ENERGY VULNERABILITY IN FEMALE-HEADED HOUSEHOLDS

Findings from the *Listening to Citizens of Uzbekistan* Survey

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CONTENTS

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EXECUTIVE SUMMARY

Uzbekistan has the second-most-energy-intensive economy in Europe and Central Asia as measured according to energy intensity per unit of gross domestic product. This study assesses the sex-disaggregated effect of access to energy across the country using data from the 2018 and 2019 waves of the *Listening to Citizens of Uzbekistan* household survey, which is representative at the national, regional, urban, peri-urban, and rural levels.

The analysis focuses on three main factors: the challenges that female-headed households (FHHs)—which constitute 20 percent of the sample—face in accessing reliable electricity and heating services; whether FHHs struggle more than male-headed households (MHHs) to pay for utilities; and how often FHHs use coping mechanisms such as reducing food, health care, and other purchases to meet basic needs.

The analysis suggests that FHHs have similar access to energy as MHHs but find it harder to pay for utilities and basic needs. FHHs are more likely than MHHs to reduce their food consumption and borrow money to pay for basic needs. Poor FHHs with employed household members are more likely to reduce their food consumption than MHHs with no employed household members.

ABBREVIATIONS

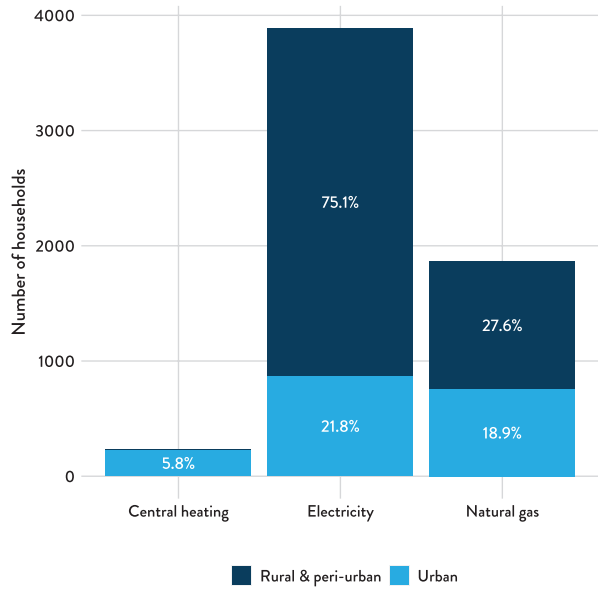
ECA	Europe and Central Asia
ESMAP	Energy Sector Management Assistance Program
FHH	Female-headed household
GDP	Gross domestic product
GP	Global practice
L2CU	Listening to Citizens of Uzbekistan
MHH	Male-headed household
UZS	Uzbekistan som

1. INTRODUCTION

Uzbekistan has the second-most-energy-intensive economy in Europe and Central Asia as measured according to energy intensity per unit of gross domestic product (GDP). Although its energy intensity declined by approximately 68 percent from 1998 to 2013, its energy use per unit of GDP is 2.1 times as high as the regional average (World Bank 2013). The residential sector accounts for 40 percent of total energy consumption (UNDP 2016).

Three types of centralized energy services are available to households, small enterprises, and public buildings in Uzbekistan: central heating systems, including domestic hot water; electricity; and gas. Access to these services is not universal. Of the households surveyed for the *Listening to Citizens of Uzbekistan* (L2CU) survey, 97 percent have access to electricity, 47 percent have access to centralized gas (Although only 22 percent of the households surveyed are located in urban areas, 40 percent of the surveyed households that have access to centralized gas are urban.), and 6 percent have access to central heating (nearly all urban) (figure 1).

Figure 1. Access to Centralized Energy Services



Source: L2CU Household Survey (June/July 2018).
Note: Figure 1 shows the percentage of households with access to centralized energy services. Access to electricity is nearly universal for Listening to Citizens of Uzbekistan (L2CU) households. Access to central heating is rare; nearly every household with access to central heating is urban. Access to centralized gas is more common, particularly for urban households.

"... households headed by women and men may differ in their level of access, ability to pay for energy services, energy needs and uses, and understanding of energy efficiency improvements."

Central heating systems installed between the 1950s and the 1970s were designed as open systems for hot water supply, in which water from the central heating network was transferred directly to the domestic hot water system and radiators in public buildings. This design accelerated deterioration of heat transportation and distribution networks and led to inefficient energy use. Underinvestment in maintenance, rehabilitation, and modernization of the district's heating systems over the past two decades, which has resulted in further deterioration of its heating service, has compounded these deficiencies. Central heating services have degraded in all cities of Uzbekistan; in several cities, the services have stopped working for parts or all of the city. Where the system has failed, electricity and gas have been used extensively to provide heat and hot water in multiapartment buildings and public buildings, causing several problems, including inefficient use of electricity and natural gas; overloaded power sector infrastructure, which accelerates deterioration and thus leads to frequent power outages, especially in winter; and safety and health risks caused by the use of poor-quality or polluting heaters and stoves (World Bank 2018).

Uzbekistan's President, Shavkat Mirziyoyev, elected in 2016, launched a large-scale reform program to increase access to good-quality public services in dialogue with citizens to ensure greater accountability and transparency and to improve the population's well-being. A major

element of this program involves increasing access to energy resources and increasing the efficiency and financial sustainability of the energy sector. Related policy measures include modernization, upgrades, and renovation of the energy services infrastructure, especially in rural areas; introduction of energy-efficient technologies; and increases in energy tariffs to improve the financial returns of energy services.

The conventional approach to energy policy and planning is based on the assumption that a good energy policy, program, or project will meet the practical needs of men and women equally, but households headed by women and men may differ in their level of access, ability to pay for energy services, energy needs and uses, and understanding of energy efficiency improvements. An approach to energy policy and planning that overlooks the differences between male-headed households (MHHs) and female-headed households (FHHs) could have unintended differential effects on and benefits for men and women.

Objectives of the Study

Reliable data and evidence on access to (and quality of) energy services and the differential effects of energy policies on households' welfare has only recently become available. The L2CU survey gathers monthly data on access to public services (including energy) and other topics such as employment and citizens' views on the country's economic outlook (box 1).

Using the L2CU baseline and monthly data, this study assessed the gender-disaggregated effect of energy access in Uzbekistan. It focused on three main questions:

- Do FHHs face challenges in accessing reliable electricity and heat?
- Do FHHs struggle more than MHHs to pay for utilities?
- How often do FHHs use coping measures such as reducing food, health care, and other purchases to meet basic energy needs?

The study complements an earlier qualitative study of Uzbek households' experiences with and perceptions of poor-quality energy services. Access to centralized energy services and quality is generally poor to moderate in many areas outside Tashkent, which causes many households to use inefficient—and sometimes unsafe—coping strategies (Hiller et al. 2016). The monetary and nonmonetary costs of those coping strategies can be high, particularly for rural and low-income households, which often accumulate debt to pay for centralized energy services. Furthermore, low-income households may be unable to supplement poor centralized energy services with alternative nonnetworked sources. Respondents expressed a strong desire to improve their situation. Some communities are paying for the costs of maintenance and repairs themselves and are willing to pay more for higher-quality services if reforms are implemented (Hiller et al. 2016).

BOX 1. *Listening to Citizens of Uzbekistan* (L2CU) Survey

The L2CU survey, a collaborative effort of the World Bank and the Development Strategy Center in Tashkent, was created to comprehensively monitor the views and well-being of a representative group of people during introduction of policy reforms. The L2CU comprises a 4,017-household nationally representative baseline survey, a monthly panel survey of a subset of 1,500 households from the baseline survey, and qualitative data collection from specialists and focus groups. The baseline survey was conducted in June and July 2018, and the monthly panel surveys were initiated in September 2018 and are expected to continue for the foreseeable future.

The surveys address topics related to poverty, housing, migration, and employment. The questions cover income and income sources; shocks and coping strategies; employment; migration; access to public services (including energy); interactions with service providers, government representatives, and Mahalla Citizens Assembly (i.e., community self-governing bodies) representatives; and views on the country's governance. The qualitative component, which was launched in November 2018, uses a combination of focus group discussions and key informant interviews to investigate in greater detail matters related to governance, accountability, service delivery, and livelihoods.

By tracking people's experiences over the course of a year, the study demonstrates how policies affect people's daily lives. An advisory council of representatives of the State Statistical Committee, government ministries, and national think tanks advised on the study's design and provides continuous assistance in the review and interpretation of the results.

Source: World Bank ND.

Findings from Previous Studies on Gender and Energy Access

Previous studies have found strong linkages between gender and energy access in six critical areas: access to (and quality of) energy services; energy affordability, tariffs, and pricing; environment and health and safety (exposure to energy hazards); energy conservation decisions; coping strategies for poor energy access, affordability, and quality; and user knowledge, access to information, and interaction with energy providers (Hiller et al. 2016; World Bank 2015a, 2016; Ajwad et al. 2014; Canpolat and Georgieva 2019) (figure 2).

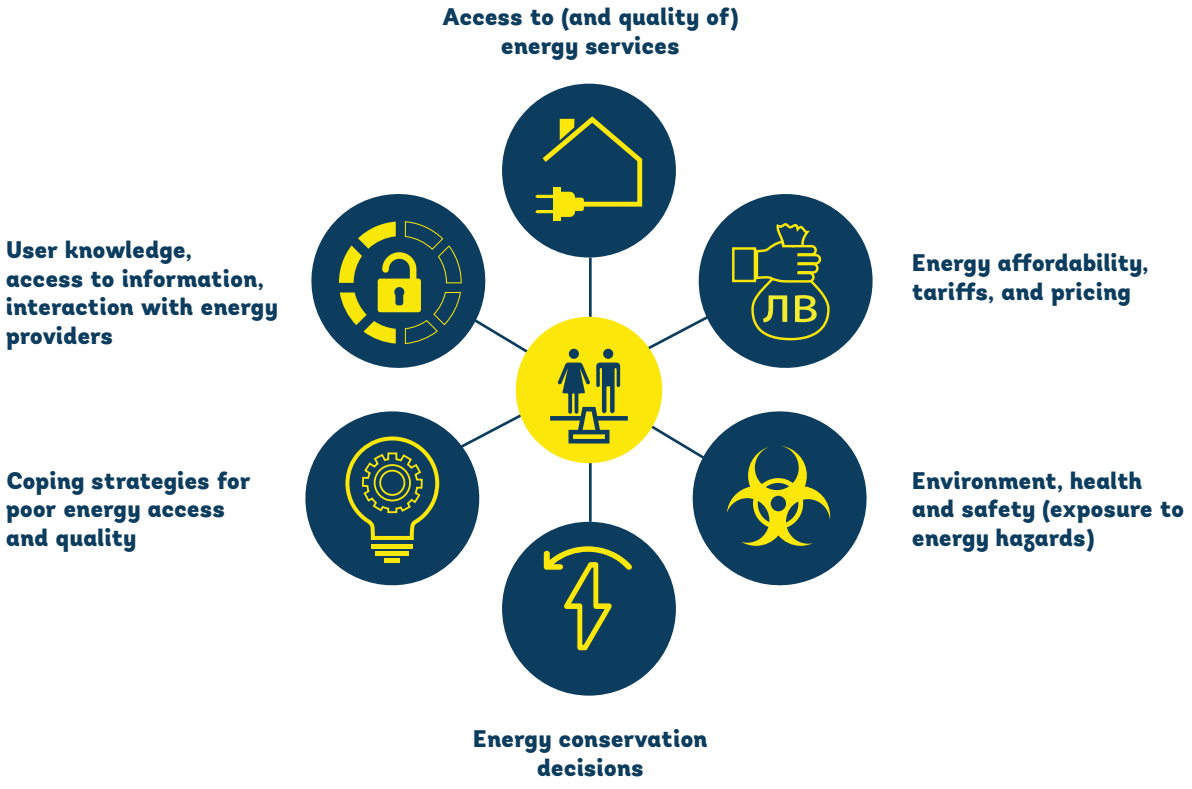
Access to (and Quality of) Energy Services

Access to affordable energy is essential for fulfilling basic needs such as cooking, heat, and mobility. Energy scarcity has a disproportionate effect on women and girls, who rely on labor-saving appliances (e.g., washing machines, electric stoves, vacuum cleaners) to perform traditional household chores. Without reliable energy sources, women must perform these jobs by hand, which leaves less time to engage in income-earning activities. An unreliable energy supply affects women employed in the formal sector in two ways: they must manage their job responsibilities while power is available, and they must meet household and family needs when they come home from work, in what has been referred to as the "second shift."

Energy Affordability, Tariffs, and Pricing

Low-income and poor households often have a higher energy burden than higher-income households because they spend a greater percentage of their income on energy. They also often live in less-energy-efficient housing and pay more per square foot for energy because they cannot afford improvements that would make their homes more energy efficient; they may also lack information about such options. Energy constitutes a significant share (10–20 percent) of annual household expenditures in Uzbekistan: approximately USD 264 (UZS 750,000) for a family of five (USD 53 (UZS 150,000) per capita) (Hiller et al. 2016). Some low-income households reported that their energy expenditures rose to 50 percent of their income during winter (Hiller et al. 2016). The L2CU findings show annual household spending

Figure 2: Critical Gender Equality Aspects of Demand-Side Energy Access



of approximately USD 68.95 (UZS 583,500) for a family of five (USD 13.79 (UZS 116,700) per capita), although the average L2CU household reports spending only 3 percent to 4 percent of its annual budget on energy (World Bank ND).

FHHs could be particularly disadvantaged because they tend to be poor households. Women headed almost 20 percent of households in the baseline L2CU survey. This is consistent with 2002 Demographic and Health Survey data (Republic of Uzbekistan 2004), which report that women headed 18 percent of the country's households. Large-scale male outmigration in recent decades (World Bank 2016; Ajwad et al. 2014) has contributed to the increase in the number of FHHs in Uzbekistan. FHHs are more likely to have lower incomes than MHHs. Among households in the monthly L2CU telephone survey, FHHs are generally 30 percent to 50 percent less likely than MHHs to be able to afford utilities or food and 30 percent to 40 percent more likely to report borrowing money to pay for basic household needs. Energy affordability for elderly women who live alone on a fixed low income deserves special consideration in Europe and Central Asia (World Bank 2015a). Such households may require more social assistance or additional support to ensure that they can fulfill basic needs, including heating, utilities, and food. Where male migration is high and there are few opportunities to earn a cash income locally, such as in Uzbekistan, FHHs may also need additional support to pay for energy (World Bank 2015a).

Environment and Health and Safety (Exposure to Energy Hazards)

Women are directly exposed and vulnerable to health and environmental energy-related hazards. According to Global Health Observatory data (WHO ND), in 2016, household air pollution caused 3.8 million deaths (mainly women and children) from fumes emitted by biomass-based fuels, accounting for 7.7 percent of global mortality. In many regions, such as South Asia and parts of sub-Saharan Africa, it has become the most important risk factor for ill health—higher even than unsafe water and sanitation (Dutta et al. 2017). Uzbek focus groups reported several effects of limited access to energy in Uzbekistan, including greater incidence of illness (colds and influenza) in winter and the inconvenience of the whole family living in the only room that has heating; safety concerns associated with unpredictable centralized gas outages that could cause gas leakages and explosions; safety concerns for women, children, and elderly adults due to a lack of street lighting after dark; and greater time burden and costs of using solid fuels (firewood, cotton stalks, animal manure) due to the amount of time required to collect these materials and the high cost of transporting them (Hiller et al. 2016).

Energy Conservation Decisions

Energy conservation measures and interventions should focus on women, because they are the predominant users and managers of energy in the household. In Uzbekistan, women take more responsibility than men for household energy conservation and in educating other members, particularly children, to conserve energy (Hiller et al. 2016). In Ferghana oblast center, women were found to be more familiar with how much energy the household consumes; where the bill is perceived to be higher than the household's consumption, they are not afraid to argue with inspectors.

Coping Strategies for Limited Energy Access, Affordability, and Quality

Rising energy expenditures and unreliable energy supply disproportionately affect women and FHHs across socioeconomic groups (Canpolat and Georgieva 2019). They cope by:

- *Reducing spending on food.* Women are more likely to sacrifice their own food consumption first (World Bank 2015a).
- *Reducing healthcare expenses by avoiding doctor visits or self-treating.* Households might stop going to hospitals or health clinics, reduce or skip medications, or use traditional treatments. Elderly individuals, who live on smaller, fixed incomes and have higher, more regular medical costs, most often mention resorting to this strategy.
- *Reducing expenses on education, clothing, social gatherings, and traditional celebrations.* Households might not be able to afford uniforms or tuition fees for better-quality schools. They may stop attending social gatherings and traditional celebrations such as weddings because of transportation and gift expenses, which can result in social isolation.
- *Borrowing money from relatives, friends, and financial institutions.* The poorest households may be more likely to borrow from relatives or friends. In certain cases, they might borrow money from financial institutions, which can cause stress and impose the additional cost of interest.
- *Reducing household energy use as much as possible.* To reduce bills, households may reduce their energy use by heating only one room in the house, changing their bathing habits, avoiding spending time at home to save on heating costs, using electrical appliances less, and performing certain tasks such as washing clothes manually. Extended families in cold-climate countries may live together in the winter months, often in crowded conditions, to save on heating expenses.

