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Paving the way to build the resilience of men and women

**How to conduct a gender analysis
of resilience**

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Paving the way to build the resilience of men and women

How to conduct a gender analysis of resilience

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Abstract

Despite significant recent improvements in measuring resilience, there are still relevant gaps in the analysis. One of the relatively unexplored aspects of resilience is whether a gender-specific analysis of resilience capacity can become relevant for policy use. This paper contributes to the literature on resilience by analysing a data set with one of the most adopted resilience indicators and highlighting the emerging gaps. There are many reasons why policy makers should be targeting women with their resilience-enhancing activities'. The descriptive analysis, at the individual level, indicates that women – and in particular, older, widowed women – tend to be more likely to live in consumption-poor households. Households with widowed, female heads are more likely to experience food insecurity. Finally, widowed and younger female heads of household, as compared to other female heads, were more likely to suffer persistent shocks and consequent losses. A practical application to the Uganda case study, also, reveals that women's education appears to play a larger role in mitigating persistent exposure to, and losses from shocks, compared to men's education. All these reasons suggest that policy makers' attention should be focused on women. This ultimately translates into the need for better and more gender-specific resilience analysis. In order to move ahead with this, it is necessary to employ better-specified data collection and analysis tools and approaches.

Keywords: resilience; gender; food security; quantitative.

JEL codes: C01; C23; I32.

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1 Introduction

Resilience is the ability to cope with current and future shocks and stresses, ranging from natural hazards such as floods, droughts and earthquakes; food chain threats caused by disease, sudden illness or death; conflicts and protracted crises.¹ Analyses of resilience require an understanding of how shocks are introduced in a given setting – whether at the individual, household, community and/or higher levels (FSIN, 2015) – as well as how these units interact in forming coping strategies. Analyses of resilience may also look at various outcomes (FSIN, 2016). Natural disasters and seasonal stresses, for example, are community-level (or covariate) events, but tend to have very different effects on poorer and wealthier households in the community. The death of a working family member is typically viewed as a household-level (or idiosyncratic) shock that can affect household income, but relative dependencies, as well as decision-making roles, can vary among household members as well. Access to resources, services and support networks are crucial to the three components of resilience put forth by Béné *et al.* (2012): absorptive capacity, adaptive capacity and transformative capacity. However, socio-economic, health, cultural and institutional factors can alter these capacities substantially for different groups and individuals within a population.

For FAO, within food security and agriculture, resilience is often analysed at the household or community levels – in relation to a specific livelihood or socio-economic group (e.g. pastoralists, farmers, fishers etc.), or to a specific environmental and ecological context (FAO, 2016). This paper highlights the need to look further at resilience from a gender perspective and approaches for analysis, given the evolving survey data at the household and individual levels. An increasing number of empirical studies are looking at how risks are distributed unequally within households, with many findings that men and women within households' experience and respond differently to shocks, and that these differences can be tied to gender inequalities in economic opportunities and mobility. Furthermore, in regards to coping, households may or may not act centrally as decision makers. Recent country studies on agricultural households, for example, discuss how men and women often use different coping strategies when facing weather-related shocks, with these differences stemming from disparities in land ownership, and access to other forms of capital and resources. Coping strategies that are adopted, whether centrally or by specific individuals, can also have very different implications for men and women in the household. For example, migrating outside an affected community for work is a common coping strategy. This can have widely varying effects on household members that stay, whether it is adult men from the household that migrate, or adult women. These effects range from changes in time burdens, decision making over assets and outcomes for children.

However, while data availability is improving, most surveys – due to cost issues and a general outlook that household shocks are felt or recognised by all household members – still collect information on exposure to shocks and coping strategies, as well as other outcomes related to resilience, at the household as opposed to individual level. Current analyses of resilience using survey data therefore tend to focus on the household as the central decision maker – adjusting consumption, selling assets, seeking alternate sources of employment, borrowing and adopting other coping strategies. This includes FAO's Resilience Index Measurement and Analysis (RIMA) model, which examines different socio-economic dimensions of households' ability to cope with shocks (such as changes in assets, income, access to food and basic services, social

¹ See www.fao.org/resilience/areas-of-work/en

safety nets, local infrastructure and community networks), as well as how these predetermined factors relate to food security and other outcomes associated with vulnerability.^{2,3} Gender analyses within household-level approaches are therefore limited to comparisons across male and female heads of household. These comparisons can be problematic, however, as the composition of female-headed households may be quite diverse.

Given that individual-level data on exposure to, and coping with, shocks is scarce, this paper first aims to provide direction on how data that is currently available in surveys can be used to better understand gender dimensions of resilience, focusing on household-level analyses that could inform models such as RIMA. In addition to variables within survey modules on shocks and coping, as well as food security, we discuss the importance of looking at variables on decision making over economic activities, as well as individual-level data on assets and financial outcomes, in gender analyses of resilience. We also examine what individual-level data could be useful to collect in these areas going forward, filling certain gaps in understanding gender differences in resilience within households.

As a case study, we then use household survey data on shocks, coping and related outcomes from the 2009–10 and 2010–11 rounds of the Uganda Living Standards Measurement Surveys, Integrated Surveys on Agriculture (LSMS-ISA), also known as the Uganda National Panel Survey (UNPS), as a case study to highlight how household-level gender analyses, even while reliant on comparisons of the sex of the household head, can refine these analyses through further disaggregations, both across socio-economic and geographic variables. The Uganda analysis reveals a few important conclusions that could help inform gender analyses of resilience: (1) the importance of accounting for age and marital status – particularly widowhood – in comparisons across male and female heads; (2) that geography plays an overarching role in explaining variation in outcomes related to resilience, particularly for women, for whom more vulnerable groups are also often concentrated in particular localities; and (3) the need to include variables on savings account and mobile phone ownership, which are still often collected at the household level, but in which surveys are increasingly moving in the direction of collecting individual-level data.

In sum, this paper tries to provide two areas of guidance. First, recognising that variables related to resilience are still largely collected at the household level across different types of surveys, we highlight important variables, as well as analyses and breakdowns that would help refine household-level gender analyses. Second, we discuss directions that surveys are taking – in terms of collecting individual-level data across areas such as decision-making, control over assets and access to finance, as well as composite measures incorporating these variables – that would eventually allow individual-level analyses of resilience.

² Since 2008, RIMA evolved from its initial model to RIMA-II (2016). See www.fao.org/3/a-i5665e.pdf

³ See, for example, Béné *et al.* (2012); Ellis (2000); Dercon (2002); Barrett and Constanas (2014).

2 The policy importance of examining the gender dimensions of resilience

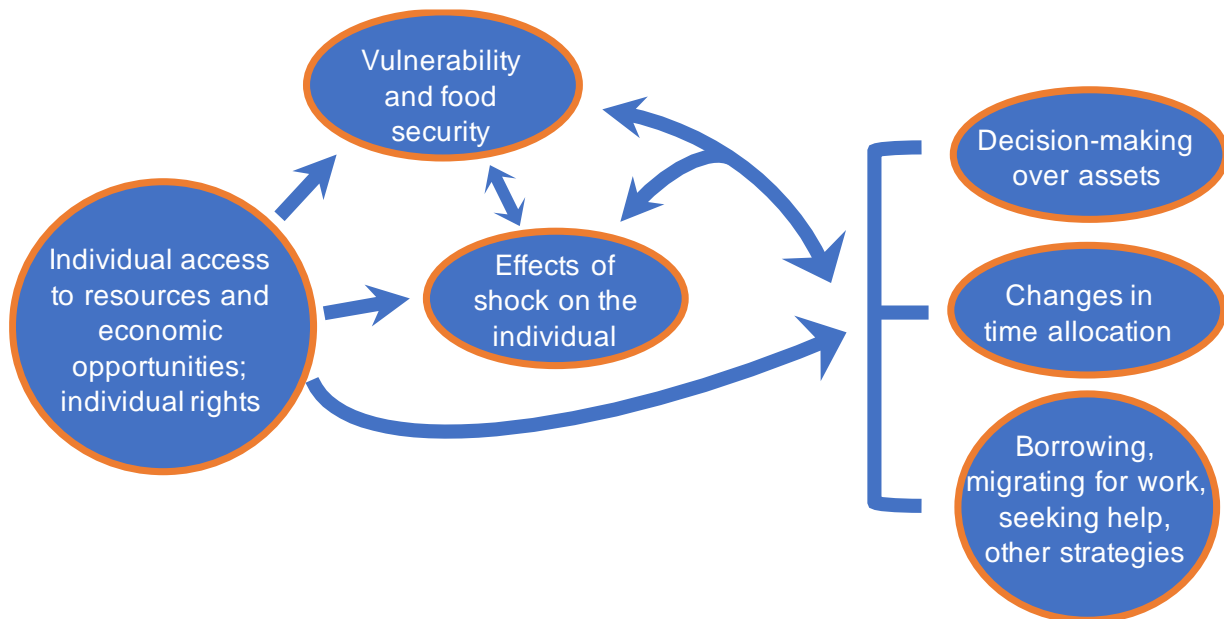
Within low-income contexts, households can cope with risk and shocks in different ways. When faced with a shock, for example, households might draw down on assets (including selling land or livestock in rural contexts) or savings, reduce consumption, alter household members' time across paid or unpaid work and schooling, migrate for work, borrow, seek other help from family and/or friends. Households may also save and accumulate assets adopt new technologies to bolster themselves against future uncertainties.

Empirical studies from different countries, however, are increasingly showing that household members often do not act collectively in these decisions. Substantial spousal disagreement on intra-household decision-making roles have often been highlighted in recent studies from sub-Saharan Africa (Donald *et al.*, 2017), which looked at decisions over large purchases and use of spouse's income, as well as Bangladesh (Ambler *et al.*, 2017), which examined decision-making over the use of productive capital and assets. Men and women within the household may also use different coping strategies to respond to shocks, often stemming from gender inequalities in economic opportunities and mobility, as well as time burdens.

Yet, in surveys, many variables important to understanding resilience – including asset ownership/use, financial access and food security – have typically been asked only of one person, and primarily the household head. Gender analyses of resilience therefore tend to focus on comparisons by the household head. However, the definition of headship can vary substantially across countries and regions, controverting at least one or both of these assumptions. Buvinic and Gupta (1997) provide a useful perspective on some of these issues – the definition of household, particularly in contexts where joint family systems are common, can vary greatly across countries. Surveys often also leave the designation of household head to members of the household, who may use different criteria to make this assignment, making comparisons within countries difficult as well. Headship may also be a temporary concept, for example when spouses migrate for work. Decision-making over resources may also be a complex process across different household members, so that comparisons by household headship may not be very meaningful – and may more than likely mask outcomes for all men and women of interest in the sample.

Figure 1 presents a visual schematic of areas in which gender differences can arise in coping with shocks. Women, particularly in poorer and/or more traditional contexts, often have less access to resources and economic opportunities, including employment, property rights and education, as well as legal and customary rights covering traditions over marriage and childbearing. This can affect their vulnerability and food security, and potentially (although this may vary across contexts) their individual effects from shocks. Inequalities in access to resources and rights also affect coping strategies such as decision-making over assets, changes in time allocation, borrowing, seeking additional employment and other assistance from family and friends, etc. These coping strategies further affect individual outcomes from shocks, including vulnerability and food security.

Figure 1. Areas where gender differences emerge in exposure, and the ability to cope with shocks



Source: Authors' elaboration.

Many of these channels have been documented in the literature. Kumar and Quisumbing (2013), for example, use nationally representative data from Ethiopia to show that female-headed households have fewer resources, fewer years of schooling and smaller networks. Their study also finds that female-headed households have a larger food gap (defined by the number of months they cannot fulfill their food needs), and are more likely to have food shortages compared to male-headed households. In a study using the Mali Demographic and Health Survey, Van de Walle (2013) finds that households headed by widows have significantly lower living standards than other households in rural and urban areas. The detrimental effects persist even among widows who are absorbed into male-headed households, and are also passed on to children, suggesting an intergenerational transmission of poverty stemming from widowhood. Within agriculture, several studies have discussed how women farmers also tend to have smaller landholdings and lower productivity, stemming from multiple factors – insecure land rights, poorer access to inputs, markets and credit – which can result in their greater vulnerability to external shocks, including changes in access to natural resources (Goldstein and Udry, 2008; Kilic, Palacios-Lopez and Goldstein, 2015).

These inequalities in resources and rights can affect health and food security as well. Dercon and Krishnan (2000), for example, test how men's and women's body mass index (BMI) changed with individual illness shocks in Ethiopia. They find that, while risk is shared efficiently in most of the Ethiopian highlands, poor women in the southern part of the country, where customary laws on divorce settlement are biased against women, have relatively much worse nutritional outcomes compared with men in their households. These deprivations can also affect the intensity of how shocks are felt within households – in a study of pastoralist communities in Ethiopia and Kenya, Doss, McPeak and Barrett (2008) found that men and women may differ in their perception of the nature of a shock, its severity and the appropriate coping mechanisms to be used.

Differences in access to resources and greater vulnerability also translate into differences in decision-making when facing shocks. In a survey of couples from Thailand, for example, Antonopoulos and Floro (2005) found that women tend to keep more of their individual assets in real (tangible) form, such as jewelry, which gives them more control over asset use and transfer. Frankenberg, Smith and Thomas (2003) found that gold, primarily in the form of jewelry, was often sold to cope with the recent Indonesian economic crisis. Using data from Bangladesh and Uganda, Quisumbing, Kumar and Behrman (2018) also found that men's and women's asset holdings are affected differently from shocks; in Uganda, food price increases significantly lowered jointly held assets and women's assets. In regards to idiosyncratic shocks, illnesses in the household also had a large detrimental impact on wives' assets in Bangladesh, while death negatively affected wives' assets in Uganda. Not all shocks had varying impacts for men and women, but these findings highlight some of the intra-household channels affecting men and women differently. Using representative data collected under the Gender Asset Gap Project from Ecuador, Ghana and the state of Karnataka in India, Doss *et al.* (2017) found that women in the Karnataka and Ghana samples were less likely to borrow or rely on savings than their partners, aside from asset holdings, and more likely to obtain assistance from family or friends in response to shocks.

