



## Household capacities, vulnerabilities and food insecurity: Shifts in food insecurity in urban and rural Ethiopia during the 2008 food crisis

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### ABSTRACT

The global food crisis of 2008 led to renewed interest in global food insecurity and how macro-level food prices impact household and individual level wellbeing. There is debate over the extent to which food price increases in 2008 eroded food security, the extent to which this effect was distributed across rural and urban locales, and the extent to which rural farmers might have benefited. Ethiopia's food prices increased particularly dramatically between 2005 and 2008 and here we ask whether there was a concomitant increase in household food insecurity, whether this decline was distributed equally across rural, urban, and semi-urban locales, and to what extent pre-crisis household capacities and vulnerabilities impacted 2008 household food insecurity levels. Data are drawn from a random sample of 2610 households in Southwest Ethiopia surveyed 2005/6 and again in mid to late 2008. Results show broad deterioration of household food insecurity relative to baseline but declines were most pronounced in the rural areas. Wealthier households and those that were relatively more food secure in 2005/6 tended to be more food secure in 2008, net of other factors, and these effects were most pronounced in urban areas. External shocks, such as a job loss or loss of crops, experienced by households were also associated with worse food insecurity in 2008 but few other household variables were associated with 2008 food insecurity. Our results also showed that rural farmers tended to produce small amounts for sale on markets, and thus were not able to enjoy the potential benefits that come from greater crop prices. We conclude that poverty, and not urban/rural difference, is the important variable for understanding the risk of food insecurity during a food crisis and that many rural farmers are too poor to take advantage of rapid rises in food prices.

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### Introduction

Beginning in 2007 and reaching into late 2008, global food prices increased dramatically and rapidly. The FAO's food price index, an index of global food prices, soared to a peak that was nearly 160% greater than its lowest point in 2007 (FAO, 2011). This increase in prices led to renewed interest in the topic of global food insecurity, driven in part by intense media interest in the food crisis and the consequent food riots that broke out in countries around the world (Benson, Minot, Pender, Robles, & von Braun, 2008). As media interest died down, a number of questions remained about

the extent to which global prices are transmitted to local markets, and ultimately to households and those within. To date, much of the work addressing these questions has been based on simulation studies that examine the impact on consumption of a given increase in food prices. These exercises have typically relied on pre-crisis data, and sought to simulate the impact of a given rise in food prices on the expected caloric intake (Aksoy & Isik-Dikmelik, 2008; FAO, 2008; Ivanic & Martin, 2008). Other studies have relied on analyses of past crises to gain general insights into who is or who is not at risk during a crisis (Ruel, Garrett, Hawkes, & Cohen, 2010). Still others have examined shifts in the prevalence of malnutrition during the food crisis period, at both the local and national level. Yet, as Ruel et al (2010: 170S) notes in a recent review, "... Given the recent onset of the 2007–2008 food price crisis, little empirical evidence exists at this point on its impact on poverty, food security,

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and nutrition.” And, more recently, Naylor and Falcon (2010) noted that the question remains, “...how do price shocks and variability affect food security for people on the ground?” A recent review of the existing evidence addressing this very question highlighted that the poorest of the poor were disproportionately impacted by the crisis, but it also highlighted the limited number of empirical studies that examined shifts in food insecurity and spotlighted methodological shortcomings with the studies that had been carried out (Compton, Wiggins, & Keas, 2010). We thus aim to complement these existing studies by focusing on the empirical distribution of household food insecurity in southwest Ethiopia before and during a period of high food prices.

Food insecurity occurs when an individual has limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (Anderson, 1990). Food insecurity is closely related to other widely discussed concepts like food insufficiency and hunger but has the important distinction that one can be food insecure but still be consuming sufficient energy and meeting micronutrient demands. This is because a household can be food insecure if members are concerned about accessing food in the near future. This is critical because the thought of having insufficient food tomorrow can impact on behaviors today. It is very likely that if one is food insecure for some time then their dietary quality and or quantity will be compromised and undernutrition may be induced. Examining the distribution of food insecurity will likely provide more general insights into patterns of risk and vulnerability because the health consequences of food insecurity are many and varied. Food insecure households in low-income countries often have diets that are less diverse (Becquey et al., 2010; Belachew, Hadley, & Lindstrom, 2008; Hadley, Borgerhoff Mulder, & Fitzherbert, 2007) and perhaps of lower energy content, leading to poorer nutritional status (Hackett, Melgar-Quinonez, & Alvarez, 2009; Sarlio-Lahteenkorva & Lahelma, 2001; Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009). Evidence is also accumulating that the nutritional consequences are but one piece of a larger food insecurity syndrome. Food insecurity is also associated with higher symptoms of common mental disorders (Heflin, Siefert, & Williams, 2005; Weaver & Hadley, 2009) and diagnoses of mental disorder (Sorsdahl et al., 2010). Varied evidence also supports a link between the experience of food insecurity and high-risk sexual behavior among women (Weiser et al., 2007) and to a lesser extent among men. Evidence also supports a link between household food insecurity and school enrollment, attendance, and achievement with some evidence suggesting that the negative impact is biased against girls (Ashiabi, 2005; Roustit, Hamelin, Grillo, Martin & Chauvin, 2010).