- *Delaying payments and not paying bills.* Households may be forced to delay bill payments, which often incurs penalties. If they fail to pay their energy bills, they will be disconnected.

In Uzbekistan, families cope with low temperatures at home in winter by residing in one room; wearing heavy clothing inside (including hats and scarves); covering windows, doors, and floors with film, cloth, or blankets; using electric ovens as space heaters; moving to temporary living quarters; avoiding using electric devices; and shifting from centralized energy services to solid fuels (Hiller et al. 2016). Although some low-income households go into debt to pay for centralized energy services, others avoid doing so out of fear of being disconnected and having to pay a reconnection fee.

User Knowledge, Access to Information, and Interaction with Energy Providers

Women may lack information about energy efficiency and affordable options. A World Bank (2015a) qualitative study on energy subsidy reform in eight countries in Europe and Central Asia found that men are better informed about appliances' technical characteristics, energy efficiency, and reliability, so households are likely to defer to men's decisions.

Qualitative research in Europe and Central Asia suggests that cultural norms affect the way men and women relate to energy providers and social assistance offices (World Bank 2015a). A Europe and Central Asia study on the gender-disaggregated effect of energy subsidy reforms found that interacting with energy providers (seeking information, reporting service problems, inquiring about inconsistent bills) is more often a male responsibility because men are thought to be more authoritative and assertive and better informed about the technical aspects of such inquiries (World Bank 2015a).

Several women in urban areas reported that they are responsible for routine interactions with providers, such as paying bills, but that they would send their husbands to resolve a grievance because this is too stressful and time consuming and the results are uncertain (World Bank 2015a). The Europe and Central Asia study reveals that women who are reluctant to interact with energy providers are also more passive about understanding the specifics of tariff reforms (World Bank 2015a). In rural areas, where traditional gender roles seem stronger, women are often burdened with collecting solid fuels while men deal with energy bill payments, particularly if the inspectors are male (Hiller et al. 2016).

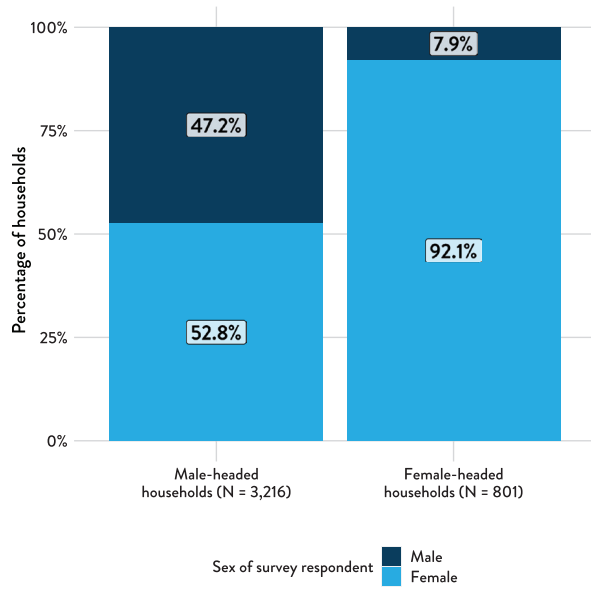
"Female-headed households are generally 30 percent to 50 percent less likely than male-headed households to be able to afford utilities or food and 30 percent to 40 percent more likely to report borrowing money to pay for basic household needs."

2. HOUSEHOLD SURVEY PROFILE

The L2CU representative baseline survey was administered to 4,017 households, of which 20 percent (801 households) were FHHs and 80 percent (3,216 households) were MHHs. The surveyed households had the following demographic characteristics.

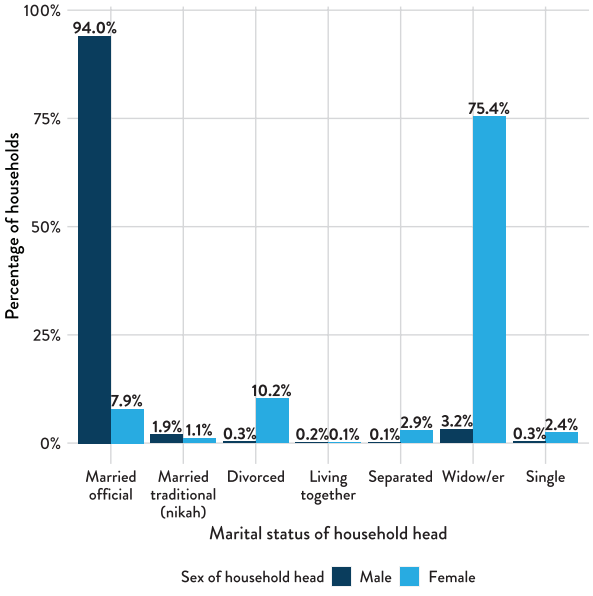
- **Sex of survey respondents:** 52.8 percent of respondents in MHHs that completed the survey were women, and 7.9 percent of respondents in FHHs were men (figure 3).
- **Marital status:** 94 percent of male heads of household were married; 75 percent of female heads of household were widowed, and 10 percent were divorced (figure 4).
- **Age of household members:** The mean age of a household member was 28.3 years in a MHH and 28.8 in a FHH; 84.2 percent of MHHs and 76.8 percent of FHHs had at least one member younger than 18, and approximately 37 percent of households had at least one grandchild of the head of household living in the household (figure 5).
- **Age of head of household:** The mean age of a head of household was 49.7 for men and 57.0 for women (figure 6). Nearly one-third of female heads of household were 70 or older.
- **Household consumption quintiles:** The proportion of households in different consumption quintiles was similar for MHHs and FHHs, although FHHs were more likely to be in the lowest quintile (figure 7).

Figure 3. Sex of Survey Respondents, According to Sex of Head of Household



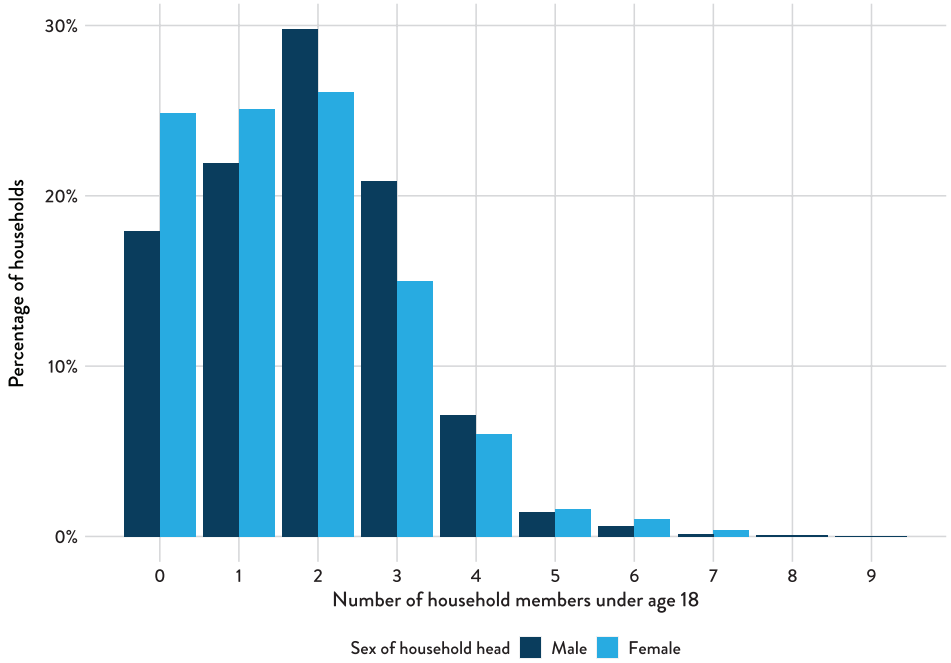
Source: L2CU household survey (June/July 2018).
Note: Figure 3 shows the percentage of male and female respondents in male- and female-headed households. The majority of the respondents in female-headed households are females.

Figure 4. Marital Status of Head of Household



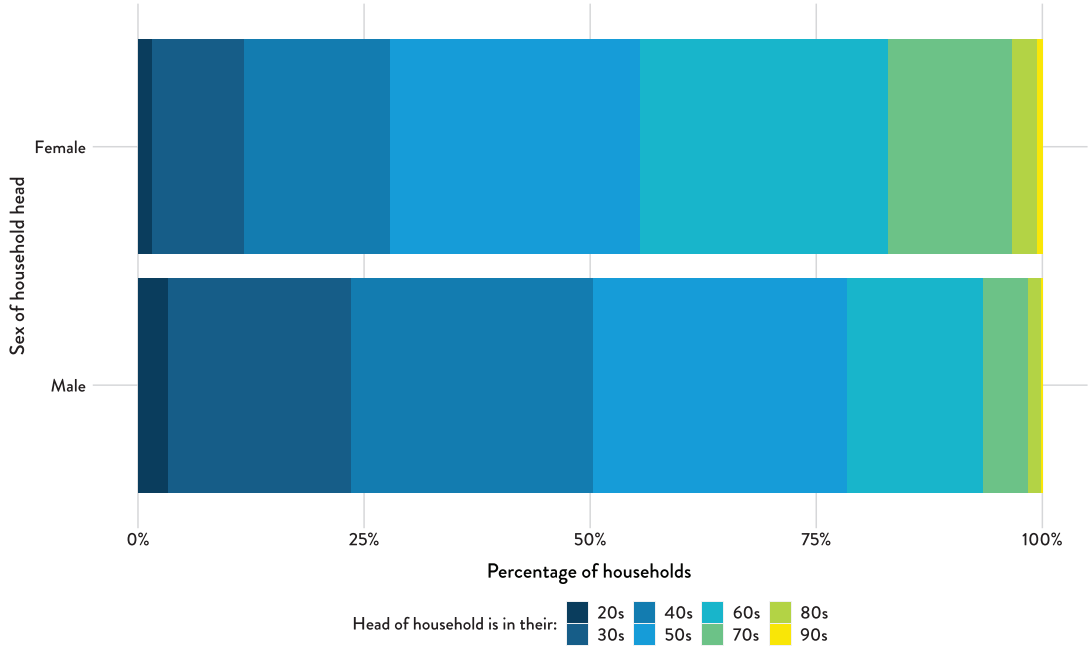
Source: L2CU household survey (June/July 2018).
Note: Figure 4 shows the marital status of male and female heads of household. The vast majority of female heads of household are widows. By comparison, the vast majority of male heads of household are married.

Figure 5. Percent of Households with Members Younger Than 18, According to Sex of Head of Household



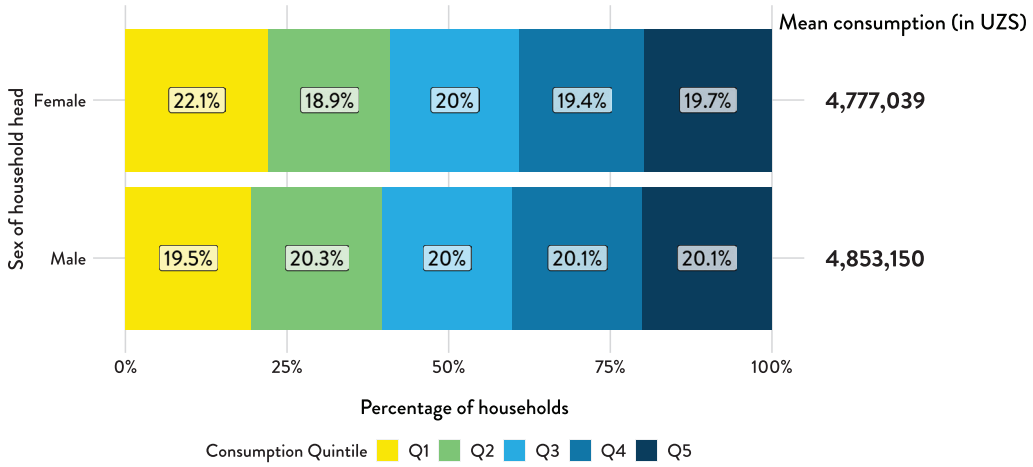
Source: L2CU household survey (June/July 2018).
Note: Figure 5 shows the percentage of households that have members younger than 18. Approximately 37 percent of households had at least one grandchild of the head of household living in the household.

Figure 6. Age of Head of Household



Source: L2CU household survey (June/July 2018).
Note: Figure 6 shows the age of female and male heads of household. The average age of female heads of household was 57.0, and the average age of male heads of household was 49.7. Nearly one-third of female heads of household were 70 or older.

Figure 7. Household Consumption Quintiles, According to Sex of Head of Household



Source: L2CU household survey (June/July 2018).
Note: Figure 7 shows the consumption levels of female-headed households and male-headed households, by consumption quintiles, where Q1 = up to UZS 2.107 million; Q2 = UZS 2.108 million to UZS 2.960 million; Q3 = UZS 2.961 million to UZS 4.076 million; Q4 = UZS 4.077 million to UZS 6.169 million; and Q5 = more than UZS 6.169 million. A higher percentage of female-headed households are likely to be in the lowest quintile.

FHHs were less likely than MHHs to report that members of the household worked. FHHs had fewer noncontinuous workers, including seasonal and informal workers, than MHHs. FHHs and MHHs had a similar number of children (household members younger than 15) and relied on remittances in equal measure.

"Female-headed households were less likely than male-headed households to report that members of the household worked."

3. FINDINGS OF THE L2CU SURVEY

Across the country, the survey results provided little indication that FHHs had less access to energy services, but they had much greater difficulty paying for utilities and basic needs. Households that were unable to pay for utilities reduced food consumption and borrowed money to pay for basic needs. Critical findings were in four areas: access to (and quality of) energy services, affordability and ability to pay, coping mechanisms, and priorities for public services and infrastructure.

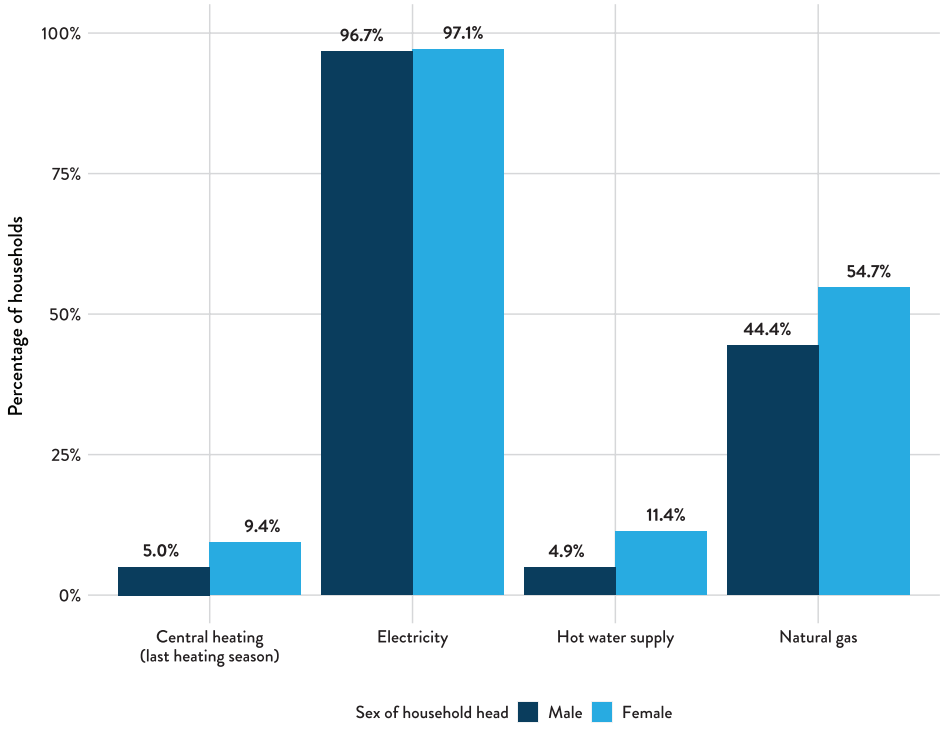
"Across the country, the survey results provided little indication that female-headed households had less access to energy services, but they had much greater difficulty paying for utilities and basic needs"

Access to (and Quality of) Energy Services

The L2CU data show that FHHs had slightly greater access to central heating, hot water, and natural gas than MHHs (figure 8). There were no differences in access to electricity according to the sex of the head of household (figure 8, table 1).

