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Food Security in Transition: Rural Transformation in Khatlon Province, 2015–2023

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Rural transformation has been well documented across Asia and sub-Saharan Africa, yet the extent to which similar processes are taking place in Central Asia remains less well understood. This study focuses particularly on southern Tajikistan, one of the poorest areas of the region, and uses panel survey data from 2015 and 2023 to examine how rural livelihoods have evolved and whether a process of 'rural transformation' is underway. The analysis considers changes in poverty and food security, rural employment patterns, agricultural production, and migration. Several key patterns emerge. First, the region continues to experience reductions in poverty and food insecurity. However, these improvements appear fragile, as sizable shares of the population move both into and out of poverty, suggesting that many households remain vulnerable to economic shocks. Second, local labor force participation and employment remain low. Although agriculture continues to provide the largest share of employment, average farm sizes have declined, and there is limited evidence of widespread adoption of improved agricultural technologies. One notable exception is the large-scale adoption of mechanization for land preparation on larger plots, particularly through agricultural service providers. Third, an increasing number of working-age adults leave rural areas in search of employment elsewhere, which appears to have contributed to improvements in household welfare during the study period. However, this movement is driven predominantly by international labor migration rather than by rural–urban employment opportunities within the domestic economy.

Keywords: Tajikistan; rural transformation; labor migration; mechanization; farm size; poverty

1. Introduction

Rural transformation – often framed as a core component of structural transformation – has been widely documented across developing countries and is commonly associated with sustained reductions in poverty and food insecurity (Barrett, Christian, & Shiferaw 2017). Transformation typically involves rising agricultural productivity, a declining share of labor in agriculture, expanding rural non-farm employment, and increased rural–urban mobility (Barrett, Christian, & Shiferaw 2017; Deininger, Jin, & Ma 2022). Yet these stylized patterns may not generalize to all contexts. In particular, for parts of Central Asia, the dominant pathway of rural change may be less about rural–urban reallocation and local job creation, and more about the externalization of labor through international migration and the inflow of remittances.

Following the collapse of the Soviet Union, newly independent post-Soviet states embarked on far-reaching institutional and economic reforms that reshaped their production systems and influenced the welfare of their populations. The perceived success of China's agricultural reforms – most notably the introduction of the household responsibility system – raised expectations that individualization of agriculture could stimulate agricultural productivity and reduce poverty in transition economies (Rozelle & Swinnen 2004). At the same time, the considerable variation in reform strategies and economic outcomes across post-Soviet countries provided a unique opportunity to analyze the relationship between institutional reform and economic growth. Consequently, the early years of the post-Soviet transition attracted substantial scholarly attention.

While the early transition period in post-Soviet economies attracted substantial scholarly attention, far less research has examined how rural economies in these countries have evolved in the decades since the initial reforms. In particular, the extent to which processes resembling rural transformation – commonly documented worldwide – are taking place in Central Asia remains insufficiently understood. Tajikistan presents an especially relevant case in this regard. Despite sustained economic growth since the end of its civil war, the country remains one of the poorest in the region, and its rural economy continues to be characterized by limited local employment opportunities, small and fragmented farm structures, and strong dependence on international labor migration and remittances (Akramov & Shreedhar 2012).

These features suggest that rural welfare improvements may be occurring through a pathway that differs from the classic model of structural transformation. Rather than being driven primarily by rising agricultural productivity and the expansion of rural non-farm employment, improvements in household welfare may instead be closely linked to income earned abroad and transferred through remittances. In such a context, international labor migration can function as a key livelihood strategy for rural households, relaxing liquidity constraints and supporting consumption while only partially stimulating productive investment in the local rural economy.

Against this background, this study examines how rural livelihoods, agricultural production, migration, and household welfare have evolved in southern Tajikistan over the past decade. Using representative household survey data collected in 2015 and 2023 across 12 districts of Khatlon Province, the paper provides new micro-level evidence on whether and how rural transformation is unfolding in this context. In particular, it investigates whether improvements in poverty and food security are associated with structural changes in the rural economy, or whether they primarily reflect the growing role of international labor migration and remittance inflows in shaping household livelihoods.

The remainder of the paper proceeds as follows. In Section 2, we will first provide background on Tajikistan's rural economy, land institutions, and the macro context of migration

and remittances. Section 3 will then explain the study data and methodology, followed by the results in Section 4. We will end the paper with a discussion and conclusion.

2. Background

Since the end of the Civil War, following its secession from the Soviet Union, Tajikistan's economy has grown tremendously. Its population generally experienced sizable improvement in its food security status, living standards, and welfare – nevertheless from a very low starting point. By 2015, the country's economy had grown sufficiently to reach lower-middle-income status. Nevertheless, it remains the poorest country in Central Asia (World Bank 2026) and faces significant unemployment challenges: only 28 percent of women and 45 percent of men aged 15 years and older were employed in 2024 (ibid.). Khatlon Province has historically been the poorest province of Tajikistan (TajStat & World Bank 2015) but has good potential for agricultural development, including a favorable climate, relatively fertile land, and access to irrigation water. Khatlon province accounts for 40 percent of Tajikistan's agricultural land and 48 percent of its arable land (ibid.).

The gradual restructuring of collective and state farms into individual and family-based *dehkan* farms in the late 1990s and early 2000s played a critical role in improving incentives, increasing farm autonomy, and enhancing agricultural productivity. Individual and family farming systems generally outperform large collective structures in terms of efficiency and profitability, while also contributing to rural income growth and poverty reduction (Lerman & Sedik 2008; Akramov & Shreedhar 2012). The household survey evidence from three mountainous regions of Tajikistan – Gorno-Badakhshan, the Rasht Valley, and Eastern Khatlon – shows that individual and family farms were the main source of household income and the foundation of rural livelihood strategies. Household income and poverty level were strongly associated with access to productive assets, particularly land and livestock, as well as household size and dependency ratio. Households engaged in migration, small business activities, or market-oriented agricultural production were significantly less likely to be poor (Robinson & Guenther 2007).

However, the full benefits of land reform and farm restructuring have been constrained by limitations in insecure land-use rights, limited access to credit and markets, weak rural institutions, and continued state intervention in agricultural production (Lerman & Sedik 2008; Akramov & Shreedhar 2012). Despite the reforms and transformations, Tajikistan's agricultural policies, power relations, infrastructure, and landscapes are still strongly shaped by their Soviet legacy (Hofman 2018; Zakirova, Alff, & Schmidt 2023). Initial land reforms, for example, have been characterized as largely 'cosmetic' (Zakirova 2025: 20) and remain partly incomplete (Hofman 2018). All farmland remains state property, with farmers obtaining inheritable and transferable use rights to the respective farmland (Klumper, Theesfeld, & Herzfeld 2018). Selling of land-use rights, however, is not allowed (Klumper, Theesfeld, & Herzfeld 2018).

