How off-farm employment shapes women's dietary quality: Evidence from rural Africa

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Abstract

Off-farm employment is increasingly important for rural households in Africa. While previous research has analyzed welfare implications of off-farm activities at a household level, little attention has been given to potential nutritional benefits of individual household members, particularly women. Using survey data from rural Tanzania and Zambia, we examine the relationship between female off-farm employment and women's dietary quality. We also explore potential underlying mechanisms such as income, bargaining power, and time allocation. Our findings show that female off-farm employment is positively associated with improved dietary diversity. Women engaged in off-farm work consume more meat, fish, and vitamin A-rich fruits and vegetables, suggesting improved intake of critical micro-nutrients. Pathway analysis suggests that the positive association between off-farm employment on dietary diversity is mainly driven by increased household income and enhanced bargaining power of women. The results remain robust across several sensitivity checks, indicating that female labor force participation can improve women's nutrition in rural areas of developing countries.

Keywords: Off-farm employment; Dietary quality; Gender; Time allocation; Nutrition; Africa

1 Introduction

Women in rural areas of developing countries have historically played an important role in farming, contributing significantly to both subsistence and small-scale commercial agriculture (FAO, 2023). However, farming systems face increasing pressures from rapid population growth and climate shocks which disrupt agricultural productivity and reshape labor dynamics (Hazell et al., 2024; Musungu et al., 2024). In response to these challenges and the rise of employment opportunities in other sectors such as service, construction, or small business, individuals are increasingly shifting labor to off-farm activities (Mutsami et al., 2024).

Off-farm employment has been recognized as a key avenue for poverty reduction in rural areas (Davis et al., 2017; Kijima et al., 2006; Van den Broeck et al., 2017). Additionally, growing evidence suggests a positive relationship between household participation in off-farm employment and nutritional outcomes (Dzanku, 2019; Rahman & Mishra, 2020; Sangwan & Kumar, 2021; Van den Broeck et al., 2021). However, most studies focus on household-level effects and do not consider how nutritional benefits are distributed among individual household members. This is a significant limitation, as resource allocation within households is rarely equitable, with women and children often receiving fewer benefits (Koppmair et al., 2017).

To address this gap, we investigate the relationship between women's participation in off-farm employment and their dietary quality. While much of the existing research on individual-level nutritional effects of employment focuses on children (Debela et al., 2021; Hosen et al., 2023; Melaku et al., 2024; Rashad & Sharaf, 2019), little attention has been given to the implications for women. This focus is important because women in developing countries are disproportionately affected by undernutrition and micronutrient deficiencies (UNICEF, 2023). Women of reproductive age face a particularly high nutritional vulnerability due to the physiological demands of pregnancy and lactation, which can affect both their health and the

development of their infants (Cusick & Georgieff, 2016; UNICEF, 2023). Women also often bear primary responsibility for managing household nutrition (Tibesigwa & Visser, 2016).

Women's participation in off-farm activities can influence their dietary quality through three main pathways, namely income, bargaining power, and time allocation. Income earned from off-farm work may relax budget constraints, enabling women to purchase more diverse and nutritious foods (Maity, 2020). Increased economic independence achieved through off-farm work may enhance women's decision-making power within the household, and past research shows that female-controlled income is often directed towards diverse and nutritious food (Kassie et al., 2020; Ogutu et al., 2020). Additionally, off-farm work may influence which tasks women take in their household and how much time they allocate to those tasks. Increased time burden through off-farm work, could, for example, reduce time spent on for food-related activities and thereby affect dietary quality.

To analyze the relationship between female off-farm employment and their dietary quality, we use primary data from 1151 women living in rural regions of Tanzania and Zambia. Data were collected through harmonized cross-sectional surveys carried out May to August, 2023. Other related datasets such as the World Bank's Living Standards Measurement Study (LSMS) may offer some advantages through their panel structure, but dietary information is rarely captured at the individual level, limiting the usefulness for our research question.

This article makes two key contributions to the literature. First, it shifts the focus from household-level outcomes to individual-level impacts, particularly on women. While most studies assess household-level effects, they often overlook intra-household disparities in resource allocation. We analyze how women's participation in off-farm work relates to their overall dietary diversity, and also investigate which food groups are most affected to better understand the implications for the intake of key nutrients. Second, we explore potential

mechanisms driving these outcomes, focusing on changes in income, bargaining power, and time allocation. A better understanding of potential mechanisms can help design targeted interventions that improve women's dietary quality by addressing relevant barriers. Doing so, this article aims to connect the research on welfare effects of off-farm employment with the research on drivers of women's dietary quality (Kassie et al., 2020; Komatsu et al., 2018; Quisumbing et al., 2021; Vemireddy & Pingali, 2021).

The remainder of this article is organized as follows. In Section 2, we discuss the conceptual framework. In Section 3, we provide an overview of the collected data and measurement of key variables. The estimation strategy is explained in Section 4. In Section 5, we present and discuss our results before we conclude and provide policy recommendations in Section 6.

2 Conceptual framework

Women's participation in off-farm employment can shape the quality of their diets through multiple interconnected pathways. The key mechanisms include changes in income, shifts in bargaining power, and changes in time allocation. The impact of each pathway – whether positive or negative - depends on the specific context and nature of the off-farm work.

The first pathway is household income. Off-farm employment usually leads to higher incomes among rural dwellers compared to farm-based work (Baysan et al., 2024). For women, additional income from off-farm activities can relax household budget constraints, enabling greater consumption of market-purchased, diverse foods (Maity, 2020). Beyond immediate consumption, this income may also be reinvested in agricultural productivity through purchasing yield-enhancing technologies (Hazell et al., 2024). Higher agricultural yields may further improve dietary diversity by increasing the availability of diverse own-produced foods within the household. This dual pathway via market access and improved farm output suggests

that income is potentially the most important channel for enhanced dietary quality among women.

The second pathway through which women's off-farm employment can affect their dietary quality is bargaining power. Earning an income can enhance women's economic independence, potentially increasing their role in household decision-making. When women have greater control over financial resources, they are more likely to prioritize food and nutrition. Research consistently shows that income controlled by women is more frequently allocated to food than income controlled by men (Kassie et al., 2020; Ogutu et al., 2020). This suggests that the empowerment effect of off-farm employment can lead to improvements in dietary diversity, particularly when it translates into greater decision-making authority over household spending.

Third, engagement in off-farm activities affects how women allocate their time. Increased work commitments can heighten time constraints, reducing the time available for meal preparation as well as procurement and/or production of diverse foods. As a result, women may rely more on convenient but less diversified and nutritious food options, potentially compromising their dietary diversity and nutritional well-being (IFPRI, 2024; Komatsu et al., 2018; Quisumbing et al., 2021; Sangwan & Kumar, 2021).

The impact of time constraints on dietary diversity may strongly vary by the type of off-farm activity and the degree to which different tasks are taken up by other household members. Self-employment in off-farm businesses tends to offer greater flexibility in time management compared to wage employment, as the latter often requires adherence to fixed working hours and may involve additional commuting time (Debela et al., 2021). Women engaged in wage employment may, therefore, find it particularly challenging to allocate time for food production on their farms, food purchases, meal preparation, and other food-related activities.