Gender differences may also arise outside of the household, within the community. In an earlier study from eastern Ghana, Goldstein (1999) found that spouses' reported consumption values do not mirror one another, and intra-household transfers do not move at all in the wake of agricultural shocks. This could indicate that the household may not be the appropriate unit of analysis for understanding how individuals respond to shocks. The study finds, rather, that women pool their risk with other women in the village, while men have a broader network within and outside their village. This has policy implications for how poverty and other social programmes are targeted.

Shocks can also affect men's and women's allocation of time differently, owing to their typically highly dissimilar roles across domestic work and childcare, contributing family work and work for pay. Women in poorer, more traditional contexts are heavily burdened by domestic work, and also face several social-economic constraints on their ability to work for an income. For example, initiatives on agricultural technology adoption are often taken over by male producers because of women's time constraints, and the norms that limit their ability to manage input and production decisions (World Development Report, 2012). Bhalotra and Umaña-Aponte (2012) use Demographic and Health Survey (DHS) data from sub-Saharan Africa to suggest that, during times of recession, women tend to move from paid to self-employment, predominantly in non-agriculture, particularly in contexts where opportunities for paid employment are already more limited, and aggregate income variation is more closely tied to rainfall variation. In a different context, Gajate-Garrido (2015) conducts an analysis using the 2012 and 2013 Pakistan Rural Household Panel Surveys, controlling for individual, year and district fixed effects, to find that health shocks lead women to seek paid employment, reducing time spent on household chores and taking care of children. Gehrke and Foster (2016) also use 2006 data from rural India to test whether consumption risk, in the form of rainfall shocks, affects female labour supply and time allocation to home production. Their study finds that adult female labour supply increases in response to these shocks, thereby reducing their time in household work; correspondingly, time spent by girls in these activities increases, and with a reduction of their time in school. Understanding intra-household response to shocks more precisely, along with outcomes for children's time, health and education, is therefore critical for policy design.

How does this evidence translate into empirical analyses of resilience, particularly given that nationally representative surveys still tend to collect most data in areas relevant to Figure 1 at the household level? If women in many low-income contexts tend to have lesser decision-making roles, education and access to resources, do households with a greater share of female members also have a diminished ability to cope with shocks? What variables are important for looking within female- and male-headed households (for example, women's age, marital status, education, land/asset ownership and financial and extension services) that could be included in current household analyses, including FAO's RIMA? What is the role of community/local characteristics, beyond intra-household factors, in understanding gender differences in resilience? Understanding these channels helps shed light on policy links, in addition to which groups are more vulnerable. Section 3 discusses the availability of data in gender-relevant dimensions of resilience in more detail.

3 Availability of data on gender and resilience, and way forward

3.1 What data/measures are currently available?

As discussed in Figure 1, it is important to understand gender inequalities in accessing resources and rights, as well as vulnerability and food security, the experience of shocks and different coping strategies. In this section, we discuss data that is currently available across surveys, with a focus on nationally representative surveys that could be used to conduct national assessments of resilience. Much survey data across these dimensions is still currently collected at the household level, but we also examine areas where a greater emphasis is being placed on individual-level data, and its implications for analyses going forward.

(a) Modules on shocks experienced by the household

Modules on shocks affecting households are increasingly common in nationally representative household socio-economic surveys. These include household exposure in the last 12 months to different types of covariate and idiosyncratic shocks, and household coping strategies such as reliance on help from family and friends; seeking new employment; drawing down on savings, assets, and/or consumption and borrowing. The World Bank Living Standards Measurement Study (LSMS) is one example of such a socio-economic survey; these modules help to complement other survey modules on household welfare, and provide greater insight into household vulnerability (Box 1). These questions are only asked at the household level, not across different members. In using this data, as a result, gender differences are typically only presented by the sex of the household head.

Box 1. Module on shocks in World Bank Living Standards and Measurement Study (LSMS) surveys

While not necessarily the same across different countries LSMS, the following are questions and examples of response options that are typically included in LSMS modules on shocks and coping strategies:

(1) Types of shocks encountered by households:

- natural shocks (e.g. drought, floods, landslides, crop or livestock disease);
- price shocks (costs of inputs, prices received for output);
- illness, accident or death of income-earning members;
- sudden loss of earnings or employment due to other reasons;
- theft of money and/or assets;
- conflict and/or violence.

(2) Characteristics of shock:

- when it occurred;
- duration;
- losses encountered from shock, e.g. income, assets, food production.

(3) Coping strategies:

- unconditional help provided by relatives/friends;
- unconditional help provided by local government;

- involuntary change in dietary patterns (fewer preferred food options, reduction in the proportion or number of meals per day, etc.);
- changed cropping practices (crop choices or technology);
- household member(s) took on more non-farm (wage- or self-) employment;
- household member(s) took on more farm wage employment 7 = Household member(s) migrated;
- relied on savings;
- obtained credit;
- sold durable household assets (agricultural or non-agricultural) 11 = Sold land/building;
- rented out land/building;
- distress sales of animal stock;
- sent children to live elsewhere;
- reduced expenditure on health and education 96 = Other (specify).

Looking ahead

Given men's and women's different household responsibilities and resource constraints, particularly in low-income contexts, understanding individuals' experience and coping with shocks within the household is important. However, implementing an individual-level survey approach is much more costly and complex, and the methodology would have to be considered carefully to ensure that the information gained is valuable, and not just added noise. In particular, as discussed below, it may be useful to use separate approaches for (a) questions on the occurrence of the adverse event itself, as compared to (b) how the event is experienced, handled or coped with.

On the occurrence of shocks eliciting a yes/no response, adverse natural and conflict-related events hit the entire household as well as most, if not all, of households in affected communities. Similarly, illnesses or death within the household is at least recognised by all household members, even if individual members ultimately handle the shock differently. Nevertheless, as with other survey modules on consumption, access to facilities and other welfare-related outcomes, there can be informational asymmetries and differences in interpretation within the household, as discussed in Doss *et al.* (2008). From a cost perspective, handling potential reporting differences within the household is complicated, as informational inequalities can also be present in other survey modules. Moving to individual-level questions on the occurrence of shocks may be more feasible, with smaller, focused surveys, as opposed to large nationally representative surveys.⁴

⁴ Identifying the household member ID of the respondent for the module on shocks might also be helpful, as has been done in the LSMS-ISA survey modules for welfare and food security (see below). This would not, however, help in calculating representative estimates of whether there are systematic differences in responses between men and women in the population. Some perception-based surveys (for example, the Afrobarometer surveys) use sampling approaches that randomly select one woman and one man from each household, to understand gender differences in reporting. There are also issues with this approach, including whether surveying a randomly sampled individual within the household provides more information than the de facto 'head' – this can vary greatly by cultural/regional context, economic circumstances, etc. and does not address the issue raised earlier about how men and women within the household may disagree.

For household surveys alone, however, cost considerations may ultimately force the choice of which questions on shocks can be surveyed at the individual level. In this case, the literature strongly indicates that men and women often resort to different coping strategies, based on their available resources and constraints – as discussed earlier, as well as below in the sections on food security and decision-making. The literature also details growing evidence across countries that men and women experience household deprivations differently, through nutritional inequalities, and decisions that affect their income, asset holdings and time use. Along these lines, two important topics that could be asked separately of men and women in the household are (a) steps they took in responding to a particular shock (similar to different types of coping strategies), and (b) constraints they faced in addressing and/or preventing the shock from affecting the household more seriously (for example, not enough money saved, collateral for borrowing, knowledge about agricultural technology or limited mobility to access markets and institutions, etc.). It is certainly difficult to move the interview frame from a household to an individual perspective, but, to ensure better policy targeting, it is important to understand what gender differences persist when handling adverse events.

There has been a rise in the inclusion of GPS data in household surveys, with the LSMS-Integrated Surveys on Agriculture (LSMS-ISA) recording geocodes for communities as well as individual land parcels for farming households. In the case of natural/covariate shocks, it may therefore also be possible to link external GPS data on weather and climate with household survey data to better understand which areas and households are more vulnerable to weather disruptions. The World Bank LSMS team, for example, began a collaboration in 2016 to study high-resolution population maps of different countries,⁵ developed by the Facebook Connectivity Lab and the Center for International Earth Science Information Network (CIESIN), which provides data on the distribution of human populations at 30-metre spatial resolution. The World Bank LSMS team compares these population maps with country survey data (including country LSMS-ISA surveys) to develop methodological guidelines for using these maps, alongside other geospatial sources, for sampling in household surveys, infrastructure planning and better understanding individuals' exposure to natural disasters.

(b) Food insecurity

Within household surveys, variables on food insecurity are measured through food consumption-related indicators that cover the availability of food and household members' access to and use of food, as well as the consistency of access to food throughout the year. Food security is inherently linked to resilience both as an *ex ante* determinant of resilience, particularly to climate-related shocks affecting agricultural production, as well as *ex post* outcomes after shocks have occurred (Hoddinott, 2014). Within household surveys, however, indicators on food security are typically collected at the household as opposed to individual level, often due to cost considerations – both in conducting surveys, and the limited feasibility of targeting anti-poverty programmes to individuals within the household.

On consumption, one of the most widely used indicators, for example, is FAO's prevalence of undernourishment (PoU) (see Cafiero, 2014; Wanner *et al.*, 2014), which measures the share of the population whose dietary energy intake is below a specific figure (the Minimum Dietary Energy Requirement (MDER) for their age, sex and height). The PoU is constructed as a three-year moving average, and as such captures chronic hunger as opposed to fluctuations

⁵ These countries were Ghana, Haiti, Malawi, South Africa and Sri Lanka.

associated with shorter-term shocks. As nationally representative individual consumption data are not consistently available, the most commonly used surveys to construct this indicator across countries are Household Income and Expenditure Surveys (HIES), which include monetary expenditures on food, as well as quantities consumed. The Women's Empowerment in Agriculture Index (WEAI) module,⁶ which was piloted in Bangladesh, Guatemala and Uganda in 2011–12 and has since been collected in baseline surveys for Feed the Future's 19 focus countries across Asia, Latin America and sub-Saharan Africa, also collects data on the frequency of household consumption of different types of food over the last seven days. On stability of access to food, an increasing number of surveys, including the WEAI, are collecting data on food shortages encountered by the household in the past year. The LSMS-ISA surveys also have a similar module on food security, which is posed to one knowledgeable adult man or woman in the household. The questions that are typically asked as part of the WEAI and LSMS-ISA are included in Box 2 below.

However, given that these data are collected at the household level, gender-relevant breakdowns for the PoU and other widely used measures of food consumption are only available by sex of the household head. The PoU also relies on a probability distribution model to estimate the overall level and distribution of calorie consumption in the population for different age/sex groups. As discussed earlier, although there is a broad understanding that, in relation to consumption, income or wealth, poorer households are more likely to include deprived individuals, there is a growing body of literature discussing intra-household inequalities in relation to access to resources and consumption. Collecting individual-level data on food consumption, however, often involves very time-consuming data collection methods, and thus are rarely collected across large enough sample sizes to understand distributional trends at regional or national levels.

Looking ahead

In the absence of individual-level survey data specifically on food consumption and diet, other subjective approaches have been explored and/or developed to understand food security issues for men and women. The Food Insecurity Experience Scale (FIES), for example, began development as part of FAO's Voices of the Hungry project in 2013 to measure the severity of food insecurity, and could be measured at the individual or household level. The FIES consists of eight questions (Box 2) to understand whether respondents experience mild food insecurity (i.e. uncertainty regarding ability to obtain food), moderate food insecurity (i.e. compromised food quality and variety; reduced quantities of food, skipping meals) or severe insecurity (hunger). Since 2014, FIES has been included in the Gallup World Poll, which is nationally representative and is administered to adults 15 and older. Overall, FIES is a useful policy tool in identifying the risk factors and consequences of food insecurity. When included as an individual-level module as part of larger national population surveys, it can provide a valuable understanding of how perceived food insecurity is associated with gender, age, income and other socio-economic and demographic variables.

⁶ The WEAI is the result of a recent partnership between Feed the Future, International Food Policy Research Institute (IFPRI), USAID, Oxford Poverty and the Human Development Initiative.

Box 2. Examples of survey questions/modules on food security and shortages

FAO Food Insecurity Experience Scale (FIES; is used in the Gallup World Poll and can be used to measure individual or household food insecurity in population surveys):

The FIES consists of eight questions that form a scale covering a range of food insecurities (from mild to severe).

During the last 12 months, was there a time when, because of a lack of money or other resources:

1. You were worried that you would not have enough food to eat?
2. You were unable to eat healthy and nutritious food?
3. You ate only a few kinds of food?
4. You had to skip a meal?
5. You ate less than you thought you should?
6. Your household ran out of food?
7. You were hungry but did not eat?
8. You went without eating for a whole day?