Moreover, despite formal liberalization policies that granted farmers greater freedom in crop selection and agricultural technologies, freedom of crop choice remains constrained, and farmers largely continue similar agricultural management practices (Zakirova, Alff, & Schmidt 2023). Many farmers remain locked into producing cotton due to the acquisition of a 'cotton debt', a practice that helped safeguard benefit streams to 'strongmen' or 'cotton elites' (a more extensive description can be found in Van Atta (2009) and Hofman (2018)). Moreover, local authorities are responsible for meeting government-dictated production quotas for strategic crops (e.g., cotton and wheat) at regional and sub-regional levels; hence, they pressure farmers into growing these crops, particularly on *dehkan* farms (Hofman & Visser 2021). Finally, the experience of the agricultural research institutes, extension workers, and

farmers largely rests on resource-intensive crop cultivation practices like those applied during the Soviet period (Zakirova, Alff, & Schmidt 2023). Therefore, deepening market-oriented reforms, strengthening land tenure security, and improving access to agricultural services are essential for sustaining agricultural growth and supporting broader rural transformation in Tajikistan.

The dismantling of collective farms has led to difficulties, including insufficient and affordable access to quality inputs such as seeds, machinery, extension, and advisory services. Moreover, it has further hampered the maintenance and operation of large-scale irrigation infrastructure, which fell into serious disrepair after the collapse of the Soviet Union and the country's ensuing civil war. With support from development partners, particularly the United States Agency for International Development (USAID), World Bank, and Asian Development Bank, Tajikistan has made significant efforts to strengthen its agricultural irrigation system by establishing water user associations (WUAs) throughout the country to foster participatory irrigation management. The evidence suggests that enhanced irrigation services primarily affect farmers' decisions about the area allocated to traditional crops such as cotton and wheat, thereby contributing to higher cropping intensity through more reliable water delivery. However, while improved water management is a necessary condition for agricultural intensification, knowledge transfer and extension services are critical for stimulating diversification and higher-value agricultural production (Balasubramanya 2019; Buisson & Balasubramanya 2019).

From a macro-level perspective, a few things stand out regarding rural transformation in Tajikistan. First, there is no evidence of ongoing movement of people from rural areas to urban centers. The country's population is still increasing, and its rural population is growing at a slightly higher rate than its urban population (World Bank 2026). Among the five Central Asian countries, Tajikistan is the country that has the largest share of its population living in rural areas, and the highest population growth rate (*ibid.*).

Second, transformation from an agriculture-dominated economy toward a more diversified, market-integrated, higher-productivity economy with stronger rural–urban linkages has not yet taken place. While Tajikistan's agrifood sector accounts for only about a quarter of its GDP, it still employs about two-thirds of the workforce, and nearly 90 percent of these workers are employed in primary agricultural activities (Diao et al. 2023). Limited employment opportunities exist outside the agricultural sector, particularly in rural areas (Lerman & Sedik 2008, Mukhamedova & Wegerich 2018, World Bank 2024). Since its independence, the number of people employed in the agricultural sector has increased roughly in proportion to population growth (TajStat 2024), whereas the total area of agricultural land has remained almost unchanged, thus suggesting an intensification of labor use.

Third, Tajikistan's economy is highly dependent on personal remittances (World Bank 2023). The lack of formal, well-paid jobs and private business opportunities locally to earn sufficient household income has motivated people to migrate abroad since the beginning of the 2000s (Shimizutani & Yamada 2023; World Bank 2023). Since 2006, the value of personal remittances was more than 25 percent of the country's GDP. In 2015, personal remittances were 27 percent of GDP, the lowest level in a decade (World Bank 2026). Migrants were modestly affected by the COVID-19 pandemic: after a sharp decline in employment and remittances in April and May 2020, they quickly returned to their former levels (Shimizutani & Yamada 2021). Strong labor demand in Russia following its invasion of Ukraine in February 2022 and an appreciation of the Russian ruble (before it depreciated again toward the end of 2022) benefited labor migrants and the remittances they were able to send home (World

Bank 2023). By 2022, remittances were an estimated 51 percent of Tajikistan's GDP (World Bank 2026).¹

3. Data and Methodology

3.1 Data

This assessment relies on two datasets: (i) the 2015 Interim Zone of Influence (ZOI) Survey, and (ii) the 2023 USAID/IFPRI Population-Based Survey (PBS). Each dataset consists of face-to-face interview data from 2,000 households in the 12 districts in Khatlon Province that have formed USAID's ZOI since 2012 (**Figure 1**). The 2015 survey team intended to re-interview the households who responded to the 2012 FEEDBACK PBS (Feed the Future FEEDBACK 2014). The 2012 FEEDBACK PBS households were selected for interview in a two-stage cluster sample designed to represent the population of the ZOI (Feed the Future FEEDBACK 2014). The Government of Tajikistan's National Statistical Agency provided a list of standard enumeration areas for the ZOI based on the 2010 census. In the first stage, 100 clusters were randomly selected using a probability-proportional-to-size approach. In the second stage, 20 households were randomly selected within each cluster using official village registration books.

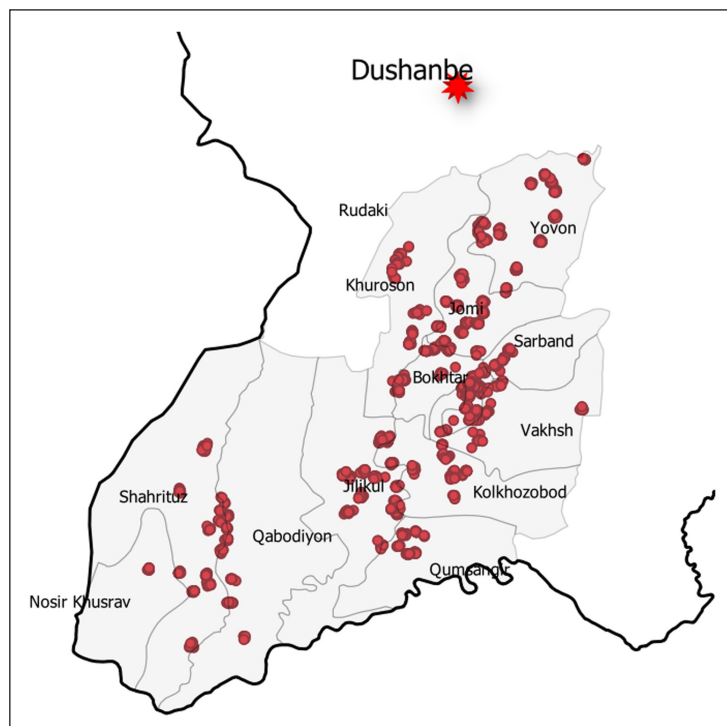


Figure 1: Household survey locations of the 2023 USAID/IFPRI PBS in Khatlon Province, Tajikistan.