The presence and availability of other household members who can take on tasks previously performed by the employed woman further influence the strength of the time allocation pathway. If other family members, such as spouses, older children, or extended family, can compensate the time women allocate to off-farm work, and perform household tasks such as food purchase, preparation, and production, the potential negative effects on dietary quality may be mitigated.

Taken together, these pathways suggest that the relationship between women's participation in off-farm employment and their dietary diversity is complex. The net effect depends on which pathway – income, bargaining power, or time allocation – is the most dominant. While income and bargaining power generally enhance dietary diversity by addressing financial and decision-making constraints, severe time limitations may counteract these benefits, leading to mixed outcomes. Given the central role of financial constraints in limiting dietary diversity in developing countries, we hypothesize that increased income and bargaining power from off-farm employment will, on average, improve women's dietary diversity. However, for women facing significant time constraints, these gains may be attenuated, or even offset, resulting in smaller improvements or negative nutritional effects.

3 Materials and methods

3.1 Data

We collected data for this study through a survey of rural households from Tanzania and Zambia. In Tanzania, we focus on rural areas of Morogoro and Iringa, two neighboring regions in the mid-eastern part of the country. Agriculture is the main source of livelihood in the two regions, but employment in small businesses, agriculture, service, and manufacturing also exists (Mutsami et al., 2024). Consumption of diversified food among women in the two

regions is low with less than 20% consuming at least five of the recommended food groups (Tanzania National Bureau of Statistics, 2022). In Zambia, our study focuses on the Western Province, bordering Angola to the west and Namibia to the south. Western Province is among the most marginalized regions in Zambia with high poverty rates (Zambia Statistics Agency, 2022). Many people are involved in small-scale farming while others run small businesses and are employed in sectors such as agriculture, tourism, hospitality, construction, and transport (Mutsami et al., 2024).

We conducted a household survey in both countries from May to August 2023, following a two-stage sampling procedure. First, we randomly selected 60 and 30 villages in Tanzania and Zambia, respectively, using a probability proportional to size approach. Second, we created full household lists with the help of community leaders from each village and randomly sampled 15 to 16 households per village. Our overall sample consists of 773 and 378 women in Tanzania and Zambia, respectively. The joint dataset consists of 1151 observations.

We visited the selected households and conducted interviews with a structured questionnaire. While the household head, who is male in many cases, answered most questions, some sections such as food consumption and time use were specifically administered to women.

The interviews were conducted in the local language by a team of research assistants, trained and supervised by the researchers. We used a similar questionnaire[1] in both countries, capturing various farm, household, and individual characteristics with a particular focus on individual economic activities and food consumption. Apart from different socio-economic characteristics such as age, gender, marital status, and education level, we also asked for participation in farm and off-farm activities by household individuals. Questions on food consumption were asked to the main woman and man in each household. The main woman was in most cases the female

[1] There were some sections specific to the region, but the data used in this article come from identical questions. For instance, rice production module was admisterded in Tanzania but not in Zambia.

spouse. However, there were a few instances where the female spouse was missing due to health issues, migration, or other reasons. In such cases, the individual food consumption and employment modules were administered to the next available woman in the household aged at least 15 years.

3.2 Measurement of key variables

3.2.1 Women's dietary quality

We assess women's dietary quality using the Women's Dietary Diversity Score (WDDS), a widely used indicator that is positively associated with micronutrient adequacy (Arimond et al., 2010; Haddad et al., 1994). In line with Kassie et al. (2020) and Quisumbing et al. (2021), we calculate the WDDS for the primary women in each household using nine food groups as outlined in Kennedy et al. (2011). These food groups include (i) starchy staples; (ii) pulses (beans, peas, and lentils), nuts, and seeds; (iii) milk and milk products; (iv) meat, poultry, and fish; (v) eggs; (vi) dark green leafy vegetables; (vii) other vitamin A-rich fruits and vegetables; (viii) other fruits and vegetables; and (ix) organ meat.

The WDDS is computed as the sum of food groups consumed by the respondent, based on a recall period covering the past 24 hours. We prefer a 24-hour recall period over longer time windows (e.g., 7 days or 30 days) due to its simplicity and lower susceptibility to recall bias. It may not fully capture habitual dietary patterns, as daily food consumption can vary (Kassie et al., 2020). However, this variability is usually small among poor rural households in developing countries, where diets are relatively consistent (Koppmair et al., 2017).

3.2.2 Women's employment

Our primary explanatory variables relate to women's off-farm employment, defined as income-generating activities outside the family farm. We measure participation at the extensive margin using a dummy variable, which equals one if a woman engaged in any off-farm employment in the past 12 months and zero otherwise. To capture the intensive margin, we use the number of hours spent in off-farm activities during the seven days preceding the survey. We use a 12-month window for the extensive margin to capture overall participation trends, as off-farm employment may be seasonal or irregular. In contrast, the intensive margin is measured over the past 7 days to provide a more precise estimate of recent work intensity, minimizing recall bias.

Beyond overall off-farm employment, we further distinguish between two types: wage employment and self-employment. Wage employment refers to work performed at any time in the past 12 months in exchange for remuneration (either monetary or in-kind) from an individual or entity outside the household. Self-employment includes work in non-farm enterprises, either through owning and managing a business or contributing labor to a business owned by another household member within the same period at any time in the past 12 months. Wage and self-employment are measured at both the extensive and intensive margins.

4 Econometric approach

4.1 Basic model

We are interested in estimating the association between women's participation in off-farm employment and their dietary diversity using a regression model of the form:

$$D_{ij} = \beta_0 + \beta_1 W_{ij} + \beta_2' \boldsymbol{M}_{ij} + \beta_3' \boldsymbol{X_{ij}} + \tau_j + \varepsilon_{ij} \quad (1)$$

where D_{ij} is the WDDS by women i in country j. The variable W_{ij} represents off-farm employment status of i, which is either a binary variable for the extensive margin or a continuous variable for the intensive margin. We first run a regression where off-farm employment is the main explanatory variable and later differentiate between self-employment and wage employment. The vector $\boldsymbol{M}_{ij}$ contains women's characteristics such as age, marital status, household head status, education and a dummy variable showing their involvement in own farm activities, and $\boldsymbol{X_{ij}}$ is a vector of household characteristics such as household size, land size, asset ownership, and participation in employment by other household members, male and female. Finally, τ_j are country fixed effects and ε_{ij} is the error term.

Our parameter of interest is β_1, showing the magnitude and direction of the relationship between women's participation in off-farm employment and their dietary diversity. A positive sign on β_1 means that off-farm employment is positively associated with women's dietary diversity.

To better understand which kind of food groups are affected most, we also run separate regressions for each of the nine food groups. Since the outcome variables are dichotomous, we employ a linear probability model (LPM). We run regressions as shown in Equation 1 but we replace D_{ij} with each of the nine food groups.

4.2 Identification strategy

The parameter β_1 could be biased due to endogeneity coming from unobserved heterogeneity and reverse causality. Even though we adjust for a wide range of socio-economic characteristics, women involved in off-farm employment (self-employment or wage employment) may still be systematically different from those not engaged in such activities in

terms of unobservable characteristics, such as ability, motivation, and attitudes. Reverse causality could also be an issue, especially if more diverse diets increase women's engagement in various economic activities due to, for example, better health.