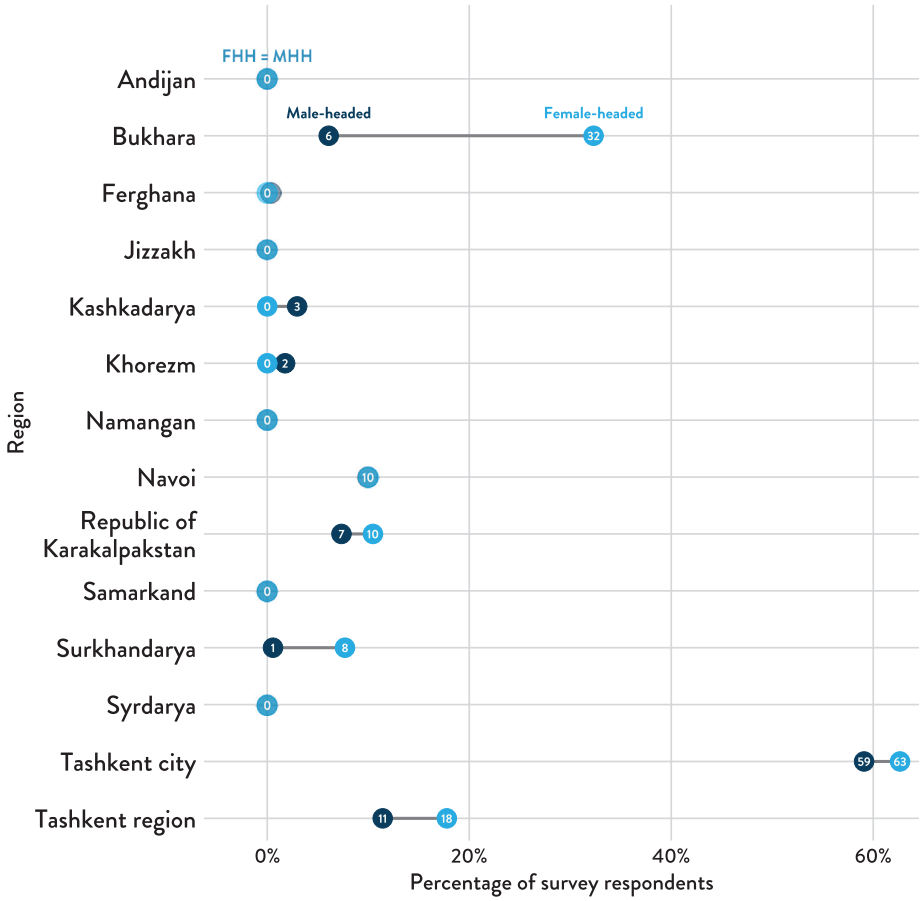
Outside Tashkent, few households had central heating (figure 9). A greater percentage of FHHs had access to heating than of MHHs, especially in Bukhara region (figure 9).

Figure 8. Access to Energy Sources, According to Sex of Head of Household



Source: L2CU household survey (June/July 2018).
Note: Figure 8 shows the percentage of male-headed households and female-headed households that have access to four sources of energy: central heating, electricity, hot water, and natural gas. Female-headed households had slightly greater access to central heating, hot water, and natural gas than male-headed households.

Figure 9. Percentage of Households with Central Heating, According to Region and Sex of Head of Household

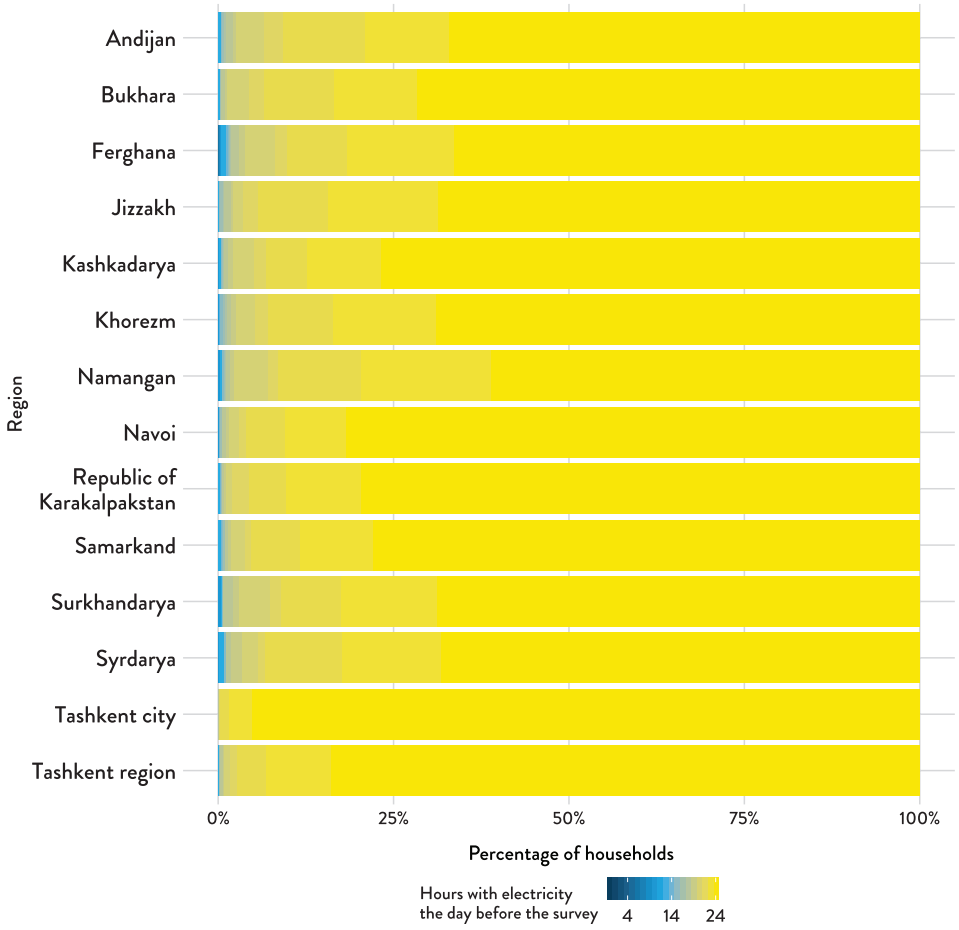


Source: L2CU household survey (June/July 2018).
Note: Figure 9 shows the percentage of female-headed households and male-headed households in each region that have access to central heating. In Tashkent city, the majority of female-headed households and male-headed households have access to central heating.

Respondents to the L2CU monthly panel surveys experienced few interruptions in electricity. Electricity was available to most households with few disruptions in all regions and at all survey waves; disruptions in the supply of electricity are rare and seldom last more than a few hours (figure 10). There was little difference between FHHs and MHHs in number of hours of access to electricity. This finding holds across the September 2018, December 2018, and March 2019 survey rounds (table 1). Likewise, there were few differences in water supply interruptions between FHHs and MHHs (figure A1).

There were important differences in water supply interruptions between regions. Of households that experienced water disruptions, those in Jizzakh, Republic of Karakalpakstan, and Khorezm experienced more frequent interruptions in water supply access (figure A2).

Figure 10. Number of Hours Household Had Access to Electricity Day Before Survey Administered, According to Region



Source: L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 10 shows the percentage of households that had electricity for zero to 24 hours the day before the survey. Disruptions in the supply of electricity are rare and seldom last more than a few hours.

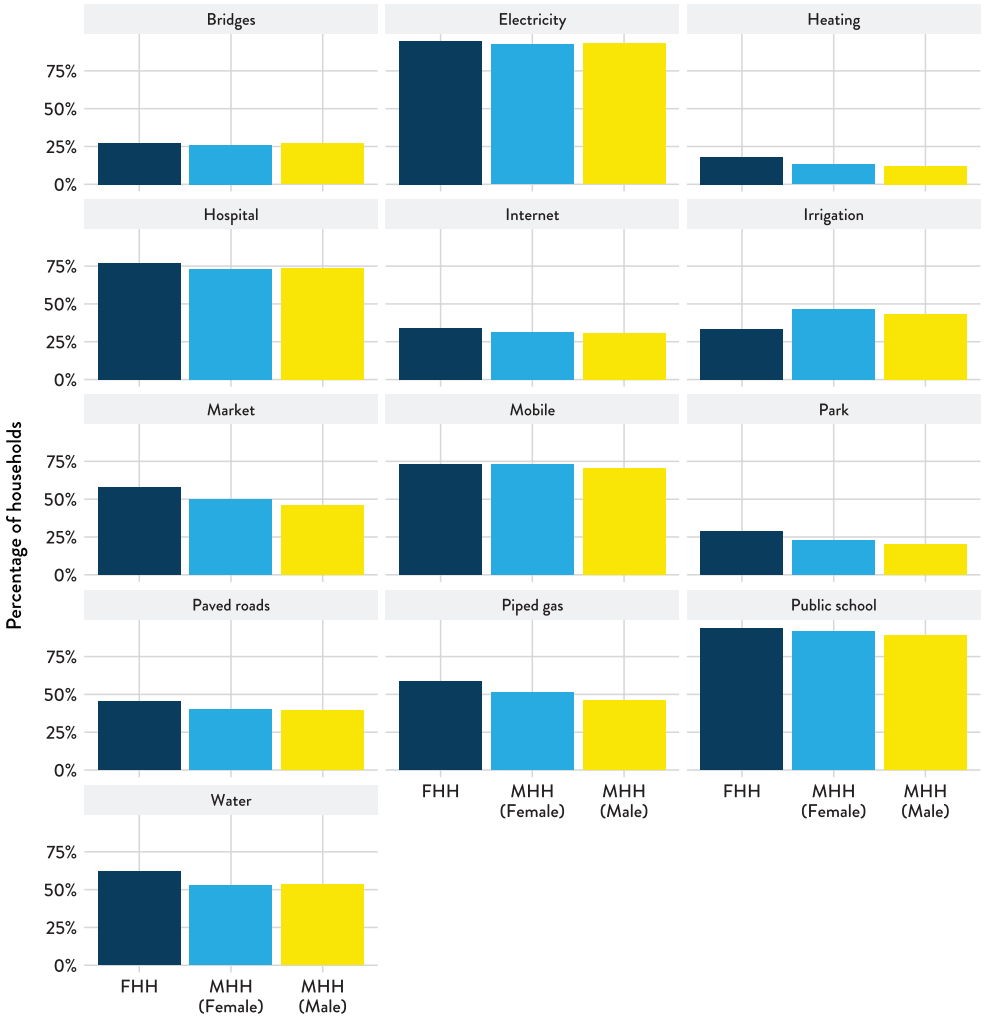
Table 1. Number of Hours Household Had Access to Electricity Day Before Survey Administered, According to Survey Round and Sex of Head of Household

Survey round	Head of household	0 to 12 hours	13 to 23 hours	24 hours
			n (%)	
1 (Sept 2018)	Male	8 (0.6)	129 (10.4)	1,103 (89.0)
	Female	1 (0.4)	29 (11.0)	234 (88.6)
4 (Dec 2018)	Male	8 (0.6)	344 (27.6)	895 (71.8)
	Female	2 (0.8)	61 (23.1)	201 (76.1)
7 (Mar 2019)	Male	9 (0.7)	470 (37.6)	770 (61.6)
	Female	0 (0.0)	84 (31.6)	182 (68.4)

Source: L2CU monthly panel survey (September 2018/December 2018/March 2019). There was little difference between female-headed households and male-headed households in the number of hours that they had access to electricity.

The L2CU data show that satisfaction levels with electricity provision were higher than for any other type of infrastructure or public service (figure 11). There were no differences in satisfaction between MHHs and FHHs or between male and female respondents.

Figure 11. Satisfaction with Public Service Provision, According to Sex of Head of Household and Respondent

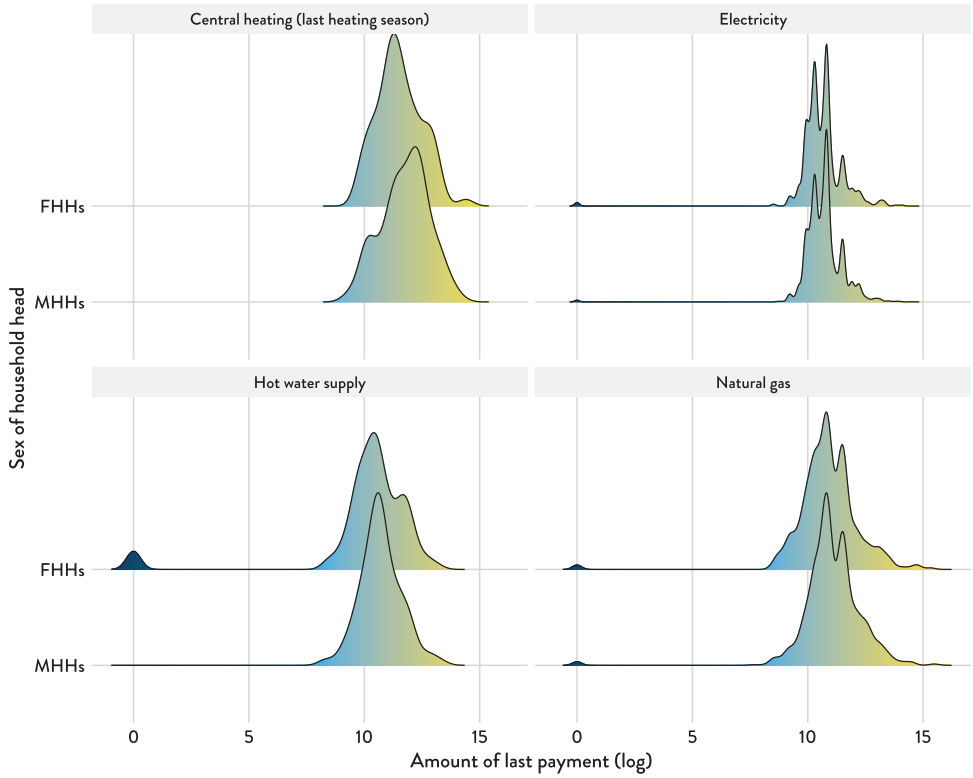


Source: L2CU household survey (June/July 2018).
Note: Figure 11 shows the percentage of female-headed households and male-headed households that consider public infrastructure and energy provision to be "satisfactory" or "good." The female-headed household (FHH) column includes female and male respondents in female-headed households. Data for male-headed households (MHH) is disaggregated by the sex of the respondent. There were no differences in satisfaction between male-headed households and female-headed households or between male and female respondents.

Affordability and Ability to Pay for Utilities

The L2CU data show that, on average, MHHs paid more for utilities than FHHs (figure 12).[1] The difference was only statistically significant for electricity and natural gas.

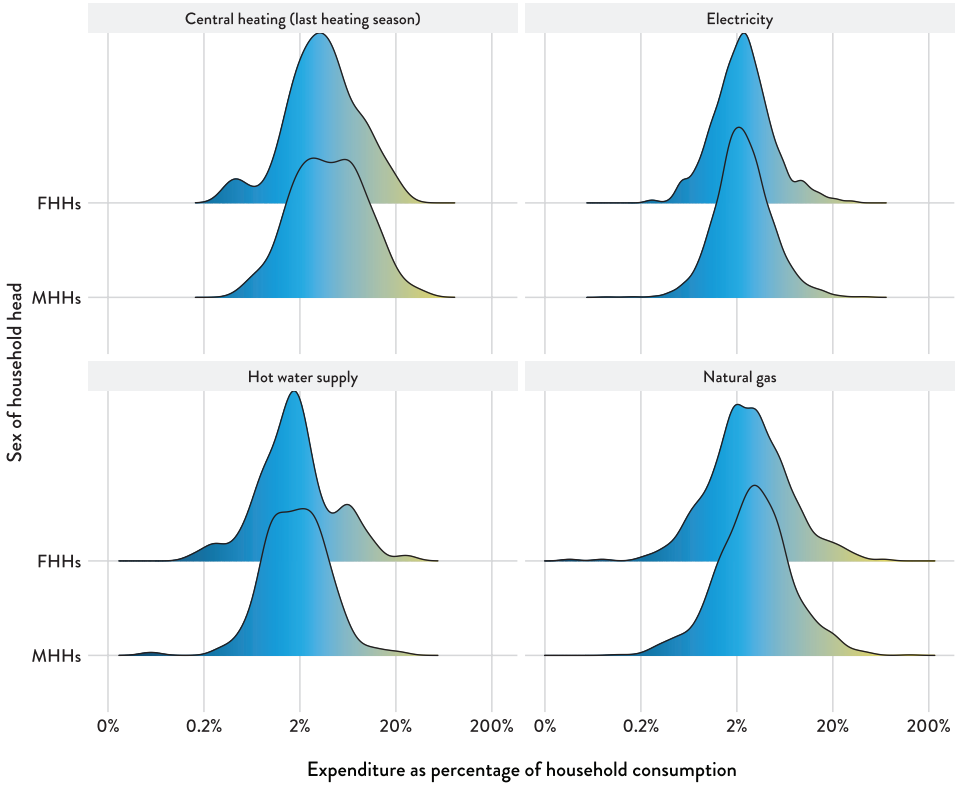
Figure 12. Amount of Last Payment for Utilities (Logged), According to Sex of Head of Household



Source: L2CU household survey (June/July 2018).
Note: Figure 12 shows the amount of the last payment for utilities among female- and male-headed households. Although, on average, male-headed households pay more for utilities than female-headed households, this difference was not statistically significant for central heating or hot water.