Source: Authors' own compilation.

¹ The steep increase of transfers in 2022 is likely also in part explained by a transit of Russian citizens' money in response to sanctions and the military mobilization campaign in 2022 (World Bank 2024).

For about one-third of villages, registration books were unavailable or unreliable because settlements had merged or divided. For those villages, a random walk was used to select households.

Interviews for the 2015 Interim ZOI Survey were conducted between February 21, 2015, and March 17, 2015. The households from the 2012 sample that could not be interviewed in 2015 were randomly replaced by another household in the same enumeration area. The questionnaire for the 2015 Interim ZOI Survey expanded on the questionnaire of the 2012 FTF FEEDBACK PBS (Feed the Future FEEDBACK 2014). In 2015, additional modules related to agricultural production, migration, and aid projects were added to this questionnaire, as well as a community-level questionnaire.

Data for the 2023 USAID/IFPRI PBS were collected between February 12 and March 23, similar to the period of data collection in 2015. Enumerators sought to re-interview households that had also been interviewed in 2015, and if these households were not available for interview, the nearest neighbor was interviewed instead. Identifying information of the households originally interviewed in 2012 was not available to the survey team. Of the 2,000 households interviewed in 2015, 402 could not be re-interviewed in 2023 and were replaced with the nearest-available neighboring household. More details about attrition can be found in Appendix A. The 2023 USAID/IFPRI PBS questionnaire followed the 2015 format, though with added modules on employment and aspirations, and minor modifications based on prior survey experience. The datasets and questionnaires are available in IFPRI (2024) and IFPRI (2025).

3.2 Methodology

This paper uses descriptive comparisons of household- and population-level statistics over time. The descriptive analyses regarding poverty and welfare are based on a comparison of households who were interviewed in both 2015 and 2023, i.e., the panel dataset. These are calculated using the attrition-corrected sampling weights to correct for bias arising from the sample design and attrition between 2015 and 2023, unless mentioned otherwise.

The poverty estimates in this paper are based on a four-step procedure. First, we aggregate different components of household consumption to construct a daily nominal consumption expenditure aggregate: we sum up the value of food consumed, non-food expenditures, and the use value of durable goods. As recommended by Deaton and Zaidi (2002), non-food expenditures exclude occasional or unusual expenses, such as wedding or funeral costs, health expenditures, or house and car repairs. We also exclude taxes paid and expenditures on durable goods. As the housing and rental markets are thin, particularly in rural areas, imputing a reliable estimate of the rental value of households' dwellings is not realistic. Similar to the estimation strategy of the national poverty estimates prior to 2021 (TajStat & World Bank 2015), we do not include this in our consumption aggregate. Secondly, we adjust the nominal prices to real prices. We use the consumer price index (CPI) as published by Tajikistan's Statistical Agency to express the consumption aggregate in equivalent terms. Third, this consumption aggregate is divided by the number of household members. For the estimate of the number of household members, we rely on the commonly used definition of household membership that is based on each individual's presence in the household for at least 6 months in the past 12 months, or a person's intention to stay in the household in the foreseeable future (e.g., newlyweds) (see more details in the questionnaires of IFPRI 2024; 2025). After this step, we have an estimate of the per capita daily consumption expenditures in each household (also referred to as per capita daily expenditures). Fourth and finally, the per capita daily expenditures of each household are compared to a poverty line. In the main part of the paper, we will rely on the 2021 national poverty line.

The estimates of agricultural production rely on the full respective samples, and we use cross-sectional sample weights to account for biases that might arise due to the sample design. In doing so, we intend to maximize the number of observations for these analyses. To improve the paper's readability, we will consistently refer to the survey year. However, most of the agricultural data presented relate to the year preceding the survey, thus mainly covering 2014 with the 2015 dataset, and 2022 with the 2023 dataset.

The statistical analyses related to migration are mainly based on cross-sectional data collected in 2015 and 2023 and apply sampling weights to adjust for sampling bias. These analyses necessarily take a broader view on household belonging, such that the classification of a household as a 'migrant household' also takes into consideration adults who were away (for work purposes) for more than 6 months in the past 12 months yet are still considered as household members by the survey respondents. This does not include former household members who permanently moved away from the origin household. Where applicable, the sample is limited to survey households who were interviewed in both 2015 and 2023, i.e., the panel dataset. In the latter case, the attrition-corrected sampling weights are used to correct for bias arising from the sample design and attrition between 2015 and 2023 (Lambrecht, Mardonova, & Akramov 2023).

The employment-related analyses are limited to the 2023 dataset. Details on employment were not collected in the 2015 survey. When analyzing work and employment, we align the sample and definitions as close as possible with the internationally accepted methodology suggested by the International Labour Organization (ILO 2013; 2023). For these analyses, we limit the sample to household members aged 18 to 65 years who have lived in the household for at least 6 months in the past 12 months, or who intend to stay in the household in the foreseeable future (e.g., newlyweds).

4. Results

4.1 Poverty and food security

Household welfare improved between 2015 and 2023, as measured by households' living conditions, the experience of hunger, per capita daily expenditures, and poverty (**Table 1**). We find large improvements in terms of accessing improved sanitation facilities (from 1 percent in 2015 to 49 percent of households in 2023), and a larger share of households with better housing quality in terms of having a good quality wall (71 percent to 78 percent, respectively) or floor (70 percent to 82 percent, respectively). We also find improvements in households' food security status. While there are few significant changes in the share of households in each food security category, the household hunger score declines significantly (from 0.67 in 2015 to 0.52 in 2023). Between 2015 and 2023, households' real per capita daily expenditures² increased by nearly 10 percent, from 14.7 to 16.2 respectively (in 2021 PPP equivalent). The share of food expenditures in overall expenditures remained constant between 2015 and 2023, indicating proportional real increases in food expenditures over time.

The panel structure of the data provides an opportunity to explore movements in and out of poverty between 2015 and 2023 (**Table 2**). Only 48.8 percent of the population was not poor in both 2015 and 2023, and 24.5 percent moved out of poverty. Yet 12.8 percent were poor in both periods, and another 14.0 percent fell into poverty.³ Similarly, a cross-tabulation

² Real values are calculated by adjusting for changes in purchasing power using official yearly CPI.

³ Note that the differences in poverty rates between **Table 1** and **Table 2** are due to their different units of analyses. **Table 1** calculates this at household level (i.e., in percentage of households in the study area), whereas **Table 2** calculates this at the individual level (i.e., in percentage of individuals living in the study area).