Women's Empowerment in Agriculture Index (asked of female head/spouse or member who has the most knowledge on food preparation):

In the last four weeks, was there ever a time when there was:

1. No food because of lack of resources, and/or
2. Any household member going hungry at night, or all day and night (household member not specified)

For (1) and (2) – How often did this happen (rarely/1–2 times, sometimes/3–10 times, or often/more than 10 times)

LSMS-ISA surveys (asked of one member per household in household surveys):

- Number of meals taken per day in the household
- What children typically eat for breakfast
- What household did the last time it ran out of salt
- Number of months in the last year the household experienced a food shortage

Existing surveys on health and nutrition could be used to better understand individual-level outcomes associated with food security. The Demographic and Health Surveys (DHS), for example, collect data on weight, height and haemoglobin levels for children aged 0–5, as well as men and women aged 15–49.⁷ Although the DHS does not include food consumption data for household members, the survey can be used to understand men's and women's relative vulnerabilities in health, and provide indicators on undernourishment, including BMI and the risk of anemia. Brown, Ravallion and Van de Walle (2017) find, for example, using DHS data for sub-Saharan Africa, that undernourished women and children are spread widely across the distribution of household wealth and consumption – roughly three-quarters of underweight women and undernourished children are not found in the poorest 20 percent of households, and around half are not found in the poorest 40 percent, reflecting substantial intra-household inequality. Floro and Swain (2013) also examine how individual food security affects occupational choice in urban areas of Bolivia, Ecuador, Philippines and Thailand.

⁷ The MICS also collect anthropometric data on children aged 0–5.

Anthropometric questions can also be a fairly simple and useful way of understanding relative vulnerabilities among girls and boys within the household – including child malnutrition indicators such as height-for-age ratios to estimate rates of stunting, and weight-for-height ratios to estimate rates of wasting.

When complemented with questions on exposure to shocks or food shortages, as well as other variables on access to infrastructure and prices, as well as natural resources, individual-level data on health and nutrition can provide a helpful view on how individuals within the household experience disruptive events, and their capacity to handle future stresses (Upton *et al.*, 2016). The DHS, for example, have community GPS data that can be linked to external data sets on climate variability and infrastructure.⁸ Johnson *et al.* (2014), link the 2010 Malawi Demographic and Health Survey with satellite remote sensing data on forest cover, to find that forest cover is associated with improved health and nutrition outcomes among children in Malawi. This analysis is also ongoing in other countries, including Kenya, Mali, Nepal and Uganda (Brown, 2014), to better understand the relationships between food production, food availability and nutritional outcomes at the individual level.

(c) Individual decision-making and control

Greater headway has been made in recent years on designing survey questions to understand how men and women within the household share resources, and make decisions that affect multiple outcomes. This includes respondents' ability to work; their ability to make decisions over earnings, expenses, asset and other resource allocation within the household; decisions on saving and borrowing and other outcomes that could affect relative deprivations and productivity within the household.

On decision-making, survey questions have traditionally focused on who usually makes decisions within the household over different domains. This includes the DHS, which asks women who the main decision maker is across areas such as family planning, the use of her own/husband's earnings, healthcare, major household purchases and visits to friends/relatives. The DHS also asks husbands of married women the same questions regarding the use of their earnings and large household purchases. Recent studies have also begun tailoring decision-making questions to include more details about the process of decision-making. This includes the extent of influence in decisions. In relation to this, Banerjee *et al.* (2015) ask whether respondents have a "major influence" or "no or minor influence" in the final decision across different types of expenses (food, clothing, health, etc.). In a study from Bangladesh on how women's increased income affects both their bargaining power and the risk of domestic violence in the household, Heath (2014) asked respondents how frequently their husbands consulted with them about different household decisions, with the optional responses being never, sometimes, often or always. The WEAI, which has received broad attention on its approach to measuring women's work and decision-making in agriculture, has built upon these themes (see Box 3). Specifically, the WEAI includes a series of decision-making questions that, in addition to asking who usually makes decisions across agriculture and other economic activities, also asks respondents the extent to which they have input into the decisions. In addition, it asks

⁸ To maintain confidentiality, the DHS does apply a random displacement of GPS coordinates between 0–2 km for urban areas, and 0–10 km for rural areas, which needs to be considered when linking DHS with landscape data (Brown *et al.*, 2013).

which domain they feel that, if they so wanted, they could be the main decision maker – rather than just participating in the final household decision.

Box 3. Decision-making questions in the Women’s Empowerment in Agriculture Index (WEAI)

In WEAI, adult men and women are asked the following questions on intra-household decision-making roles:

(1) For different economic activities in agriculture, as well as non-farm economic activities and wage/salary employment,

(a) Did you participate? (Y/N);

(b) How much input did you have (and separately, income generated from each activity)?

(Responses: no input or input in few decisions, input into some decisions, input into most or all decisions or no decision made)

(2) For different household decisions over agriculture, other non-farm employment, expenditures and family planning:

(a) Who is it that normally takes the decision?

(b) To what extent do you feel like you can make your own personal decisions regarding these aspects of household life if you want(ed) to?

(Responses: not at all, small extent, medium extent or to a high extent)

Reported decision-making roles, however, can suffer from measurement error, as well as stem from multiple potentially unobserved factors (including the respondent’s state of mind during the survey, seasonality in decision-making patterns, the role of other family members, etc.) Conducting a survey of spouses across 1 851 rural households in Tanzania, Anderson *et al.* (2017) found that spouses often do not agree on who makes decisions across a range of questions regarding household and farming management. Using DHS data for 20 countries in sub-Saharan Africa, Donald *et al.* (2017), for example, found that women reporting greater decision-making power were also more likely to have positive indicators of ‘empowerment’ (e.g. working off-farm, owning land, having similar education levels to their husbands, reporting higher earnings than their husbands’, being part of non-polygamous marriages and speaking against domestic violence). However, the heterogeneity explained by these proxies of ‘empowerment’ is very small, compared to geographic fixed effects, indicating that much is left to explain. And in their study, when spouses disagree, the share of variation explained by these indicators of empowerment falls even further. Given that household surveys often do not collect individual-level data on women beyond these characteristics (and the DHS tends to collect more), the role of unobserved factors in understanding individual resilience is likely to be substantial. We revisit this issue further in Section 4, using recent LSMS-ISA data from Uganda.

A second area of progress in household surveys is through individual-level data on assets and financial outcomes, which can affect intra-household bargaining power as well as individuals’ capacity to cope with shocks. Individual-level data on financial services access (covering a wide

range of variables including different types of account ownership, borrowing, savings and payments) is collected in the Global Financial Inclusion Survey (Global Findex), and household surveys are also increasingly collecting data on borrowing and savings at the individual level. Newer rounds of LSMS household surveys, as well as the DHS and MICS, are also collecting individual-level data on the ownership of mobile phones – which have brought immense changes for men and women in low-income contexts who otherwise face substantial geographic and resource constraints in accessing markets, credit and other information.

Assets, which can generate and help diversify income, as well as alleviate credit and liquidity constraints, can significantly improve household and individual resilience to shocks. Intra-household decision-making over how these assets are used is therefore very important to understanding gender roles in resilience. Agricultural surveys and household surveys with detailed agricultural modules, for example, are increasingly adding questions on individual land ownership, management and use. Changes in international standards have also fueled this momentum, including the 2010 round of the World Programme for the Census of Agriculture (WCA),⁹ which introduced the concept of the sub-holding and sub-holder – and thus recognised that multiple household members, including women, could be owners of an agricultural holding. Among cross-country surveys, the LSMS-ISA and WEAI ask the most detailed questions on men's and women's plot ownership, management, input use, production and other agriculture-related activities. The DHS also asks women whether they own land and, if so, whether alone or jointly with others.

Land ownership is a complex variable to measure since its definition and implications vary significantly across regions, both within and across countries. Control over land, including land management and the rights to sell or use land, is also important to understand, particularly as these rights may be vested with different individuals within the same household (see, for example, Slavchevska, De La O Campos, Brunelli and Doss, 2016). This applies to assets more broadly as well, where individual ownership in addition to rights and control need to be better understood. Recent initiatives and experiments have focused on these measurement challenges, designing individual-level survey questions on ownership and control of assets more broadly (see Box 4 and Doss, Kieran and Kilic, 2017).

⁹ The WCA, housed at FAO, guides methodology and provides technical assistance for country agricultural census programmes worldwide.

Box 4. Approaches to data collection on individual-level asset ownership, control and use

The following major initiatives have examined, through country pilots, how to collect nationally representative, individual-level data on assets.

(1) Gender Asset Gap Project

The Gender Asset Gap Project began in 2009. The project collected data that were nationally representative for Ghana and Ecuador and representative at the state level for Karnataka, India. Between 2010–11, a household asset survey in each country/region was conducted on ownership, rights and decision-making over assets, as well as asset values. The household surveys were informed by qualitative focus group discussions on these issues. The household asset survey had two instruments (a) asking the “most knowledgeable member” of the household in Ghana and Karnataka (and the primary couple in Ecuador) on asset ownership across a range of asset types and (b) rights and decision-making over these assets, which was asked separately of two adult members in each household.

(2) Methodological Experiment on Measuring Assets from a Gender Perspective (MEXA)

MEXA began as a collaboration across the LSMS, the United Nations Evidence and Data for Gender Equality (EDGE) project and the Uganda Bureau of Statistics. An initial pilot survey was conducted in Uganda in 2014, and between 2015–16 UN EDGE-supported additional household surveys in Georgia, Maldives, Mexico, Mongolia, Philippines and South Africa. MEXA aimed to understand how reported asset ownership varied between the standard household-level approach of asking the ‘most knowledgeable’ household member, as opposed to multiple individuals within the household, as well as whether partners provided different information about asset ownership when interviewed separately. The results from MEXA inform the international guidelines on individual-level measurement of asset ownership and control, submitted by UN EDGE to the United Nations Statistical Commission for adoption in 2017 (for more details about MEXA see Kilic and Moylan, 2016).

(3) Gender, Agriculture and Assets Project (GAAP)

Between 2010–2014, led by the International Food Policy Research Institute (IFPRI) and the International Livestock Research Institute (ILRI), GAAP conducted eight agricultural development impact evaluations that collected both qualitative and quantitative information on individual asset ownership and control. Although the surveys, being project based, were not standardised across areas, some interesting findings emerged which were ultimately incorporated into a list of best practices: a Gender Assets Toolkit. As well as looking at rights and control over assets in addition to ownership, these best practices include the need for (a) both quantitative and qualitative research methods, (b) analysing gender asset gaps over time rather than in just one time period and (c) adapting data collection methods to different local contexts.

(d) Multidimensional approaches: RIMA and individual-level measures

Resilience is affected by, and interacts with, a range of different socio-economic and demographic factors, both at the household and individual levels. Multidimensional approaches such as RIMA are therefore useful in understanding, across contexts, which factors are more important in understanding resilience. Over the last few years, a few individual-level measures of deprivation have also been developed that relate specifically to gender. The Individual Deprivation Measure (IDM), for example, is a new multidimensional measure of poverty that was developed between 2009–2013 as part of a large global collaboration led by the Australian National University, and is currently being tested in different countries.¹⁰ IDM includes gender-relevant dimensions on, for example, agency and decision-making, family planning, unpaid work and time use. More recently, Gallup has begun a collaboration with the World Food Programme on a Gender Equality for Food Security (GE4FS) measure, which will be implemented through the Gallup World Poll and will explore the relationship between food security and gender equality, as experienced by individuals, by combining the Food Insecurity Experience Scale and a set of questions exploring five dimensions of gender equality (freedom from violence, reproductive freedom, decision-making ability, financial self-sufficiency and status of paid and unpaid labour).

RIMA

The RIMA model employs a latent variable approach to estimate resilience. The model starts from observed variables which are factored in four key pillars of resilience (Table 1): Access to Basic Services (ABS), Assets (AST), Social Safety Net (SSN) and Adaptive Capacity (AC) in order to measure a latent common construct that is called the resilience capacity index (RCI). Often the RCI is then further used in regression analysis to understand households' probability of experiencing future shocks or losses.

¹⁰ The IDM was developed through a three-phase multidisciplinary international research collaboration across six countries (Angola, Fiji, Indonesia, Malawi, Mozambique and the Philippines). The research was led by the Australian National University, in partnership with the International Women's Development Agency (IWDA) and the Philippine Health and Social Science Association, University of Colorado at Boulder, and Oxfam Great Britain (Southern Africa), with additional support from Oxfam America and Oslo University. It was funded by the Australian Research Council and partner organisations.

Table 1. Pillars of resilience under RIMA

Pillars of resilience	Definition	Examples of variables
Access to Basic Services ABS	ABS shows the ability of a household to meet needs, such as accessing toilets, water and electricity, and distances in minutes from markets, schools and other infrastructures.	House facilities; electricity; improved water facility; improved toilet facility; improved waste disposal facilities; distances in minutes from school, hospital, water source and market.
Assets AST	AST are the key elements of a livelihood. Productive assets (mainly land and livestock) enable households to produce consumable or tradable goods. Non-productive assets (house, appliances) are an important determinant of household well-being.	Wealth index; landownings; livestock.
Social Safety Net SSN	SSN measures the ability of households to access help from friends and relatives, as well as timely and reliable assistance provided by international agencies, charities and non-governmental organisations.	Transfers received from friends and relatives; access to credit.
Adaptive Capacity AC	AC is the ability of a household to adapt to a new situation and develop new sources of livelihood. Having economically active and educated members, for example, may decrease the negative effects of a shock on a household.	Education; employment ratio; literacy of household head

Resilience is a context-specific concept. This means that the construct estimated by RIMA may, from time to time, change its composition, based on model specification or data availability. An example of the former is the case study on Somalia: the three key pillars of RIMA resembled the specific interventions put in place by FAO, World Food Programme (WFP) and United Nations Children's Fund (UNICEF) and were named PRD (productive assets), SSN (social safety nets) and ABS (access to basic services). As for data limitations, a study of resilience and child malnutrition from Mali by d'Errico and Pietrelli (2016), uses pillars based on health-related shocks experienced by children and women in the household instead of SSN. Recent increased data availability (e.g. data from LSMS and other household welfare surveys) should however reduce these constraints and make this approach more feasible across countries.