1 There was no correlation between household size and amount households reported spending on utilities.

Figure 13. Cost of Utilities as Percentage of Household Budget, According to Sex of Head of Household (Log Scale)

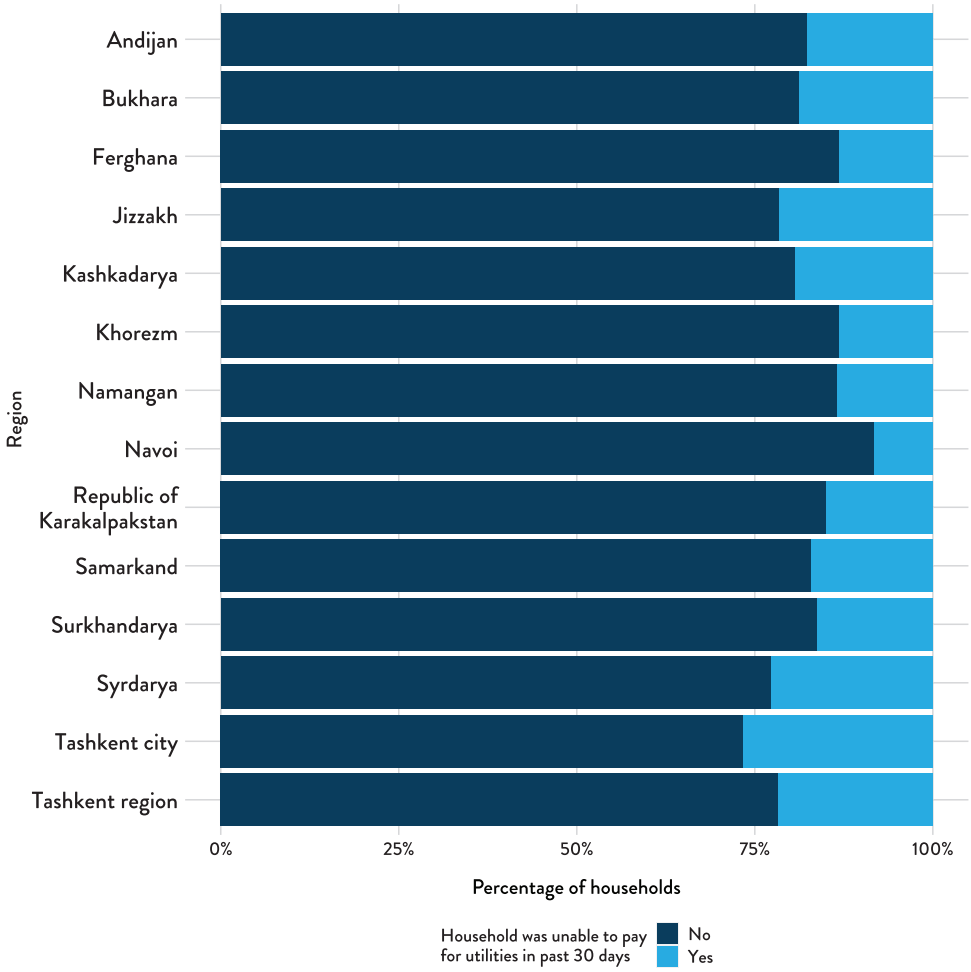


Source: L2CU household survey (June/July 2018).
Note: Figure 13 shows the percentage of the household budget in female- and male-headed households that was spent on utilities. Central heating and natural gas were, on average, the costliest utilities as a percentage of budget for female- and male-headed households. Electricity had the least amount of variability.

FHHs and MHHs spent a similar percentage of their total household budget on central heating and electricity (figure 13). FHHs spent slightly more on hot water and natural gas than MHHs; these differences were statistically significant. Central heating and natural gas were, on average, the costliest utilities as a percentage of budget for female- and male-headed households. Electricity had the least amount of variability.

The majority of households surveyed were able to pay for utilities. Jizzakh, Syrdarya, and Tashkent city had the highest percentage of households reporting that they were unable to pay for utilities (figure 14). FHHs found it harder than MHHs to pay for basic utilities (table 2). FHHs' inability to pay differed according to region, being highest in Bukhara, Kashkadarya, Syrdarya, and Surkhandarya (figure 15).

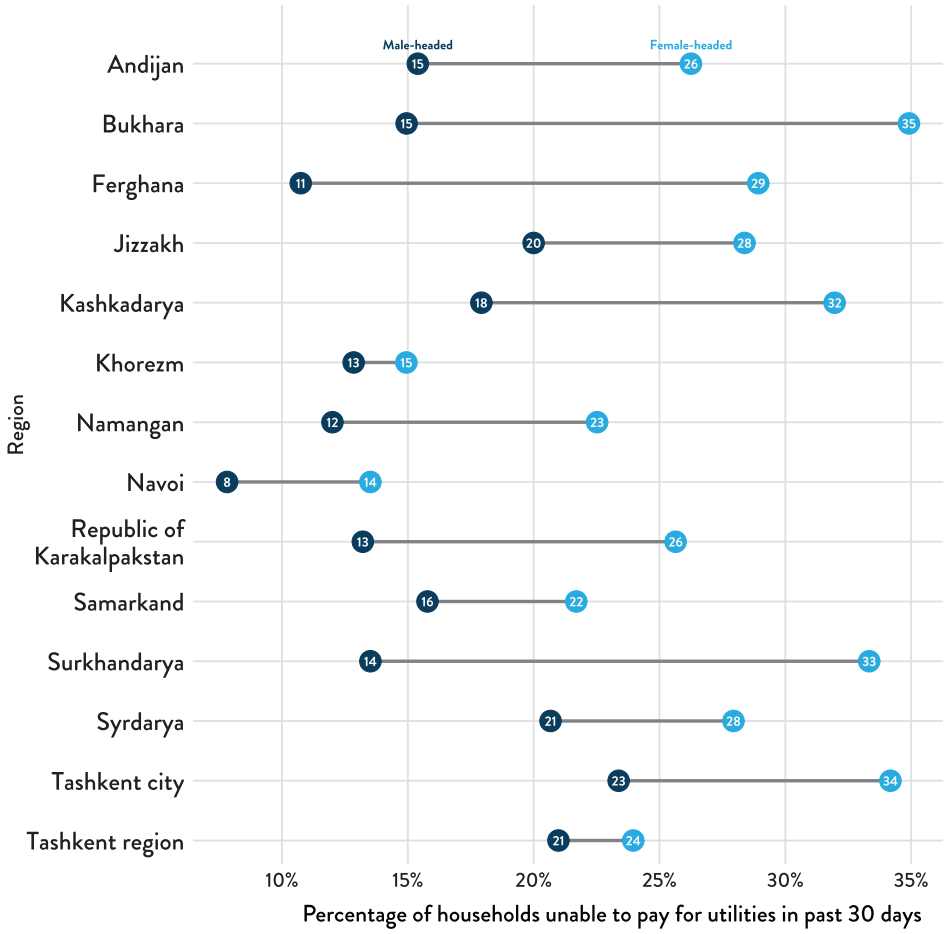
Figure 14. Proportion of Households Unable to Pay for Utilities, According to Region (All Survey Rounds)



Source: L2CU monthly panel survey (September/October/November 2018).
Note: Figure 14 shows the percentage of households in each region that were not able to pay for utilities. Most households were able to pay for utilities.

"Female-headed households' inability to pay differed according to region, being highest in Bukhara, Kashkadarya, Syrdarya, and Surkhandarya."

Figure 15. Inability to Pay for Utilities, According to Region and Sex of Head of Household



Source: L2CU monthly panel survey (September/October/November 2018).
Note: Figure 15 shows the percentage of male- and female-headed households in each region that were not able to pay for utilities. There were four areas with at least 20 percent of households unable to pay for utilities: Jizzakh, Syrdarya, Tashkent region, and Tashkent city. Female-headed households reported higher rates of inability to pay in nearly every region.

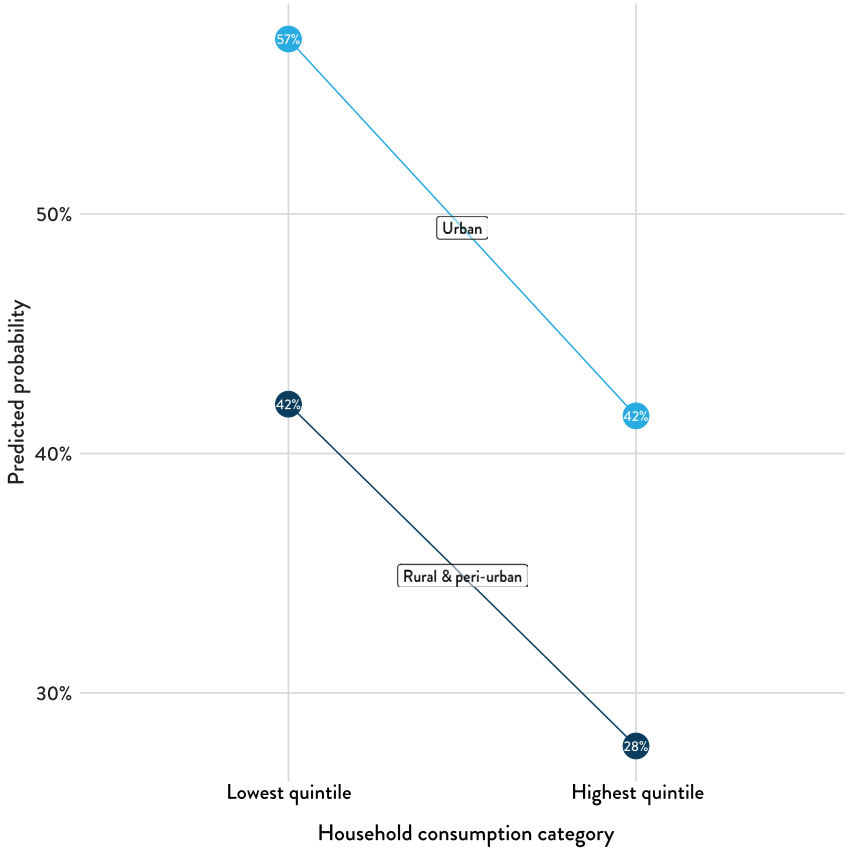
Table 2. Percentage of Households Unable to Pay for Utilities in Past 30 Days, According to Sex of Head of Household

Survey round	Head of household	Yes	No	Have not received bill yet	Chi-square test statistic	Chi-square p-value
				%		
1 (Sept 2018)	Male	18.6	78.6	2.7	22.0	<0.001
	Female	31.0	63.6	5.3	22.0	<0.001
4 (Dec 2018)	Male	13.9	85.3	0.8	27.8	<0.001
	Female	27.3	72.0	0.7	27.8	<0.001
7 (Mar 2019)	Male	14.1	83.9	2.0	25.4	<0.001
	Female	27.1	71.8	1.1	25.4	<0.001

Source: L2CU monthly panel survey (September 2018/December 2018/March 2019). Female-headed households found it harder than male-headed households to pay for basic utilities.

The links between the sex of the head of household and ability to pay for utilities were investigated using regression analysis. The authors estimated the relationship between ability to pay for utilities and the following characteristics: sex and age of head of household, whether at least one household member worked for pay, number of household members working for pay divided by number of household members, log of total household earnings divided by number of household members, consumption quintile, urban or rural residence, survey round, and region (using Tashkent region as the reference category).[2] A measure of household-level social capital, constructed as an additive index of five L2CU measures of different aspects of social capital and community trust, is also included.[3] High levels of social capital could enable households to borrow money from family and friends in times of need. Standard errors are clustered at the regional level. The authors report on predicted probabilities that are statistically significant at the $p<0.05$ level and are calculated from the regression model in the analysis that is presented in this report.

Figure 16. Predicted Probability of Inability of Female-Headed Households in Tashkent Region with at Least One Member Working for Pay to Pay for Utilities



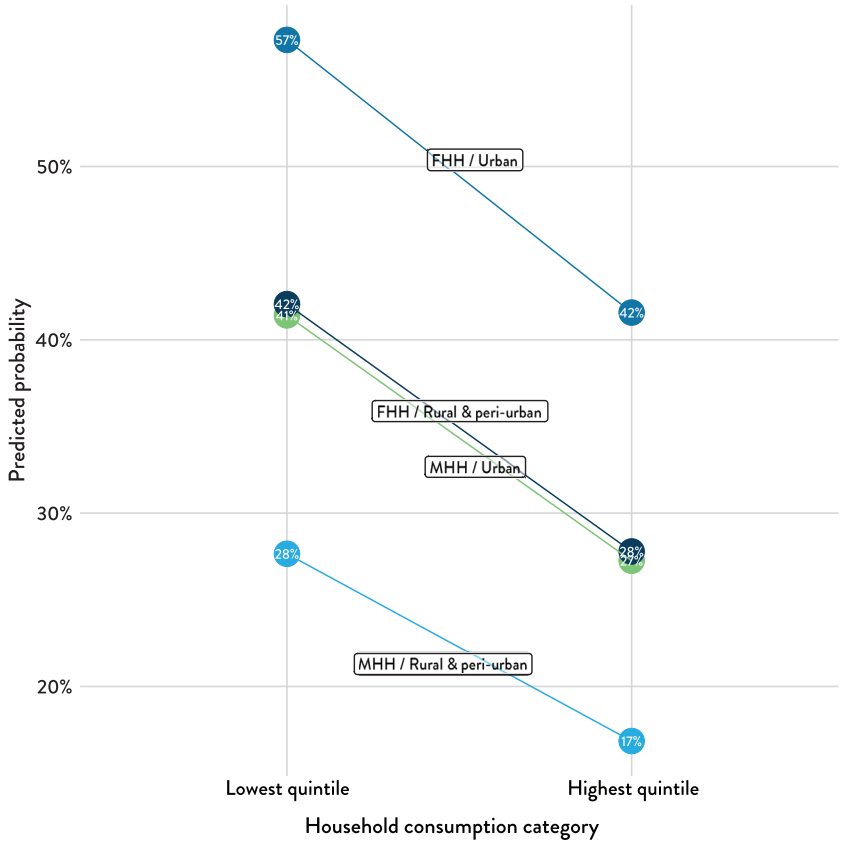
Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 16 shows the predicted inability of female-headed households in Tashkent region with at least one employed member to pay for utilities. A typical female-headed household in an urban area of Tashkent region was much more likely to report being unable to pay for utilities than a female-headed household in a rural area.

2 The authors estimated alternative regression models with different sets of control variables, including household size, whether a household member had lost a job in the last seven days, number of seasonal laborers per capita in household, and different sources of household income. The coefficient estimates from these alternative models were similar to those of the base model.

3 The survey module used to construct the social capital index asked respondents whether they agreed with the following statements: "In this community, it is safe to entrust your home to your neighbor when traveling," "I can trust someone to take care of my children for a few days while I'm away," "If you leave your bicycle or motorcycle outside unlocked, you are worried that someone will steal it," In this village, or neighborhood, most people know each other," "When neighbors have an accident, other community members are willing to help." FHHs were significantly less likely to feel safe leaving their home or their children in the care of a neighbor (figure A3).