Given the far reaching population health implications of food insecurity, an understanding of its causes, consequences, and how these are distributed across households during times of rapid food price increases is important for thinking about how macro-level changes impact household and individual level-wellbeing. There is, however, debate over the distribution of impacts during the 2008 food crisis. One set of concerns is over the extent to which urban and rural households were disproportionately affected by the rise in food prices. Much of this debate has focused on the vulnerability of the urban poor, who spend a high percentage of their total budget on purchasing food. Collier (2008) stated this position succinctly, “The unambiguous losers when it comes to high food prices are the urban poor.” This is a legitimate concern for many parts of the world as the urban population increases in size: urban dwellers rely on purchasing large portions of their food, and are thus more fully exposed to market forces (Ruel, Haddad, & Garrett, 1999). A second set of questions has focused on the extent to which rural producers might actually benefit from higher

food prices; from this perspective high food prices may be viewed as pro-poor. This hypothesis suggests that as global and local food prices fluctuate, net food sellers will see benefit from higher food prices. Others have suggested that place and livelihood strategies are secondary to poverty as influences on households’ reaction to food price spikes (Naylor & Falcon, 2010).

The issue of the food price crisis’ impact and on equality in impacts is especially relevant in Ethiopia, a country with a large rural population and high levels of poverty. Ethiopia experienced particularly dramatic increases in food prices, with some evidence showing that beginning in mid-2004 Ethiopian food prices began increasing faster than global prices (Ulimwengu, Workneh, & Paulos, 2009). Minot (2010) notes that during the food crisis, in Ethiopia “food price increases were particularly high, ranging from 83% to 184%” higher than baseline domestic prices. The price of maize increased dramatically and the growth of the domestic price reached 236% of the increase in the world price (Minot, 2010).

In this paper our objective is to use data from a population-based sample of rural, urban, and semi-urban households in southwest Ethiopia to explore how household food insecurity might be affected by dramatic upward shifts in food prices. We ask three basic questions: First, did household-level food insecurity deteriorate from baseline levels following the food crisis? Second, if it did, was the deterioration distributed equally across geographic places and differing levels of socioeconomic status? Third, to what extent did existing household-level factors either improve or worsen households’ 2008 food insecurity status?

### **Household food insecurity, household capacities and vulnerabilities**

The ability to produce sufficient foods for one’s household at home is one way that a household could achieve food security. Another way is to generate sufficient income to purchase foods on the market. The former represents the stereotypical rural farmer and the latter the stereotypical urban dweller. We thus expect measures of home production, crops sales, and measures of income or wealth to be predictive of food insecurity. For the farmer, surplus harvest can also be sold to produce additional income, which is why some investigators have highlighted the potential gains that rural farmers might enjoy from higher food prices. In short, if farmers were selling a unit of maize for \$1 but are now selling it for \$2 then, all else equal, they should benefit in terms of greater income, which should translate into more food security. This suggests the hypotheses that wealth will be protective of 2008 food insecurity, and that rural locale, which might serve as a proxy for a household’s livelihood strategy, might be important. More specifically, farmers may benefit during a period of rising and high prices and not show evidence of declining food insecurity. It is also likely that households that already were experiencing high levels of food insecurity in 2005 are expected to be more vulnerable to high food insecurity in 2008, net of other factors.

While food insecurity is ultimately determined by insufficient income combined with the inability to purchase or produce foods, it has also been hypothesized that individuals may use their social networks, and the capital that resides in those networks to reduce the variance in their food consumption (Dirks, 1980; Shipton, 1990). Social capital is defined by Bourdieu as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition... which provides each of its member with the backing of the collectively-owned capital a ‘credential’ which entitles them to credit...” (Bourdieu, 1986: 249). By drawing on the resources of other households during difficult times, individuals might not experience food insecurity, or may experience it

to a lesser degree (Hadley, Borgerhoff Mulder, & Fitzherbert, 2007; Martin, Rogers, Cook, & Joseph, 2004). The efficacy of redistributive networks has, however, been hypothesized to be vulnerable to community-wide shocks; this is also referred to as covariate risk (Devereux, 2001). When all members of a community, and hence within a network, experience a shock and no one has surplus resources, then being a member of redistributive networks may not protect households from food insecurity. This suggests two hypotheses: first, social capital should be effective in reducing the likelihood that a household experiences food insecurity and second that the effectiveness of social capital on reducing the likelihood that a household experiences food insecurity should be greater in higher-income communities.

Households may also have existing vulnerabilities that elevate their risk of worse food insecurity in the 2008 food crisis. Households are susceptible to other shocks that may make them more vulnerable to food insecurity (Krishna, 2010). Household heads or members may experience illnesses that disallow them from engaging in productive activities, which may in turn erode household food insecurity. Leatherman's analysis of Peruvian households (Leatherman, 2005) for example shows that the poorest households can lose up to 75 person-days of work a year to illness. Households might also experience catastrophic losses to productive assets like land or oxen, or may lose jobs; that latter might be particularly critical for urban households given their reliance on income to purchase foods (Ruel et al., 1999).