Because variables across the four pillars are focused at the household level, gender comparisons are typically conducted within the RIMA framework by comparing resilience capacity across male and female heads of household. FAO's series of Resilience Analysis Reports in 2015–16, for example, compares resilience capacity and other outcomes across male and female heads of household in different African countries (Burkina Faso, Niger, Mali,

Mauritania, Senegal and Sudan).¹¹ Comparisons across male and female heads of household are typically justified by assumptions that the household head is primarily responsible for the economic well-being of the household, and that women tend to have poorer access to resources than men. As discussed in the introduction, however, female heads of household can have varied socio-economic profiles. As such, considering them as one group for gender comparisons is therefore problematic. As discussed earlier, while some household surveys are making progress in adding individual-level variables related to resilience, there is still much to be done. Section 4 looks at what can be done with the current household-level approach from a gender perspective, and sheds more light on specific groups of women, particularly by age and marital status, that may require greater attention in gender analyses of resilience.

As long as statistically valid data are provided, the relationship between household resilience and gender-relevant outcomes can also be examined within RIMA. For example, the study from Mali by d'Errico and Pietrelli (2017) examines whether household resilience capacity can affect child malnutrition, using survey data from UNICEF's Multiple Indicator Cluster Survey. As mentioned earlier, one of the pillars in their analysis includes shocks experienced by children and women, including the number of children with diarrhea and/or malaria, and the number of infibulated women.

Individual-level measures based on new data: IDM and GE4FS

As mentioned above, IDM and GE4FS are new, individual-levels of deprivation that are also particularly focused on understanding the socio-economic roles and vulnerabilities of women. These efforts have also been motivated by the need to address indicators across the SDGs, which span multiple areas beyond income and consumption, including access to adequate housing, improved sources of water and fuel, family planning and exposure to violence, among others. Both measures rely on new survey data to collect information on these outcomes, and are currently testing questionnaires in the field.

Through household and individual surveys, the IDM is calculated by first assessing deprivations across 16 different areas (Table 2). These dimensions were also purposefully selected to reflect the different SDG goals.¹² The intensity of these deprivations is also measured along a five-point scale, from extremely deprived (=1) to not deprived (=5). In a 2016 study in Nepal, the IDM also incorporated a short set of questions to assess mental distress and health, based on the Kessler Psychological Distress Scale (K10), a ten-item questionnaire based on questions about anxiety and depressive symptoms that a person has experienced in the last four weeks (Kessler *et al.*, 2003).

For the IDM, the household questionnaire is completed by one knowledgeable household member, which includes listing all household members, present or absent. An individual questionnaire is completed by all adults currently present in the household.

¹¹ These country studies rely on household surveys collected for different years: Senegal (2005), Burkina Faso (1998–2003), Niger (2011), Mali (2009–10), Sudan (2009) and Mauritania (2015).

¹² A recent information sheet on IDM's 2016 survey in Nepal discusses this further: <http://www.individualdeprivationmeasure.org/data/nepal>

Table 2. Dimensions of the Individual Deprivation Measure (IDM) covered in Fiji survey, 2015–16

	Dimensions and indicators	Information needed for intensity of deprivation (5-point scale, where extremely deprived=1 and not deprived=5)
1	Hunger	Whether severe to no hunger
2	Water source (household)	Whether improved, and time in minutes from dwelling
	Water quantity	Whether enough to meet personal needs (number of times per week)
3	Shelter quality (household)	Housing materials and dwelling condition (whether “good” or not)
4	Healthcare – access	Type of professional providing healthcare treatment
	Healthcare – quality	Number of problems with healthcare treatment (extremely deprived = 3 or more significant problems)
	Healthcare – status	Whether unable to perform work due to illness (and time away from work)
5	Education – completed	Years of schooling
	Education – achievement	Literacy and numeracy (whether none, minimal, moderate, adequate or full)
6	Energy – cooking fuel (primary and secondary), and harm from smoke (household)	Whether clean fuel used, and health problems from smoke
	Energy – access to electricity (household)	Number of hours household has electricity per day
7	Type of toilet (household)	Types of improved/not improved sources
8	Family relations – decision-making	Whether no control to full control over decision-making
	Family relations – personal support	Whether no support to all the support needed
9	Clothing – protection	No protection to good protection
	Clothing – personal care	Never presentable to always presentable
10	Violence – experience and risk	Number of incidents experienced in timeframe
11	Family planning – access	No modern methods to more than one modern method
	Family planning – use	Whether severe, moderate or no barriers to use
12	Environment	Number of environmental problems experienced
13	Voice – participation (ability to raise issues in the community)	Not at all to very easily

Dimensions and indicators		Information needed for intensity of deprivation (5-point scale, where extremely deprived=1 and not deprived=5)
	Voice – influence (ability to change things in the community)	Not at all to very easily
14	Time use – labour burden	Number of hours worked per day (not burdened = 10 hours or less per day)
15	Paid and unpaid work – respect	Extremely disrespected to highly respected
	Paid and unpaid work – risk	Extremely dangerous to not dangerous
A	Assets (household)	Quintiles – extremely poor to wealthiest

Note: Household = household-level variable.

Source: IDM Fiji Study 2015–2016: Initial findings, July 2017 (available at <https://iwda.org.au/assets/files/IDM-Fiji-Final-Study-Report-31072017.pdf>).

As discussed earlier, however, the cost of conducting the survey and the respondent ability to answer a large set of questions, with subjective responses that are ultimately aggregated into a scale, need to be considered carefully. In a recent pilot in Fiji to test the IDM, in addition to the household survey, the individual survey comprised 100 questions to be asked of each adult in the household. Measuring some dimensions in the IDM such as violence, decision-making and hunger can also be quite complex to determine at the individual level. Whether the five-point scale can enable effective comparisons of subjective responses across countries (and regions within a country) is also an issue. In one context, for example, the same problems with receiving healthcare treatment, such as proximity, quality of doctors and/or antenatal services, might be considered somewhat deprived (=3), and in another context extremely deprived (=5). Similar issues exist with water quantity for personal use, and voice/agency at the community level, among other dimensions in the IDM.

The GE4FS, which is currently in cognitive testing, also focuses on similar dimensions covered by IDM. It will be based on the individual-level data covered by the Food Insecurity Experience Scale in the Gallup World Poll (GWP), described in Table 3, along with a much shorter individual questionnaire of men and women aged 15 and above (roughly 15 questions). Current topics being examined are presented in Table 3 below, although specific questions within these areas are still being designed. With this data, country-level statistics on men's and women's deprivations across these areas can also be compared against gender-relevant indicators through other surveys that are part of the GWP (Global Findex, Global Women at Work, Global Financial Literacy Survey, for example).

Table 3. Dimensions of the forthcoming Gender Equality for Food Security (GE4FS) measure

Dimensions		Potential topics (in cognitive testing, Nov–Dec 2017)
1	Freedom from violence and coercion	Questions relating to psychological abuse and control, as well as personal safety
2	Sexual and reproductive freedom	Use of contraception, family planning and decision-making around these issues
3	Decision-making ability	Involvement in different intra-household decisions, as well as in the community
4	Economic empowerment	Working for an income, financial inclusion, asset ownership
5	Status of paid and unpaid labour	Types of unpaid work, and time burdens

Both the IDM and GE4FS highlight important issues that need to be considered in gender analyses of deprivation, which is relevant for resilience analyses as well. Along with stressing the importance of examining multiple areas of vulnerability, both the IDM and GE4FS underscore the earlier discussion in this section on the need to look at additional individual deprivations across health, decision-making and time burdens, that are often not captured well through existing household income and consumption data. Both measures point some ways ahead to capturing individual-level data gaps through new data collection, although the time and monetary costs of doing so, particularly in the case of IDM, are substantial. An additional question from a policymaking perspective is whether better measurement of underlying variables that construct these measures, along with geographic data on households and communities, is more informative for targeting and policy design. Further investigation of how these measures perform in field testing, and compare with existing poverty and vulnerability analyses within each country, will be useful.

4 What analyses can be conducted with currently available data?

A case study using the Uganda Living Standards Measurement Surveys, Integrated Surveys on Agriculture (LSMS-ISA)

Given that individual-level data on key elements of vulnerability are still emerging, how can household-level approaches be refined to better understand gender differences in resilience? As mentioned earlier, comparisons simply by sex of the household head are not likely to be very informative, given the diversity of female-headed households. In this section, we underscore this issue using the 2009–10 and 2010–11 rounds of the Uganda Living Standards Measurement Surveys, Integrated Surveys on Agriculture (LSMS-ISA), also known as the Uganda National Panel Survey (UNPS). By looking at this data in different ways, we try to understand which groups of women and female heads tend to be more vulnerable to shocks and food shortages within a specific country setting. In so doing, we highlight additional variables and considerations that could be used in household-level gender analyses, including RIMA.

The UNPS is nationally representative, and also includes a subset of panel households over the three rounds, with GPS coordinates for households' communities. In addition to a range of demographic and socio-economic characteristics that are disaggregated by sex, the UNPS has a detailed household-level module on shocks, including whether the household experienced different types of shocks (across natural/environmental shocks, death or injury in the family and conflict/theft). The length of time experienced by these shocks, the effects of these shocks on income, assets, food production and purchases, and coping strategies are also included in the household questionnaires. The 2009–10 and 2010–11 UNPS rounds also have a module on welfare and food insecurity that is asked of the most knowledgeable person in the household; the main questions included in this module have been detailed earlier, in Box 2. As is common in other LSMS and household welfare surveys, however, experiences with shocks, as well as other variables on consumption/food security, borrowing/account ownership and asset ownership beyond landownings, are not asked separately among individuals within the household.

This section uses a few different approaches to examine how household-level analyses relevant to gender, which mostly rely on comparisons by sex of the household head, can be disaggregated and further refined:

Descriptive analysis:

- a) Individual-level: which groups of individual women and men are more likely to be in consumption-poor households, and/or vulnerable to food shortages?
- b) Household-level: if comparisons are to be made by sex of the household head, what specific characteristics of female- and male-headed households emerge as important in understanding their ability to cope with shocks?

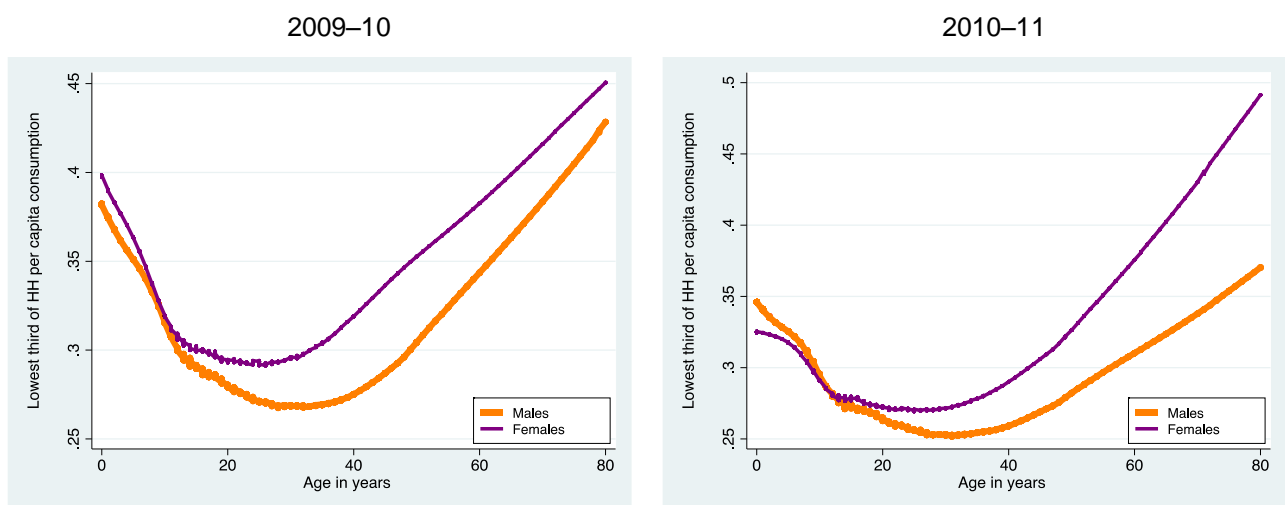
Regression analysis (household-level):

- c) What factors affect persistent vulnerability (exposure to, and losses from, shocks in both the 2009–10 and 2010–11 rounds) within male- and female-headed households?

(a) Descriptive analysis – are women more likely to be in consumption-poor households?

As discussed in studies like Ravallion *et al.* (2017), even though welfare indicators (such as wealth or consumption) are traditionally collected at the household level, one can still examine variation among individuals through their likelihood of living in worse or better-off households. All three rounds of the UNPS, for example, show that women – and in particular, older women – are more likely to be living in households that are in the bottom third of household per capita expenditure (Figure 2) which presents locally weighted regressions). In 2010–11, for example, about 7 percent more women at age 60 were living in consumption-poor households than men of the same age. We examine potential underlying reasons further below.

