a number of reasons to focus on rainfall variation as the key explanatory variable rather than on famine years. One concern related to the Village Council's classification of years into "famine" and non-famine years. The coefficient estimate on famine will be downward biased if years when food aid arrives are considered full-fledged "famines", but years when food aid does not arrive are less likely to be considered "famines", even if food conditions were equally bad in both years. Specifications including an indicator for famine as the key explanatory variable are presented in the Appendix, and these generate broadly similar to – though somewhat weaker than –specifications in which extreme rainfall is the key explanatory variable.[11]

6. Empirical Results

The summary statistics illustrate patterns in the survey data (Table 1). Extreme rainfall occurs approximately once every six years, typically from drought, but also from flooding (including the massive El Niño flooding of 1998). Famine and human disease epidemics also typically occur

[11] Omitted variable bias may also be a problem when estimating the impact of famine on murder rates. One possibility is that villages with poorly performing local institutions could experience both more frequent famines and more murders, generating a spurious upward bias in the estimated γ. Alternatively, villages with strong traditional institutions, most importantly the *Sungusungu*, have more effective community mutual insurance mechanisms – and thus less famine – and also higher witch murder rates; this would generate a downward bias in the estimated γ. This omitted variable is potentially time varying – the strength of the *Sungusungu* is a function of its leadership, and they hold frequent elections – and thus would not be captured by a village fixed effect.

approximately once every six years (the means are 0.17 and 0.15, respectively), while livestock epidemics are quite rare during the period.

There are 0.18 murders per village-year on average, or roughly one per village every five years.[12] Murders are evenly divided between witch murders and non-witch murders, both at 0.09 murders per year, for a total of 66 witch murders and 67 non-witch murders during the period. There are also approximately as many non-fatal witch attacks as witch murders.

Annual per capita income in 2001 was only roughly $200, meaning that households in this area are poor even for Tanzania, one of the poorest countries in the world, with per capita income of approximately $270 (UNDP 2002). The average household survey respondent had only 4.5 years of education, again below the Tanzanian average (United Republic of Tanzania 1999). Poor roads to neighboring districts and low grain storage rates combine to produce large fluctuations in the price of grain through the calendar year, further evidence on the high degree of food insecurity in this area. The Sukuma ethnic group make up nearly 90 percent of the population of this area, and the district has a high rates of adherence to traditional religions, at 65 percent. There are only two women's community groups per village on average.

Nineteen percent of the variation in extreme rainfall is explained with village fixed effects (result not shown), indicating that the bulk of the variation is across years rather than across villages.[13] Extreme rainfall years are associated with famine: the coefficient estimate on extreme rainfall is 0.44 (Table 2, regression 1).[14] Drought and flood entered separately are both also highly significant predictors of famine (regression 2). Extreme rainfall is uncorrelated with livestock disease epidemics and human disease epidemics (regressions 3-4), which is somewhat surprising since malnutrition typically leaves individuals susceptible to infection.

[12] The annual murder rate in Meatu from 1992-2002 is roughly 6 per 100,000 population, comparable to the U.S. rate of approximately 8 per 100,000 population during the 1990s (http://www.ojp.usdoj.gov/bjs/).
[13] Including village fixed effects and year indicators captures 29 percent of the variation in extreme rainfall.
[14] The results in Table 2 are similar if probit estimation is used rather than linear regression.

Extreme rainfall is strongly positively associated with witch murders in these villages (Table 3, regression 1). Extreme rainfall is associated with 0.087 more witch murders per year (statistically significant than zero at 95 percent confidence) in the village fixed effects specification, our best empirical specification. This implies that there are over twice as many witch murders in years of extreme rainfall as in other years. Figures 1 and 2 illustrate the positive relationship between the proportion of villages experiencing extreme rainfall and witch murders graphically by year for 1992 to 2002, and by division-year (a division is an administrative unit, and there are three divisions in Meatu). Drought and flood both have a similar impact on murders (results not shown).