Table 1: Household living conditions, food security, and poverty status, 2015 and 2023.

	2015	2023	<i>T test</i>
Improved sanitation	1%	49%	***
Quality wall	71%	78%	***
Quality floor	70%	82%	***
Little to no hunger	86.2%	87.9%	
Moderate hunger	11.5%	9.6%	
Severe hunger	2.2%	2.5%	
Household hunger score	0.67	0.52	***
Per capita daily total expenditure ^{a, b}	14.7	16.2	***
Per capita daily food expenditures ^a	8.7	10.0	***
Poor (below 2021 poverty line) ^b	39.1%	28.7%	***
Food share in expenditures ^b	62.7%	63.3%	
# observations	1,598	1,598	

^a Expressed in 2021 TJS equivalent to facilitate comparison to the 2021 poverty line. ^b The expenditures include food, non-food, and durable goods use value. Asterisks show statistically significant differences between results in respective survey years; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We apply population weights corrected for attrition.

Table 2: Comparison of poverty status in 2015 and 2023.

		Poverty status in 2023		
		Not poor	Poor	Total
Poverty status in 2015	Not poor	48.8%	14.0%	62.8%
	Poor	24.5%	12.8%	37.2%
	Total	73.3%	26.7%	100.0%

Note: percentages are calculated using individual-level attrition weights using the panel households only ($N_{2015} = 1,595$; $N_{2023} = 1,595$).

of households' hunger status across the two years shows that a large share of households are moving across different categories (not shown here). These movements in and out of poverty or hunger, and the fact that several households hover near the poverty line, point to the precariousness of the population in the face of shocks.

4.2 Livelihoods

Employment rates and labor force participation are low.⁴ In 2023, only 36 percent of men and 21 percent of women had been employed in the past seven days (**Table 3**). Even among those employed in the past seven days, 26 percent of men and 16 percent of women can be

⁴ Note that the ILO defines employment as activities to produce goods or provide services for pay or profit. Hence, it does not include activities that produce goods or services for home consumption, such as subsistence farming activities.

Table 3: Employment and work in the past seven days, among men and women (18–65 years old).

	During the past 7 days		
	Men	Women	<i>T test</i>
Employed	36.4%	20.5%	***
Underemployed (among the employed)	25.8%	15.7%	***
Labor force participation	38.7%	21.2%	***
Not in employment, education, or training (NEET)	57.8%	75.6%	***
Work (excl. reproductive work)	62.9%	66.8%	***
Agricultural work ^a	46.8%	60.5%	***
Crop work	39.5%	51.5%	***
Mainly for home consumption	36.7%	48.7%	***
For sale	2.8%	2.8%	
Livestock work	31.5%	40.5%	***
Mainly for home consumption	29.4%	38.9%	***
For sale	2.1%	1.5%	**
Non-farm enterprise work	13.5%	10.0%	***
Wage or salaried work	24.1%	9.6%	***
# observations	2,804	3,990	

Source: Authors' estimation, based on the 2023 household survey dataset and using household survey weights, not including long-term migrants. Asterisks indicate significant differences between men and women at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^a Includes work in household crop production, livestock production, and fish farming or fishing. Each person can be involved in several types of work.

considered underemployed, i.e., these persons would have worked more if additional paid work was available. The labor force participation rate, including both employed and unemployed persons, is slightly higher – 39 percent of men and 21 percent of women are in the labor force. A striking 58 percent of men and 76 percent of women were not in employment nor in education or training (NEET). Although data collection took place during a time of year with likely fewer employment opportunities compared to other times of the year, the employment rates increase only modestly when considering the past 12 months rather than the past seven days, to 44 percent of men and 23 percent of women (results not shown here).

When we consider work more broadly and include also work in agricultural activities that are performed mainly for home consumption, we find much larger rates of men and women who work: 62.9 percent of men and 66.8 percent of women worked in the past seven days (**Table 3**), and 73.4 percent and 74.2 percent, respectively, in the past 12 months (not shown in the tables). A large share of adults are involved in agricultural work, but women more often do so than men (60.5 percent and 46.8 percent, respectively, in the past seven days). Activities destined for home consumption are more often performed by women, whether for crop production or livestock. Conversely, we find that men more often engage in activities that generate goods for sale. The largest gender differences are found in wage or salaried work, where 24.1 percent of men and only 9.6 percent of women had waged or salaried work in the past

seven days (**Table 3**), and 35.1 percent and 14.4 percent, respectively, in the past 12 months (not shown in the tables).

As households in rural Khatlon often include several adults, livelihood patterns may be different when considering households rather than individual adults. We therefore look at households' aggregate employment status in **Table 4**. Only 62 percent of households had at least one member employed in the past 12 months. Hence, 38 percent of households did not have any member employed locally in the past 12 months. However, most households (93 percent) did have at least one member who worked. This discrepancy is mainly explained by the large share of households in the study area who are engaged in crop farming for home consumption (78 percent of households) and livestock rearing for home consumption (56 percent of households).

Given the importance of labor migration as an alternative to local employment, **Table 4** also compares the employment and work status of household members in households without and with labor migrants. Differences between households without and with labor migrants are significant, but relatively modest in size. Households without a labor migrant are more likely to have a member who is employed locally (66 percent vs. 59 percent). This mainly seems to be driven by non-farm enterprises, as households without labor migrants are more likely to have a non-farm enterprise (36 percent) compared to households with a labor migrant (29 percent). Households with migrants are, however, more often engaged in subsistence activities, including crop farming and livestock rearing, thus reflecting the continued importance of subsistence farming – even in the presence of alternative income sources. Households without employed household members are more likely to receive remittances

Table 4: Household livelihood sources and migrant status during past 12 months.

<i>At least one adult household member ...</i>	All households	Household without a labor migrant	Household with a labor migrant	<i>T test</i>
Employed ^a	62%	66%	59%	***
Work (excl. reproductive work)	93%	93%	93%	
Agricultural work ^a	84%	80%	87%	***
Crop work	80%	75%	84%	***
Mainly for home consumption	78%	72%	81%	***
For sale	6%	6%	6%	
Livestock work	58%	52%	62%	***
Mainly for home consumption	56%	49%	60%	***
For sale	4%	4%	3%	
Non-farm enterprise work	32%	36%	29%	***
Wage or salaried work	52%	54%	51%	
# observations	1,998	731	1,207	

Source: Authors' estimation based on the 2023 household survey dataset and using household survey weights. Asterisks indicate significant differences between households without and with labor migrants at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^a Includes only local employment, and not employment during domestic or international migration. ^b Includes work in household crop production, livestock production, and fish farming or fishing. Each household can be involved in several types of work.

than households with employed members (68 percent vs. 62 percent, respectively – not shown in the tables). Again, however, these differences are relatively modest, and in many households the lack of employment among household members is not accommodated by remittance receipts.