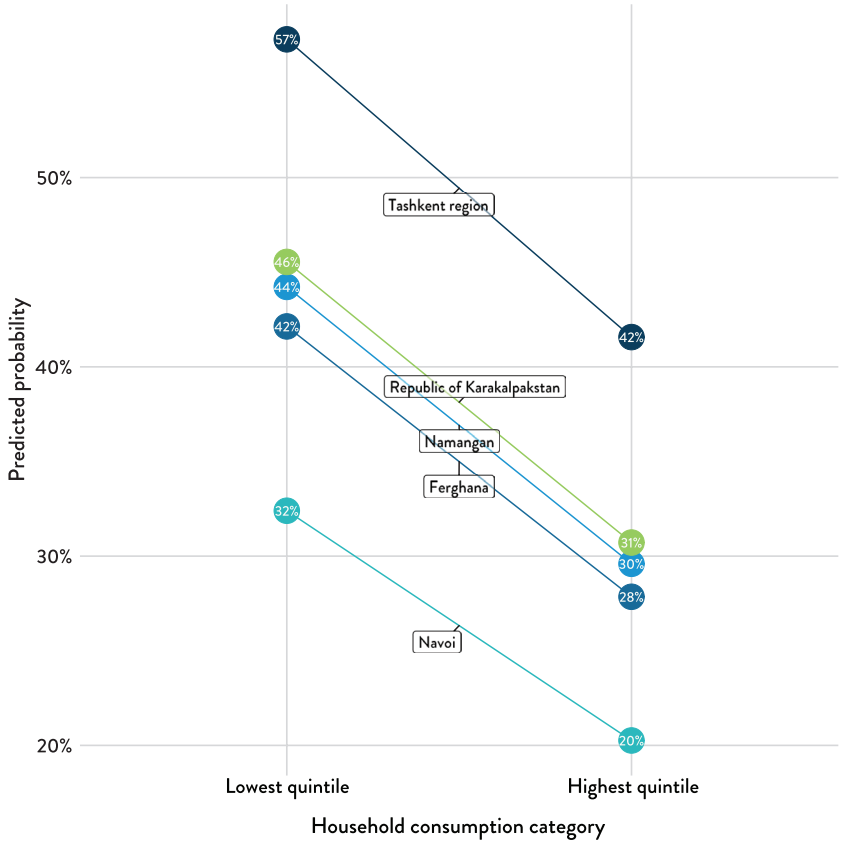
The regression results indicated that ability to pay for utilities varied according to income level (consumption), location (urban vs rural and peri-urban), and sex of the head of household. Poor FHHs in urban areas struggled much more to pay for utilities than poor FHHs in peri-urban or rural locations (figure 16). Poor urban FHHs also had much greater difficulty paying for utilities than poor urban MHHs (figure 17). Poor FHHs in rural and peri-urban areas had greater difficulty paying for utilities than MHHs in the same areas (figure 17). FHHs in Tashkent and the Republic of Karakalpakstan found it much harder to pay for utilities than FHHs in other regions, such as Navoi and Ferghana (figure 18). These results are consistent with the regression analysis of household ability to afford food (figure A4).

Figure 17. Predicted Probability of Inability to Pay for Utilities for Households in Tashkent Region with at Least One Member Working for Pay



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 17 shows the predicted inability of households in Tashkent region that have at least one employed member to pay for utilities. Female-headed households are more likely to be unable to pay than male-headed households in rural and urban areas.

Figure 18. Predicted Probability of Inability to Pay for Utilities for Urban Female-Headed Households with at least One Member Working for Pay

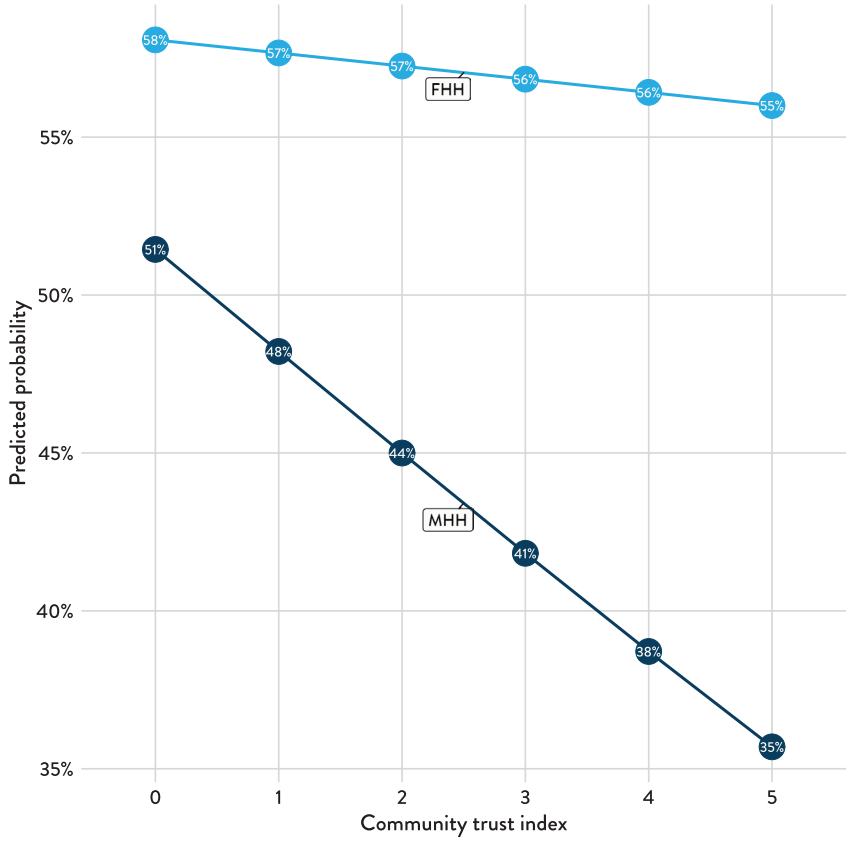


Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 18 shows the predicted inability of female-headed households in urban areas that have at least one employed member to pay for utilities. The regional differences are generally smaller than the gender gap, but there are still significant differences.

"For female-headed households, the difficulty of paying for utilities was constant at every level of social capital."

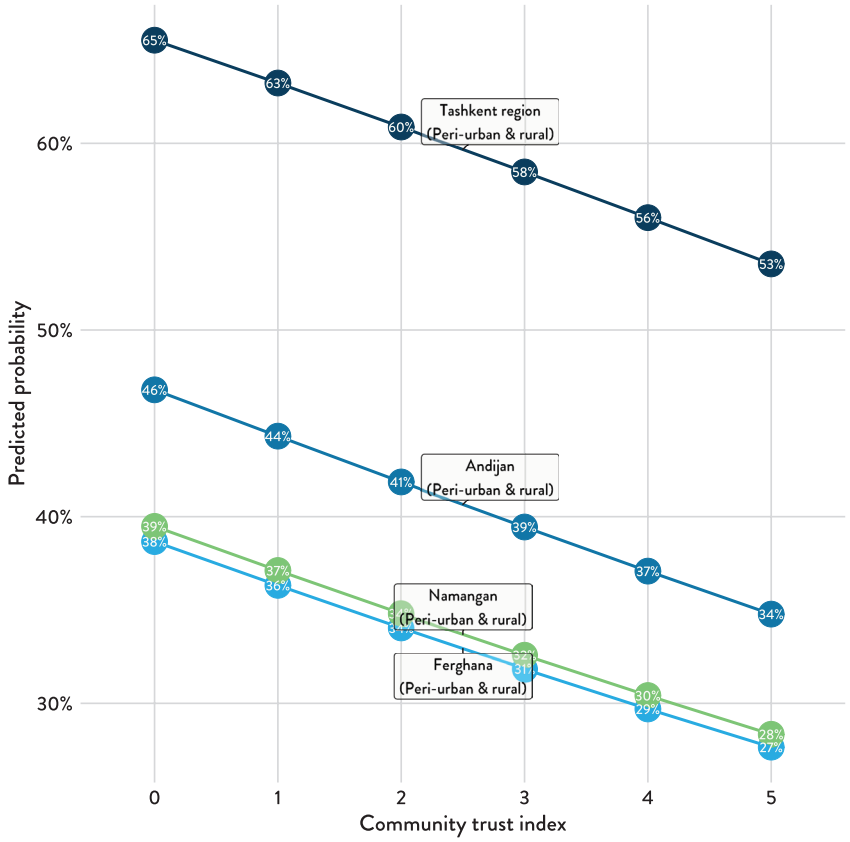
For FHHs, the difficulty of paying for utilities was constant at every level of social capital (figure 19). This was true for FHHs living in Tashkent region, as well as the Ferghana valley (figure 20). There were nevertheless regional variations, as urban FHHs in Tashkent region were much more likely to report being unable to pay for utilities than rural and peri-urban FHHs in Ferghana valley. For MHHs, higher levels of social capital were associated with greater ability to pay for utilities. This may indicate that MHHs have tighter-knit social networks to which they can turn for financial assistance.

Figure 19. Predicted Probability of Being Unable to Pay for Utilities (Urban Household in Tashkent Region Lowest Consumption Quintile)



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 19 shows the predicted inability of urban households in the lowest consumption quintile to pay for utilities. Greater social capital, measured according to answers to a series of questions about trust in one's community, was associated with greater ability of male-headed households to pay for utilities.

Figure 20. Predicted Probability of Being Unable to Pay for Utilities (Female-Headed Households in Lowest Consumption Quintile Living in Tashkent Region vs. Ferghana Valley)



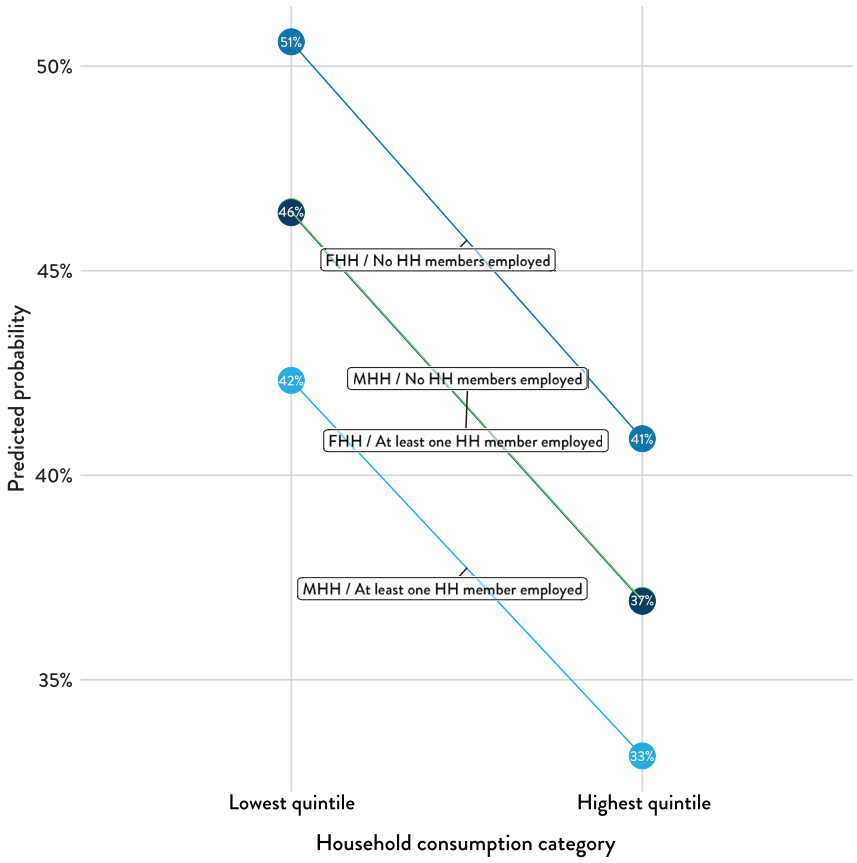
Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 20 shows the predicted inability of female-headed households in the lowest consumption quintile to pay for utilities. Rural and peri-urban female-headed households in Ferghana valley were much less likely to report being unable to pay for utilities than urban female-headed households in Tashkent region.

"For male-headed households, higher levels of social capital were associated with greater ability to pay for utilities. This may indicate that male-headed households have tighter-knit social networks to which they can turn for financial assistance."

Coping Mechanisms

The regression results suggest that poor FHHs in urban areas were much more likely to reduce their food consumption to pay for basic household needs than poor MHHs in urban areas. Poor FHHs with employed household members were also more likely than MHHs with no employed household members to reduce their food consumption to pay for basic household needs (figure 21).

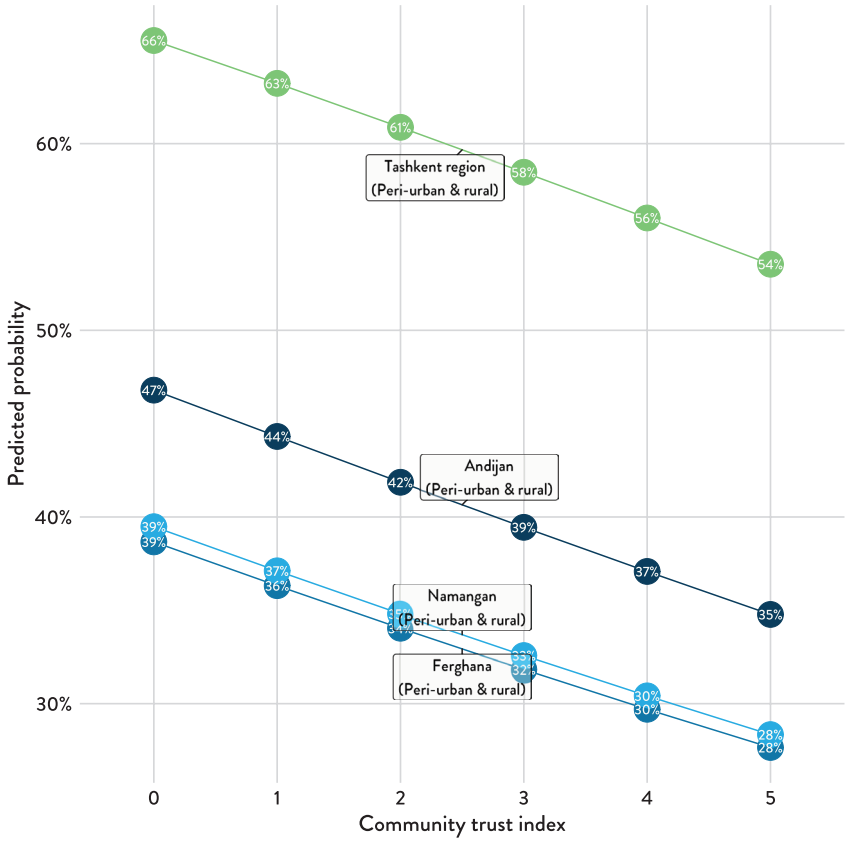
Figure 21. Predicted Probability of Reducing Food Consumption to Pay for Basic Needs for Urban Households in Tashkent Region



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 21 shows the predicted probability of urban households reducing their food consumption to pay for basic needs. Households in the lowest consumption quintile were much more likely to consume less food to pay for basic needs, yet male-headed households with employed members in the lowest quintile were only slightly more likely to reduce their consumption of food than female-headed households without employed members (e.g., households depending on benefits or remittances).

The regression results suggest that FHHs draw on social capital to a much less extent than MHHs when faced with having to reduce their food consumption to pay for basic needs. For a poor FHH in Tashkent region, the predicted probability of reducing food consumption to pay for basic needs was 54 percent (vs. 38 percent for a poor MHH living in the same location) at the highest levels of social capital and 66 percent (vs. 50 percent for a poor MHH living in the same location) at the lowest levels of social capital (figures 22 and 23).

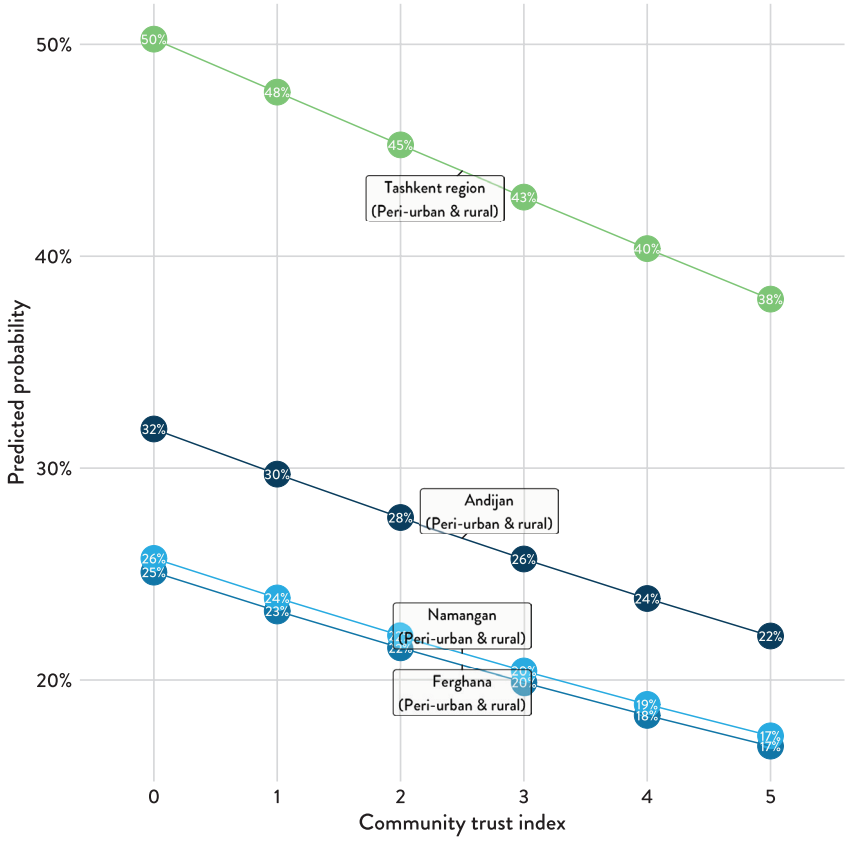
Figure 22. Predicted Probability of Reducing Food Consumption to Pay for Basic Needs (Female-Headed Households in Lowest Consumption Quintile



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 22 shows the predicted probability of female-headed households in the lowest consumption quintile reducing food consumption to pay for basic needs, according to their level of social capital.