Yet extreme rainfall is unrelated to the number of non-witch murders in these villages: the point estimate on extreme rainfall is near zero (Table 3, regression 2). Taking both types of murder together, extreme rainfall has a positive but marginally statistically significant effect (p-value = 0.16) on total murders (regression 3).

Villages with higher average socioeconomic status have fewer witch murders, and this relationship is particularly strong for villages with higher average educational levels (Table 4, regression 1), and is negative (but insignificant) for both average village income and the proportion of village residents who grow cash crops. The proportion of residents who follow traditional religions and the density of women's groups are not significantly associated with witch murders, but the proportion of Sukuma residents is positively and marginally statistically significantly related to witch murders (coefficient estimate 0.14, standard error 0.08). This coefficient is difficult to interpret: residents of Sukuma areas may have the most strongly held witchcraft beliefs; homogeneous communities may be more successful at mobilizing to eliminate "witches"; or the proportion of Sukumas could be proxying for an unmeasured local socioeconomic characteristic. Average income is strongly negatively related to non-witch murders, while villages with larger populations have more such murders.[15]

[15] However, conditional on the other socioeconomic controls, villages with higher average educational attainment have unexpectedly *more* non-witch murders. It is unclear how to interpret this result.

The main witch murder results are robust to the inclusion of controls for extreme rainfall in the preceding and following years (Table 5, regression 1), the inclusion of explanatory variables for disease epidemic outbreaks (regression 2), and largely robust to the inclusion of year fixed effects (regression 3), although in the latter case the point estimate falls from 0.087 to 0.062 is only marginally significant (p-value = 0.12). This drop is not unexpected since large parts of the district may be subject to common weather shocks, such as El Niño flooding in 1998. The results are also robust to the use of a murder rate (murders per 1000 households, Table 6 regression 2), and somewhat robust to the use of witch killings plus attacks (regressions 3-4) as dependent variables, and to the inclusion of an indicator variable for 2002 (results not shown).

Witch murders in years of extreme rainfall are concentrated in villages in which more residents practice tradition religions (Table 7, regression 1): the estimated effect of extreme rainfall in villages where all residents practice traditional religions is statistically significant at over 90 percent confidence. In contrast, the effect of extreme rainfall on witch murders is not significantly different in villages with more Sukumas (regression 2), higher education levels (regression 3), more local women's groups (regression 4), or income (results not shown).[16]

6.1 Characteristics of the Victims

Witch killing victims are nearly all female (96 percent, Table 8, Panel A)[17], with relatives living in the village (98 percent), and ethnically Sukuma (96 percent). Both the median and mean victim age is over 50 years, and a non-trivial proportion lived alone at the time of the attack (unfortunately we did not collect information on widow status, but it is reported that these women are often widows).

[16] There are more witch murders in famine years but the relationship is not statistically significant at traditional confidence levels (Appendix Table 1, regression 2). A specification in which extreme rainfall serves as the instrument for a famine year yields a point estimate of 0.20 (standard error 0.11), although this estimate is potentially misleading since extreme rainfall that does not result in a famine may still be associated with negative income shocks and food shortages (i.e., the exclusion restriction fails to hold).

[17] In fact, only two victims during this period were male. In one case, the victim was the husband of the intended female "witch", but he was reportedly accidentally killed with bows and arrows at night while walking around his homestead when the killers mistook him for his wife. The victim's wife subsequently fled the village for safety. The author was present at the interview at which this information was collected (August 2002).

Along three dimensions of property ownership, victims tend to be either "below average" or "average" in terms of socioeconomic status (Table 8, Panel B). For example, in terms of livestock ownership, 55 percent of victims were below average for the village, 38 percent were average, and only 8 percent above average. Similarly for asset ownership (of household goods, like a radio) 69 percent were below average and none above average, while the figures are more balanced for land ownership.