To address potential endogeneity bias, we use an instrumental variable (IV) approach estimated with a two-stage least squares (2SLS) estimator. This method requires at least one instrument that is sufficiently correlated with women's employment (instrument relevance), but uncorrelated with unobserved factors that affect women's dietary diversity, except through employment status (instrument exogeneity), (Abadie & Cattaneo, 2018). We use the share of women (excluding the woman of interest) participating in off-farm employment within a given village or enumeration area as an instrument. This type of instrument has been used in similar settings (Melaku et al., 2024; Rashad & Sharaf, 2019) because it reflects the local employment environment, which is largely exogenously determined by local economic conditions and external to the individual household.

The choice of this instrument is supported by literature suggesting that individuals' participation in various rural employment activities is influenced by local social networks (Gee et al., 2017). These networks facilitate the flow of information about job opportunities, which likely increases employment participation (Merfeld, 2023). We do not expect the instrument to directly affect women's nutrition, as it is measured at the village level and not at the household or individual levels. However, one may argue that the availability of local employment opportunities serves as a proxy for broader economic conditions, which may influence women's diets through various channels, particularly income and wealth. Since we control for household wealth (measured by assets), this concern is likely mitigated.

Results in Table A1 show that our instrument is significantly correlated with women's participation in off-farm employment. In addition, falsification tests, confirm that the outcome

variable (women's dietary diversity) is not significantly correlated with the share of women at the village level involved in off-farm employment (Table A2).

This IV approach may have certain limitations. In principle, it is possible that the exclusion restriction assumption is violated if individuals involved in off-farm activities decide to live in certain places or villages for instance near markets selling diverse food. We believe this scenario does not significantly affect our results since individuals in rural areas of Tanzania and Zambia inherit ancestral land and since land is owned by the state, individuals' ability to buy and sell land is rather limited (Genicot & Hernandez-de-Benito, 2022; Mulungu et al., 2025).

Still, to increase the efficiency of our estimates, we supplement the external instruments with heteroskedasticity-based instruments (HI) following Lewbel (2012). Lewbel's approach achieves identification when there are some exogenous variables in the structural equation and errors in the first-stage regression are heteroskedastic. Based on Lewbel (2012) approach, the instruments are generated by multiplying the residuals from first stage regression with the selected exogenous variables in the mean-centered form. The use of both external and internal instruments improves efficiency and allows testing overidentifying restrictions (Lewbel, 2012). Tests from IV regressions show that our instruments are valid as presented in Table A3. For instance, the Kleibergen-Paap Wald rk F-statistic is large enough to reject the null of weak instruments. In addition, the Hansen J-statistic and its associated p-value are provided for the overidentification test. In all models, we fail to reject the null hypothesis that the instruments are exogenous.

4.3 Sensitivity analysis

We perform two sensitivity tests. First, we test the sensitivity of our main explanatory variable (women's participation in off-farm activities) based on methods proposed by Altonji et al. (2005), Oster (2019), and Diegert et al. (2022). The tests assess the sensitivity of the results to unobservables in comparison with observed characteristics. The tests help us determine how much stronger the influence of unobservable characteristics would need to be relative to observable factors, in order to yield a coefficient estimate of zero.

The second sensitivity test, developed by Kripfganz and Kiviet (2021), is instrument-free and it involves confining the admissible correlation of the main regressors (employment activities) with the error term within plausible bounds. The main output from KLS is graphical, indicating confidence intervals from both IV and KLS (Kripfganz & Kiviet, 2021). We, therefore, compare both IV and KLS regressions to obtain empirical insights into the plausibility of our identification strategy. If the confidence intervals from 2SLS are wider than those from KLS, the instruments would need to be considered weak.

4.4 Exploring potential mechanisms

To better understand the pathways linking women's off-farm employment to dietary diversity, we examine three key mechanisms: household income, bargaining power, and time allocation. First, we consider per capita income, measured as the sum of net household income from different sources. Income is measured per capita, by dividing the total income by the household size. We adjust income using purchasing power parity (PPP) data from the 2017 International Comparison Program (ICP) of the World Bank.

Second, we assess women's bargaining power by examining their involvement in decisions on how income from different sources is used. We consider four income sources: crops, livestock,

off-farm, and remittances. A woman is classified as having at least partial control over an income source if she makes decisions about its use – either solely or jointly with their partner. These decison-making variables are represented as binary indicators, where one signifies involvement and zero otherwise.

Third, we capture time allocation using a 24-hour time-use format for the household's main woman. Respondents reported their activities on a typical working day, recorded in 30 minute intervals from 3 a.m. to 2.59 a.m. We categorize these activities into nine groups: household chores, self-care and maintenance, leisure, resting and sleeping, cooking, care work, farming, wage employment, and self-employment, all measured in hours per day. We apply the same approach to measure time allocation for the household's main man.

We follow the model presented in Equation 1 to estimate the association between participation in employment and time allocation, bargaining power, and household income. We estimate separate models, each regressing the specific mechanism on the employment variables using OLS, while controlling for individual and household characteristics. We considered using an IV model, but identifying valid instruments for all models was challenging. Some instruments failed the validity tests for certain outcome variables, leading us to opt for OLS instead. Due to potential issues coming from unobserved heterogeneity, the results should not be interpreted causal effects, but mainly serve to better understand and contextualize potential underlying mechanisms.

5 Results

5.1 Descriptive statistics

Table 1 presents descriptive statistics of sampled women and their households, for the full sample and differentiated by country. In the pooled sample, 17% of women consume at least

five food groups, on average, which emphasizes the strong need for dietary improvements among the target group. Diets are more diverse in Tanzania compared to Zambia, but the situation is critical in both countries.

Off-farm employment is not yet common among women in the sample regions (22% in Tanzania and 12% in Zambia). If women engage in off-farm work, self-employment is the more frequent form of compared to wage employment. In rural areas of Tanzania and Zambia, available wage employment opportunities include agricultural labor (on farms owned by someone else), construction work, teaching, retail jobs (working in local shops), and service sectors such as hospitality and tourism, while self-employment activities include food vending, tailoring and weaving, transport services, hairdressing and beauty services. Even though both activities were not explicitly designed as mutually exclusive answering options in the survey, there was no respondent who simultaneously pursued both types of employment.

Panel B in Table 1 shows that the average land size is relatively small, with an average of 1.75 hectares. Panel C of Table 1 shows that among male household members, off-farm work is pursued by around 20% of the sample, while only 3% of the other female members are involved in such activities.