Figure 2. Locally weighted regressions: share of males and females in households that are in the bottom third of household per capita expenditure

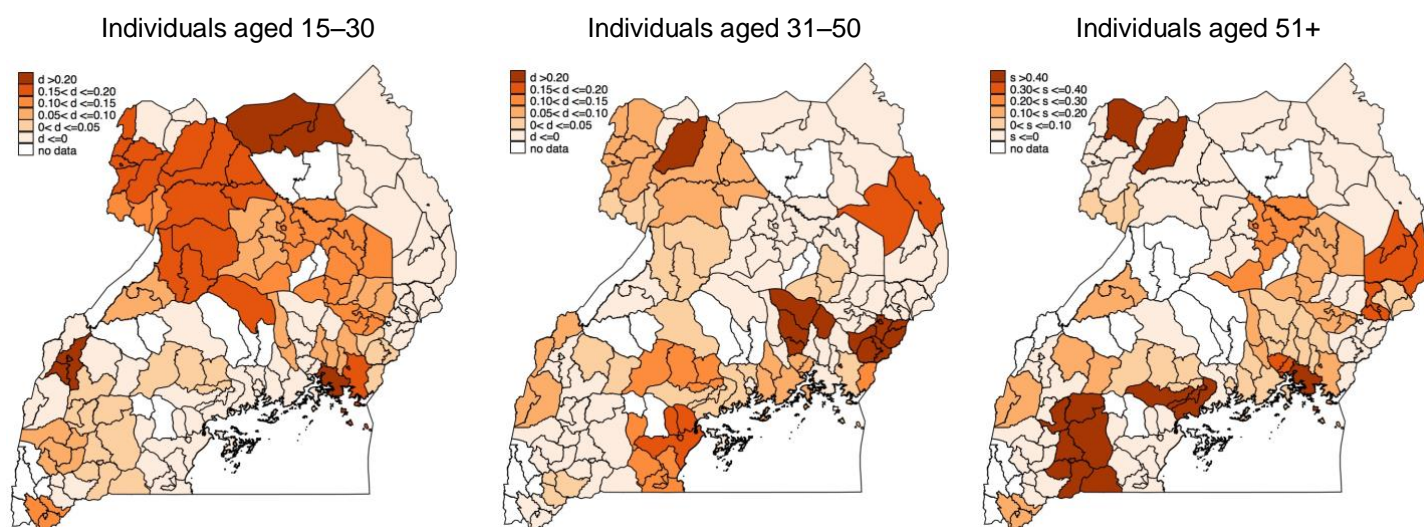


Note: Locally weighted regressions, bandwidth = 0.8.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

These trends tend to be geographically concentrated as well, and by age. Across districts, Figure 3 presents differences between the share of women and the share of men in the lowest third of per capita expenditure. Among younger women, greater gaps exist in the Northern region, including high-poverty districts like Lanwo and Kitgum, which have also had high concentrations of internally displaced populations in previous years. Among older women, particularly those aged 51 and over, the biggest gaps arise in a few districts in the North/West Nile area, as well as the southern part of the Western region, where poverty rates are much lower but the region is vulnerable to food shortages, since agricultural production is much lower and the region is heavily reliant on cattle and livestock. Customary practices among communities like the Banyankole in this area are also often highly restrictive towards women, including preventing women from owning most forms of property (ICRW, 2010). Importantly, the darkest areas in the map represent much greater differences among elderly women than for younger women. In the overall sample, for instance, comparing the share of women versus men aged 51+ who were in the bottom third of per capita expenditure, 15 districts had a gender gap of 20 percent or greater, and eight districts had a gap of 40 percent or more. Among the 15–30 age group, only five districts had a gender gap of 20 percent or more.

Figure 3. Share of women vs men in bottom third of household per capita expenditure

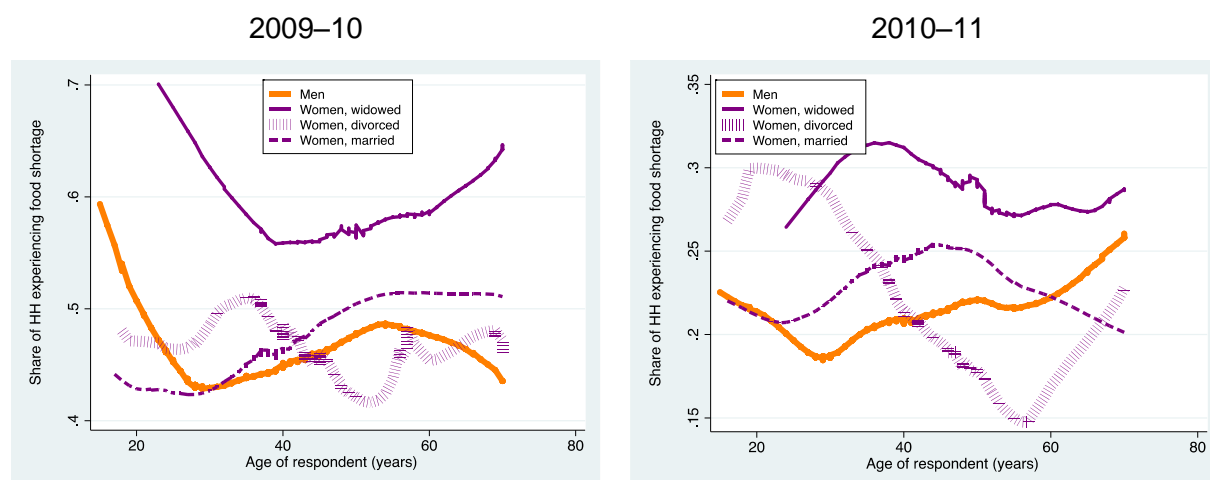


Source: Uganda National Panel Survey (UNPS) 2009–10 round.

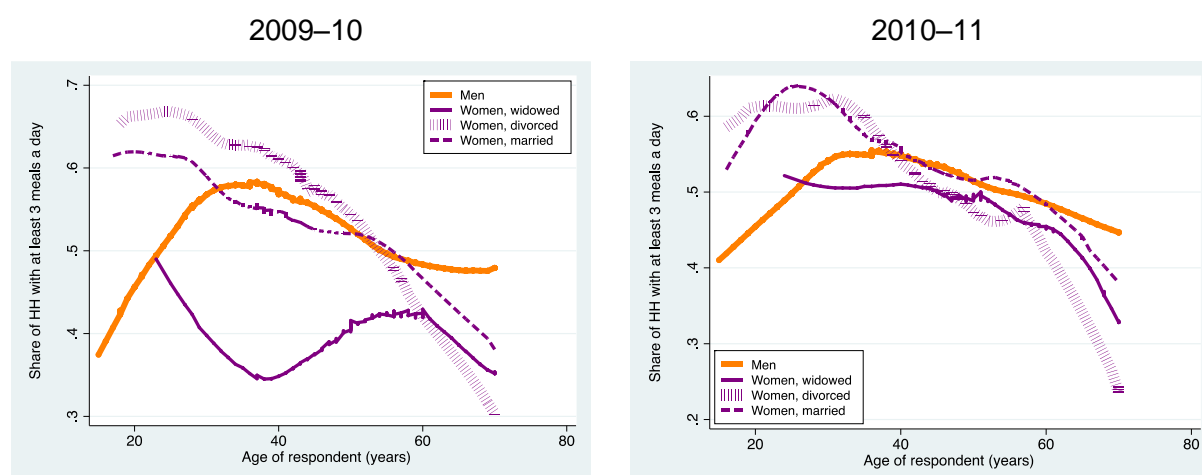
Similar patterns emerge with food security. As mentioned earlier, the 2009–10 and 2010–11 UNPS rounds have a module on food shortages, which is asked of one knowledgeable member of the household, whether male/female or the head/spouse. Given that the respondent ID is identified in the module, Figure 4 presents locally weighted regressions to compare men’s and women’s responses by age, as well as women’s marital status. Similar to Van de Walle’s 2013 study from Mali, we find that widowed women, in particular, are clearly worse off than other women; Figure 3 shows that female widows are much more likely than other groups to be in households experiencing a food shortage in the last year, and the 2009–10 round shows they were also much less likely to report having three meals a day.

Figure 4. Locally weighted regressions: share of men and women experiencing food insecurity

Number of months in last year that households faced a food shortage in last year



Share of households that usually have at least three meals a day

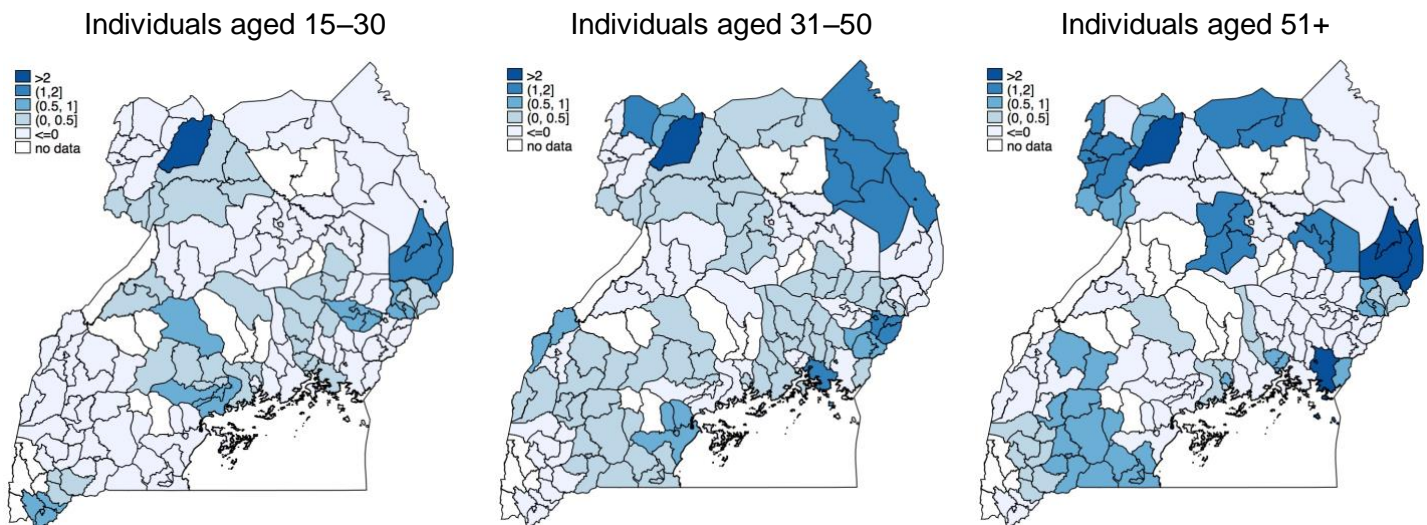


Note: Locally weighted regressions, bandwidth = 0.8.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Finally, Figure 5 also underscores the role of geography in gender analyses of deprivation, by looking at the within-district differences between the average number of months of food shortage experienced by women versus men. Some clear patterns emerge; greater gender gaps exist among older men and women, and these gaps tend again to be concentrated in specific districts in the Northern region, as well as some districts in the southwest. Crucially, the sizeable variations within regions (some districts having high gender gaps, next to districts in the same region with very low gender gaps) reflect the need to examine community effects at a more disaggregated level. As we examine below in further regression analyses, the degree to which household food shortages are explained by geographic effects is also much greater than the variation explained by socio-economic and demographic variables typically covered by household surveys.

Figure 5. Average months of food shortage experienced by women, over men, in the last year (district-level differences)



Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Figures 2–5 show that even in the absence of individual-level data on consumption and food security, one can, to an extent, examine descriptively how individual men and women are situated across worse and better-off households. However, while some interesting findings emerge (including that women, and particularly older women, tend to be in households that have greater consumption vulnerability), their resulting outcomes from being in consumption-poor households are difficult to understand without individual-level data on indicators like health, decision-making and financial outcomes. Statistical comparisons of household-level outcomes across individual men and women may also run into problems, with sampling/clustering of effects within households.

(b) Examining heterogeneity within female-headed households, and geographic variation

If household-level gender comparisons therefore tend to rely on the household head as the point of reference, how can we further refine our view of headship to better understand outcomes? Table 1 reflects the substantial heterogeneity within female heads of household, particularly differences by age of the household head. Older female heads, as expected, are much more likely to be widowed, whereas those between 31–50 years of age are the most likely to be divorced. Younger heads of household tend to have slightly more education, and are much less likely to own agricultural land – women heads aged 15–30 were also much more likely to own a mobile phone. The oldest group (those aged 66+) seem particularly vulnerable in not having any woman or man working for a wage, and also not having a savings account with a bank or Monetary Financial Institutions (MFI), or a mobile phone. Women heads in the 31–50 and 51–65 age groups were also more likely to have women owning/managing agricultural land, as well as having a male household member living/working outside the household.

Varying endowments and vulnerabilities across the age distribution of female heads is consistent with local knowledge and qualitative data as well. Across Uganda, older individuals typically have less access to credit, in addition to lower income and poorer social safety nets. Widowed and childless women are especially vulnerable in communities with greater restrictions on women's ownership of property and inheritance rights.