Finally, several household composition factors have been highlighted as generating vulnerability among households. Two that we investigate here are female-headed households and the size of households. Female-headed households have been specifically identified as being at risk for experiencing poor food insecurity outcomes during food crises. The FAO for instance notes, "female-headed households ... are most vulnerable to sharp rises in basic food prices." (FAO, 2008) All else equal households that are larger have higher energy demands, and thus must be more likely to experience poor food insecurity, net of other factors.

## Methods

The data for this study come from the households of the ongoing Jimma Longitudinal Survey of Youth. The study population occupies three diverse agro-ecological zones and includes urban, semi-urban, and rural settings in and around the city of Jimma, Ethiopia. The rural samples include households that appear at low density across the landscape. These households are heavily engaged in agriculture and typically lack access to electricity, piped water, or improved roads. The semi-urban households occur in market towns that include a high-density center with electricity, improved roads, and greater access to water. These sites are more heterogeneous in livelihood strategy with a mixed of agricultural and non-agricultural employment. The urban site is a high-density town that includes a university, teaching hospital, various clinics, schools, places of worship, and business sectors. In the urban setting, households are densely packed against one another and enjoy electricity and close access to a variety of amenities; this is in stark contrast to the rural sites where households are often several kilometers apart.

Households were randomly sampled from within each study site with the sample size determined by the relative proportion of the study population in the site and the overall target sample size. This sampling plan produced representative samples of households in Jimma Town, the three outlying towns, and nine rural "neighborhoods". Household lists were verified and updated by interviewers to ensure that marginalized households were not systematically excluded. A trained interviewer obtained consent from the household head or spouse of the head to complete

a household survey. The household survey was completed in 2005–2006 and again in mid-2008. The study was approved by the ethical review boards at Jimma University and Brown University. This was a secondary data analysis carried out on anonymized data.

### *Household food insecurity*

Household level food insecurity was measured with a six item scale that was adapted from published food insecurity scales used in developing countries (Coates et al., 2006; Frongillo & Nanama, 2006; Webb, Coates, Frongillo, Rogers, Swindale, & Bilinsky, 2006). The items were included after much discussion with the interviewing team and pilot testing and reflect what appear to be universal expressions of food insecurity (Swindale & Bilinsky, 2006). The household head was asked a series of six questions which addressed whether the household ran out of food or did not have enough money to buy food in the last three months. The questions covered whether: (1) the respondent worried about running out of food, (2) the household ran out of food, (3) the variety of food for children was reduced, (4) the children did not have enough to eat, (5) the respondent or another adult did not eat enough, and (6) the respondent ever felt hungry but did not eat. These "Yes" responses were coded one and "No" responses coded zero, and the responses were summed to produce an index of household food insecurity, with higher values indicating poorer food insecurity. An analysis of the index showed that it had high internal consistency in both years and in rural, urban, and semi-urban sites (Cronbach's Alpha > 0.70). This scale appears to have good psychometric properties, high face validity, and good content validity (Belachew et al., 2011; Hadley, Belachew, Lindstrom, & Tessema, 2009; Hadley, Lindstrom, Tessema, & Belachew, 2008). Others have shown that dietary patterns and food insecurity shift during crises (Hartini, Padmawati, Lindholm, Surjono, & Winkvist, 2005; Piaseu & Mitchell, 2004; Studdert, Frongillo, & Valois, 2001).

### *Household wealth*

A summary index of material goods was created to measure household socioeconomic status. Using baseline data, we constructed the index of household wealth by surveying ownership across 18 items. The items included such things as functioning radios, televisions, cooking stoves, and various furniture items. We then converted this set of measures to a continuous variable using loadings on the first factor in a factor analysis, to closely match the wealth index used by the Demographic Health Surveys. The first factor is highly correlated with a simple asset index ( $r = 0.90$ ) and a crude measure of income. The substantive interpretation of our models remains unchanged when we substitute the index.

### *Household headship and membership*

Using data on self-reported household headship, we classified households as female-headed if a female reported herself as the head of household. Using data on reported household membership, we calculated the number of individuals who were mentioned as current household members; from this we summed to create a measure of household size. Unfortunately we did not have access to information about out-migrations, which might have been a coping strategy used to improve food security.

### *Household social capital*

The social capital construct was assessed by reading a list of tasks and asking the household head how difficult it would be to get help with each task from someone outside of the household;

this was meant to directly assess the “credit” an individual had within a large social network. The tasks included: finding someone to watch your children, borrowing a small amount of salt or coffee, getting help with a task like lifting a heavy object or engaging in agricultural work, borrowing 25 kg of flour, maize, teff, or wheat, borrowing money for medicine for a child, and borrowing 10, 50, and 100 Ethiopian birr. Possible responses were very easy, easy, difficult, and very difficult. Reliability analysis on these items revealed an alpha of 0.84 so the items were summed to create a single measure of social capital.

#### Portfolios diversity

We attempted to capture the diversity in household productive livelihoods by summing potential agricultural and business sources of income. The theory underlying this measure was that diversified portfolios may spread risk and therefore limit the negative impact of a food price shock.