Witch murders are concentrated in the six month pre-harvest, or "hungry", period from February to July, when most food stores have been exhausted, and there is a sharp drop in witch murders immediately after the harvest (Table 8, Panel C). The hypothesis that the proportion of witch murders is the same in the pre-harvest and post-harvest periods is rejected at 99 percent confidence.

7. Conclusion

This paper argues that extreme poverty is a key underlying cause of the brutal murder of elderly women as "witches" in rural East Africa. Years of extreme rainfall – either drought or famine – lead to large negative income shocks and food insecurity for villages in rural western Tanzania, and to a doubling of witch murders. These are typically murders of elderly women accused of causing misfortune for their families, including crop failure and illness. The murders are particularly likely to occur in poor households, and in poor villages, during the "hungry" season of the year. There is no significant relationship between extreme rainfall and non-witch murders, although we do find that poorer villages do generally have higher non-witch murder rates. Taken together, these results provide novel empirical evidence on the causal link between extreme poverty and violent crime in rural Africa.

A natural next question is what public policy can do to address the issue of witch killings in Tanzania. The most immediate solution would be to more aggressively prosecute witch killers in Tanzanian courts, and target apprehension efforts in the areas where most crimes occur. However, this is likely to be strongly resisted – as past attempts have been – by residents of the region, most of whom believe that killing witches ultimately promotes community welfare. A potentially more attractive

option is for the government – or for non-governmental organizations and donors – to provide elderly women in this area with regular old age pensions, which would transform elderly women from a net household economic liability into an asset.[18]

[18] The number of witch killings in Northern Province, South Africa has dropped since the introduction of the old age pension in the early 1990s (Singer 2000), although it is difficult to establish causality given the dramatic political and social changes that also occurred in South Africa during the 1990s. Old age pensions may also have positive welfare consequences for other household members. For recent estimates of the impact of elderly pensions on child nutrition in South Africa, refer to Duflo (2000).

8. Tables and Figures

Table 1: Descriptive Statistics

	Mean	Std dev.	Obs.
Panel A: Natural calamities, per village-year			
Extreme rainfall (drought or flood)	0.17	0.37	725
Drought	0.11	0.31	725
Flood	0.06	0.23	725
Famine	0.17	0.37	725
Livestock disease epidemic	0.01	0.09	725
Human disease epidemic (e.g., cholera, diarrhea, measles)	0.15	0.36	725
Panel B: Crimes, per village-year			
Witch murders	0.09	0.32	725
Witch murders per 1000 households	0.25	0.99	725
Witch murders and attacks	0.19	0.58	725
Witch murders and attacks per 1000 households	0.55	1.85	725
Total murders	0.18	0.52	725
Non-witch murders	0.09	0.40	725
Panel C: Village characteristics			
Annual per capita consumption expenditures (USD)	195.3	78.2	725
Average years of education	4.5	1.7	725
Proportion Sukuma ethnic group	0.90	0.17	725
Proportion households grow cash crops	0.64	0.30	725
Households per village	409.2	176.4	725
Proportion practice traditional religions	0.65	0.26	725
Women's community groups per household	0.0041	0.0048	725

Table 1 Notes:
1) Data are from the 2001-2002 Household Survey and 2001-2002 Village Council Surveys. In the Household Survey, both men and women were surveyed, though two-thirds of respondents were men. Year 2002 data is for the period January to August 2002 (and was collected in July-August 2002).

Table 2: Extreme Rainfall and Village Calamities

	Dependent variable:			
	Famine		Livestock disease epidemic	Human disease epidemic
Explanatory variable	OLS (1)	OLS (2)	OLS (3)	OLS (4)
Extreme rainfall (drought or flood)	0.44***		0.010	-0.03
	(0.07)		(0.008)	(0.05)
Drought		0.56***		
		(0.08)		
Flood		0.22**		
		(0.09)		
Village fixed effects (66 villages)	Yes	Yes	Yes	Yes
R^2	0.23	0.27	0.11	0.06
Root MSE	0.35	0.34	0.08	0.37
Number of observations	725	725	725	725

Table 2 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level.