Table 4. Ordinary Least Squared (OLS) regressions (pooling 2009–10 and 2010–11 data): correlates of female-headed households, across different age groups of female heads

	Female HOUSEHOLD head:			
	(1) Aged 15–30	(2) Aged 31–50	(3) Aged 51–65	(4) Aged 66+
Rural area	-0.03 [-1.73]	0.056* [1.93]	-0.016 [-0.61]	-0.003 [-0.36]
Widowed	-0.024 [-1.39]	0.056* [2.09]	0.195*** [5.67]	0.175*** [6.50]
Divorced	-0.016 [-1.14]	0.222*** [9.10]	0.081*** [3.50]	0.048*** [4.70]
Max years of education, women 15+	0.003** [2.37]	0.009*** [5.45]	0.001 [0.25]	-0.002 [-1.52]
Max years of education, men 15+	-0.007*** [-5.66]	-0.010*** [-3.80]	-0.003 [-1.68]	-0.002** [-2.34]
At least one woman in wage work	0.017** [2.91]	0.061*** [4.25]	0.027** [3.23]	0.004 [0.37]
At least one man in wage work	-0.030*** [-4.09]	-0.057** [-2.91]	-0.024** [-2.61]	-0.024** [-2.98]
Any man member lives/works outside household	0.012 [1.71]	0.040** [3.28]	0.039** [3.10]	-0.018*** [-3.43]
Any woman member lives/works outside household	-0.006 [-0.90]	-0.046*** [-4.36]	-0.004 [-0.35]	0.013 [1.68]
Household size	-0.002* [-2.04]	0.003 [0.85]	-0.001 [-1.16]	-0.002* [-1.97]
Household owns agricultural land	-0.032*** [-3.39]	-0.057* [-1.96]	0.009 [0.73]	-0.003 [-0.36]
Household owns agricultural land*share of women who manage plots (sole responsibility)	0.018 [1.57]	0.105*** [7.60]	0.090*** [9.38]	0.050*** [8.66]
Household dwelling: independent flat/house	-0.015 [-1.65]	-0.026 [-1.40]	0.017 [1.76]	0.007 [0.95]
Household has electricity	0.017 [0.82]	-0.037 [-1.14]	-0.001 [-0.08]	0.002 [0.20]
Household has a piped water connection	-0.015 [-0.98]	0.016 [0.62]	0.056** [2.84]	0.002 [0.17]

	Female HOUSEHOLD head:			
	(1) Aged 15–30	(2) Aged 31–50	(3) Aged 51–65	(4) Aged 66+
Anyone in household owns a mobile phone	0.016** [2.60]	-0.011 [-0.78]	-0.014* [-1.88]	-0.014** [-2.47]
Anyone in household has a savings account with a Monetary Financial Institutions (MFI)/bank	0.008 [1.32]	0.032** [2.79]	0.021*** [3.99]	-0.017** [-3.14]
Household in top third of per capita expenditure distribution	0.003 [0.57]	0.011 [0.91]	0.018* [2.05]	-0.01 [-1.65]
Observations	4 590	4 590	4 590	4 590
Share of households in total sample	0.03	0.11	0.07	0.04
Share among female headed households	0.10	0.44	0.29	0.17
Community fixed effects included	Y	Y	Y	Y
R-squared	0.172	0.255	0.245	0.275
R-squared not controlling for community fixed effects	0.06	0.16	0.16	0.18

Notes: (1) T-statistics accounting for community clustering in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Looking next at the UNPS module on shocks, Table 5 below looks at differences in shocks experienced across households headed by women and men of different age groups, as well as in the bottom and top third of the distribution of consumption expenditure. Save but one case, there are no significant gender differences across any of the breakdowns. The lack of systematic differences across both years by age or per capita expenditure also indicates that gender differences in the exposure to the shock may not be substantial, particularly since these shocks occur at the household/community levels. Figure 6, however, does show that aggregate estimates can mask some important geographic differences in specific areas, with several districts with gender differences of 20 percent or greater across the share of female- versus male-headed households reporting any shock, particularly among older (31–50 and 51+) groups. The Western Nile region also seems to exhibit greater gender differences at the household head level (in many cases greater than 40 percent), for all age groups. While aggregate comparisons may not reveal strong gender differences, therefore, a closer look at certain areas where gender differences arise could be important – particularly since, as seen in Figure 5 above, more vulnerable groups of women may be concentrated in certain localities.

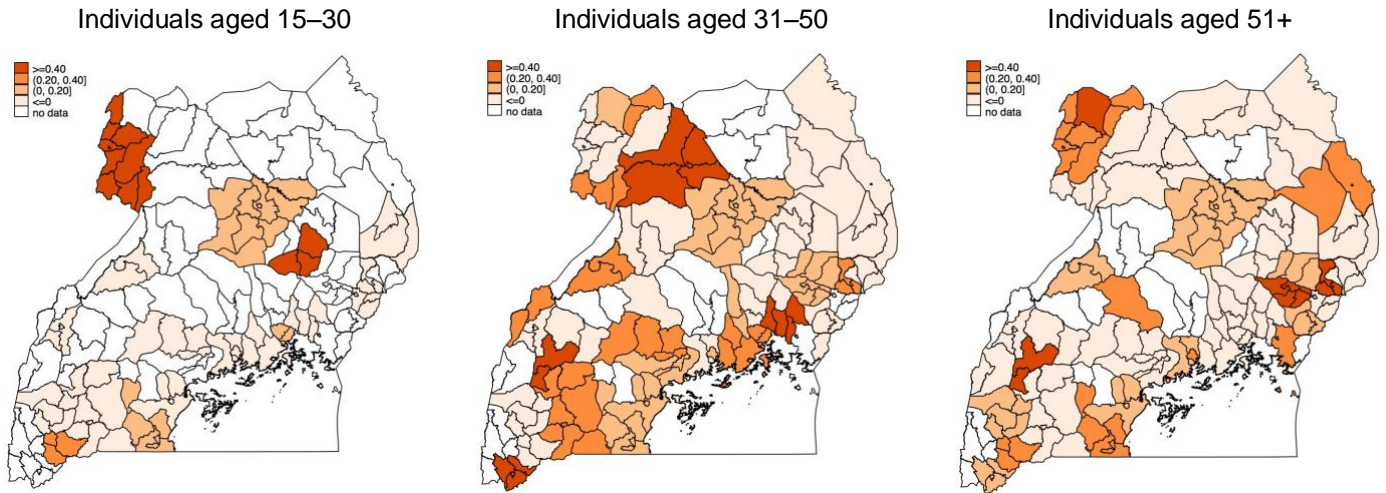
Table 5. Share of female- and male-headed households experiencing different types of shocks, by age and distribution of per capita expenditure

	Natural shock (weather/climate)				Death/illness in family				Conflict-related shock			
	FHH ²		MHH ²		FHH		MHH		FHH		MHH	
<u>2009–10 survey round</u>												
Bottom third of per capita expenditure												
Aged 15–30	0.60	[0.52]	0.54	[0.50]	0.20	[0.42]	0.17	[0.38]	0	[-]	0.06	[0.24]
Aged 31–50	0.63	[0.48]	0.55	[0.49]	0.13	[0.34]	0.18	[0.39]	0.08	[0.28]	0.05	[0.21]
Aged 51+	0.63	[0.48]	0.56	[0.49]	0.21	[0.41]	0.13	[0.34]	0.09	[0.29]	0.07	[0.26]
Top third of per capita expenditure												
Aged 15–30	0.23	[0.43]	0.33	[0.47]	0.13	[0.35]	0.12	[0.32]	0.10	[0.31]	0.13	[0.34]
Aged 31–50	0.38	[0.49]	0.45	[0.50]	0.20**	[0.40]	0.13**	[0.34]	0.15	[0.36]	0.11	[0.31]
Aged 51+	0.53	[0.50]	0.51	[0.50]	0.17	[0.38]	0.16	[0.37]	0.16	[0.37]	0.08	[0.27]
<u>2010–11 survey round</u>												
Bottom third of per capita expenditure												
Aged 15–30	0.29	[0.46]	0.35	[0.48]	0.14	[0.36]	0.03	[0.16]	0.07	[0.26]	0.03	[0.16]
Aged 31–50	0.38	[0.49]	0.34	[0.48]	0.15	[0.36]	0.07	[0.25]	0.06	[0.24]	0.05	[0.23]
Aged 51+	0.33	[0.47]	0.37	[0.48]	0.16	[0.37]	0.18	[0.38]	0.03	[0.16]	0.03	[0.17]
Top third of per capita expenditure												
Aged 15–30	0.22	[0.42]	0.19	[0.40]	0.17	[0.39]	0.14	[0.35]	0	[-]	0.05	[0.23]
Aged 31–50	0.25	[0.44]	0.31	[0.46]	0.13	[0.34]	0.14	[0.35]	0.08	[0.28]	0.07	[0.26]
Aged 51+	0.27	[0.45]	0.36	[0.48]	0.18	[0.39]	0.12	[0.32]	0.04	[0.18]	0.06	[0.24]

Notes: (1) T-tests of equality of means across FHH and MHH were conducted. ***=significant at p=0.01, **=significant at p=0.05. (2) FHH: Female Headed Household; MHH: Male Headed Household.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Figure 6. District-level gender differences in whether household reported any shock in last year

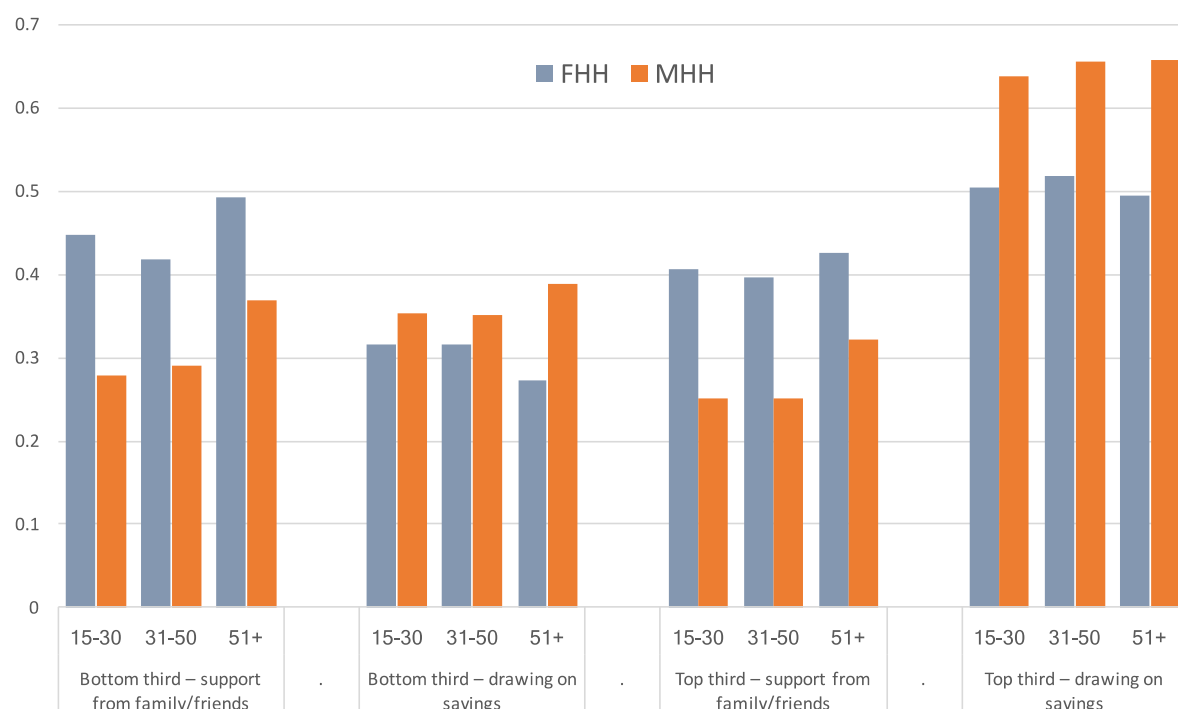


Note: District-level differences = (share of female heads reporting any shock in district – share of male heads reporting any shock in district).

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Some interesting gender differences also emerge on coping with shocks. As discussed in Section 3, along with questions on exposure to shocks, questions on coping are typically asked at the household level, so gender comparisons can only be made across men and women heads, controlling for specific characteristics of the head and household. The UNPS module on shocks asks about a range of coping strategies, including (a) seeking help from family/friends (b) relying on savings, (c) reducing consumption, (d) seeking more non-agricultural employment, (e) obtaining credit, (f) migrating for work and (g) changing agricultural practices/techniques. Of these, only significant differences between female- and male-headed households were found to have reliance on family/friends and savings. Specifically, female-headed households tend to rely much more on family and friends for support in shocks experienced in either survey round, and significantly less than male-headed households on savings (reliance on savings was, as expected, also much greater in the top third of the per capita expenditure distribution compared to the bottom third). This finding is consistent with studies from other contexts, namely Doss *et al.* (2017)’s findings from Ghana and the state of Karnataka in India, discussed in Section 2. Figure 7 also shows that while age doesn’t play a large role across these two coping strategies, gender gaps in reliance on family/friends are greater among younger heads (aged 15–30), and gender gaps in reliance on savings are greater among older heads (aged 51+).

Figure 7. Share of female- and male-headed households using different coping strategies to respond to shocks, by age and distribution of per capita expenditure

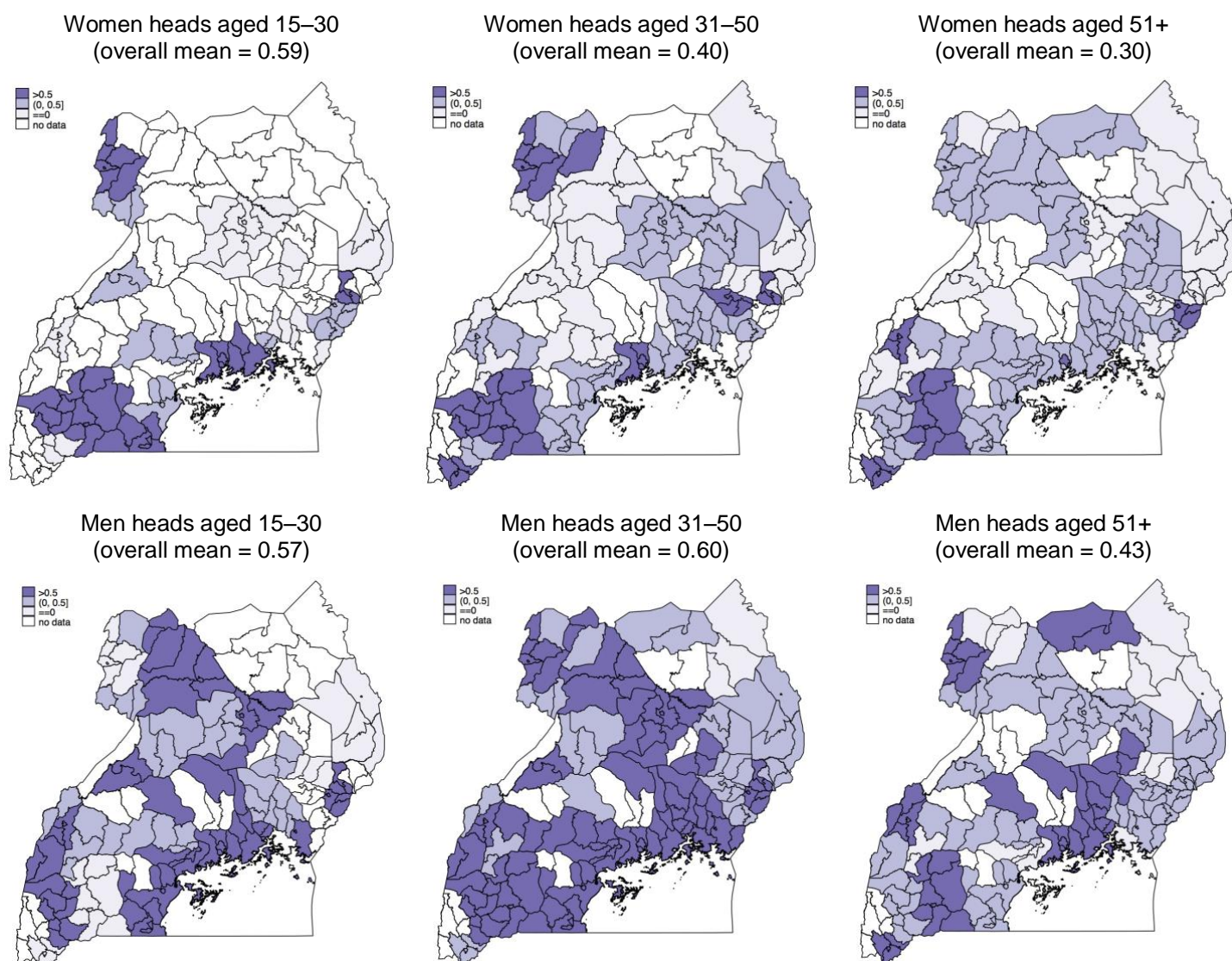


Notes: Sample includes households that faced a shock in either 2009–10 or 2010–11 rounds.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