Table 1: Summary statistics of regression variables

	Full sample (N=1151)		Tanzania (N=773)		Zambia (N=378)	
	mean (1)	s.d. (2)	mean (3)	s.d. (4)	mean (5)	s.d (6)
Panel A: Characteristics of women						
Women's Dietary Diversity Score	3.34	1.26	3.76	1.08	2.48	1.17
Consumed at least 5 food groups	0.17		0.24		0.06	
Off-farm employed (1/0)	0.19		0.22		0.12	
Self-employed (1/0)	0.15		0.18		0.10	
Wage employed (1/0)	0.03		0.03		0.02	
Works on own farm (1/0)	0.87		0.87		0.86	
Hours of off-farm employment per week	8.01	20.84	9.44	22.43	5.08	16.77
Hours of self-employment per week	6.93	20.16	8.28	21.80	4.18	15.95
Hours of wage employment per week	1.07	6.55	1.16	6.86	0.89	5.88
Hours of own farm work per week	49.15	38.72	49.75	35.33	47.93	44.87
Age of woman (years)	46.35	16.46	46.55	15.59	45.94	18.13
Married (1/0)	0.69		0.72		0.63	
Female-headed household (1/0)	0.30		0.28		0.32	
Woman has at least secondary education (1/0)	0.22		0.09		0.49	
Panel B: Household characteristics						
Household size (number)	5.01	2.35	4.64	2.07	5.75	2.69
Number of children	2.79	1.40	2.67	1.26	3.02	1.64
Household assets (index)	4.46	2.45	4.81	2.29	3.73	2.59
Land size (ha)	1.75	1.66	1.39	1.15	2.50	2.21
Panel C: Other household members' characteristics						
Male household members working off-farm (1/0)	0.20		0.23		0.15	
Other women working off-farm (1/0)	0.03		0.03		0.03	
Avg. hours of off-farm employment by male members	10.44	24.27	12.02	25.89	7.22	20.23
Avg. hours of off-farm employment by other women	1.47	8.96	1.53	9.27	1.34	8.28
Male household members wage employed (1/0)	0.07		0.07		0.07	
Male members self-employed (1/0)	0.14		0.17		0.08	
Avg. hours of wage employment by male members	3.47	13.78	3.50	14.11	3.39	13.10
Avg. hours of self-employment by male members	7.24	21.40	8.86	23.33	3.92	16.31
Other women are wage employed (1/0)	0.01		0.01		0.01	
Other women are self-employed (1/0)	0.02		0.03		0.02	
Avg. hours of wage employment by other women	0.50	5.38	0.45	5.33	0.61	5.48
Avg. hours of self-employment by other women	0.97	7.23	1.09	7.65	0.73	6.28
Observations	1151		773		378	

Notes: s.d = standard deviation

In Figure 1, we compare women with and without off-farm employment in terms of their dietary diversity scores and consumption of specific food groups. Figure 1a shows that women engaged in off-farm employment have, on average, higher dietary diversity scores than those without off-farm work. Figure 1b further indicates that women with off-farm employment consume statistically significantly more meat and fish, dark green leafy vegetables, vitamin A-rich fruits and vegetables, and other fruits and vegetables than those not involved in off-farm

activities. However, the differences do not consider potential confounding factors, which we try to address in the next section through regression analyses.

(a) Kernel density for women's dietary diversity score

(b) Food groups consumed by women

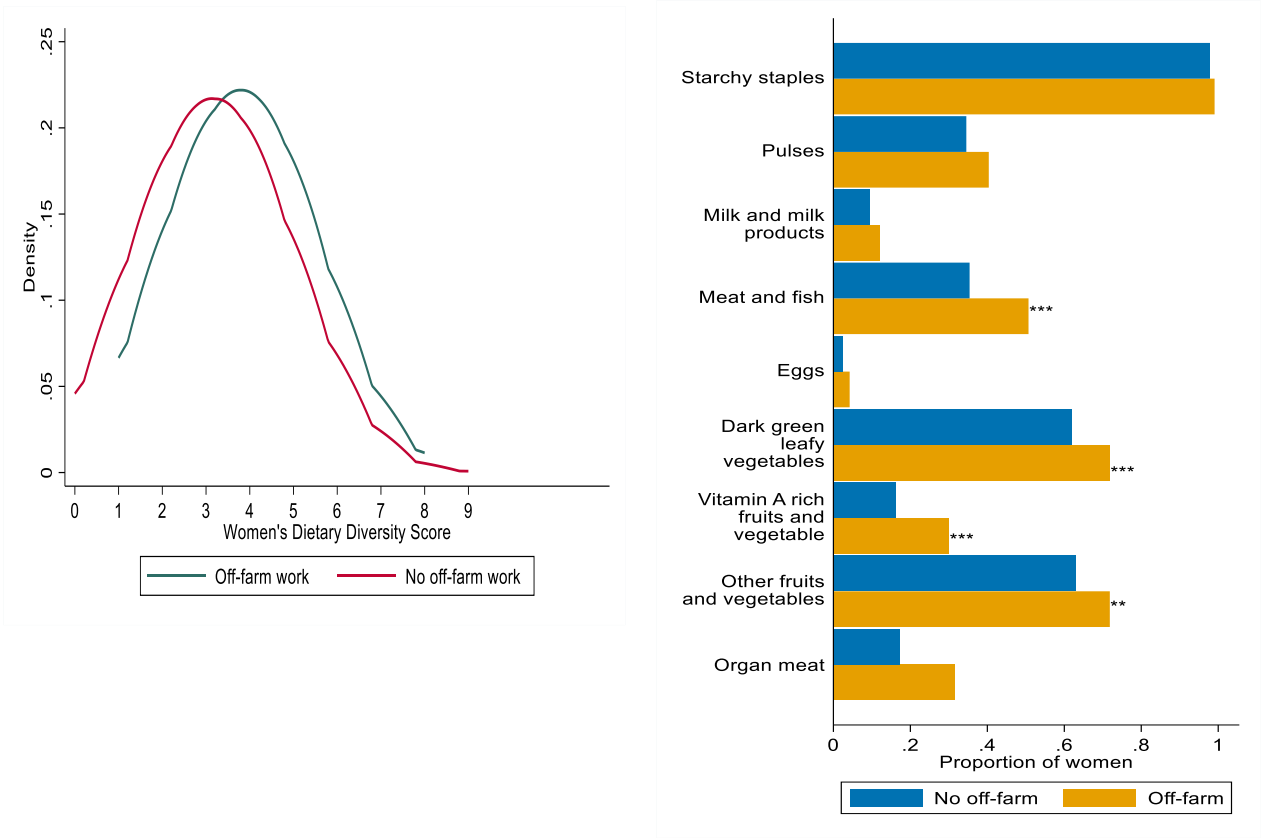

Figure 1: Food consumption by women

Notes: The figure in Panel A refers to dietary diversity score distributions for women participating in off-farm employment and those not participating in off-farm employment. Panel B refers to the proportion of women consuming different food groups. ** denotes significance at 5%, and *** denotes significance at 1% based on a two-tailed t-test.

5.2 Regression results

We first present results on the association between women's involvement in off-farm activities on the dietary diversity score using both OLS and 2SLS regressions.[2] As shown in Table 2,

[2] Since women's dietary diversity score (WDDS) is a count variable, we also perform Poisson regression. The respective results shown in Tables A8 and A9 are qualitatively very similar.

both models produce similar results. Participation in off-farm employment is positively and statistically significantly associated with women's dietary diversity. Specifically, engagement in some type of off-farm employment is associated with an increase of around 0.25 food groups. This pattern is consistent across the extensive and intensive margins of off-farm employment. Since the working hours have been transformed with an inverse hyperbolic since function, the coefficients can be interpreted such that for those women with none or only few hours of off-farm work, an additional hour directly corresponds to an increase of approximately 0.07 food groups. For women with higher values of off-farm working hours, the associations can be interpreted as elasticities, meaning that a 100% increase in working hours would lead to an increase of 0.07 food groups. This non-linearity indicates that dietary improvements are relatively higher for women with little to no prior off-farm work.