Table 3: Rainfall and Murder across Time

	Dependent variable:		
	Witch murders	Non-witch murders	Total murders
	OLS	OLS	OLS
Explanatory variable	(1)	(2)	(3)
Extreme rainfall (drought or flood)	0.087**	-0.001	0.086
	(0.044)	(0.035)	(0.061)
Village fixed effects (66 villages)	Yes	Yes	Yes
R^2	0.16	0.11	0.12
Root MSE	0.32	0.41	0.53
Number of observations	725	725	725

Table 3 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level.

Table 4: Rainfall and Murder across Villages

	Dependent variable:		
	Witch murders	Non-witch murders	Total murders
	OLS	OLS	OLS
Explanatory variable	(1)	(2)	(3)
Annual per capita consumption expenditures (USD) / 100	-0.037	-0.049**	-0.086**
	(0.028)	(0.024)	(0.041)
Average years of education	-0.022**	0.020*	-0.002
	(0.009)	(0.010)	(0.014)
Proportion Sukuma ethnic group	0.14*	-0.05	0.09
	(0.08)	(0.08)	(0.13)
Proportion households grow cash crops	-0.01	-0.09	-0.10
	(0.05)	(0.07)	(0.08)
Households per village / 1000	0.03	0.24**	0.26
	(0.12)	(0.09)	(0.17)
Proportion practice traditional religions	0.07	-0.02	0.05
	(0.06)	(0.07)	(0.09)
Women's community groups per household	0.2	-3.8	-3.6
	(3.5)	(3.7)	(4.8)
R^2	0.19	0.26	0.24
Root MSE	0.12	0.13	0.17
Number of observations	66	66	66

Table 4 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. A control for the proportion of years with extreme rainfall is also included as an explanatory variable (coefficient estimate not presented).

Table 5: Rainfall and Witch Murders, Robustness

	Dependent variable: Witch murders		
	OLS	OLS	OLS
Explanatory variable	(1)	(2)	(3)
Extreme rainfall (drought or flood)	0.082*	0.087**	0.062
	(0.044)	(0.044)	(0.039)
Extreme rainfall (drought or flood), in previous year	-0.004		
	(0.029)		
Extreme rainfall (drought or flood), in next year	0.046		
	(0.051)		
Livestock disease epidemic		-0.057*	
		(0.031)	
Human disease epidemic		-0.006	
		(0.036)	
Village fixed effects (66 villages)	Yes	Yes	Yes
Year fixed effects (11 years)	No	No	Yes
R^2	0.16	0.16	0.19
Root MSE	0.32	0.32	0.31
Number of observations	725	725	725

Table 5 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level.

Table 6: Rainfall, Witch Murders and Witch Attacks

	Dependent variable:			
	Witch murders	Witch murders per 1000 households	Witch murders and attacks	Witch murders and attacks per 1000 households
	OLS	OLS	OLS	OLS
Explanatory variable	(1)	(2)	(3)	(4)
Extreme rainfall (drought or flood)	0.087**	0.178*	0.149*	0.213
	(0.044)	(0.098)	(0.086)	(0.168)
Village fixed effects (66 villages)	Yes	Yes	Yes	Yes
R^2	0.16	0.16	0.12	0.11
Root MSE	0.32	0.84	0.56	1.56
Number of observations	725	725	725	725

Table 6 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level.

Table 7: Village Characteristics and Witch Murders

	Dependent variable: Witch murders			
	OLS	OLS	OLS	OLS
Explanatory variable	(1)	(2)	(3)	(4)
Extreme rainfall (drought or flood)	-0.11	0.056	0.032	0.026
	(0.011)	(0.120)	(0.119)	(0.056)
Extreme rainfall *	0.27			
Proportion practice traditional religions	(0.17)			
Extreme rainfall *		0.003		
Proportion Sukuma ethnic group		(0.145)		
Extreme rainfall *			0.007	
Average years of education			(0.025)	
Extreme rainfall *				11.5
Women's community groups per household				(10.0)
Village controls	Yes	Yes	Yes	Yes
R^2	0.03	0.03	0.03	0.03
Root MSE	0.32	0.32	0.32	0.32
Number of observations	725	725	725	725

Table 7 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level. The village controls are the same as Table 3. Village fixed effects are not included.