"Female-headed households draw on social capital to a much less extent than male-headed households when faced with having to reduce their food consumption to pay for basic needs. "

Figure 23. Predicted Probability of Reducing Food Consumption to Pay for Basic Needs (Male-Headed Households in Lowest Consumption Quintile)



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure 23 shows the predicted probability of male-headed households in the lowest consumption quintile reducing food consumption to pay for basic needs. Social capital benefits male-headed households more than female-headed households, yet those differences do not offset the large regional disparities between the mostly urban Tashkent region and the predominantly rural Ferghana valley.

The L2CU monthly panel data show that a statistically significantly larger share of FHHs than MHHs borrowed money to pay for basic needs. In September 2018, 28.8 percent of FHHs borrowed money to pay for basic needs (vs. 22.7 percent of MHHs) (table 3). In March 2019, this share declined to 18.8 percent for FHHs and 13.2 percent for MHHs. This, combined with FHHs' higher utility bills and greater relative inability to pay their bills, indicates that FHHs found it harder to access loans.

The share of respondents that reported borrowing money to pay for basic needs varied across regions. In Navoi, 14 percent of FHHs and 19 percent of MHHs reported borrowing money; in Bukhara, 39 percent of FHHs and 30 percent of MHHs reported doing so (figure A5).

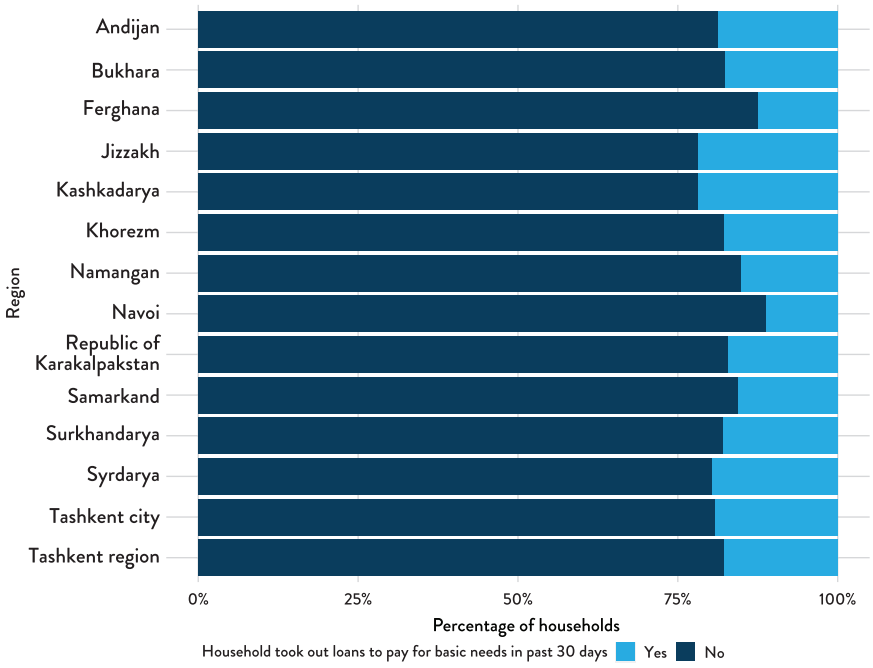
Table 3. Households That Borrowed Money to Pay for Basic Needs, According to Sex of Head of Household

Survey round	Head of household	Yes	No	Chi-square test statistic	Chi-square p-value
			%		
1 (Sept 2018)	Male	22.7	77.3	4.05	0.04
	Female	28.8	71.2	4.05	0.04
4 (Dec 2018)	Male	16.8	83.2	3.06	0.08
	Female	21.6	78.4	3.06	0.08
7 (Mar 2019)	Male	13.2	86.8	5.17	0.02
	Female	18.8	81.2	5.17	0.02

Source: L2CU monthly panel survey (September 2018/December 2018/March 2019). Table 3 shows that a larger share of female-headed households than male-headed households borrowed money to pay for basic needs.

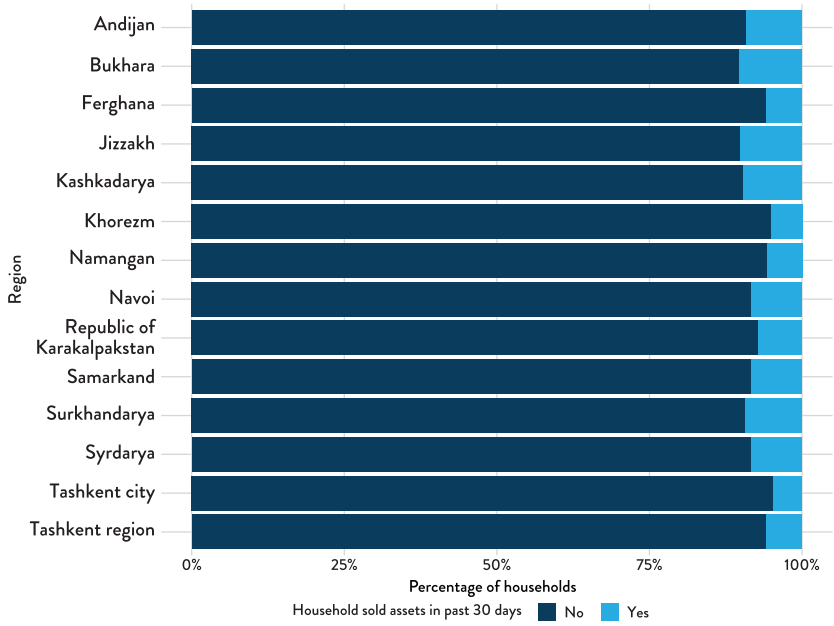
There was little regional variation in the percentage of households that borrowed money to pay for basic needs (figure 24). The highest rates were in Jizzakh and Kashkadarya regions where nearly 25 percent of households reported borrowing money for this purpose. Although selling household assets to pay for basic needs is much less common than borrowing money, 22 percent of households in Jizzakh and 23 percent in Kashkadarya reported doing so (figure 25).

Figure 24. Proportion of Households That Took Out Loans to Pay for Basic Needs, According to Region (All Survey Rounds)



Source: L2CU monthly panel survey (September 2018).
Note: Figure 24 shows the percentage of households that reported taking out loans to pay for basic needs. There was little regional variation in the percentage of households that took out loans to pay for basic needs. The highest rates were in Jizzakh and Kashkadarya, where nearly 25 percent of households reported taking out loans.

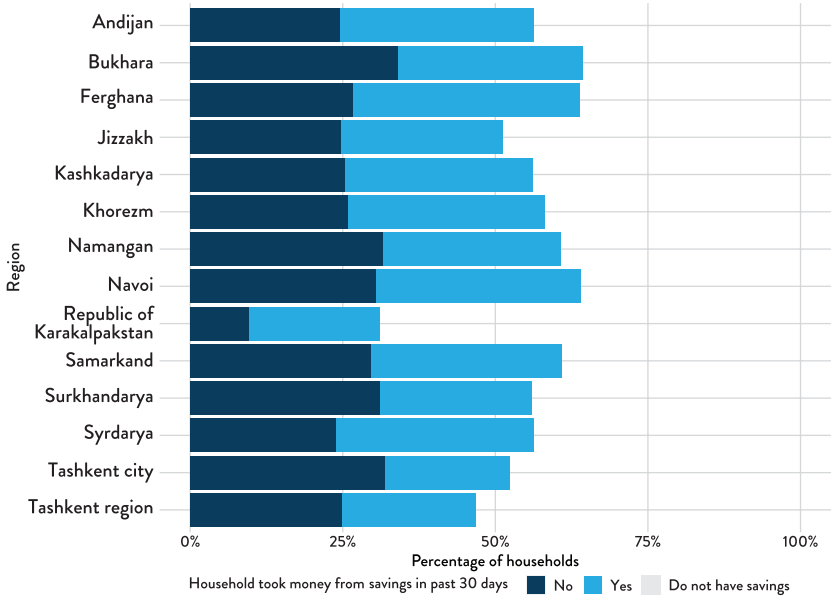
Figure 25. Proportion of Households That Sold Assets to Pay for Basic Needs, According to Region (All Survey Rounds)



Source: L2CU monthly panel survey (September 2018).
Note: Figure 25 shows the percentage of households that reported selling assets to pay for basic needs. There was little variation in the percentage of households that sold assets to pay for basic needs. The highest rates were in Jizzakh and Kashkadarya, where nearly 10 percent of households reported selling assets.

By far the most common coping mechanism to pay for basic needs was taking money from savings. Of the households that have savings accounts, the majority took money from savings to pay for basic needs in all but three regions (Surkhandarya, Tashkent city, and Tashkent region) (figure 26).

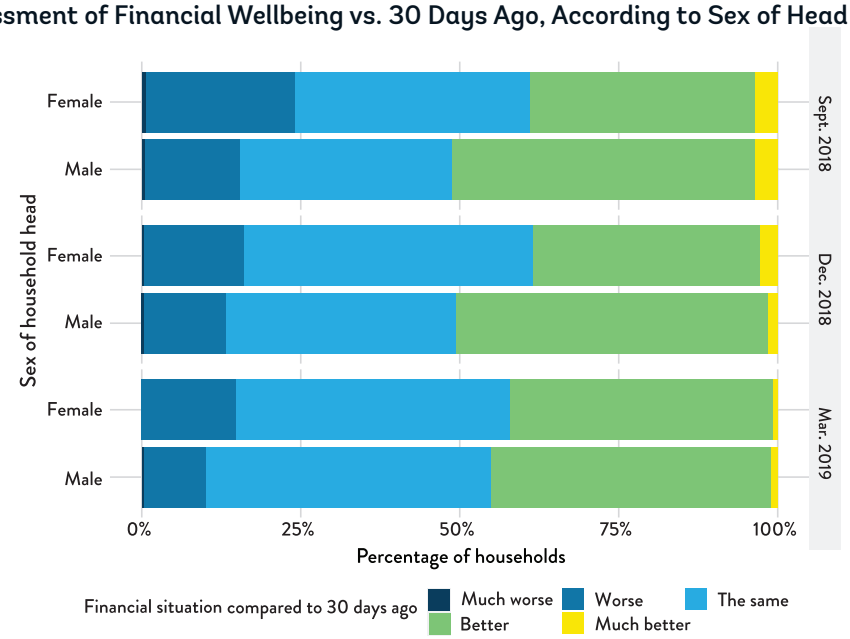
Figure 26. Proportion of Households That Took Money from Savings to Pay for Basic Needs, According to Region (All Survey Rounds)



Source: L2CU monthly panel survey (September 2018).
Note: Figure 26 shows the percentage of households that took money from savings accounts to pay for basic needs. In most regions, approximately half of households with savings had to use some of this money to pay for basic needs.

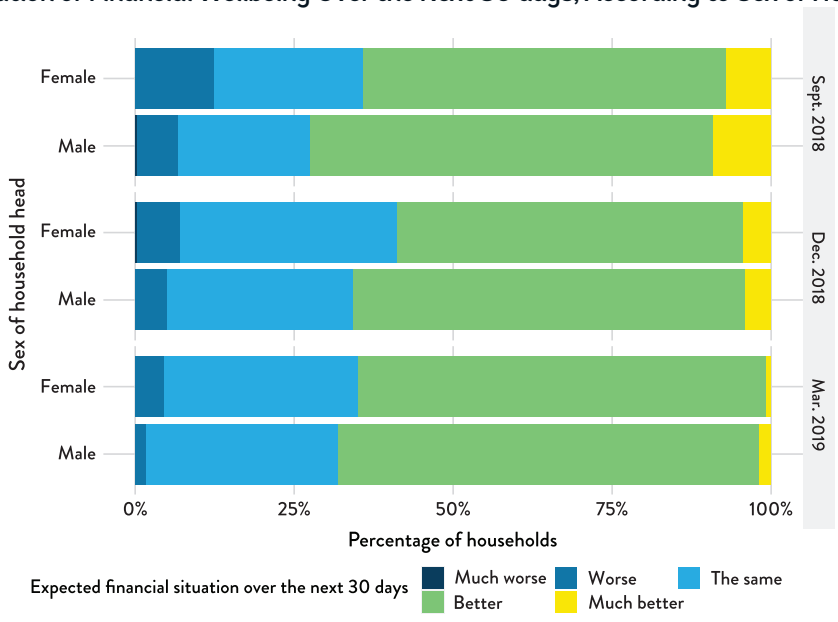
More FHHs than MHHs reported that their financial wellbeing was worse than 30 days earlier (figure 27). Similarly, more FHHs than MHHs expected their financial wellbeing to be worse or much worse over the following 30 days (figure 28).

Figure 27. Assessment of Financial Wellbeing vs. 30 Days Ago, According to Sex of Head of Household



Source: L2CU monthly panel survey (September 2018/December 2018/March 2019).
Note: Figure 27 shows the assessment that female- and male-headed households make of their financial wellbeing in the 30 days before the survey. Female-headed households are more likely than male-headed households to report that their financial wellbeing deteriorated over the previous 30 days.

Figure 28. Expectation of Financial Wellbeing Over the Next 30 days, According to Sex of Head of Household

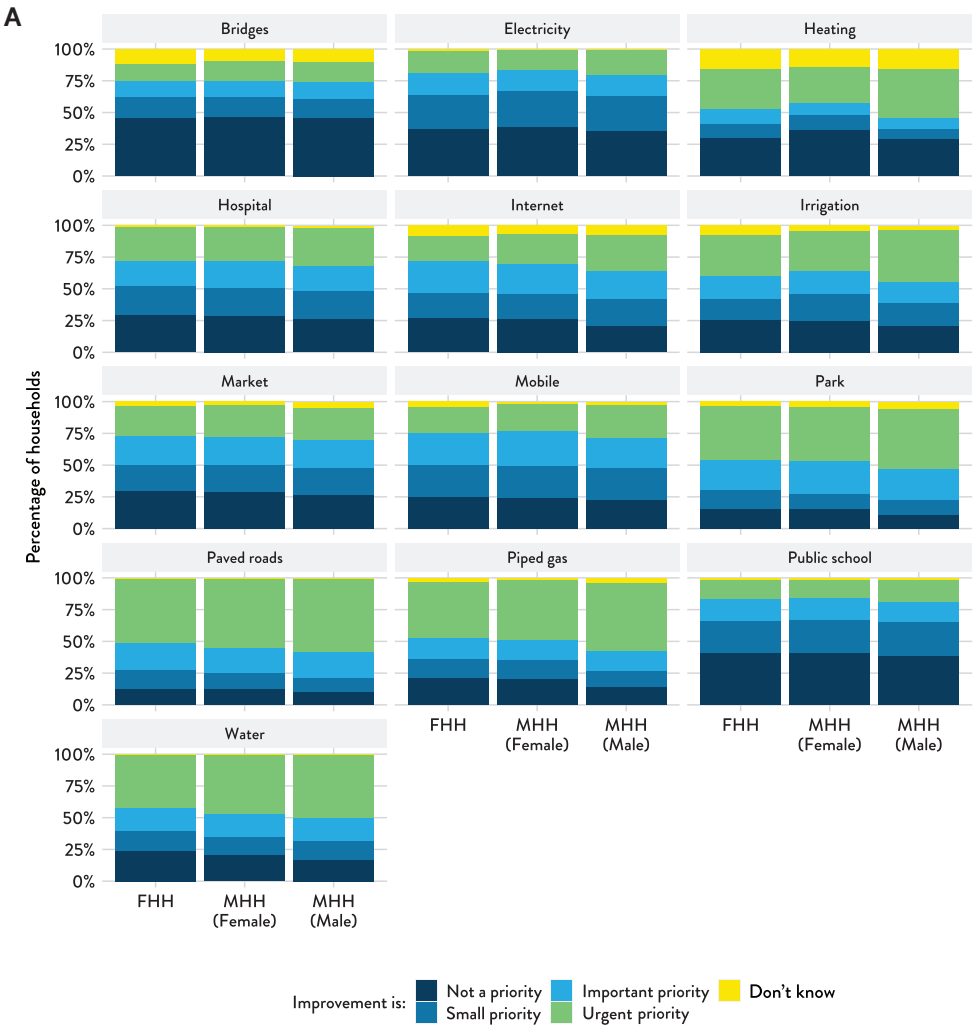


Source: L2CU monthly panel survey (September 2018/December 2018/March 2019).
Note: Figure 28 shows the expectation that female- and male-headed households have of their financial wellbeing in the 30 days following the survey. Female-headed households are more likely than male-headed households to report that they expect their financial situation to worsen over the following 30 days.