4.3 Agricultural production

A large share of households cultivate crops, but they are often limited to household plots only. The share of households cultivating crops remained constant over the survey period: 85 percent. Most households have a household plot (83 percent in 2015 and 94 percent in 2023),⁵ but only a quarter have a presidential plot (25 percent in 2015 and 24 percent in 2023), and ten percent have a dehkan farm (similar in both years). Cotton, wheat, corn, and fodder crops are grown in relatively large areas as compared to other common crops.

The average size of household agricultural landholdings decreased by 28 percent in 2023 compared to 2015 (**Figure 2**); average agricultural landholdings were 0.44 ha in 2015 but 0.32 ha in 2023. There was a sizable increase in the number of households in the study region between 2015 and 2023. This larger number of farm households (in absolute terms) largely explains the smaller average farm sizes per household. The main drop in landholdings is driven by a reduction in dehkan farm sizes (from 2.34 ha in 2015 to 1.42 ha in 2023), with dehkan farms generally larger than other plot types. Yet we also find declines in the size of presidential plots (from 0.14 ha to 0.11 ha) and household plots (from 0.14 ha to 0.12 ha). The

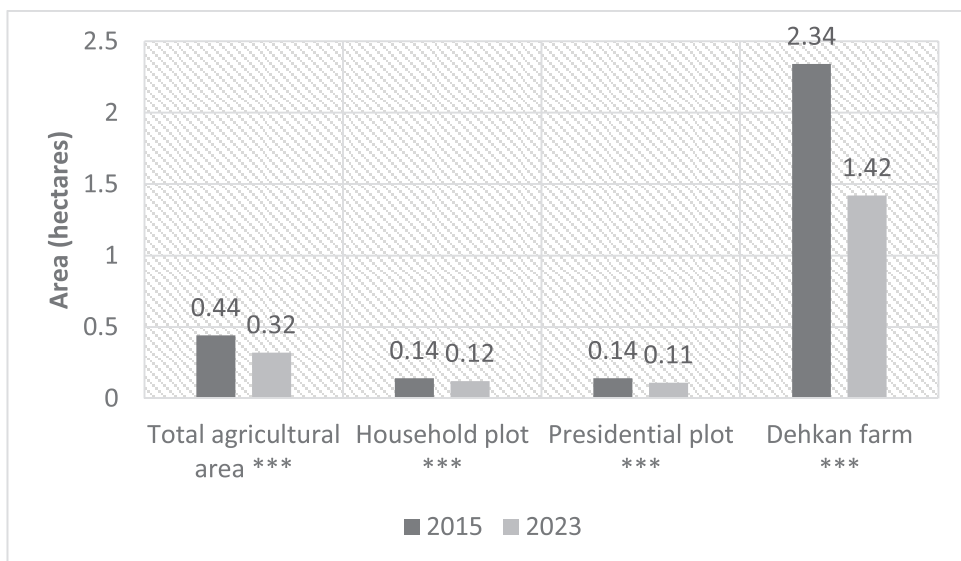


Figure 2: Farm size, by year and type of plot.

The sample only includes all households with any plot ($N_{2015} = 1,745$; $N_{2023} = 1,920$), all household plots ($N_{2015} = 1,659$; $N_{2023} = 1,869$), all presidential plots ($N_{2015} = 530$; $N_{2023} = 529$), and all dehkan farms ($N_{2015} = 214$; $N_{2023} = 205$), respectively. Asterisks indicate significant differences between 2015 and 2023 at *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

⁵ This may involve more households farming such plots, though the measure may also be sensitive to a broader interpretation of the term household plots during the 2023 survey data collection as compared to the 2015 data collection.

former relates, at least in part, to further restructuring of dehkan farms, but across all types of plots, farm fragmentation and construction on land formerly used for farming are likely at play as well.

Despite low ownership of mechanized farm implements, there is a relatively high rate of farm mechanization – particularly for land preparation and planting of the main crops (Table 5). The share of households owning tractors decreased (from 4 percent in 2015 to 3 percent in 2023). Yet, while less than half of all plots with corn, potato, tomato, or beans were prepared using mechanization in 2015, more than 90 percent of these plots were prepared using mechanization in 2023. Machinery for harvesting increased mainly for fodder crops (6 percent vs. 15 percent) and maize (2 percent vs. 8 percent). The gap between the observed low ownership rates and high usage rates is filled by machinery service providers. Only 6.3 percent of households used own mechanization, whereas 93.7 percent rented mechanization services. These seem available to most households either within the same village (82 percent) or the same jamoat (13 percent).

Low investment is evident in both the farm and non-farm sectors. Households in the 2023 survey were asked about past and planned farm and non-farm investments in the past and coming 10 years. Farm investment includes four sub-categories: agricultural machinery (i.e., tractors, plows, planters, combines, processors, etc.), agricultural structures (i.e., greenhouses, barns, storage facilities, etc.), agricultural technology (i.e., irrigation systems, pumps, etc.), and livestock. Despite its relatively broad coverage, only 11 percent of households report any farm investment in the past 10 years. Non-farm investment also includes four sub-categories: vehicles (i.e., cars, trucks, motorbikes), housing (i.e., new purchases, maintenance, renovations, etc.), electronics (i.e., refrigerators, televisions, radios, etc.), and non-electronics. Any sort of non-farm investment in the past ten years was reported by 16 percent of households. Most of this investment comes in the form of investment in electronic assets and, to a lesser extent, vehicles. Expected investments for the next ten years are slightly higher, but only marginally so, with only 14 percent of households reporting expected farm investments and only 18 percent of households reporting expected non-farm investments.

Table 5: Agricultural machinery use by crop, activity, and year.

	2015			2023		
	Land preparation	Planting	N	Land preparation	Planting	N
Corn	50.1%	10.8%	79	90.5%***	24.1%**	295
Wheat	88.2%	43.8%	364	94.5%***	29.1%***	280
Potato	40.2%	5.8%	650	97.5%***	6.1%	429
Tomato	35.7%	4.6%	553	100.0%***	4.8%	208
Beans	46.2%	10.8%	43	92.6%***	7.4%	47
Cotton	89.7%	84.1%	84	96.5%*	66.6%**	73
Fodder crops	71.8%	16.7%	460	88.4%***	11.7%	402

Note: Asterisks indicate significant differences between 2015 and 2023 at *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The number of observations (N) represents households growing each crop or crop category. Crops grown on less than 0.02 hectares are excluded from the analysis.