In Tables A4–A7, we differentiate between different forms of off-farm employment, namely wage employment and self-employment. The coefficients for both types of activities are positive and similar in magnitude, but only the coefficient for self-employment is statistically significant. This is likely due to the fact that only 2-3% of women in our sample are wage-employed, which may limit statistical power and results in imprecise estimates.

Table 2: Associations between women's off-farm employment and women's dietary diversity

WDDS	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
Off-farm employed (1 = yes)	0.284***	0.254***		
	(0.097)	(0.093)		
Hours worked in off-farm employment (log)			0.079***	0.067**
			(0.027)	(0.028)
Age of woman (years)	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Female-headed household (1/0)	-0.081	-0.014	-0.071	-0.010
	(0.088)	(0.081)	(0.073)	(0.075)
Woman has at least secondary education (1/0)	0.214**	0.220**	0.189**	0.221**
	(0.093)	(0.097)	(0.094)	(0.10)
Household size (number)	0.039**	0.041**	0.028	0.042**
	(0.018)	(0.016)	(0.017)	(0.017)
Household assets (index)	0.093***	0.092***	0.093***	0.092***
	(0.020)	(0.018)	(0.020)	(0.019)
Land size (ha)	-0.001	-0.005	-0.003	-0.006
	(0.026)	(0.022)	(0.026)	(0.022)
Involved in farming (1/0)	0.133	0.107	0.110	0.107
	(0.116)	(0.111)	(0.120)	(0.105)
Male household members off-farm employed (1/0)	0.006	0.005		
	(0.099)	(0.085)		
Other women working self-employed (1/0)	0.041	0.071		
	(0.181)	(0.211)		
Male hours in off-farm employment (log)			-0.001	0.006
			(0.002)	(0.088)
Other women hours in off-farm employment (log)			-0.004***	0.073
			(0.002)	(0.211)
Country fixed effects	Yes	Yes	Yes	Yes
R^2	0.298	0.298	0.304	0.297

Notes: Columns 1 and 3 refer to OLS estimates with robust standard errors in parentheses. The 2SLS estimates in columns 2 and 4 are estimated using leave-out means instruments and heteroskedasticity-based instrumental variable approaches, following the approach by Lewbel (2012) and bootstrapped standard errors are in parentheses based on 500 replications. ** denotes significance at 5%, and *** denotes significance at 1%.

5.3. Sensitivity tests

To further validate these results, we conduct three sensitivity tests. First, we test the coefficient stability under different assumptions of sorting on unobservables based on Oster (2019). Panel A of Table A10 presents the 'Delta' values for off-farm employment estimates. Similar to previous work, we chose an $R^2_{max} = 1.3 \times R^2$ (Ruml & Parlasca, 2022). The observed value of 2.2 is far above the recommended of 1 (Oster, 2019). This indicates that the coefficients are rather robust to potential omitted variable bias. For instance, the 'Delta' value of 2.2 in column

1 of Table A10 indicates that the unobserved selection would need to have more than twice the influence as the included control variables to yield a coefficient of 0.

This conclusion is further corroborated by sensitivity checks proposed by Diegert et al. (2022), which do not require the assumption that omitted variables are uncorrelated with the included controls. As shown in Panel B of Table A10, the test yields a breakdown point of 65%, implying that unobserved variables would need to explain approximately 65% of the variation in women's dietary diversity currently explained by the included variables to nullify the estimate. Additionally, Figure A1 provides a graphical representation of the test for different levels of exogeneity of the control variables.

Next, we utilize the kinky least square (KLS) method as an alternative sensitivity analysis and compare its findings to those obtained using 2SLS. Figure A2 illustrates a comparison of the 2SLS and KLS approaches. We can draw two main conclusions: First, the narrow confidence intervals of the 2SLS approach suggest that our instruments are not weak. Second, the confidence intervals of the KLS and 2SLS approaches overlap, which reinforces the validity of our instruments.

Combined, these sensitivity checks strengthen the reliability of our findings, offering compelling evidence against the strong influence of unobserved factors. However, despite the range of tests conducted, we emphasize that our results should be viewed as associations rather than causal impacts, as the nature of the data limits definitive causal conclusions.

5.4 Regression results for specific food groups

We further analyze which specific food groups drive the overall positive association between off-farm work and dietary diversity. Examining the relationship between employment and the consumption of specific food groups allows us to better understand which components of

women's diets are most influenced by their off-farm activities, which facilitates insights into whether shifts in food consumption lean more towards nutrient-rich options (e.g., vegetables, fruits, and animal-source foods) or less healthy options, potentially due to income gains or time constraints. We, again, run OLS and 2SLS regression models. Since the results for both models are rather similar, we only show the results from the 2SLS model here and show the results based on OLS estimations in Table A11.

As illustrated in Table 3, our analysis reveals a positive association between women's participation in off-farm employment and consumption of high-value foods, including meat, fish, and Vitamin A-rich fruits and vegetables. This pattern could be driven by additional income generated through off-farm employment, which may enable women to access high-quality and nutrient-rich foods, such as livestock products and horticultural products. These types of food are predominantly purchased rather than home-produced in many rural African households (Dzanku et al., 2024; Huelsen et al., 2024).

Table 3: Women's self-employment and wage employment and food groups consumed

	Starchy staples	Pulses	Dairy	Meat and fish	Eggs	Dark green leafy vegetables	Vitamin A-rich fruits and vegetables	Other fruits and vegetables	Organ meat
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Woman is off-farm employed (1/0)	0.008	0.047	0.003	0.075*	0.006	0.012	0.081**	0.021	0.001
	(0.008)	(0.041)	(0.021)	(0.039)	(0.016)	(0.033)	(0.035)	(0.037)	(0.001)
Age of woman (years)	-0.001	0.001	0.001**	-0.001	0.000	0.001	-0.001*	-0.001	0.000
	(0.001)	(0.001)	(0.021)	(0.001)	(0.000)	(0.033)	(0.001)	(0.001)	(0.000)
Female-headed household (1/0)	-0.015	-0.055	-0.006***	-0.047	0.021	0.086***	0.019	-0.011	-0.007
	(0.013)	(0.038)	(0.023)	(0.036)	(0.014)	(0.029)	(0.028)	(0.038)	(0.011)
Woman has at least secondary education (1/0)	0.001	0.012*	0.013***	-0.004	0.007*	0.016***	-0.004	-0.000	-0.000
	(0.002)	(0.007)	(0.005)	(0.006)	(0.004)	(0.006)	(0.005)	(0.006)	(0.002)
Household size (number)	0.000	-0.012*	0.019***	0.034***	0.007**	0.003	0.017***	0.022***	0.002
	(0.001)	(0.006)	(0.005)	(0.007)	(0.003)	(0.005)	(0.006)	(0.006)	(0.002)
Household assets (index)	-0.008*	0.002	-0.003	0.002	-0.003	-0.000	0.005	0.001	0.000
	(0.005)	(0.009)	(0.007)	(0.009)	(0.004)	(0.008)	(0.006)	(0.009)	(0.002)
Land size (ha)	-0.009	0.044	0.019	-0.023	0.001	0.040	-0.017	0.068*	-0.016
	(0.011)	(0.042)	(0.024)	(0.042)	(0.014)	(0.034)	(0.033)	(0.039)	(0.016)
Involved in farming (1/0)	-0.012	-0.007	0.027	-0.016	0.008	0.019	-0.027	0.005	0.008
	(0.011)	(0.037)	(0.024)	(0.039)	(0.015)	(0.031)	(0.032)	(0.036)	(0.010)
Male household members self-employed (1/0)	-0.002	0.001	0.047	0.039	-0.021	-0.027	0.003	-0.002	0.033
	(0.025)	(0.079)	(0.063)	(0.082)	(0.023)	(0.077)	(0.071)	(0.081)	(0.034)
Other women are self-employed (1/0)	-0.001	0.001	0.001**	-0.001	0.000	0.001	-0.001*	-0.001	0.000
	(0.001)	(0.001)	(0.021)	(0.001)	(0.000)	(0.033)	(0.001)	(0.001)	(0.000)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.050	0.039	0.109	0.092	0.052	0.312	0.093	0.093	0.081