Table 8: Victim Characteristics

	Mean
Panel A: Demographic characteristics	
Female	0.96
Age	57.6
Sukuma ethnic group	0.96
Lived alone	0.13
Had relatives in the village	0.98
Panel B: Socioeconomic characteristics	
Livestock ownership:	
"Below average"	0.55
"Average"	0.38
"Above average"	0.08
Asset ownership:	
"Below average"	0.69
"Average"	0.31
"Above average"	0
Land ownership:	
"Below average"	0.32
"Average"	0.57
"Above average"	0.11
Panel C: Timing of witch murders	
Pre-harvest/harvest season (February through July)	0.74
Post-harvest season (August through January)	0.26
Months:	
January	0.02
February	0.02
March	0.07
April	0.21
May	0.12
June	0.12
July	0.19
August	0.07
September	0.05
October	0
November	0.05
December	0.07

Table 8 Notes:
1) Data are from the 2002 Village Council Survey. The standard deviation of victim age is 12.9 years. Asset ownership data is missing for 4 of 53 victims, and month data is missing for 11 of 53 victims.

Figure 1: Proportion of Villages with Extreme Rainfall and Average Witch Murders, by Year (1992-2002)

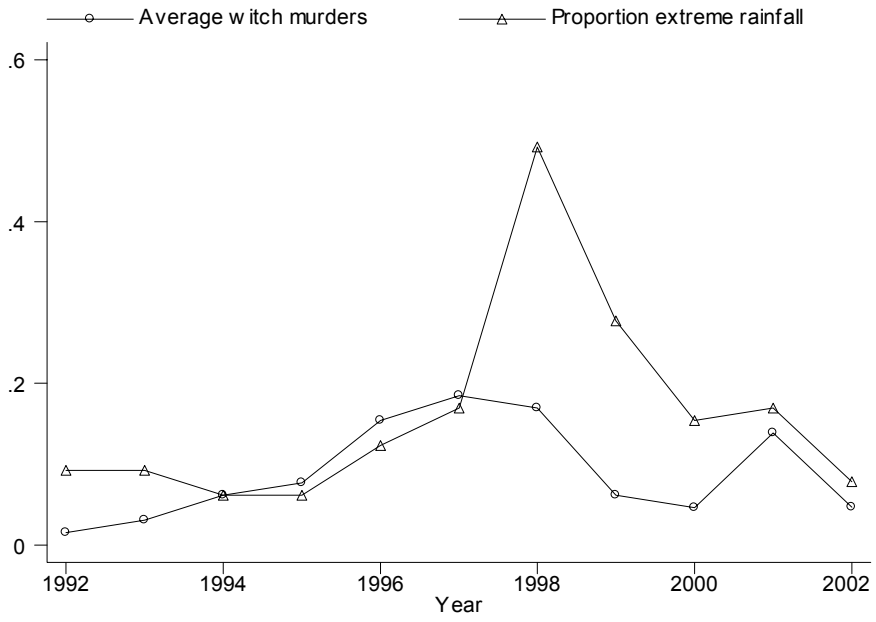
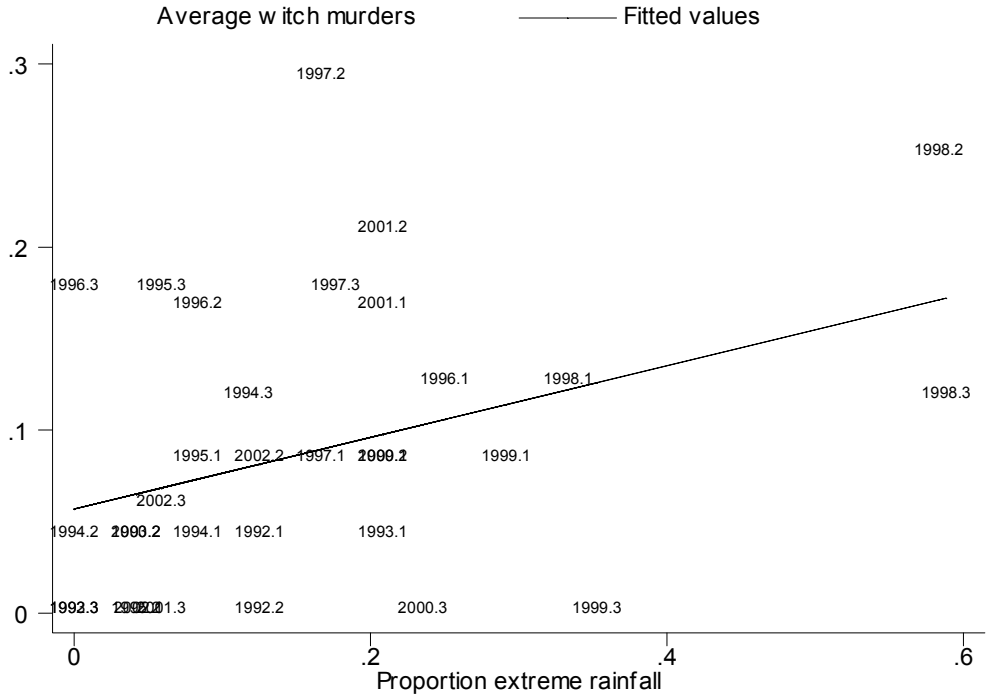