4.4 Migration and employment

In 2015, 35 percent of households had at least one international labor migrant in the year prior to data collection, whereas this increased to 59 percent in 2023 (**Table 6**). These are in line with the nationwide trend of rising personal remittances since the economic downturn in 2014 and 2015. Domestic labor migration, on the other hand, is relatively rare, with only 2 percent of households having a domestic migrant in the year prior to data collection in 2015 and in 2023.

In total, 43 percent of households received remittances in 2015, but a much larger share (64 percent) did so in 2023. Therefore, the average amount of remittances received per household was much lower in 2015 (5,044 in 2021 Tajik Somoni) than in 2023 (7,280 in 2021 Tajik Somoni). The average value of remittances received per remittance-receiving household is similar between 2015 and 2023 (about 15,032 TJS and 14,195 TJS, respectively). We note, however, that accurate measurement of remittance flows into households is challenging and that our estimates are likely prone to under-reporting. Evidence from Filipino migrants shows that recipient-reported remittances were on average 23% lower than migrants' reports (De Arcangelis et al. 2023).

Figure 3 shows an overview of the estimated number of adult men and women in each category between the ages of 15 and 65. Most international labor migrants are relatively young men. The share of adults migrating internationally was much lower in 2015 – at 11.4 percent of all working-age adults – compared to 2023, when 22 percent had migrated internationally in the past year. Women constitute only a minority of migrants (3.2 percent in 2015 and 8.9 percent in 2023). The percentage of adults who migrated in the year prior to 2023 is therefore particularly high when we consider men only – 41.3 percent of all adult men aged 18–65 years old, and 51 percent of men aged 18–35 years old were an international labor migrant at some point in time during the past 12 months.

A cross-tabulation of households' migrant status in 2015 and 2023 demonstrates that migration is a key livelihood strategy for households, but it is not a permanent condition (**Table 7**). Only 28.5 percent of households had no labor migrant in either 2015 or 2023. More than a quarter (25.9 percent) had a labor migrant in both 2015 and 2023. Hence, more than a third of households changed migrant status between these years, and among households

Table 6: Higher migration and remittances in 2023 compared to 2015.

	2015	2023	<i>T test</i>
Household had a labor migrant in the past 12 months	36.4%	60.0%	***
Household had an international labor migrant in the past 12 months	35.4%	58.9%	***
Household had a domestic labor migrant in the past 12 months	2.1%	2.0%	
Household received any remittances in the past 12 months	42.9%	64.4%	***
Total value of remittances received (in 2021 TJS)	5,044	7,280	***
Total value of remittances received, among all remittance-receiving households (in 2021 TJS)	15,032	14,195	
<i># observations</i>	1,995	1,998	

Source: Authors' estimates based on household-level data, weighted using cross-section sample weights.

Asterisks indicate significant differences between households in 2015 and 2023 at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

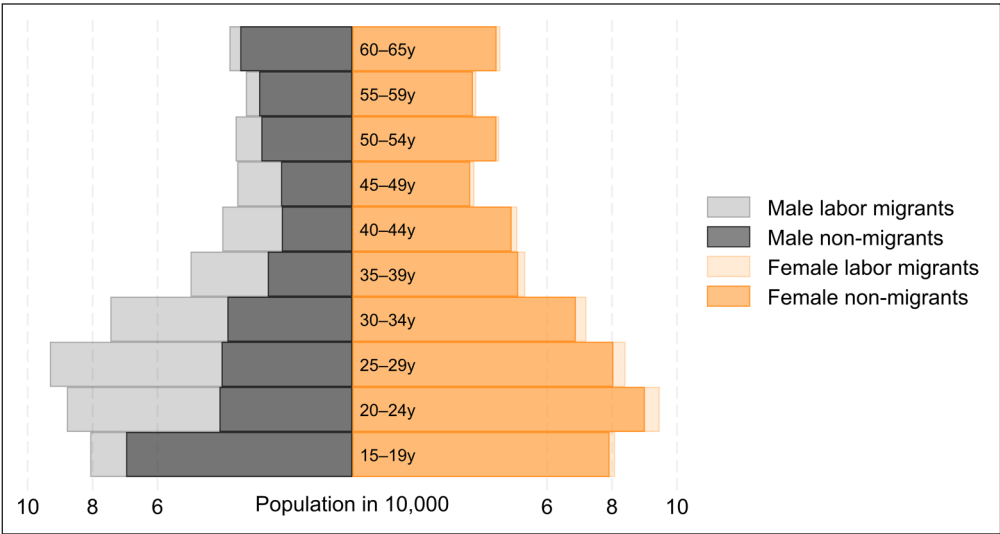


Figure 3: Population of 12 districts of Khatlon Province in 2023, by age group and whether s/he migrated abroad for work in the past year.
Source: Authors' estimation, including all adults of working age belonging to the households in the study region and using cross-section sample weights ($N_{2023} = 8,746$).

Table 7: Household migrant status based on having a labor migrant in the past year, in 2015 and 2023.

	Household without migrant in 2023	Household with migrant in 2023	Total
Household without migrant in 2015	28.5 %	36.4%	64.9%
Household with migrant in 2015	9.2%	25.9%	35.1%
Total	37.7%	62.3%	

Source: Authors' estimation based on household-level data, using attrition-corrected panel survey weights ($N_{2015} = 1,592$; $N_{2023} = 1,592$).

that retained their migrant status, the household member who migrated was not necessarily the same person in both years. Nevertheless, about 54 percent of the people who migrated for work in 2015 were also migrating for work in 2023.

Relative differences between labor migrant and non-migrant households are not very large. Compared to non-migrant households, migrant households had less landholding assets in 2015 (Table 8). Yet, when considering other proxy measures of household wealth (based on household assets), we find that households with migrants are better off in both years. Moreover, households with labor migrants are less likely to experience moderate or severe hunger than households without labor migrants. The relationship between migration and expenditures differs across the two survey years. On average, migrant households had lower per capita daily expenditures than non-migrant households in 2015. By contrast, in 2023 we find that migrant households had higher daily expenditures per capita than non-migrant households.

Table 8: Socio-economic characteristics of households with and without labor migrants.