#### Other household shocks

Household heads were also asked about the occurrence of other shocks to their household. We expected that these would predict poorer 2008 food insecurity because of their potentially damaging impact on household income, production, or wealth. Household heads were asked about: major crops loses, death of oxen or cows, loss of job, serious illnesses in the household last more than 3 months, disabling injuries, and death of close relative. Households that experience at least one of these shocks received a one, while all others received a zero.

#### Models

The dependent variable is a household’s reported level of food insecurity in 2008, measured on a seven-point scale. Since the number of outcome categories is large, we estimate the predictive effects of our covariates of interest using a multiple linear regression model. This model produces results that are substantively similar to a generalized linear model for ordinal outcome variables, but with less statistical complexity and lower computational burden. The drawback to this method is that it assumes the outcome categories are evenly spaced; that is, for example, the difference between food insecurity scores of zero and one are the “same” as the difference between scores of five and six. Multiple regression also treats the dependent variable as continuous and unbounded, which can potentially generate predicted values outside the observed range. That problem does not arise in the models we estimate. However, the predicted values do take on values between those in the observed scale, which is an explicit simplification in the interpretation of our results.

We begin by assessing average changes in levels of food insecurity for households in urban, semi-urban, and rural areas between 2005 and 2008. To explain variation in these outcomes, we first estimate a pooled regression model that includes households in all three study sites. This model produces precise estimates due to the large sample size, but requires the assumption that the effects of covariates are the same in each area. Because average levels of the independent variables differ across the three areas (wealth, for example, is much greater for urban than rural households), this assumption may lead to biased coefficient estimates. Thus, we relax this assumption by separating households by area and re-estimating the same regression model only for households that are urban, semi-urban, or rural. In each set of models, we condition on households’ “baseline” levels of food insecurity prior to the crisis in 2005. This enables us to capture both the overall

level and the change in food insecurity that households experienced between 2005 and 2008, given households’ capabilities and vulnerabilities outlined above.

#### Results

The original data set contains 3647 households with measured food insecurity levels in 2005. Of these, 518 were not re-interviewed in 2008. In urban settings 197 dropped out (14%), in semi-urban 192 dropped (18%), and in rural 129 households were not re-interviewed (11%). The average level of food insecurity was substantively similar among drop outs and those who continued (score of 2.5 vs. 2.7) as were wealth levels. A further 519 households were eliminated from the analysis because they reported in 2005 not having a child currently living in the house (Because two of the food insecurity questions specially ask about children’s dietary behaviors, these households were eliminated.) This leaves a total of 2610 households in the study.

In 2005, 40% of households did not endorse any of the food insecurity items (were completely food secure) whereas only 11% of households in 2008 did not endorse any items; this is the least severe definition of food insecurity and shows a marked increase in food insecurity. This increase in food insecurity was reported for all sites but the increase was greatest in rural areas, where 64% reported some insecurity in 2005, vs. 97% in 2008. The mean household food insecurity score increased by 1.0 point representing an increase of 36% between 2005 and 2008 (Table 1). The mean change in rural areas was 1.3 or 45%, the mean change in semi-urban was 0.7 for a 27% increase, and the mean change in urban areas was 0.9 points for a 32% increase.

#### Coping strategies and alternative shocks

Nearly a quarter of households reported in engaging in at least one coping strategy in the 3 months prior to the 2008 survey. Approximately 15% of households reported that someone in the household had to increase the number of income-generating activities in order to meet their needs – among those in urban sites, 22% of households reported this, compared to 17% in the semi-urban sites, and 8% in the rural sites. About 11% of households reported that students in the household had to miss school because they needed to help with income- or food-generating tasks; approximately 14% of rural households endorsed this, 11% of urban households and 7% of semi-urban households. Households that were more food insecure in 2008 were significantly more likely to have deployed at least one of these coping strategies. Among households scoring 4 or greater on the 2008 food insecurity

**Table 1**

Changes in household food insecurity scores across year and place, and descriptive statistics of explanatory variables. Standard deviations are reported in parentheses for non-dichotomous variables.

	All	Urban	Semi-urban	Rural
Food insecurity score, 2005	2.8 (2.5)	2.7 (2.6)	2.7 (2.5)	2.9 (2.4)
Food insecurity score, 2008	3.7 (1.8)	3.6 (2.1)	3.5 (1.8)	4.1 (1.3)
Change in mean food insecurity	1.0 <sup>a</sup>	0.9 <sup>a</sup>	0.7 <sup>a</sup>	1.3 <sup>a</sup>
Percent increase	36%	32%	27%	45%
Wealth index (–1 to 3.4)	0.0 (0.9)	0.6 (1.0)	0.1 (0.8)	–0.6 (0.2)
Social capital (1–28)	11.5 (4.8)	9.2 (5.1)	12.4 (4.7)	13.1 (3.8)
Portfolio diversity (0–8)	2.0 (2.3)	0.3 (0.9)	0.7 (1.4)	4.4 (1.6)
Female headed (0–1)	0.14	0.23	0.17	0.04
Own plot of land (0–1)	0.41	0.04	0.16	0.93
Other household stressors (0–1)	0.38	0.20	0.21	0.66
N	2610	939	693	978

<sup>a</sup>  $p < 0.01$ , paired difference of means test.

measure, 32% engaged in one or more of these coping strategies, compared to only 9% of those with lower food insecurity ( $P < 0.01$ ). Further, analyses show that even when controlling for 2006 food insecurity score, deploying one or more of these strategies was associated with worse 2008 food insecurity.