Figure 2: Proportion of Villages with Extreme Rainfall versus Average Witch Murders, by Division-Year (1992-2002)



Notes: The data for 2002 are for January through July/August.

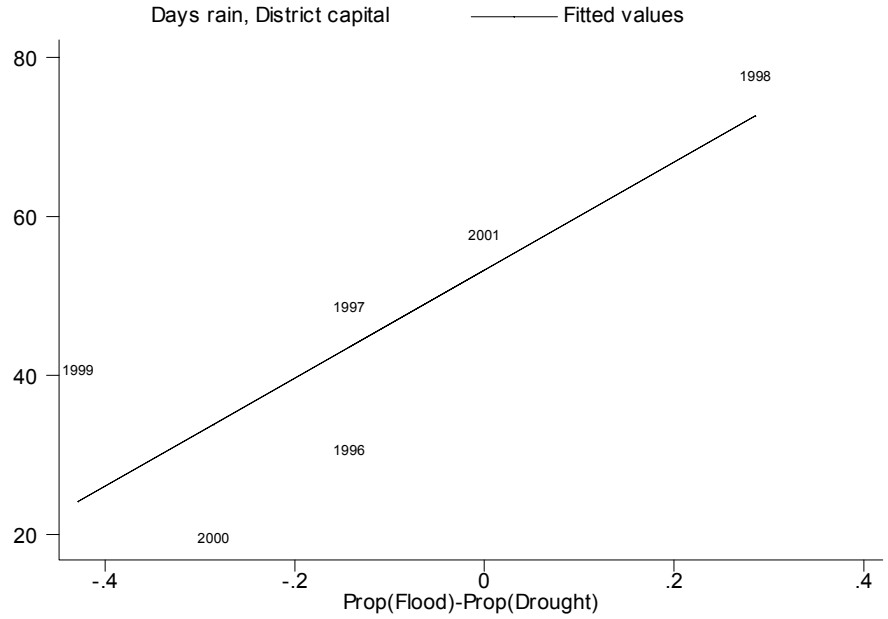
9. Appendix

Appendix Table 1: Rainfall and Famine

	Dependent variable: Witch murders		
	OLS	OLS	IV
Explanatory variable	(1)	(2)	(3)
Extreme rainfall (drought or flood)	0.087**		
	(0.042)		
Famine		0.036	0.20*
		(0.037)	(0.11)
Village fixed effects (66 villages)	Yes	Yes	Yes
R^2	0.15	0.15	-
Root MSE	0.32	0.32	0.32
Number of observations	725	725	725