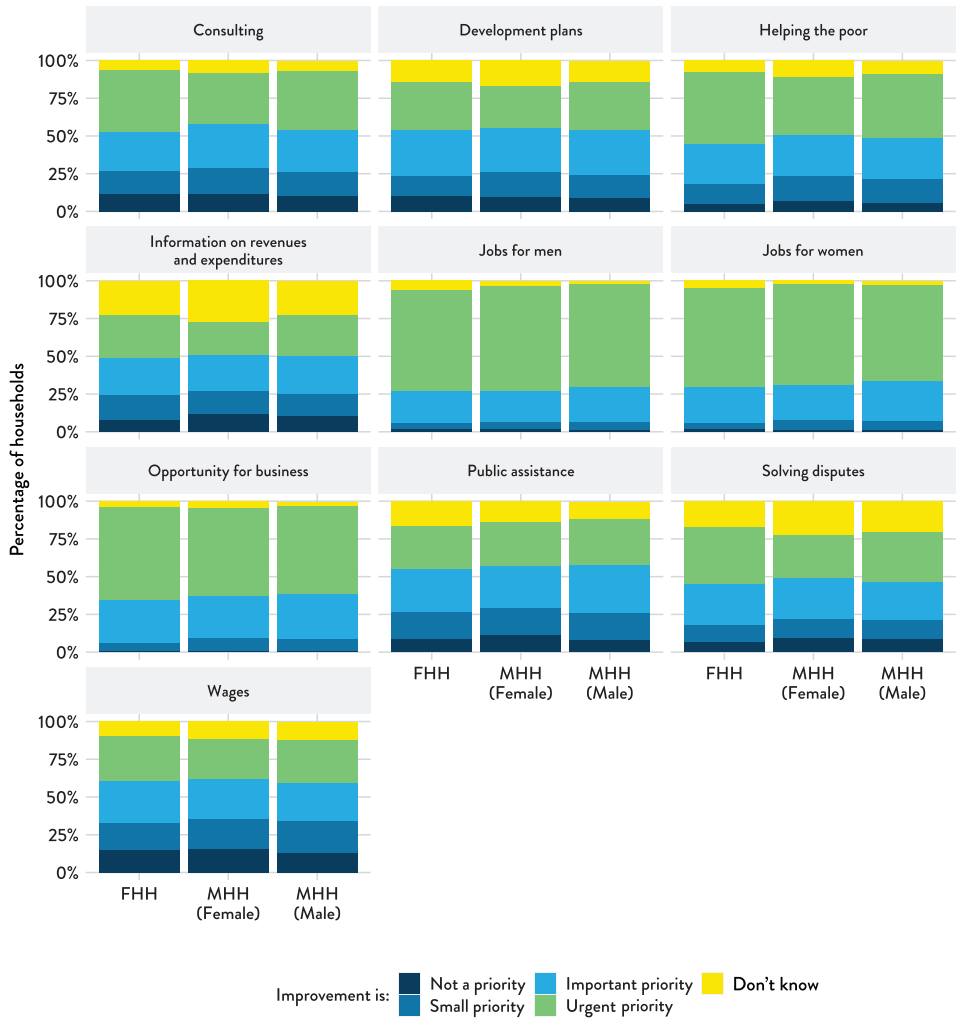
Priorities for Public Services and Infrastructure

No substantive differences in priorities were found between MHHs and FHHs or between male and female respondents. More citizens view piped gas, central heating, drinking water, and paved roads as priorities for government attention than other infrastructure and services (figure 29A). More jobs for men and women and better business opportunities were top priorities (figure 29B).

Figure 29. How High a Priority Is It to Improve (A) Public Services and Infrastructure, and (B) Policies, According to Sex of Head of Household and Respondent



B



Source: Household survey (June/July 2018).
Note: Figure 29 A and B shows the priority ascribed to various public services, infrastructure, and policies by female- and male-headed households. Female-headed households and male-headed households did not differ meaningfully in their priorities for public service improvements. Overall, the most important priorities were jobs, opportunities for businesses, access to paved roads, and access to public utilities such as piped gas and water. The female-headed households (FHH) column includes female and male respondents. Data for male-headed households (MHH) is disaggregated by the sex of the respondent.

4. CONCLUSION

Although there was little indication that FHHs had less access to energy services (electricity, heating, hot water, natural gas) in Uzbekistan, they found it much more difficult than MHHs to pay for utilities and basic needs. FHHs were more likely than MHHs to reduce food consumption and borrow money to pay for basic needs. High levels of community-level social capital mitigated the high cost of utility bills for poor MHHs but not FHHs. Additional analysis is needed to explain why FHHs faced difficulties meeting basic needs given that there are few differences in household consumption levels between FHHs and MHHs. For example, future research could address how the composition of FHHs—including number of household dependents—affects their ability to meet basic needs.

Measures to upgrade the energy infrastructure to increase households' energy efficiency and energy subsidy reforms require accompanying measures to protect poor households and FHHs from high bills and energy upgrade costs. A variety of mechanisms and pricing options can be used to enable women to pay for greater energy access, including energy efficiency improvements (World Bank 2015b), such as:

- Financing mechanisms to enable poor households and FHHs to pay connection fees or buy energy-efficient appliances (e.g., offer low to 0 percent interest financing, utility on-bill financing,[4] public grants, energy efficiency credit lines through a development bank) (World Bank Group 2018)
- Instituting pay-as-you-go models, smart meters, and progressive tariffs[5]
- Waiving import duties for renewable energy products to reduce costs
- Instituting alternative payment methods (e.g., cash or in-kind, enabling remote payment for the urban husbands or relatives of rural dwellers)

> **"Female-headed households were more likely than male-headed households to reduce food consumption and borrow money to pay for basic needs."**

Tariff levels that do not reflect FHHs' difficulties in affording utilities will constrain their access to energy. Public consultation processes must be sensitive to the unique needs of FHHs when assessing communities' ability and willingness to pay. Connection or user fee requirements that do not offer affordable options—such as revolving funds, grants, and affordable credit facilities to increase household connectivity—will not meet the needs of poor households, particularly women. One policy option would be to charge poor households and FHHs lower rates for initial usage and then increase rates as consumption increases. Loans or staggered payment structures may also increase access where initial start-up and hook-up costs are high.

The findings also suggest that FHHs do not benefit from community social capital to the same extent as MHHs. FHHs may have fewer friends and relatives to turn to for financial support. Interventions to increase FHHs' connectivity to other community members and access to financial, social, and other resources would help increase their resilience. This may involve greater efforts on the part of neighborhood citizen assembly members to provide outreach to FHHs and bring them together with other community members in community-wide meetings and activities, such as participatory planning to inform government infrastructure investments in villages or participatory budgeting.[6]

4 On-bill financing refers to a loan that a utility makes to a customer, the proceeds of which pay for energy efficiency improvements. Customers make regular monthly loan payments on their utility bill until the loan is repaid.

5 Pay-as-you-go models allow low-income customers to pay off energy efficiency investments in flexible payment terms, usually over long periods of time, while creating a credit history through mobile payments. Smart meters allow consumers to monitor energy use and help them identify activities they are spending the most on so that they can make changes to save energy and pay less on their bills. Progressive tariffs rise with increasing levels of electricity consumption; for instance, monthly consumption in excess of 400 kWh is charged at nearly double the average cost of supply. They reward low consumption and involve other measures such as individual metering and often include assistance (e.g., subsidized tariffs) for poorer households.

6 Neighborhood citizen assemblies are community self-governing bodies that perform functions such as distributing social welfare payments, community policing, and maintaining villages' cleanliness. Although previously informal, they are now enshrined in Article 105 of Uzbekistan's Constitution as territorial self-government organizations. Additional research is needed to understand the extent to which they already provide outreach to FHHs and how they can improve this outreach. A recent decree requires that at least 10 percent of district-level budgets be prepared based on citizen feedback (Presidential Decree of August 22, 2018, "About the measures to provide openness of budget data and active engagement of citizens in budget process").

To reduce FHHs' vulnerability and increase their resilience, the government of Uzbekistan could also strengthen its support to FHHs for business development and entrepreneurship. National programs, such as the Every Family Is an Entrepreneur Program, that provide collateral-free loans to women, including FHHs, could complement the loans with mentoring support. The World Bank-financed Ferghana Valley Enterprise Project is an example of how the government could provide mentorship and business development support to entrepreneurs. By connecting FHH loan beneficiaries with successful business entrepreneurs, the government could help to increase FHHs' social networks and the number of people to whom they can turn for advice, support, and even clients.

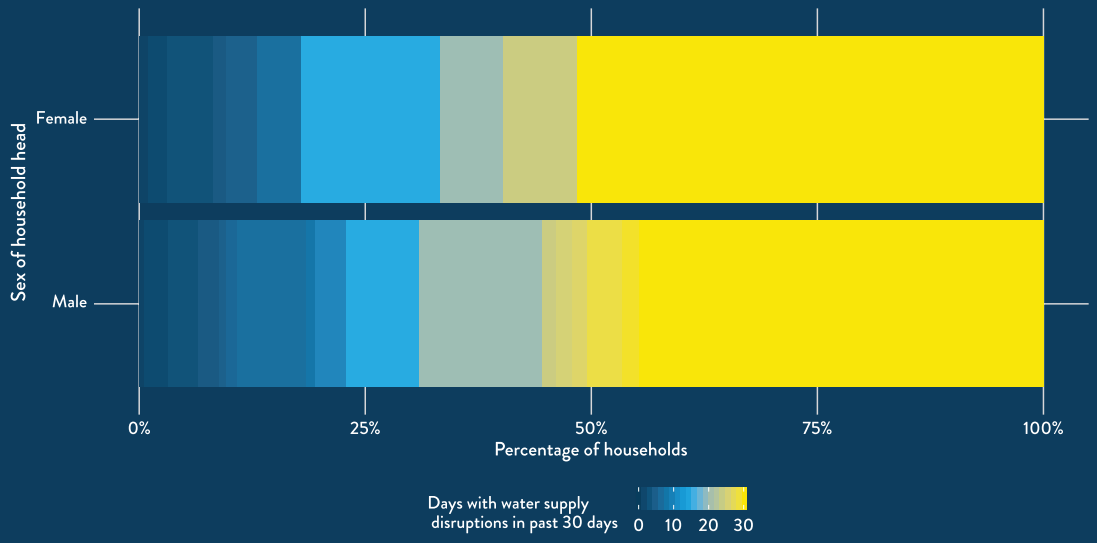
"Tariff levels that do not reflect female-headed households' difficulties in affording utilities will constrain their access to energy."

APPENDIX A

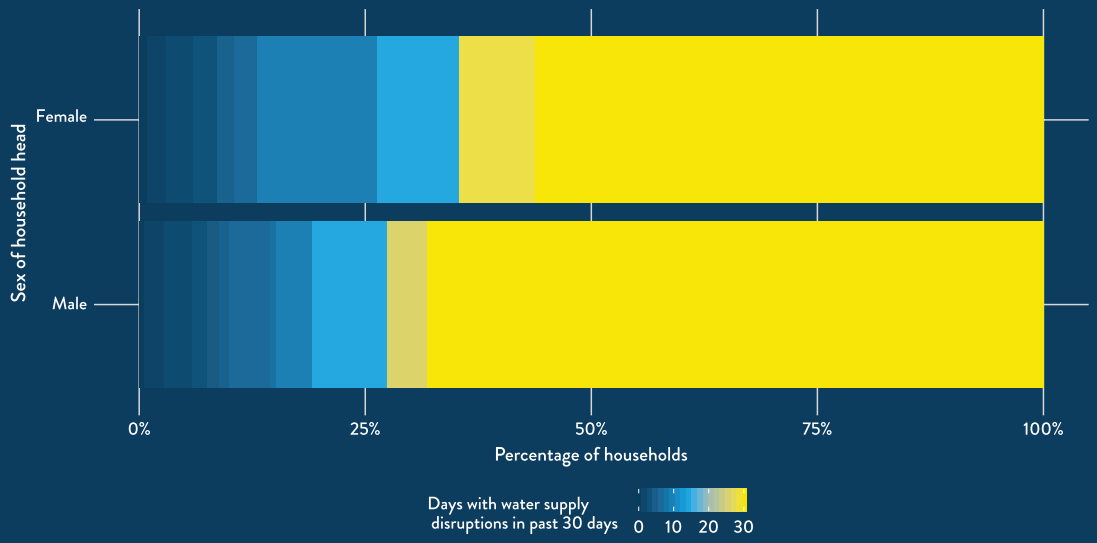
Except where otherwise noted, the source of all figures in the Appendix is the L2CU monthly panel survey (September/October/November 2018).

Figure A1. Days with Water Supply Disruptions in Previous Month for Households That Experienced Water Disruptions, According to Sex of Head of Household: (A) Round 1, (B) Round 3