Rising prices were not the only assault on household wellbeing. Just over one third of respondents experienced an external shock to the household. Crop losses or damages were the most frequently endorsed shock, followed by loss or death of oxen, loss of a job, death of a close relative and the household paid for the burial, a serious illness lasting at least three months, and an injury causing disability. These were not randomly distributed across sites but the experience of each was associated with worse food insecurity in 2008; household response to the food security questionnaire increased by between 0.4 and 1.0 points indicating worsening food insecurity. The experience of a shock was a positive predictor of higher food insecurity in 2008, even after controlling for urban/rural setting and 2005 food insecurity score.

### Household capacities and vulnerabilities

Households tended to face higher levels of food insecurity in 2008 than they did in 2005. In bivariate analyses and consistent with theoretical expectations, 2008 food insecurity was associated with baseline household capacities such as wealth ( $r = -0.44$ ,  $P < 0.01$ ), social capital ( $r = -0.15$ ,  $P < 0.01$ ), 2005 food insecurity score ( $r = 0.35$ ,  $P < 0.01$ ), production portfolio diversity ( $r = 0.14$ ,  $P < 0.01$ ), female-headship ( $r = 0.06$ ,  $P < 0.01$ ), being landless ( $r = -0.13$ ,  $P < 0.01$ ) and shocks and coping responses (as noted above). Household size was not associated with 2008 food insecurity score.

Next we explored to what extent these existing capacities and vulnerabilities impacted on 2008 food insecurity while controlling for 2005 levels. Each of these variables was put into a multiple regression model (Table 2; excluding coping responses) predicting each household's 2008 food insecurity score. In the full model, which pools all geographic sites together, a range of household factors are found to predict household 2008 food insecurity score. Baseline food insecurity scores were positively associated with 2008 scores suggesting that households tended to shift to lower levels of food insecurity relative to their 2005 situation. The effect of wealth depended on how a household entered the crisis. Wealth was highly protective against increases in food insecurity for

previously secure households, but its effect was diminished among those households with a worse 2005 food security. Controlling for these effects, households with greater baseline social capital tended to be somewhat more food secure in 2008. Households with diversified production sources and that were female-headed tended to have slightly worse 2008 food insecurity. Finally, the experience of an economic or health shock was associated with worse 2008 food security, net of these other factors.

One problem with fitting these models to all geographic data together is that many covariate distributions overlap minimally. For example, the rural sites are substantially poorer than urban sites and urban sites tend to not have access to lands for planting crops, so the variable measuring ownership of land takes on very different meanings in rural and urban sites (Table 1). Pooling the households into one large model assumes that the effects of the covariates are the same in each site. It is likely, however, that there is structural confounding due to geography (Oakes & Johnson, 2006). To address this issue, regression models were fit to each geographic area separately.

We find large differences patterned by urban or rural locality. Descriptively, households that were food secure in 2005 (i.e., scored 0 on the household food insecurity measure in 2005) worsened to an average score of 2.7 in urban areas, 2.5 in semi-urban areas, and 4.0 in rural areas; each very large increases on a 7 point scale. Among insecure households, there is also evidence of regression to the mean: while secure households become more insecure, insecure households tended to improve by a small amount (Fig. 1). How households entered into the food crisis had a larger impact on how they emerged in urban and semi-urban areas. In rural areas, households reported an average food insecurity score of approximately 4 regardless of where they "started" in 2005.

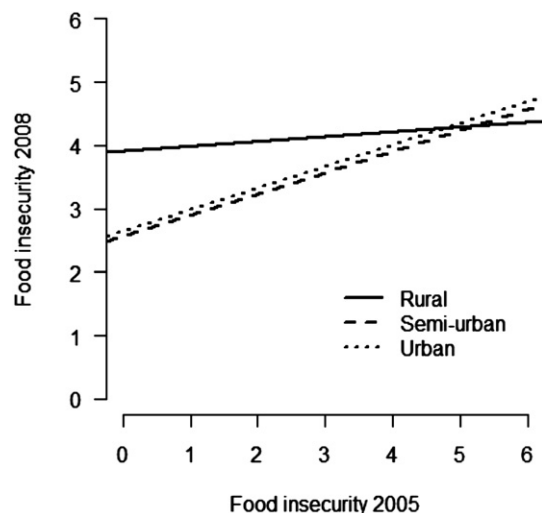
In the multivariate regression models, a household's 2005 food insecurity status remained a significant and positive predictor of 2008 food insecurity only in urban and semi-urban locales (Table 2). In rural areas, a household's 2005 level of food insecurity mattered less (Fig. 1). Similarly, wealth was protective against increases in food insecurity in urban and semi-urban areas, but less so in rural areas. In urban areas, wealth provided a significant buffer against increasing food insecurity: the urban rich were much better

**Table 2**

Regression model predicting household 2008 food insecurity score; pooled model, and separate models by area: urban, semi-urban, and rural. Standard errors in parentheses. Negative coefficients indicate variables associated with lower food insecurity in 2008.