Appendix Table 1 Notes:
1) Huber robust standard errors in parentheses. Significantly different than zero at 90% (*), 95% (**), 99% (***) confidence. Regression disturbance terms are clustered at the village level. The instrumental variable in Regression 3 is the indicator variable for Extreme Rainfall.

Appendix Figure 1:
Proportion of villages near the district capital with floods minus the proportion with drought, versus number of rainfall days in the capital (by year)



10. References

Abrahams, Ray. (1987). "Sungusungu: Village Vigilante Groups in Tanzania", *African Affairs*, 86(343), 179-196.

Abrahams, Ray. (1994). *Witchcraft in Contemporary Tanzania*. African Studies Center, University of Cambridge.

Abrahams, Ray, and Sufian Bukurura. (1992). "Party, Bureaucracy, and Grassroots Initiatives in a Socialist State: The Case of Sungusungu Village Vigilantes in Tanzania", in C.M. Hann (ed.) *Socialism: Ideals, Ideologies, and Local Practice*, Routledge: London and New York.

Amnesty International. (2001). *Amnesty International 2001 Annual Report*, London.

Ashforth, Adam. (2002). "An Epidemic of Witchcraft? The Implications of AIDS for the Post-Apartheid State", *African Studies*, 61(1), 121-143.

Baxter, P.T.W. (1972). "Absence makes the heart grow fonder: Some suggestions why witchcraft accusations are rare among East African pastoralists", in Max Gluckman (ed.), *The Allocation of Responsibility*. Manchester University Press.

Becker, Gary. (1981). *A Treatise on the Family*. Harvard University Press.

Becker, Gary. (1968). "Crime and Punishment: An Economic Approach", *Journal of Political Economy*, 76, 169-217.

Becker, Jasper. (1998). *Hungry Ghosts: Mao's Secret Famine*. Henry Holt Publishers.

Behringer, Wolfgang. (1999). "Climatic Change and Witch-Hunting: The Impact of the Little Ice Age on Mentalities", *Climatic Change*, 43, 335-351.

Boyer, Paul, and Stephen Nissenbaum. (1974). *Salem Possessed: The Social Origins of Witchcraft*. Harvard University Press, Cambridge.

British Broadcasting Corporation [BBC]. (2001). "Ghana 'Witch' Sues Village Elders", April 6, 2001, BBC News Online.

British Broadcasting Corporation [BBC]. (2002). "Tackling 'Witch' Murders in Tanzania", October 29, 2002, BBC News Online.

Bukurura, Sufian Hemed. (1994). "The Maintenance of Order in Rural Tanzania", *The Journal of Legal Pluralism and Unofficial Law*, 34, 1-29.

Collier, Paul, and Anke Hoeffler. (2000). "Greed and Grievance in Civil War", *World Bank Research Paper #2355.*

Dercon, Stefan, and Pramila Krishnan. (2000a). "Vulnerability, Seasonality and Poverty in Ethiopia", *Journal of Development Studies*, 36(6), 25-53.

Dercon, Stefan, and Pramila Krishnan. (2000b). "In Sickness and in Health: Risk Sharing within Households in Rural Ethiopia", *Journal of Political Economy*, 108(4), 688-727.

Duflo, Esther. (2000). "Grandmothers and Granddaughters: Old Age Pension and Intra-household Allocation in South Africa", unpublished manuscript, MIT.

Empowering Widows in Development [EWD]. (2002). "10 Country Report" (http://www.oneworld.org/empoweringwidows/10countries/).

Evans-Pritchard, E.E. (1937). *Witchcraft, Oracles and Magic among the Azande*, Oxford: Clarendon Press.