Notes: IV estimates with bootstrapped standard errors are in parentheses based on 500 replications. * denotes significance at 5% and ** denotes significance at 5%.

When we again differentiate between the different types of off-farm work, we find that self-employed women are notably more likely to consume meat, fish, and Vitamin A-rich fruits and vegetables compared to their counterparts who are not involved in self-employment (Table A12). Wage-employed women, however, exhibit a lower likelihood of consuming dark green leafy vegetables compared to those not engaged in wage activities (Table A13). This negative association may be due to time constraints, since dark green leafy vegetables are frequently self-produced on farms or in kitchen gardens managed by women. This type of activity may decline as more women engage in wage employment. In addition, although dark green leafy vegetables often require shorter cooking times relative to other food groups like pulses, the preparation process—which involves washing, chopping, and removing stems—can be labor-intensive. The effect of off-farm employment activities on time allocation is further examined in the subsequent section.

5.5 Exploring mechanisms

5.5.1 Household income

Having shown that participation in off-farm employment is positively associated with women's dietary diversity, we now explore three key channels: income, bargaining power, and time allocation. We first analyze the relationship between women's off-farm employment and household's per capita income. To do so, we regress the per capita household income on women's off-farm employment while controlling for individual and household control variables. The results, presented in Table 4, provide strong evidence for this channel: women's participation in off-farm work is associated with 84% higher per capita income. This substantial income gain suggests that off-farm employment serves as an important financial resource for rural households, potentially enabling greater food purchases and improved diet quality. The

additional income earned from employment may be spent purchasing high quality food, such as meat, fish, and Vitamin A fruits and vegetables as seen in Table 3.

Additionally, higher household income may alleviate financial constraints that limit food choices, reduce vulnerability to seasonal food shortages, and enable investment in long-term household needs. Higher household income likely complements increased financial autonomy for women, as it not only enhances their decision-making power but also provides them with greater financial resources (Melaku et al., 2024). However, the extent to which income gains translate into sustained nutritional improvements may still depend on market access, food price fluctuations, and broader economic conditions (Hirvonen et al., 2017; Bai et al. 2021).

Table 4: Women's employment and household income

	Per capita income (log)
Woman is off-farm employed (1/0)	0.838***
	(0.181)
Woman controls	Yes
Household controls	Yes
Country fixed effects	Yes
R-squared	0.393
Observations	1151

Notes: OLS regression results with robust standard errors in parentheses. Per capita income is transformed using an inverse hyperbolic sine (IHS) transformation approach. Full results are presented in Table 14. *** denotes significance at 1%.

5.5.2 Women's decision-making power

We now examine the next possible channel: bargaining power. As shown in Table 5, the relationship between women's participation in off-farm employment and their decision-making

power – measured by control over income earned from different sources – is largely positive. In particular, column 3 indicates that women engaged in off-farm work are more likely to exercise control over off-farm income compared to those not participating in these activities. This higher level of control reflects greater bargaining power within households, allowing women to influence resource allocation. With greater authority over income, women in off-farm employment can prioritize spending on diverse and higher-quality foods, potentially improving dietary diversity and overall nutritional status (Sangwan & Kumar, 2021).

The effect sizes for other types of income are close to zero and statistically insignificant, which has two important implications. First, from a methodological perspective, this suggests that concerns around reverse causality are likely minimal, as we do not observe that women with high general control over income disproportionally able to engage in off-farm work. Second, while off-farm employment increases women's involvement in decisions regarding off-farm income, this does not appear to extend to other income sources, potentially limiting broader shifts in household financial decision-making.

Table 5: Women's employment and income control

	Crop income	Livestock income	Off-farm income	Remittances
	(1)	(2)	(3)	(4)
Woman is off-farm employed (1/0)	0.007	0.011	0.051**	0.007
	(0.032)	(0.035)	(0.028)	(0.028)
Woman controls	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
R-squared	0.076	0.074	0.071	0.075
Observations	1049	715	1097	1097

Notes: OLS regression results with robust standard errors in parentheses. Full results are as shown in Tables A15. ** denotes significance at 5%.

5.5.3 Time allocation

Next, we examine time allocation as the third possible channel linking off-farm employment to dietary diversity. We analyze the relationship between women's off-farm employment and how they allocate their time to different activities. The regression results in Table 6 show that for women, participation in off-farm activities is statistically significantly associated with fewer hours spent on household chores, self-care and maintenance, care work, leisure, cooking, as well as rest and sleep. Specifically, off-farm activities correspond to an approximate 30-minute reduction in time spent on household chores and a 10-minute decrease in time spent on cooking. This suggests that off-farm employment may limit the time available for nutrition-related activities, such as food preparation and could thus reduce dietary quality. Note that off-farm employment does not statistically significantly reduce time allocated to work on their own farm, which implies that time trade-offs primarily affect non-productive activities like household chores rather than agricultural work. For instance, descriptive comparisons in Table A16 show that households with women in off-farm employment have a higher farm production diversity than those not involved in such activities.

In general, time allocation does not seem to be the dominant pathway, given that the overall associations between off-farm employment on women's dietary diversity are positive. A plausible reason is that other household members take over some of the household- and food-related tasks. We examine this possibility by looking at the relationship between women's participation in off-farm employment and time use of male household members. As shown in Table A17, we see that female off-farm employment is associated with a reduction in men's leisure time by nearly an hour. However, the estimates for men's time spent on household chores and cooking are positive but not statistically significant, so that we do not find strong evidence for a shift in time allocated to food-related work from a household's main woman to the main man.