Variable	Full sample	Urban	Semi-urban	Rural
Constant	3.65 (0.10)*	3.69 (0.18)*	3.45 (0.23)*	3.85 (0.28)*
2005 food insecurity score	0.14 (0.01)*	0.13 (0.03)*	0.21 (0.03)*	0.08 (0.06)
Wealth index	-0.85 (0.05)*	-0.92 (0.08)*	-0.76 (0.11)*	-0.36 (0.26)
Wealth $\times$ 2005 food insecurity	0.09 (0.02)*	0.06 (0.03)*	0.13 (0.04)*	0.03 (0.08)
Social capital	-0.02 (0.01)*	-0.01 (0.01)	-0.03 (0.02)	-0.00 (0.01)
Portfolio diversity	0.07 (0.03)*	0.13 (0.08)	-0.01 (0.08)	0.06 (0.03)*
Female headed, yes	0.16 (0.09)	0.21 (0.14)	-0.03 (0.17)	0.19 (0.21)
Own plot of land, yes	-0.51 (0.12)*	-0.11 (0.35)	-0.18 (0.30)	-0.61 (0.18)*
Other household stressors, yes	0.23 (0.02)*	0.27 (0.14)	0.16 (0.16)	0.26 (0.09)*
N	2605	936	691	978
Model F	108	53.4	31.5	5.28
P	<0.01	<0.01	<0.01	<0.01
R <sup>2</sup>	0.25	0.32	0.27	0.04

\* $P < 0.05$ .



**Fig. 1.** Predicting 2008 food insecurity based upon pre-crisis 2005 food insecurity levels for urban, semi-urban, and rural households. Lines show fitted values from bivariate linear regression models applied to households within each area. The y-intercept represents the predicted increase in food insecurity for households that were completely secure in 2005. The steeper the line, the more similar 2008 insecurity was to 2005 insecurity for households in each area.

off in 2008 than the urban poor, at all levels of 2005 food insecurity. For the semi-urban sites the interaction between wealth and 2005 food insecurity suggested that wealth was protective but primarily among those households that were relatively food secure in 2005. Among rural households, wealth was not protective, though rural households were significantly poorer than those in urban and semi-urban areas. This effect is shown in Fig. 2. Note too that this figure shows another key result: that predicted 2008 food insecurity for the poorest households is very similar across urban, semi-urban, and rural sites. This suggests that poor urban dwellers were not at differentially high risk of food insecurity in 2008. Rather, poor households in all geographic areas experienced similar levels of 2008 food insecurity. Importantly, because rural households were poorer on average, nearly all households experienced high levels of 2008 food insecurity and the small amount of wealth contained in rural areas did little to buffer households.

Disaggregating households by area reveals how the effects of land ownership are concentrated in rural areas. Rural households with access to “plots of land for growing crops” scored 0.6 points lower on the 2008 food insecurity measure, all else equal. Only 7% of rural households were without such land. By contrast, this effect was negative but small and not statistically significant in urban and semi-urban areas, where, regardless, only 4% (urban) and 19% (semi-urban) owned land.

The effects of social capital were also not consistent across sites, failing to achieve statistical significance once disaggregated by site. However, in all areas, baseline social capital was negatively associated with 2008 food insecurity levels: net of other factors, more social capital protected household food insecurity status by a minimal amount in 2008.

Place-specific effects were seen for portfolio diversity and female-headed households as well. Both variables appeared to be associated with greater food insecurity in urban and rural areas, but not in semi-urban households. However, the effects were substantively small and not statistically distinguishable from zero. The existence of other household stressors were associated with worse food insecurity outcomes in 2008, but owing to the smaller sample sizes in each site, the effects were, while substantively similar to the pooled estimate, not consistently statistically significant at conventional levels (i.e.,  $P < 0.05$ ).

### Why didn't most rural farming households benefit?

The results above show that rural households had the greatest deterioration of their food insecurity and that baseline household capacities did little to protect against declines in food security. The rural effect is due in part to the limited wealth in those areas. This

suggests two things: first, the urban poor are not at differential risk of being food insecure during the food crisis in southwest Ethiopia; and second, that rural farmers were seemingly unable to capitalize on the higher food prices. In this section we ask to what extent rural farmers could have taken advantage of price increases by selling on the open market. To do so we examine what fraction of all rural households with access to land were producing various crops and, of those producing, what fraction reported selling any of their yields in 2008.