Fajnzylber, Pablo, Daniel Lederman, and Norman Loayza. (2002). "What Causes Violent Crime?", *European Economic Review*, 46, 1323-1357.

Fearon, James D., and David D. Laitin. (2001). "Ethnicity, Insurgency, and Civil War", presented at Annual Meetings of the American Political Science Association, San Francisco, California.

Gluckman, Max (ed.). (1972). *The Allocation of Responsibility*. Manchester University Press.

Green, Maia. (1994). "Shaving Witchcraft in Ulanga: Kunyolewa and the Catholic Church", in Ray Abrahams (ed.) (1994). *Witchcraft in Contemporary Tanzania*. African Studies Center, University of Cambridge.

Grossman, Herschel, and Minseong Kim. (1995). "Swords or Plowshares? A Theory of the Security of Claims to Property", *Journal of Political Economy*, 103(6), 1275-1288.

Hoddinott, John, and Bill Kinsey. (2001). "Child Growth in the Time of Drought", *Oxford Bulletin of Economics and Statistics*, 63(4), 409-436.

Knack, Steven. (1994). "Does Rain Help the Republicans? Theory and Evidence on Turnout and the Vote", *Public Choice*, 79(1-2), 187-209.

Mehlum, Halvor, Karl Ove Moene, and Ragnar Torvik. (2000). "Crime-Induced Poverty Traps", unpublished manuscript, Norwegian University of Science and Technology.

Mesaki, Simeon. (1994) "Witch-killing in Sukumaland", in Ray Abrahams (ed.) (1994). *Witchcraft in Contemporary Tanzania*. African Studies Center, University of Cambridge.

Mombeshora, Solomon. (1994). "Witches, Witchcraft and the Question of Order: A View from a Bena Village in the Southern Highlands", in Ray Abrahams (ed.) (1994). *Witchcraft in Contemporary Tanzania*. African Studies Center, University of Cambridge.

Mui, Vai-Lam. (1995). "The Economics of Envy", *Journal of Economic Behavior and Organization*, 26, 311-336.

Nugent, Jeffrey B. and Nicholas Sanchez. (1999). "The Local Variability of Rainfall and Tribal Institutions: The Case of Sudan", *Journal of Economic Behavior and Organization*, 39, 263-291.

Oster, Emily. "Witchcraft, Weather and Economic Growth in Medieval Europe", unpublished manuscript, Harvard University.

Paxson, Christina. (1992). "Using Weather Variability to Estimate the Response of Savings to Transitory Income in Thailand", *American Economic Review*, 82(1), 15-33.

Rose, Elaina. (1999). "Consumption Smoothing and Excess Female Mortality in Rural India", *Review of Economics and Statistics*, 81(1), 41-49.

Rosenzweig, Mark R., and T. Paul Schultz. (1982). "Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Child Survival in Rural India", *American Economic Review*, 72(4), 803-815.

Rowlands, Alison. (1998). "Telling Witchcraft Stories: New Perspectives on Witchcraft and Witches in the Early Modern Period", *Gender and History*, 10(2), 294-302.

Singer, Rena. (2000). "Anti-Witch Hunting Laws Create Tension in South Africa", *Christian Science Monitor*, Dec. 6, 2000.

United Nations Development Program. (1998). *Shinyanga Human Development Report.*

United Nations Development Program. (2002). *2002 Human Development Report: Deepening Democracy in a Fragmented World*. Oxford University Press.

United Republic of Tanzania. (1999). *Shinyanga Region Socio-Economic Profile*.

Von Cott, Donna Lee. (2000). "A Political Analysis of Legal Pluralism in Bolivia and Colombia", *Journal of Latin American Studies*, 32, 207-234.

Wendel, Margareta, and Gerd Holmboe-Ottesen. (1992). "Food Availability and Nutrition in a Seasonal Perspective: A Study from the Rukwa Region in Tanzania", *Human Ecology*, 20(1), 89-107.