	2015			2023		
	No Migrant	Migrant	<i>T test</i>	No Migrant	Migrant	<i>T test</i>
Plot area owned (in hectares)	0.93	0.43	**	0.28	0.28	
Asset score ^a	-0.18	0.05	***	-0.19	0.25	***
Asset quintile ^b	2.91	3.16	***	2.75	3.14	***
Household hunger score	0.65	0.62		0.78	0.48	***
Suffers from moderate hunger	11.4%	12.0%		13.9%	8.5%	***
Suffers from severe hunger	2.9%	1.2%	***	5.3%	2.4%	***
Per capita daily expenditures (in 2021 Tajik Somoni)	15.5	12.6	***	17.2	18.1	*
Household is poor	37.8%	45.9%	***	28.6%	23.7%	**
Expenditures on home renovation and repair (in 2021 Tajik Somoni)	3455	5356		618	1311	***
Medical expenditures (in 2021 Tajik Somoni)	2176	2264		1549	2041	***
Expenditures on marriage gifts and ceremonies (in 2021 Tajik Somoni)	6475	4984		1245	2820	***
# observations	1,275	720		792	1,207	

Source: Authors' estimation using cross-sectional household weights. ^a Poverty based on per capita daily expenditures in 2021 real Tajik Somoni compared to the national poverty line of 2021. Here expressed in percentage of households in poverty. Asterisks indicate significant differences between non-migrant and migrant households at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^a The asset score is the first component of a polychoric PCA analysis based on the households' housing conditions and assets (i.e., flooring, exterior wall, toilet, drink water, water use, cooking fuel, rooms, car, motorcycle, bicycle, refrigerator, washing machine, iron, vacuum cleaner, air conditioner, fan, sewing machine, TV, satellite dish, and computer). ^b Households are assigned to asset quintiles based on the aforementioned asset score, where 1 includes the poorest and 5 the richest households.

In addition to funding daily household needs, remittances often help cover unexpected expenses. Unusual, one-time expenditures contribute little to households' day-to-day consumption, may not reflect their average living standards, and are therefore not included in per capita daily expenditures for poverty estimates. Expenditures on home renovation and repair, specific medical expenditures, or marriage gifts and ceremonies, for example, are expenditures that we might expect to be higher among migrant households. Indeed, we find that migrant households had much higher expenditures on weddings and other large events, as well as on medical service fees, in 2023 – but not in 2015 (**Table 8**). Also note that expenditures on home renovation and repair, and on marriage gifts and ceremonies, were generally higher in 2015 than in 2023. A reduction in the latter may relate to increased government regulations and controls on excessive spending on ceremonies (National Testing Center 2017).

5. Discussion

Rural transformation has been observed in many regions and countries worldwide, characterized by increased agricultural productivity, further diversification into non-farm employment in rural areas, and a labor force increasingly moving away from rural areas (Belton & Filipinski 2019). It is often considered critical to economic development (Deininger, Jin, & Ma 2022) and holds promise for sustained poverty reduction and improvements in welfare (Belton & Filipinski 2019; Barrett, Christian, & Shiferaw 2017). This paper sought to understand whether, and to what extent, rural transformation has taken place in southern Tajikistan over the past decade. It relies on unique, representative household-level panel survey data from 2015 and 2023, adding a rare micro- and meso-level perspective to the available macro-level data.

The region, indeed, continues to witness impressive improvements in welfare, measured through reductions in poverty and food insecurity, and improvements in asset status. Yet a major concern is the potential transitory nature of these improvements, with sizable shares of the population crossing the poverty threshold in both directions: out of poverty and into it. The gains in welfare may not necessarily translate into sustained household resilience, and when a large share of households hovers near the poverty line, the population remains vulnerable to external shocks.

Rural areas do not exhibit clear signs of rural transformation: the agricultural sector remains the largest source of work and employment, whereas farm sizes continue to decline. Crop production remains a key aspect of livelihoods in the study region, with 85 percent of households engaged in it – either on household plots, presidential plots, or dehkan farms. Average farm sizes, however, have reduced by 28 percent since 2015. With the exception of the large uptake of mechanization for land preparation on larger plots, agricultural modernization processes and agricultural productivity gains are modest.

Moreover, we do not observe as much rural-to-urban movement, which is often portrayed as a characteristic of rural transformation. Instead, rural out-migration is dominated by international labor migration of young men, with migrant workers' family members often remaining behind. Between 2015 and 2023, we find a steep increase in labor migration. Roughly 36 percent of households had a labor migrant in 2015, rising to 60 percent in 2023. In 2023, roughly half of all adult men aged between 18 and 35 years old had migrated at some point in the past year. Among those remaining, a majority of adults were neither employed nor engaged in education or training (58 percent of men and 76 percent of women).

These points strongly suggest that southern Tajikistan's recent trajectory aligns with a predominantly migration-led welfare pathway in an otherwise slow-paced or stalled agricultural transformation. In doing so, it is not unlike trends observed in other Central Asian countries (e.g., Atamanov & Van den Berg 2012a; Brück, Mahe, & Naudé 2018; Lombardozi 2020), but it does contrast strongly with the general pattern observed across low- and middle-income countries whereby 'in the course of development, the share of individuals employed in agriculture decreases; farm size, labor productivity (and wages) in the general economy, and the agricultural sector increase; and capital substitutes for labor' (Deininger, Jin, & Ma 2022).

Previous studies find that labor migration in Tajikistan is predominantly male. This increased demand for women's time and labor contributes to the feminization of agriculture. At the same time, remittances seem to increase migrant households' incomes, leading to reduced work and improved food security as their purchasing power strengthens (Ghimire, Harou, & Balasubramanya 2023). Our findings are in line with this evidence. Male-dominated labor migration and rural transformation are likely to affect gender relations and roles in these

communities due to women's broader involvement in agriculture. In this regard, evidence from neighboring Uzbekistan shows that agricultural transformation increased women's unpaid labor, and in migrant communities, women gained empowerment (Najjar, Devkota, & Feldman 2022).

The rural transformation literature strongly suggests that diversification into non-farm employment is a key pathway for rural income growth, poverty reduction, and rural transformation, complementing agricultural development rather than replacing it (Haggblade, Hazell, & Reardon 2010). The rural non-farm economy plays a critical role in the transformation of rural areas by facilitating income diversification and reducing dependence on agriculture. However, the evidence presented in this paper suggests that rural non-farm employment and investment are very low in Tajikistan. This is similar to the evidence observed in other Central Asian countries. It seems that development of the rural non-farm economy is shaped by both 'push' factors, such as limited access to agricultural resources and underemployment in farming, and 'pull' factors, including education, infrastructure, and proximity to markets (Atamanov & Van den Berg 2012b). Thus, development of the rural non-farm sector in Tajikistan requires investments in education, infrastructure, rural financial services, and improved access to markets.

6. Conclusion

This paper sought to understand whether and to which extent rural transformation has taken place in the past decade in southern Tajikistan. It relies on unique, representative household-level panel survey data from 2015 and 2023, adding a rare micro- and meso-level perspective to the available macro-level data.

In line with macro-level indicators, we find that welfare indicators improve. Yet this does not appear to reflect a classic rural transformation based on rising agricultural productivity, local non-farm employment, and rural–urban labor reallocation. Instead, the observed pathway is strongly linked to international labor migration and remittances. In Tajikistan, this dependence is not short-lived – but instead has been increasing in the decades since its independence from the Soviet Union. It occurs at a scale and intensity that surpasses those of most – if not all – countries across the world. Moreover, the vast majority of migrants find work in the same country, Russia, leading to significant economic and political vulnerability.