Table 6: Women's employment and women's time allocation

	Household chores	Self care and maintenance	Leisure	Rest and sleeping	Cooking	Care work	Own farm work	Self-employment	Wage employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Woman is off-farm employed (1/0)	-0.466*** (0.156)	-0.279*** (0.077)	-0.749*** (0.191)	-0.530** (0.231)	-0.191** (0.092)	-0.399*** (0.072)	-0.294 (0.226)	2.224*** (0.227)	0.498*** (0.114)
Woman controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.125	0.142	0.050	0.106	0.132	0.095	0.230	0.233	0.108
Observations	1151	1151	1151	1151	1151	1151	1151	1151	1151

Notes: OLS estimates with robust standard errors in parentheses. Full results are shown in Table A18. ** denotes significance at 5%, and *** denotes significance at 1%.

6 Conclusion and policy implications

Off-farm employment generates several benefits for household, especially in rural areas of low-income countries. Individual benefits, for example in terms of better diets, have, however, received little attention so far. In this article, we therefore examined whether women's dietary quality is influenced by their involvement in off-farm employment. We assessed the relationship between women's involvement in off-farm employment and their dietary diversity using primary data from rural areas of Morogoro and Iringa regions of Tanzania and Western Province in Zambia.

Using instrumental variable approach, we find robust evidence that participation in off-farm activities is positively associated with women's dietary diversity. The additional food groups consumed by women in such off-farm employment activities are high-value and nutrient dense

foods such as meat, fish, and vitamin A-rich fruits and vegetables, which reinforces the interpretation of higher dietary quality among employed women in the study areas.

In an attempt to explore potential mechanisms, we observe a positive association between women's participation in off-farm work and their household's per capita income. This finding suggests that increased income of off-farm employment may be an important channel through which off-farm work improves women's dietary diversity. In addition, our pathway results suggest that women's involvement in off-farm employment enhances their bargaining power through increased control of income from off-farm activities. Such improved bargaining power could explain why we see an increase in women's dietary diversity since previous research demonstrates that women are more likely to spend more income on diverse and nutritious diets than men (Ogutu et al., 2020).

Finally, we observed that women's involvement in off-farm activities reduces their time allocated to key activities such as food preparation, household chores, and self-care and maintenance. In general, less time allocated to such activities can lead to adverse effects on diet quality on individual well-being (Debela et al., 2021; Melaku et al., 2024). We did not find strong evidence that other household members take over these jobs by extending their time efforts in these domains. However, since we observed a positive association between off-farm employment on dietary diversity, the potential negative effects of time allocation do not seem to be the dominant pathway.

While our results are robust to several specifications, a few limitations deserve to be discussed. First, we use cross-section data, so that we cannot fully rule out issues of unobserved heterogeneity. We, therefore, interpret our findings as associations and encourage future research on dietary implications at the individual level, using panel data or other quasi-experimental methods. Second, to account for food consumption variation caused by

seasonality, future research can consider collecting several rounds of individual food consumption data spread across the year. Last, the proportion of women in wage employment in our sample is relatively small, which may reduce the statistical power of our analysis. This issue reflects the lack of wage opportunities for women still present in many parts of rural Africa.

Our findings offer several important policy implications. Off-farm employment plays a crucial role in improving women's dietary quality, by increasing their income and financial autonomy. Policies that enhance women's access to profitable off-farm activities, including wage employment and entrepreneurship, can support better nutrition outcomes for women. This could involve targeted skills training, improved access to credit, and the promotion of rural industries that create employment opportunities.

In addition to expanding job opportunities, it is essential to address the distribution of household labor. Our findings suggest that while women's off-farm employment reduces their time for household chores and food preparation, these responsibilities are often not fully taken over by other household members. Policymakers and development program should promote gender equitable labor distribution within household and challenge cultural norms that place the burden of domestic work disproportionately on women. This could be achieved through awareness campaigns, community engagement, and policies that incentive men's participation in household responsibilities.

Finally, improving dietary quality for women involved in off-farm employment requires not only income generation but also ensuring the accessibility, availability, and affordability of nutritious food. Strengthening local markets by increasing the supply of diverse and nutritious foods such as fruits, vegetables, legumes, and animal-sourced products, can help translate income gains into better diets. Policymakers should also focus on improving rural market

infrastructure, reducing barriers to food access, and consider incentives such as subsidies or tax reductions for vendors selling nutritious foods. These measures can help ensure that the benefits of off-farm employment extend beyond income gains to meaningful improvements in dietary diversity and overall well-being.

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Online Appendix

How off-farm employment shapes women's dietary quality: Evidence from rural Africa

Table A1: Association between instrument and participation in labor force activities

	Off-farm employment (1)	Self-employment (2)	Wage employment (3)
Share of women in off-farm employment	0.337***		
	(0.121)		
Share of women in self-employment		0.339***	
		(0.130)	
Share of women in wage employment			0.282***
			(0.136)
Age of woman (years)	-0.002***	-0.001**	-0.001
	(0.001)	(0.001)	(0.000)
Female-headed household (1/0)	0.117***	0.094***	0.025**
	(0.029)	(0.028)	(0.014)
Woman has at least secondary education (1/0)	0.082**	0.065**	0.025
	(0.032)	(0.029)	(0.014)
Household size (number)	0.013**	0.008	0.004
	(0.005)	(0.005)	(0.002)
Household assets (index)	0.018***	0.016***	0.002
	(0.005)	(0.005)	(0.003)
Land size (ha)	-0.013*	-0.005	-0.009***
	(0.007)	(0.006)	(0.003)
Involved in farming (1/0)	-0.071**	-0.037	-0.033**
	(0.033)	(0.031)	(0.015)
Male household members off-farm employed (1/0)	0.153***		
	(0.028)		
Other women off-farm employed (1/0)	0.098		
	(0.062)		
Male household members self-employed (1/0)		0.162***	
		(0.039)	
Other women self-employed (1/0)		0.099	
		(0.086)	
Male household members wage employed (1/0)			0.175***
			(0.020)
Other women wage employed (1/0)			0.087*
			(0.051)
R-squared	0.108	0.083	0.094
Country fixed effects	Yes	Yes	Yes
Observations	1151	1151	1151

Notes: OLS estimates robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A2: Falsification test

	(1)	(2)	(3)
Share of women in off-farm employment (0-1)	-0.210		
	(0.351)		
Share of women in self-employment (0-1)		-0.342	
		(0.399)	
Share of women in wage employment (0-1)			0.720
			(0.873)
Age of woman (years)	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.002)
Female-headed household (1/0)	0.015	0.011	0.016
	(0.083)	(0.082)	(0.082)
Woman has at least secondary education (1/0)	0.245***	0.238**	0.232**
	(0.092)	(0.099)	(0.093)
Household size (number)	0.044***	0.046***	0.044***
	(0.015)	(0.017)	(0.015)
Household assets (index)	0.098***	0.101***	0.096***
	(0.015)	(0.018)	(0.014)
Land size (ha)	-0.009	-0.009	-0.006
	(0.021)	(0.021)	(0.021)
Involved in farming (1/0)	0.087	0.075	0.093
	(0.094)	(0.094)	(0.094)
Male household members off-farm employed (1/0)	0.047		
	(0.082)		
Other women working off-farm employed (1/0)	0.102		
	(0.179)		
Male household members self-employed (1/0)		-0.096	
		(0.094)	
Other women working self-employed (1/0)		-0.009	
		(0.211)	
Male household members wage employed (1/0)			0.198
			(0.127)
Other women working wage employed (1/0)			0.320
			(0.326)
R-squared	0.292	0.293	0.287
Country fixed effects	Yes	Yes	Yes
Observations	1151	1151	1151

Notes: OLS estimates of association between the instruments and WDDS. ** denotes significance at 5%, and *** denotes significance at 1%.