The results suggest that rural households had limited opportunity to take advantage of higher market prices. Less than one percent of rural landed households did not report planting at least one crop. Many households reported growing maize and teff yet fewer than five percent of rural households reported selling these crops in the 12 months prior to the interview (Table 3). In fact, one-third of rural households reported selling no crops at all during the 12 months prior to the interview and only 30% of rural households reported selling two or more different types of crops. Excluding coffee and chat, 76% of households sold nothing. The low levels of selling are likely due in part to limited land on which to farm. A majority of households reported 1 ha for their total land utilized for crops and 90% reported 3 ha or less. Average earnings for households for all crops sold was \$48 USD of which \$5 USD came from food crops and \$43 USD from the sale of coffee and chat. A few households sold considerably more, which pulled the average up. The vast majority of households, however, were earning very small amounts of money for their food crops sales. The median total value of reported crops sold for rural households in the sample in 2008 was just \$15 USD.

### Discussion

We examined the distribution of household food insecurity across two periods of time corresponding with markedly different food price environments and found that household food insecurity was substantially worse during the period of time that overlapped with dramatically higher food prices in Ethiopia, and globally. Further our analysis of these two periods suggests that rural households saw the greatest decline in household food security, and this was likely due to the fact that rural households tended to be much poorer. Still, poor households in all sites tended to have high food insecurity in 2008, echoing conclusions made recently by Ruel et al (2010) and Naylor and Falcon (2010) that the key factor in determining who was at risk during the food crisis was poverty and not urban/rural differences. Thus, rural-urban food insecurity differentials may be minimized when there are underlying high levels of poverty.

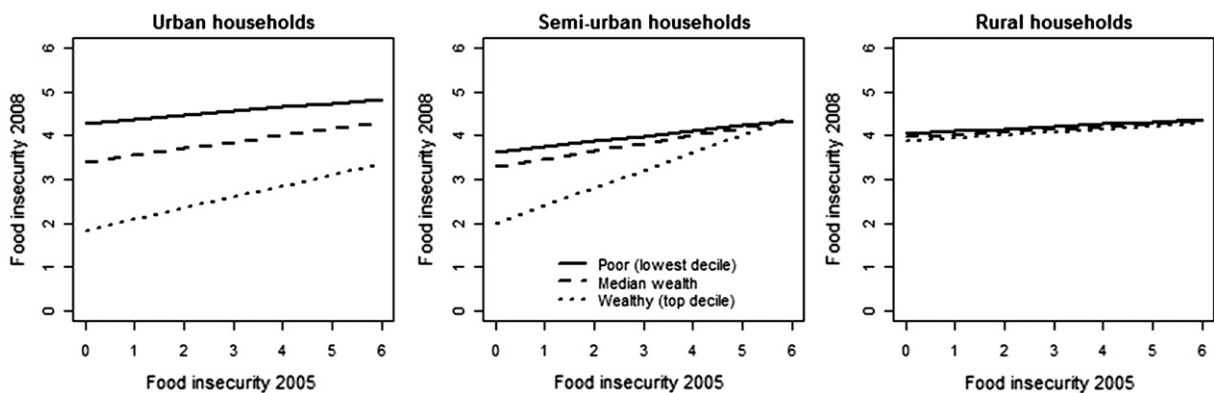


Fig. 2. Model predicted estimates of 2008 food insecurity by place, wealth level, and 2005 food insecurity status. Fitted values are calculated at the 10th, 50th, and 90th percentiles of wealth within each area, holding the values of all other variables constant at their area means. The sample includes 936 urban households, 691 semi-urban households, and 978 rural households.

**Table 3**  
Cropping and selling outcomes among rural households ( $N = 1131$ ).

Crop type	Growing (%)	Selling (% of those growing any)
Maize	81	4
Teff	54	2
Barley	7	5
Wheat	14	7
Inset	79	3
Coffee	67	72
Chat	57	63
Fruits/vegetables	47	44

Nearly one out of four households reported attempting to increase their income streams, pulling children from school or selling off assets to meet the needs of their households. These are coping strategies utilized during seasonal hunger periods or other food crises, all of which are strategies commonly noted (Devereux, Vaitla, Swan, Hunger Watch, & Action Against Hunger, 2008; Dirks, 1980; FAO, 2008; Shipton, 1990). Households that engaged in these strategies tended to have worse food security outcomes in 2008 than households that did not report engaging in these strategies suggesting that these strategies are predictive of future food insecurity outcomes. This is potentially an important point because it suggests that knowledge of these coping strategies can be useful for targeting those households at risk of declining food security, a point also highlighted by Ruel et al. (2010).

Other than coping strategies, wealth and baseline food insecurity, existing household capacities and vulnerabilities played a limited and place-specific role in protecting households from deteriorating food security. In other words, poor households likely have few options to deal with rapidly rising costs.

Wealth tended to buffer households from food insecurity in urban areas but the protective effect was less clear in semi-urban sites and absent in rural areas. Among urban sites, wealth protected against 2008 food insecurity at all levels of 2005 food insecurity. The poorest urban households tended to have 2008 food insecurity levels comparable to the poorest semi-urban and rural households. Among semi-urban sites wealth only buffered those households that tended to be fairly food secure in 2005. As 2005 food security declined, wealth was less effective in buffering likely due to the sheer increase in the price of food items in 2008. For the rural sample, we focused on crops sales and production but analysis might also meaningfully focus on the determinants of input and cropping decisions on the part of rural households as well as the roles of government and NGO programs and climate and weather events. Such analyses are beyond the scope of our study but may prove helpful in understanding the other dimensions of rural poverty and food insecurity.