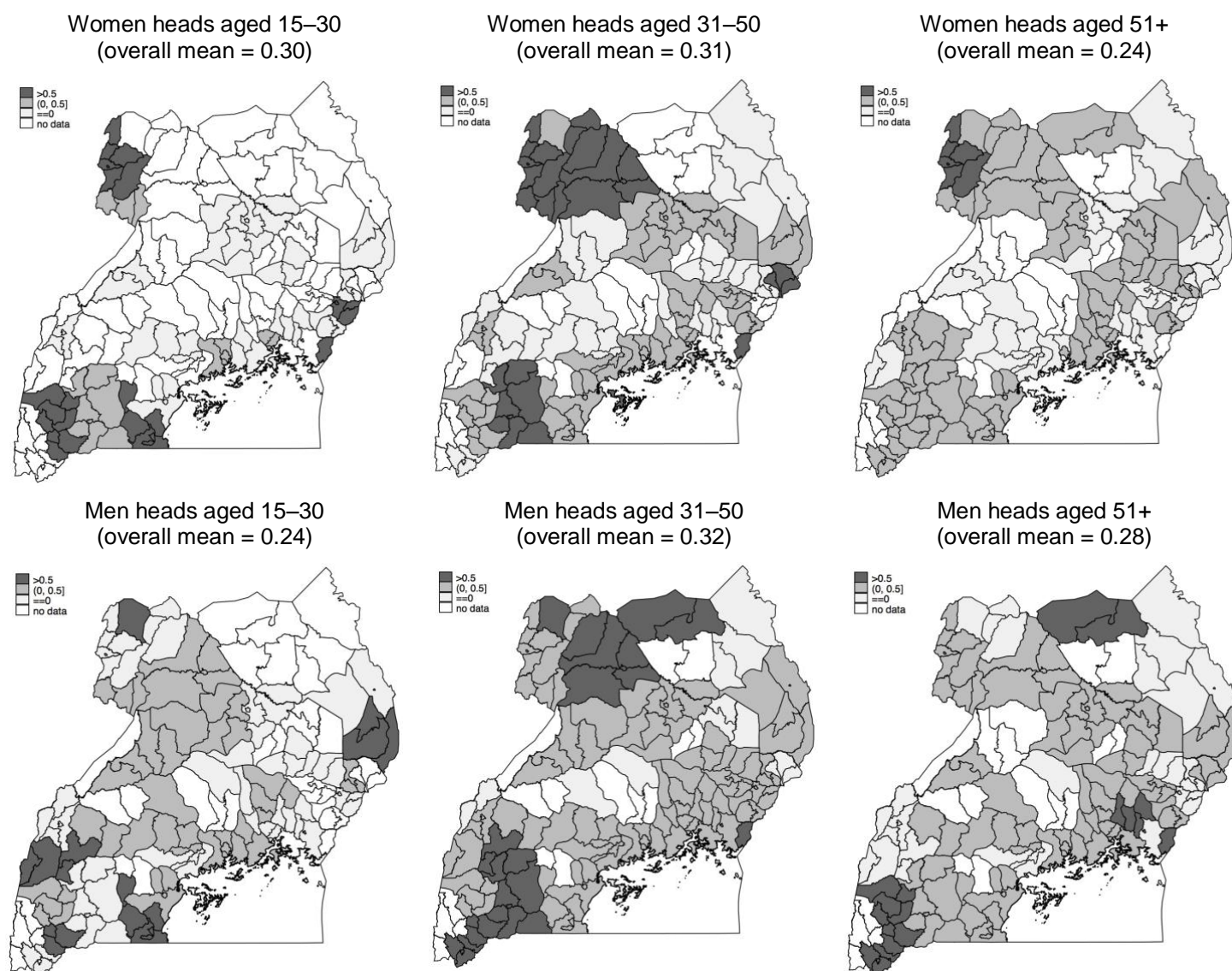
Given the importance of reliance on family/friends and access to finance as coping strategies, Figures 8 and 9 also examine geographic differences across female- and male-headed households by related outcomes collected by the UNPS on mobile phone and savings account ownership. These variables were also collected at the household level, so are again compared across female- and male-headed households of different age groups. The figures highlight overall gender gaps across male and female household heads of different ages, as well as useful geographic trends to pinpoint areas where women face greater inequalities. Figure 8 shows, for example, that women heads aged 15–30 whose households own a mobile phone are much more geographically concentrated in certain districts than male heads in the same age group, even though the overall shares of mobile phone ownership across these households are similar. This geographic concentration of areas with higher mobile phone ownership among women-headed households holds for older age groups as well, although the overall gender gaps are greater (60 percent of households with male heads aged 31–50, for example, had a mobile phone, compared to 40 percent of households headed by women in the same age group). Similarly, Figure 8 shows that while overall shares of male- and female-headed households owning savings accounts are not very different, within and across age groups, there are substantial variations across regions – and again, positive outcomes for women are more focused in a few regions. As discussed in the regression analysis below, both mobile phone and savings account ownership also have significant effects on persistent exposure to different types of stresses, as well as losses from shocks.

Figure 8. Share of female- and male-headed households with a mobile phone, by age of head and district



Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Figure 9. Share of female- and male-headed households with a savings account, by age of head and district

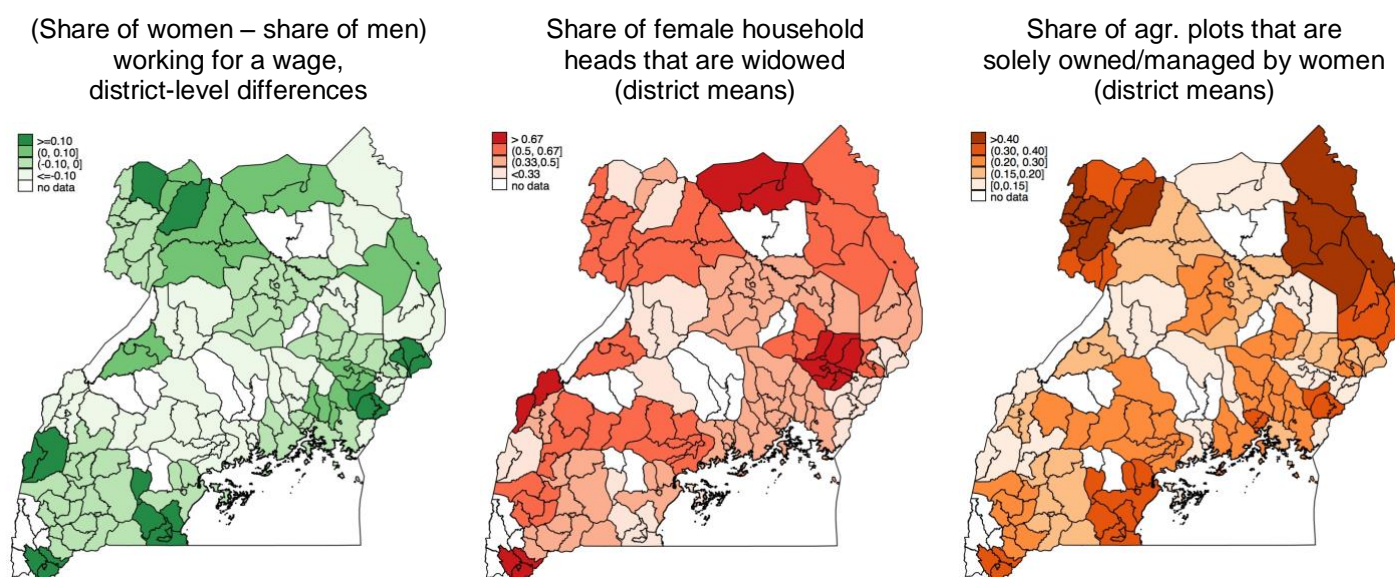


Notes: Savings account recorded are with any financial institution (including microfinance).

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Below, Figure 10 also shows how additional the individual-level variables controlled for on the right-hand side in Table 1, that may affect women’s ability to cope with risks/shocks, are also very geographically concentrated in certain areas. This includes variables examined in RIMA, such as wage employment, but also other variables related to marital status and asset ownership, such as widowhood and the share of agricultural plots solely owned and/or managed by women. Most areas across the country, for example, have higher rates of wage employment for men as compared to women. However, there are a few districts close to the borders in the Northern region (particularly in the West Nile area), as well as in the south, where the share of women working for a wage is greater. Districts with higher shares of widowed women are spread throughout the country, with some high concentrations again throughout the Northern region, where higher numbers of women farmers also solely own/manage agricultural land (particularly in the West Nile region, and Karamoja further to the northeast).

Figure 10. Geographic (district-level) variation in some outcomes for women: working for a wage, widowhood and ownership/management of agricultural plots



Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Overall, the analysis above not only shows the importance of looking within female- and male-headed households, to the extent possible by age, marital status and other individual and household characteristics, but also using disaggregated geographic data to examine gender differences further across localities. Individual-level data on coping strategies, including related outcomes on savings and mobile account ownership, as well as ownership of other assets, would also be very useful in understanding gender differences in resilience within households.

Overall, since household surveys are increasingly collecting GPS data of agricultural plots, households, and/or communities, this information can be used to better understand the distribution of gender-specific outcomes within a country, as well as where gender gaps are greater, and hence where policy can be better targeted. As discussed earlier, connecting GPS-linked enumeration areas with geocoded data from other surveys, like the DHS, that collect individual-level data on health and decision-making, can also offer a wider view into gender differences in resilience.

(c) Regression analysis with panel data: looking at factors affecting persistent vulnerability within male- and female-headed households

Household panel data can allow for a dynamic view of outcomes related to resilience, such as susceptibility to food shortages over time, and regressions can shed light on which variables – controlling for other observed factors – tend to matter more in explaining these outcomes. Using OLS regressions controlling for community fixed effects, Table 6 below looks, within male and female households, at which groups are more likely to face food shortages in both the 2009–10 and 2010–11 rounds, based on initial socio-economic and demographic characteristics from the 2009 round. These characteristics include whether the household is rural, education and wage work among men and women in the household, age of the household head, household size, agricultural landownings and the share of women solely owning/managing agricultural land, as well as household-level characteristics on whether the home is an independent dwelling, access to electricity, ownership of a mobile phone and ownership of a savings account. In addition to community fixed effects (representing the different enumeration areas in the sample), the dynamic model also included, on the right-hand side, whether the household experienced a food shortage in 2009, which as expected is positively associated with a food shortage in the subsequent year.

Table 6. OLS regressions: gender differences in how community fixed effects are associated with food shortage, within female- and male-headed households

	Whether experienced a food shortage in 2010–11 (Y=1, N=0)	
	Female heads	Male heads
<i>Characteristics from 2009–10 round:</i>		
Experienced a food shortage in 2009–10	0.088** [2.33]	0.131*** [6.59]
Rural area	0.108 [1.37]	0.143*** [5.30]
Widowed	0.036 [1.63]	0.106 [0.89]
Max years of education, women 15+	-0.001 [-0.12]	-0.005** [-3.32]
Max years of education, men 15+	-0.011** [-2.41]	-0.007** [-2.63]
At least one woman in wage work	0.091* [1.89]	-0.021 [-0.99]
At least one man in wage work	0.032 [0.81]	-0.004 [-0.14]
Any man member lives/works outside household	0.073 [1.07]	0.014 [0.68]
Any woman member lives/works outside household	-0.086 [-1.50]	-0.046 [-1.37]

	Whether experienced a food shortage in 2010–11 (Y=1, N=0)	
	Female heads	Male heads
Age of head: 15–30	0.112	-0.028
	[1.25]	[-0.89]
Age of head: 31–50	-0.003	-0.031**
	[-0.06]	[-2.41]
Age of head: 51–65	0.018	0.001
	[0.38]	[0.03]
Household size	0.009**	0.005***
	[2.67]	[3.43]
Household owns agricultural land	0.053	0.063
	[0.60]	[1.26]
Household owns agricultural land*share of women who manage plots (sole responsibility)	-0.035	-0.041
	[-0.55]	[-0.59]
Household dwelling: independent flat/house	-0.035	-0.054
	[-0.55]	[-1.28]
Household has electricity	0.045	-0.005
	[0.83]	[-0.15]
Anyone in household owns a mobile phone	-0.001	-0.040*
	[-0.03]	[-1.97]
Anyone in household has a savings account with a Monetary Financial Institutions (MFI)/bank	-0.042	-0.009
	[-1.74]	[-0.73]
Observations	1 369	3 175
Community fixed effects included	Y	Y
R-squared controlling for community fixed effects	0.54	0.38
R-squared not controlling for community fixed effects	0.17	0.16

Notes: Robust t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

Interestingly, Table 6 highlights that not many observed characteristics are significantly associated with experiencing a food shortage in both years, and that unobserved geographic effects actually play a much stronger role in explaining variation in the dependent variable. This is particularly the case for female-headed households (R-squared falls from 0.54 to 0.17 when community fixed effects are excluded, compared to 0.38 to 0.16 for male-headed households). This also underscores the discussion of the figures and maps above on the role of geography in understanding gender differences in variables related to resilience.