A. Monthly Panel Survey Round 1 (September 2018)

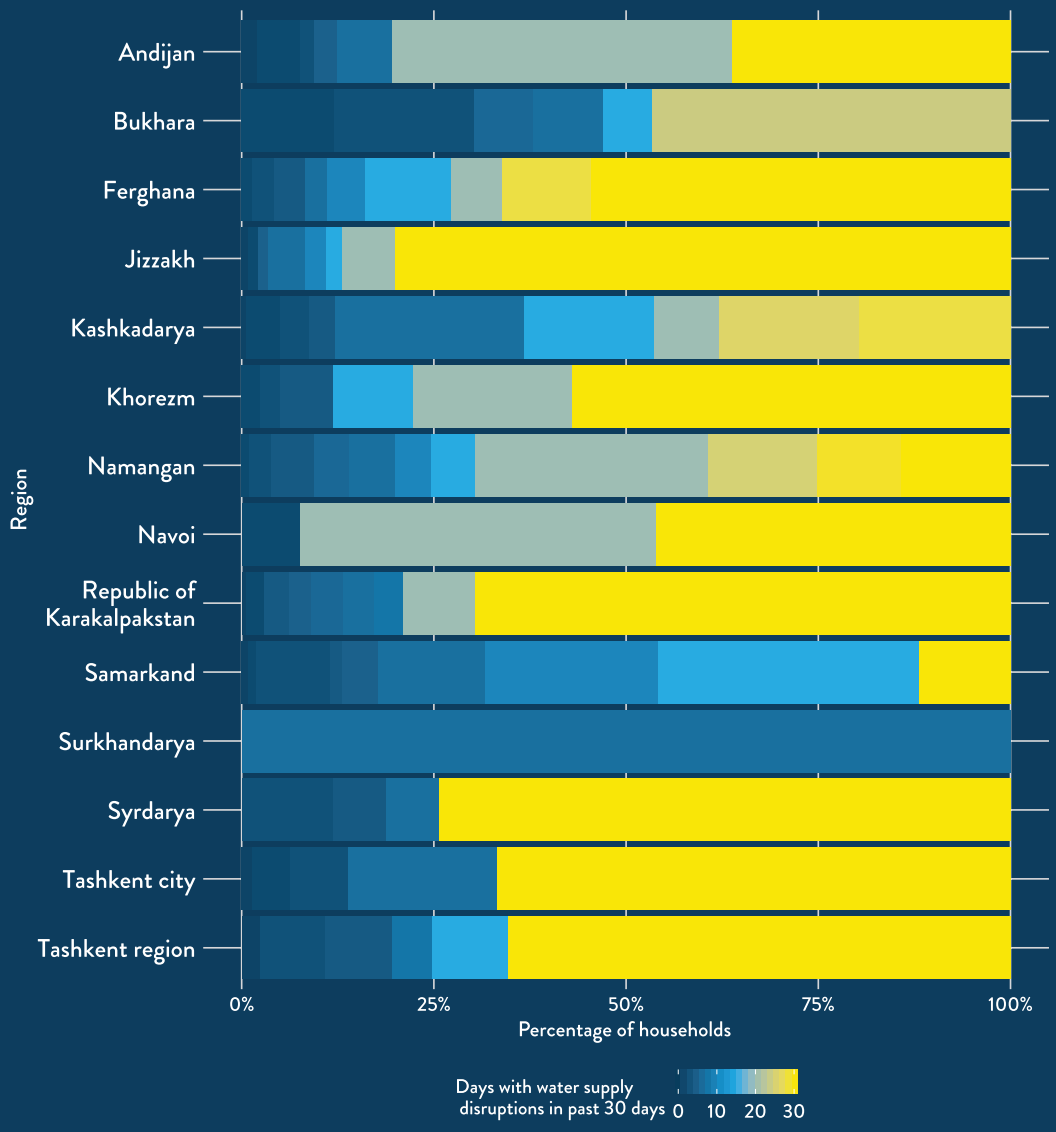


B. Monthly Panel Survey Round 3 (November 2018)



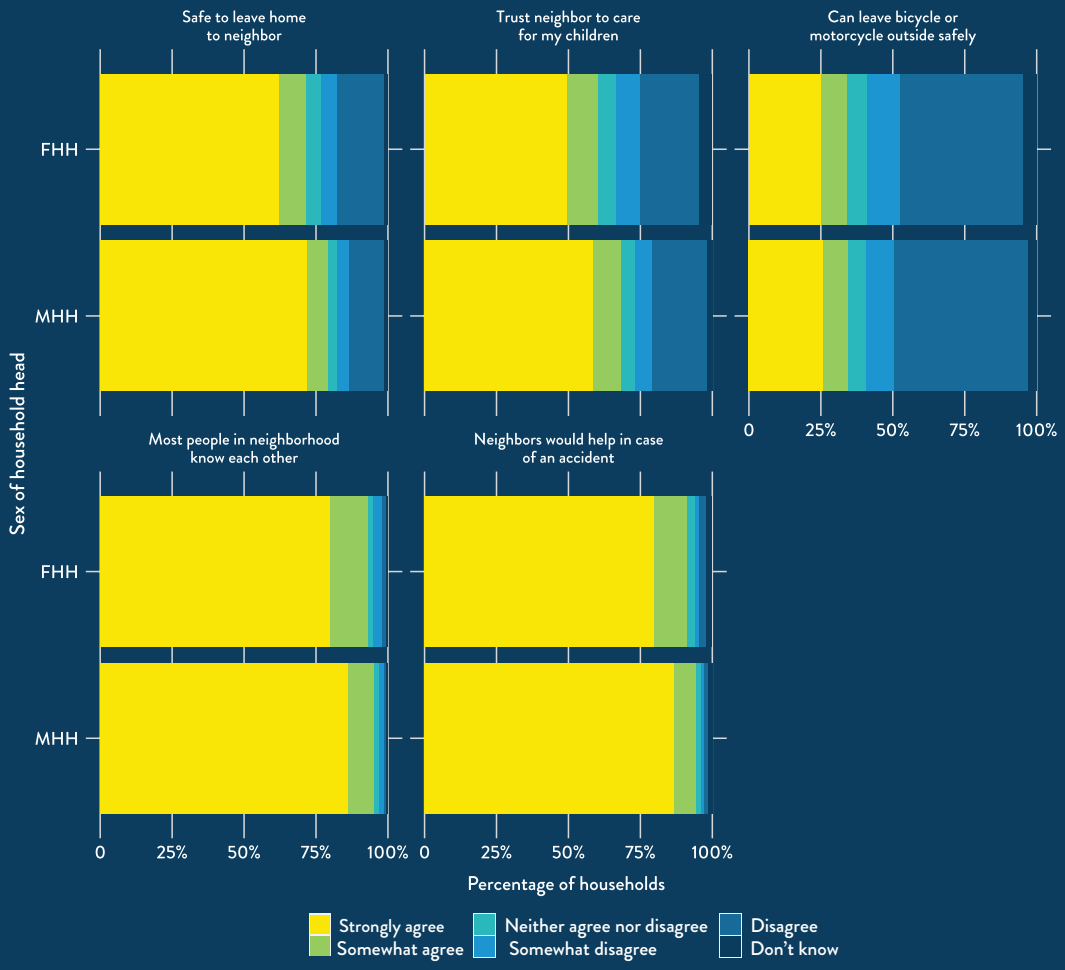
Note: Figure A1 shows the percentage of female- and male-headed households that had experienced disruptions in water supply in the 30 days preceding the survey, according to the number of days the disruption lasted. The figure includes households that reported having water disruptions at least once in the previous 30 days (~11 percent of households). Water supply disruptions affected nearly all households in the sample. In November 2018, male-headed households were significantly more likely to have no water supply than female-headed households.

Figure A2. Days with Water Supply Disruptions in Previous Month for Households that Experienced Water Disruptions, According to Region



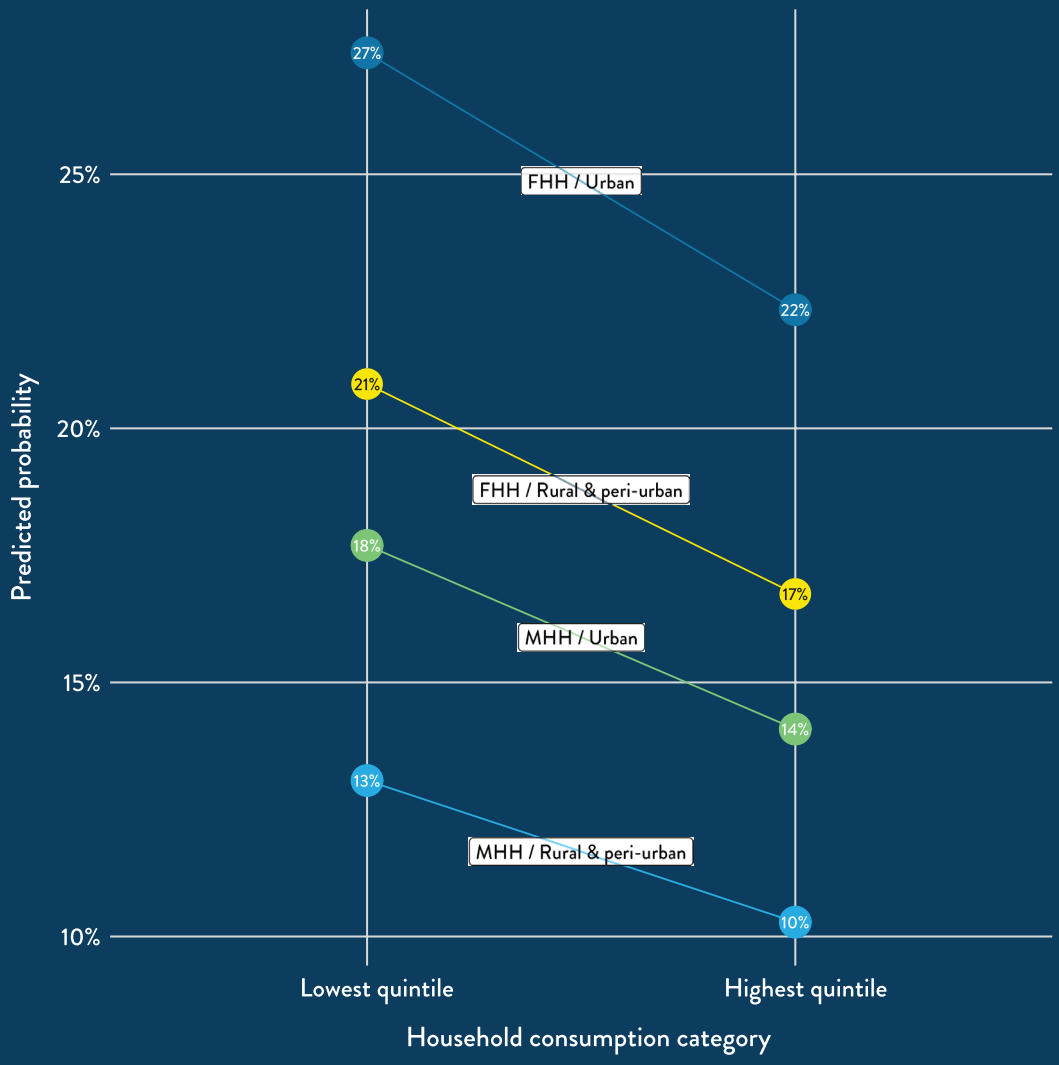
Note: Figure A2 shows the percentage of households in each region that had experienced disruptions in water supply in the 30 days preceding the survey, according to the number of days the disruption lasted. The figure includes households that reported having water disruptions at least once in the previous 30 days (~11 percent of households). Most disruptions in most regions lasted between 20 and 30 days.

Figure A3. Measures of Social Capital, According to Sex of Head of Household



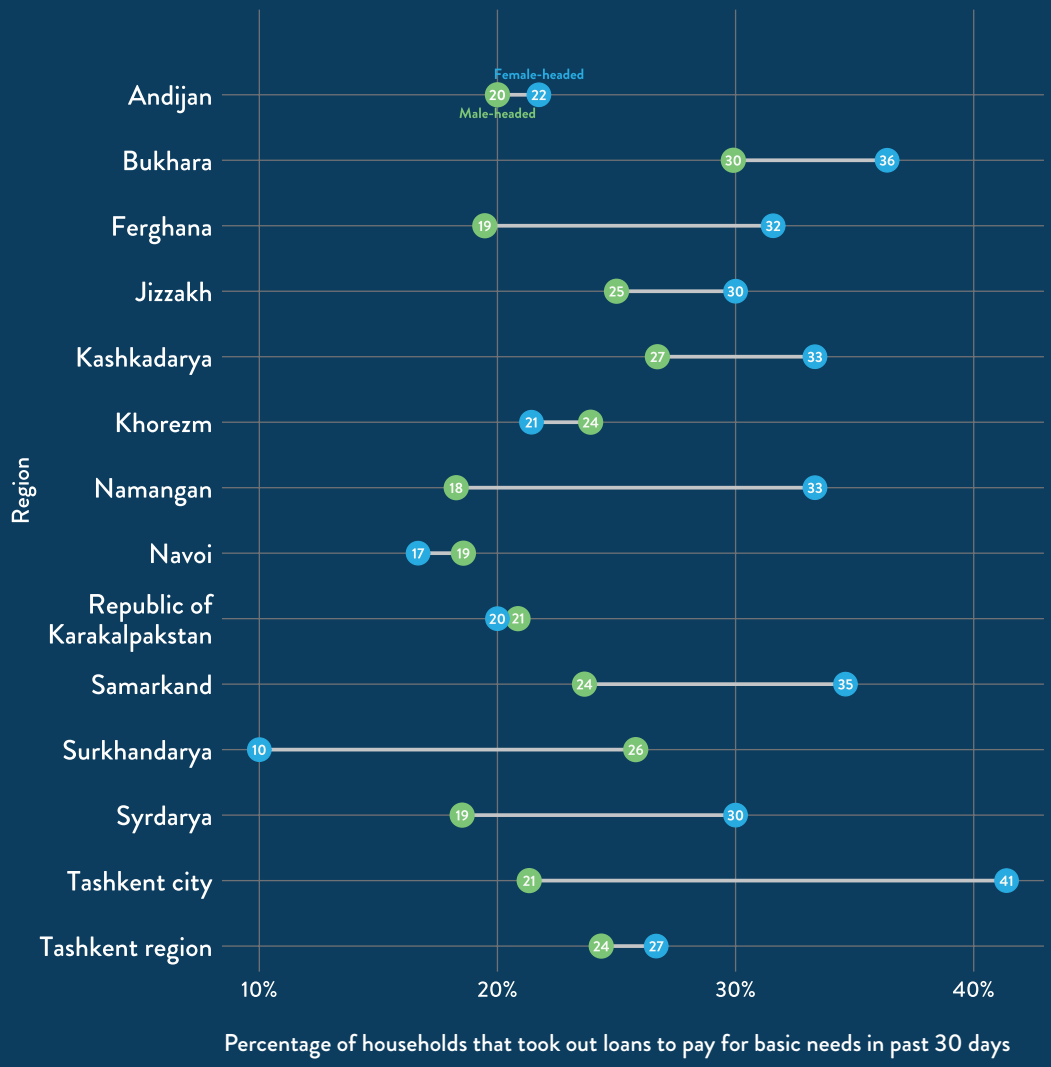
Source: L2CU household baseline survey (June/July 2018)
Note: Figure A3 shows the percentage of female- and male-headed households that reported relying on the various measures of social capital. Male-headed households tend to have higher levels of social capital in almost all categories, but female-headed households are slightly more likely to feel safe leaving a bicycle or motorcycle outside.

Figure A4. Predicted Probability of Being Unable to Afford Food for All Household Members for a Household in Tashkent Region with at Least One Employed Member



Sources: L2CU household baseline survey (June/July 2018) and L2CU monthly panel survey (combined September 2018 to March 2019).
Note: Figure A4 shows the predicted probability of households in the Tashkent region being unable to afford food, according to their consumption level. Female-headed households were more likely to be unable to afford food than male-headed households in rural and urban areas. The gender gap and the rural-urban gap were considerably larger than the difference between the lowest and highest quintiles of consumption.

Figure A5. Percentage of Households That Borrowed Money to Pay for Basic Needs, According to Sex of Head of Household and Region



Note: Figure A5 shows the percentage of female- and male-headed households in each region that reported borrowing money to pay for basic needs. In almost all regions, female-headed households were more likely to take out loans to pay for basic needs. The difference was most pronounced in Tashkent city, where female-headed households were twice as likely as male-headed households to take out loans, and in Surkhandarya, where male-headed households were 2.5 times as likely as female-headed households to take out loans.

REFERENCES

Ajwad, Mohamed Ihsan, Ilhom Abdulloev, Robin Audy, Stefan Hut, Joost de Laat, Igor Kheyfets, Jennica Larrison, Zlatko Nikoloski, and Federico Torracchi. 2014. *The Skills Road: Skills for Employability in Uzbekistan*. Washington, DC: World Bank.

Canpolat, Ezgi, and Sophia Georgieva. 2019. *Energy Subsidy Reform Assessment Framework: Incidence of Price Subsidies on Households and Distributional Impact of Reform—Qualitative Methods*. Washington, DC: World Bank.

Dutta, Soma, Annemarije Kooijman, and Elizabeth Cecelski. 2017. *Energy Access and Gender: Getting the Right Balance*. Washington, DC: World Bank.

Hiller, Bradley Todd, Evgeny Kochkin, Yadviga Viktorivna Semikolenova, and Robertus A. Swinkels. 2016. *Social Impact of Centralized Energy Services' Conditions in Uzbekistan: A Qualitative Assessment*. Washington, DC: World Bank.

Republic of Uzbekistan. 2004. *Uzbekistan Health Examination Survey 2002*. Calverton, MD: Analytical and Information Center, Uzbekistan State Department of Statistics, and ORC Macro.

UNDP (United Nations Development Programme). 2016. *Promoting Energy Efficiency in Public Buildings in Uzbekistan*. New York: UNDP. http://www.undp.uz/en/projects/project.php?id=155.

World Bank. ND. "Study: Listening to the Citizens of Uzbekistan." Washington, DC: World Bank. http://www.worldbank.org/en/country/uzbekistan/brief/l2cu.

World Bank. 2013. *Energy Intensity Level of Primary Energy* (MJ/$2011 PPP GDP). http://data.worldbank.org/indicator/EG.EGY.PRIM.PP.KD/countries.

World Bank. 2015a. *Toward Gender-Informed Energy Subsidy Reforms: Findings from Qualitative Studies in Europe and Central Asia*. Washington, DC: World Bank.

World Bank. 2015b. *Tools to Understand Social Issues in Energy Tariff and Subsidy Reforms in Europe and Central Asia*. Washington, DC: World Bank.

World Bank. 2016. *World Bank Migration Factbook*. Washington, DC: World Bank.

World Bank. 2018. *District Heating Energy Efficiency Project, Project Appraisal Document*. Washington DC: World Bank.

World Bank Group. 2018. *The Philippines: Options for Financing Energy Efficiency in Public Buildings*. Washington, DC: World Bank.

WHO (World Health Organization). ND. "Mortality from Household Air Pollution." https://www.who.int/gho/phe/indoor_air_pollution/burden/en/.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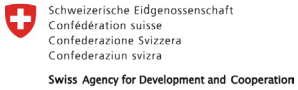
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