Under the right conditions, migration can stimulate investment, facilitate the transfer of skills, and thereby sustainably reduce poverty (McKenzie 2026). The latter is evident in Tajikistan, and there is ample attention by policymakers to supporting labor migration. A risk, however, is that the opportunities offered to sustain welfare through international migration reduce the pressure for more intensive and effective domestic investments and reforms that could improve local employment. Ideally, remittances support not only households' current and future needs, but spur productive investments and employment locally. In time, this might reduce the strong dependence of Tajikistan's rural households on international, one-sided labor migration. Yet, as shown by Bloem, Lambrecht, and Kamiljon (2025), income aspirations in southern Tajikistan are strongly linked to international migration but not to local income-generating opportunities.

What is missing, hence, is a strong sense of urgency to design and implement effective policies that go beyond a remittance-dependent welfare path. Both infrastructure as well as national and international policies will be necessary to support local investments and entrepreneurship, thereby adequately leveraging the opportunities of the vast amounts of financial and human capital originating from migration to supporting rural development and progress toward high-value agriculture and rural non-farm diversification.

Appendix A: Attrition

The 2023 sample primarily includes households formerly surveyed in 2015. Households that could not be re-interviewed were replaced by new households. Out of 2,000 households, 402 households of the 2015 sample could not be re-interviewed in 2023 and were replaced by the nearest-available neighboring household. Overall, this is a relatively low level of attrition, especially given that there were eight years between the two main survey rounds (2015 and 2023). Households that left the sample either refused to participate (350 households), no longer lived in the study area (37 households), had no available respondent (1 household), or could not be found (13 households).

Attrition could lead to biased results if those leaving the sample are significantly different from those remaining in the sample – especially when it pertains to refusals (compared to those naturally leaving the sample due to death or out-migration). We analyze whether those leaving the sample are significantly different from those who stayed in the sample in both rounds in Table A.1. We find only limited significant differences between the characteristics in 2015 of panel and non-panel households. Households leaving the sample have household members of a slightly younger age (approximately 1.5 years, which is significant though not sizable). Households that left the sample have on average one member less than those who stayed, which aligns with the expectation for panel surveys – though proportionally so when considering a lower number of children, and male and female adults.

Attrition weights were calculated based on the results of a simple probit regression analysis on being interviewed in 2023, with standard errors clustered at village level. The household weight was then adjusted with the inverse probability of being interviewed in 2023.

Table A.1: Comparison of baseline characteristics (2015 dataset) between those remaining in the panel and those leaving the panel in 2023.

	In panel	Left panel	T test
Maximum age in household	55.43	53.85	**
Maximum education level among adults	2.20	2.18	
Household size	7.92	7.04	***
# children <5 years old	1.23	1.13	
# male adults	1.94	1.71	***
# female adults	2.41	2.23	***
Quality wall	69%	78%	***
Farm income	86%	84%	
Remittances	33%	35%	
Livestock	75%	70%	**
Has household plot	86%	86%	
Has presidential plot	27%	24%	
Has dehkan farm	12%	9%	
Knows aid project in community	7%	5%	
Agricultural project beneficiary	1%	1%	

(Contd.)

	In panel	Left panel	T test
No food	38%	32%	**
Slept hungry	11%	13%	
Whole day no food	8%	7%	
HHS score	0.65	0.58	
Per capita daily expenditures (in 2021 Taj Som)	15.92	17.17	**
Poor	34%	28%	**
Urban	8%	12%	**
<i>Number of observations</i>	<i>1,598</i>	<i>402</i>	

Asterisks show statistically significant differences between panel households and non-panel households at * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. No weights are applied.

Data availability
The data for this study are publicly available at:

- 2015: International Food Policy Research Institute (IFPRI), 2024, "Interim Feed the Future Zone of Influence survey in Tajikistan, 2015", <https://doi.org/10.7910/DVN/DHRV46>, Harvard Dataverse, V1, UNF:6:JUm4iUnASyOT2OlRhJA3SA== [fileUNF].
- 2023: International Food Policy Research Institute (IFPRI), 2025, "2023 USAID/IFPRI Population-Based Survey (PBS) for Khatlon Province, Tajikistan", <https://doi.org/10.7910/DVN/LCKCU1>, Harvard Dataverse, V1, UNF:6:A7SSOm1i29HpUwyBtaLcsA== [fileUNF].

Ethics and consent
This study was approved by the Institutional Review Board of IFPRI (DSGD-23-0105; # 00007490).

Acknowledgments
Funding for this work was provided by the United States Agency for International Development (USAID) through the Tajikistan Evaluation and Analysis Activity. The support and contributions from USAID Mission to Tajikistan and various USAID-supported projects are gratefully acknowledged. The IFPRI team particularly thanks the Tajik Academy of Agricultural Sciences for their support. Academicians Nurali Asozoda, Amirshoev Fayzullo and Yatimzoda Khurshed, and Ms. Nodira Baeva supported the work by facilitating the government's support. Academician Jalil Pirizoda and Mrs. Tanzila Ergesheva contributed to the survey methodology, questionnaire design, and discussion of the findings. Abduaziz Kasymov, Mehrdod Yorov, and Nargis Hamidova of Zerkalo Analytics Group made important contributions to the survey methodology and questionnaire design and organized the fieldwork in an excellent manner.

The publication has not been independently peer reviewed. Any opinions expressed here belong to the author(s) and are not necessarily representative of or endorsed by IFPRI, USAID, TAAS, Zerkalo Analytics Group or any other agencies that contributed to the work.

Funding information
Funding for this study was provided by the United States Agency for International Development (USAID).

Competing Interests

The authors have no competing interests to declare.

Authors' contributions

Isabel Lambrecht: conceptualization, methodology, formal analysis, data curation, writing, supervision, project administration.

Jovidon Aliev: conceptualization, formal analysis, data curation.

Mohru Mardonova: conceptualization, formal analysis, data curation.

Kamiljon Akramov: writing, supervision, project administration.

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How to cite this article: Lambrecht, Isabel, Jovidon Aliev, Mohru Mardonova, and Kamiljon Akramov. 2026. "Food Security in Transition: Rural Transformation in Khatlon Province, 2015–2023." *Silk Road: A Journal of Eurasian Development* 5(1): 2, 1–23. DOI: <https://doi.org/10.16997/sr.2249>

Submitted: 06 March 2026 **Accepted:** 11 June 2026 **Published:** 29 August 2026

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Silk Road: A Journal of Eurasian Development is a peer-reviewed open access journal published by University of Westminster Press.

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