Along these lines, Table 7 below examines characteristics associated with experiencing shocks and shock-related outcomes in both the 2009–10 and 2010–11 rounds (experienced any shock

in both years; experienced loss from this shock in both years; experienced food shortage in both years). The results again highlight both the importance of looking at specific characteristics within male- and female-headed households – widowed, as well as younger, female heads of household were more likely to experience a shock, as well as losses from these shocks (as elicited in the UNPS as losses in income, food production and/or assets); widowed female-headed households were also significantly more likely to experience a food shortage in both years. Among gender-relevant variables, only the maximum years of education among women 15+ in the household had a systematically negative effect across all three shock-related outcomes – years of education among men aged 15+ only had a lowering effect on experience of food shortage in both years. Interestingly, there were no effects from employment-related variables (whether there was any wage-earner among adult men and women in the household), as well as women’s landownership. Some household-level socio-economic variables also matter – farming households (those owning agricultural land) were more likely to experience shocks in both years, as well as households without electricity (column (1)), a savings account (column (3)) or ownership of mobile phones (all three columns).

Table 7. Characteristics associated with shock/food shortage in both 2009–10 and 2010–11 (OLS regressions)

	Experienced any shock in both years		Experienced loss from any shock in both years ⁽¹⁾		Experienced food shortage in both years	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Characteristics from 2009–10 round:</i>						
Rural area	0.131**	0.134***	0.127**	0.132**	0.103**	0.103*
	[3.23]	[3.51]	[2.96]	[3.32]	[2.33]	[2.19]
Female head	0	-0.034	-0.025	-0.052	0.002	-0.014
	[0.01]	[-0.56]	[-0.78]	[-0.82]	[0.12]	[-0.44]
Female head*widowed	0.052*	0.064*	0.044	0.054*	0.046*	0.053*
	[2.16]	[2.27]	[1.73]	[1.90]	[1.99]	[2.06]
Max years of education, women 15+	-0.006**	-0.006**	-0.006**	-0.006***	-0.007***	-0.007***
	[-2.35]	[-2.93]	[-3.35]	[-4.34]	[-4.05]	[-4.60]
Max years of education, men 15+	-0.002	-0.002	-0.004	-0.003	-0.007***	-0.007***
	[-0.67]	[-0.53]	[-1.03]	[-0.93]	[-4.23]	[-3.62]
At least one woman in wage work	-0.019	-0.023	-0.026	-0.029	-0.009	-0.01
	[-0.48]	[-0.63]	[-0.66]	[-0.81]	[-0.63]	[-0.66]
At least one man in wage work	0.006	0.01	0.009	0.014	-0.01	-0.011
	[0.48]	[0.79]	[0.87]	[1.30]	[-0.53]	[-0.59]
Any man member lives/works outside household	-0.005	-0.007	0.002	0.001	0.015	0.015
	[-0.15]	[-0.20]	[0.05]	[0.02]	[0.90]	[0.87]
Any woman member lives/works outside household	0.009	0.01	0.016	0.016	-0.007	-0.007
	[0.43]	[0.48]	[0.98]	[1.07]	[-0.24]	[-0.22]
Age of head: 15–30		-0.074**		-0.058*		-0.006
		[-2.53]		[-2.01]		[-0.26]

	Experienced any shock in both years		Experienced loss from any shock in both years ⁽¹⁾		Experienced food shortage in both years	
	(1)	(2)	(3)	(4)	(5)	(6)
Age of head: 31–50		-0.02		-0.014		-0.011
		[-1.14]		[-0.79]		[-0.74]
Age of head: 51–65		-0.014		-0.019		0.005
		[-0.29]		[-0.35]		[0.15]
Female head*aged 15–30		0.159**		0.160**		0.009
		[2.65]		[2.42]		[0.10]
Female head*aged 31–50		0.036		0.013		0.037
		[0.57]		[0.22]		[0.83]
Female head*aged 51–65		0.024		0.031		-0.011
		[0.28]		[0.32]		[-0.25]
Household size	0.002	0.001	0.001	0.001	0.009**	0.008**
	[0.46]	[0.21]	[0.27]	[0.13]	[3.02]	[2.89]
Household owns agricultural land	0.090**	0.093**	0.116***	0.118***	0.049	0.052
	[2.99]	[3.22]	[4.76]	[4.87]	[1.41]	[1.38]
Household owns agricultural land*share of women who manage plots (sole responsibility)	-0.039	-0.04	-0.038	-0.037	-0.021	-0.022
	[-1.35]	[-1.48]	[-1.52]	[-1.60]	[-0.74]	[-0.75]
Household dwelling: independent flat/house	0.048	0.047	0.044	0.043	-0.066	-0.065
	[1.39]	[1.30]	[1.30]	[1.19]	[-1.68]	[-1.63]
Household has electricity	-0.053*	-0.060**	-0.028	-0.034	-0.017	-0.017
	[-2.13]	[-2.35]	[-1.13]	[-1.43]	[-0.64]	[-0.64]
Anyone in household owns a mobile phone	-0.020*	-0.020**	-0.029***	-0.032**	-0.042**	-0.041**
	[-2.27]	[-2.33]	[-4.10]	[-3.35]	[-2.51]	[-2.40]
Anyone in household has a savings account with a Monetary Financial Institutions (MFI)/bank	0.032	0.032	0.037	0.037	-0.022**	-0.021**
	[1.07]	[1.05]	[1.24]	[1.22]	[-2.66]	[-2.51]
Observations	4 632	4 632	4 632	4 632	4 632	4 632
Community fixed effects included	Y	Y	Y	Y	Y	Y
R-squared	0.356	0.358	0.366	0.367	0.358	0.359
R-squared not controlling for community fixed effects	0.07	0.07	0.08	0.08	0.13	0.13

Notes: Robust t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1; (1) The UNPS asked households whether they had suffered a loss in income, food production, and/or assets from different shocks.

Source: Uganda National Panel Survey (UNPS) 2009–10 round.

What can these results tell us, from a gender perspective? With currently available household survey data, as has been emphasised earlier, looking at different types of female heads of household is important. In particular, the age of the female head, as well as marital status (widowhood) are important in understanding vulnerability and resilience to shocks. Women's education, interestingly, also in this context seems to matter more than men's education in experience with repeated shocks/food-related stresses. Given the significant effects of agricultural landownings, mobile phone and savings account ownership overall, disaggregating these variables further by sex (for example, looking at a broader range of assets owned by men/women, as well as who in the household owns/uses a mobile phone and savings account), we might be able to better understand other gender-related dimensions of resilience.

The overarching role of geographic factors, however, shows there is still much we don't know. Table 6 shows that among female household heads, whether they experienced food shortages in both the 2009–10 and 2010–11 rounds is explained to a much greater degree by geographic factors, as compared to male heads of household; Table 7 also shows a substantial drop in variation in outcomes explained by the right-hand side variables, when including/excluding community fixed effects. The extent to which observed socio-economic/demographic characteristics collected at the individual level, including access to other assets and finance, might dominate over geographic factors – which are also tied to other often-unobserved cultural and institutional factors affecting gender roles – would be useful going forward in gender resilience analyses.

5 Conclusions

Resilience is a multi-dimensional concept, and the ability to cope with shocks and stresses hinges on a number of factors; access to earning opportunities and finance; human and physical capital; natural resources; viable institutions within the community; property and other legal rights; and the capacity to marshal all of these endowments in an effective way. Understanding resilience within communities and households therefore requires a collective examination of these outcomes, at the relevant decision-making level.

Growing empirical evidence, however, shows greater heterogeneity in decision-making within households and communities over time use, resources and assets and coping strategies than traditional analyses would allow for. Different country studies, for example, have shown that women household members respond very differently to shocks than their male counterparts, with important implications for how policies should be targeted. The first part of this paper has been dedicated to understanding key dimensions of resilience that affect gender-specific analyses, and a view of the direction surveys are moving in, in terms of collecting and using more detailed individual-level data on health, decision-making, ownership of landed and non-landed assets, as well as access to finance.

Given that individual-level data on key elements of resilience are still emerging, how can household-level approaches be refined to better understand gender differences? Most surveys – because of cost issues, as well as a general outlook that household shocks are felt/recognised by all household members – still collect information on exposure to shocks, coping strategies and other outcomes related to resilience, at the household as opposed to the individual level. As a result, gender analyses within household-level approaches are limited to comparisons across male and female heads of household. These comparisons, however, are not likely to be very informative, given, for example, the diversity of female-headed households. In the second part of this paper, we use the 2009–10 and 2010–11 rounds of the Uganda LSMS-ISA as a case study to understand, through descriptive and regression analyses, which groups of women and female heads tend to be more vulnerable to shocks and food shortages within a specific country setting. In so doing, we highlight additional variables and considerations that could be used in household-level gender analyses, including FAO's RIMA.

Overall, the discussion of available and emerging data, as well as results from the Uganda case study, highlight a few main points that can guide household-level analyses:

1. **A closer look at vulnerable groups among women:** The descriptive analysis, at the individual level, indicates that women – and in particular, older, widowed women – tend to be more likely to live in consumption-poor households. At the household level, the descriptive analysis also shows that households with widowed, female heads are more likely to experience food insecurity, and the regression analyses show that widowed and younger female heads, as compared to other female heads of household, were more likely to suffer persistent shocks and losses from these events. Age, marital status (in particular widowhood) are therefore important to consider in household-level analyses on gender and resilience, consistent with recent evidence from other countries (Van de Walle, 2013). The Uganda case study also shows, interestingly, that women's education appears to play a larger role in mitigating persistent exposure to and losses from shocks, as compared to men's education.

2. **The role of geographic factors:** For women across different age groups, both the descriptive and regression analyses also show that deprivations across these outcomes tend to be geographically concentrated in certain localities, to a much greater extent than those for men. The regression analysis shows that geographic fixed effects also play a much greater role than observed demographic and socio-economic characteristics that are typically available in household surveys. These results therefore highlight the importance of accounting for disaggregated geographic fixed effects, given the increased availability of geocoded survey data, and looking beyond aggregate regional comparisons to focus on localities where gender differences can be greater.
3. **Additional variables that could be disaggregated at the individual level:** In addition to modules on shocks and coping strategies, this paper discusses the progress of individual-level data in areas such as decision-making, control over assets, and access to finance – as well as composite measures spanning these different dimensions – that would eventually allow individual-level analyses of resilience. In particular, the analysis from Uganda shows the importance of household ownership of mobile phone(s) and savings accounts in mitigating the effects of persistent shocks. Disaggregating these variables further at the individual level (for example, understanding who in the household owns/uses a mobile phone and savings account) could enhance gender-related analyses of resilience, given that women household heads in the Uganda study were much more likely to rely on social networks and less likely to rely on savings to cope with shocks.

Overall, the discussion of available and emerging data, as well as results from the Uganda case study, highlight the importance of moving towards individual-level data and individual-level analyses of resilience – and in the interim, including variables and geographic disaggregations in household-level analyses that examine specific groups of women who are more likely to be vulnerable to shocks. Overall, the paper emphasises a multi-pronged overview of different factors that could affect gender analyses of resilience. The role of geographic factors also underscore the fact that resilience is sensitive to context, and that approaches would likely need to be tailored across different countries. This is key in terms of policy making process, as it calls for better and more effectively gender-related data collection and analysis tools.

There are many reasons why policy makers should be targeting women with their resilience-enhancing activities'. Women manifest an impressive resilience and multifaceted array of talents, but they also face a range of constraint – particularly in their access to productive resources as land, inputs, training, and financial services (FAO, 2013). The descriptive as well as the inference analysis showed before, demonstrates that women are most likely more exposed to risks and shocks, and more scarcely endowed with adequate coping mechanisms. Policy makers should focus their attention to gathering adequate data for informing the decision process in order to support women conditions. This ultimately translates into the need for better and more gender-specific resilience analysis that should be embedded in the programmatic efforts of UN and non-UN agencies and implementers. Filling the so-called gender gap in agriculture and in other aspects of rural life (FAO, 2013) could bring significant development advances. By increasing their access to productive and non-productive resources, policy makers can also help them strengthening their voices within the household; a scenario that is likely to have multiplier effect on food security, nutrition, education, and health of children. Cultural and behavioural change is integral to the transformation of intra- and extra-household dynamics, and is a prerequisite for greater gender and social equality. Policy makers should make sure they allocate adequate resources to support the effort of gathering better and more

specific data, in order to create data-driven evidence of what is particularly needed for gender equity. Also, better data and more specific researches on resilience with a gender perspective may help attracting greater and more stable funds from donors.

Agricultural policies that contribute to closing the gender gap in access to assets, resources, services and opportunities represent one of the most effective approaches to combat rural poverty, improve agriculture, and promote sustainable and equitable rural development.

Finally, investing in women is critical to achieve all the Sustainable Development Goals (SDG) by the year 2030. Many SDG targets, and specifically the Goal 5, recognize gender equality and women's empowerment both as the objective and the solution to the sustainability challenges we face globally.

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