Social capital also showed mixed results, with no effect in rural areas and a marginal effect in urban and semi-urban sites. Social capital might not have been effective in predicting 2008 food insecurity because the 2005 measure may not represent 2008 levels of capital. It is also possible that this is an example of covariate risk: when communities collectively experience a shock individual households may be less able to effectively collect on the resources embedded within their social networks because all nodes of the network have also experienced the shock.

Female-headed households were, net of other covariates, slightly disadvantaged in terms of 2008 food insecurity but the effect was not statistically significant in the pooled data or the site-specific analyses. This lack of an effect is striking given the hypothesized vulnerability of female-headed households. Two possible reasons for the lack of effect are possible. First, it may be that female-headed households are at greater risk because they tended to enter into the

crisis period with less wealth and more food insecurity; analysis of the baseline indeed shows that female-headed households are significantly poorer, have lower social capital, and experience more food insecurity. Once these factors are controlled for then the effect of female-headed household might be rendered insignificant. Second, it may be that in the face of difficult allocation decisions, female-headed households make decisions that tend to promote food security. A literature does exist showing that men and women make different spending decisions and that women tend to favor decisions that promote nutritional wellbeing (Guyer, 1997; Thomas, 1990). Future analyses might examine this possibility by exploring statistical interactions between hypothesized determinants of food insecurity and gender of the household head.

Our analysis provides empirical support for existing analyses using pre-crisis datasets, which generally “underscore the tenuous position of the rural poor” (Naylor & Falcon, 2010: 712). The results here suggest that farming households tended to not produce enough to sell large amounts of product on the market which severely limits their ability to capitalize on higher food prices. That so little is sold on the market may also suggest that these households have to purchase at least some food from markets, which exposes them to higher food prices. Such households lie just at the margin in terms of production and consumption. That so few rural households are net sellers is entirely consistent with results from other cross-country analyses. For instances, Aksoy and Dikmelik (2008) review pre-crisis survey data for nine countries and find that only one out three rural households is a net seller, meaning that they sell more food on the market than they purchase. Naylor and Falcon (2010) review data from five countries and report that “the majority” of net sellers are in the extremely poor and poor categories and they tend to be poorer than net consumers. Thus, even those households that are producing food for markets are likely to be producing very small amounts and are likely to be very poor.

Other studies that have explored the food crisis’ effect on household food insecurity have discussed the difficulties of linking the rise in food prices to declines in food insecurity. This is due to the overlapping food, fuel, and financial crises, which disallow precisely pinpointing which of these crises, if any lead, to the deterioration of food insecurity. Our study is not immune to these threats to validity. Strengths of our study include a recent baseline survey, the panel design, the use of the same food insecurity instrument, and, most importantly, controlling for the influence of other shocks to the household. By controlling for other shocks to the household we can be more certain that the rise in food insecurity is linked to food prices and not, say, an extended illness in the household. The regression models demonstrate the importance of household shocks for household food insecurity, a point that other investigators have highlighted (Compton, Wiggins, & Keats, 2010). Indeed, it is the very impact of these shocks that social safety net programs are aimed at eliminating or attenuating.

It is worth highlighting a key assumption of our work: Food insecurity has negative effects on social, physical, and mental wellbeing. In this particular study we did not explicitly examine health, health care outcomes or schooling outcomes, although these have been widely hypothesized to have been impacted by the food crisis (e.g., Compton et al., 2010), but rather we rely on the now massive body of evidence linking food insecurity and poor outcomes (Hamelin, Habicht, & Beaudry, 1999; Weaver & Hadley, 2009). Further, gender-specific effects have been widely hypothesized but again we did not specifically address these beyond looking at female-headed household. Compton and colleagues find scant evidence to support this claim (see also Ruel et al, 2010 for statements about limited empirical evidence; but see Hampshire, Panter-Brick, Kilpatrick, & Casiday, 2009 for a case illustrating a lack of bias during a crisis). We did note that food insecure

households were more likely to report pulling children from school but we did not ask about which specific child this was. However, by isolating only those households that had one child in school, we can ask if households with only one female child were more or less likely than households with only one male child to report their child was pulled from school; This analysis showed that the odds of reporting that a child was pulled from school were nearly identical for male child only and female child only households. This is a very preliminary analysis and has the potential for misattribution errors but it does not immediately suggest support for a gender bias.

Since food insecurity is predictive of a wide range of negative health and social outcomes, our results and those of others offer a potentially devastating indictment of high food prices, or at least rapid rises in food prices. It is worth pointing out that some analysts have argued exactly the opposite: low food prices are ultimately to blame for the current food crises because low food prices led to a massive pull back of investments in agricultural research and development. These analysts see the current price spike and the outlook for higher prices in the future as a consequence of decades of underinvestment. Regardless of how this debate plays out, it is clear that there is a tremendous need, especially in sub-Saharan African countries, to begin or continue to invest heavily in rural agriculture and the underlying infrastructure required for supporting agricultural markets.

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