Table A3: IV tests

	Kleibergen-Paap rk LM statistic	Cragg-Donald Wald F statistic	Sargan statistic
	(1)	(2)	(3)
Panel A: Dummy variable for work by women			
Woman is off-farm employed (1/0)	282.3	6524.4	0.695
	p-value = 0.000		p-value = 0.404
Woman is self-employed (1/0)	228.4	7283	1.212
	p-value = 0.000		p-value = 0.271
Woman is wage employed (1/0)	38.82	5700.9	0.676
	p-value = 0.000		p-value = 0.411
Panel B: Hours worked by women			
Hours worked in off-farm employment	238.8	6613.0	0.700
(log)	p-value = 0.000		(0.403)
Hours worked in self-employment (log)	190.6	7238.2	1.06
	p-value = 0.000		p-value 0.303
Hours worked in wage employment (log)	34.58	6427.7	0.695
	P-value = 0.000		p-value = 0.404
Replications	500	500	500

Notes: Following Lewbel, 2012, the IV regression is conducted using leave-out means IV combined with heteroskedasticity-based instruments. The Kleibergen-Paap Wald rk F-statistic is used to test the relevance of the instruments, in all cases the statistic is large enough and the p-values showing significance at 1% allow us to reject the null of weak instruments. Sargan statistic and its corresponding p-value are used as tests for overidentification and in all regressions we fail to reject the null that all instruments are exogenous. The values for the Cragg-Donald Wald F statistic are large, indicating that the instruments generated are not weak.

Table A4: Wage and self-employment and women's dietary diversity - full results

	(1)
Woman is self-employed (1/0)	0.291***
	(0.108)
Woman is wage employed (1/0)	0.246
	(0.228)
Age of woman (years)	-0.001
	(0.002)
Female-headed household (1/0)	-0.020
	(0.069)
Woman has at least secondary education (1/0)	0.215**
	(0.093)
Household size (number)	0.042***
	(0.016)
Household assets (index)	0.093***
	(0.019)
Land size (ha)	-0.004
	(0.025)
Involved in farming (1/0)	0.111
	(0.123)
Male household members self-employed (1/0)	-0.131
	(0.102)
Other women working self-employed (1/0)	-0.061
	(0.249)
Male household members wage employed (1/0)	0.155
	(0.181)
Other women wage employed (1/0)	0.304
	(0.264)
R-squared	0.301
Country fixed effects	Yes
Observations	1151

Notes: OLS estimates of the relationship between women's participation in work activities and their dietary diversity. The outcome variable is the Women's Dietary Diversity Score (WDDS), which counts the number of food groups women consume. ** denotes significance at 5%, and *** denotes significance at 1%.

Table A5: Wage and self-employment and women's dietary diversity - full results

	(1)
Hours worked in self-employment (log)	0.076**
	(0.030)
Hours worked in wage employment (log)	0.086
	(0.069)
Age of woman (years)	-0.001
	(0.002)
Female-headed household (1/0)	-0.010
	(0.070)
Woman has at least secondary education (1/0)	0.218**
	(0.092)
Household size (number)	0.044**
	(0.017)
Household assets (index)	0.095***
	(0.019)
Land size (ha)	-0.001
	(0.026)
Mean of male members in wage employment (hours)	0.002
	(0.003)
Mean of male members in self-employment (hours)	-0.003*
	(0.002)
Mean of other women wage employed (hours)	0.002
	(0.001)
Mean of other women self-employed (hours)	-0.004
	(0.004)
R-squared	0.301
Country fixed effects	Yes
Observations	1151

Notes: OLS estimates of the relationship between women's participation in work activities and their dietary diversity. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A6: IV estimates of women's self-employment and household dietary diversity - full results

	(1)	(2)
Woman is self-employed (1/0)	0.249**	
	(0.101)	
Hours worked in self-employment (log)		0.067***
		(0.025)
Age of woman (years)	-0.001	-0.001
	(0.002)	(0.002)
Female-headed household (1/0)	-0.016	-0.006
	(0.081)	(0.080)
Woman has at least secondary education (1/0)	0.228**	0.230**
	(0.099)	(0.094)
Household size (number)	0.044***	0.045**
	(0.016)	(0.018)
Household assets (index)	0.096***	0.098***
	(0.017)	(0.018)
Land size (ha)	-0.008	-0.005
	(0.022)	(0.022)
Involved in farming (1/0)	0.088	0.080
	(0.101)	(0.104)
Male household members self-employed (1/0)	-0.140	
	(0.094)	
Other women working self-employed (1/0)	-0.038	
	(0.288)	
Male hours in self employment (log)		-0.003**
		(0.001)
Other women hours in self-employment (log)		-0.004
		(0.006)
R-squared	0.298	0.298
Country fixed effects	Yes	
Observations	1151	

Notes: IV estimates with bootstrapped standard error in parenthesis. ** denotes significance at 5%, and *** denotes significance at 1%.

Table A7: IV estimates of women's wage employment and household dietary diversity - full results

	(1)	(2)
Woman is wage employed (1/0)	0.202	
	(0.219)	
Hours worked in wage employment (log)		0.077
		(0.069)
Age of woman (years)	-0.001	-0.001
	(0.002)	(0.002)
Female-headed household (1/0)	0.014	0.013
	(0.085)	(0.083)
Woman has at least secondary education	0.235**	0.233**
(1/0)	(0.102)	(0.101)
Household size (number)	0.044***	0.044***
	(0.017)	(0.016)
Household assets (index)	0.095***	0.096***
	(0.018)	(0.018)
Land size (ha)	-0.005	-0.005
	(0.023)	(0.022)
Involved in farming (1/0)	0.101	0.099
	(0.108)	(0.103)
Male household members self-employed	0.164	
(1/0)	(0.162)	
Other women working self-employed (1/0)	0.305	
	(0.343)	
Male hours in wage employment (log)		0.002
		(0.003)
Other women hours in wage employment		0.002
(log)		(0.007)
R-squared	0.294	0.294
Country fixed effects	Yes	Yes
Observations	1151	1151

Notes: IV estimates with bootstrapped standard error in parenthesis. ** denotes significance at 5%, and *** denotes significance at 1%.

Table A8: Poisson estimates of women's off-farm employment and women's dietary diversity

	(1)	(2)
Woman is off-farm employed (1/0)	0.243***	
	(0.089)	
Hours worked in off-farm employment (log)		0.066***
		(0.025)
Age of woman (years)	-0.001	-0.001
	(0.002)	(0.002)
Female-headed household (1/0)	-0.017	-0.015
	(0.070)	(0.071)
Woman has at least secondary education (1/0)	0.258***	0.260***
	(0.096)	(0.096)
Household size (number)	0.044***	0.046***
	(0.016)	(0.017)
Household assets (index)	0.088***	0.090***
	(0.019)	(0.019)
Land size (ha)	-0.005	-0.005
	(0.028)	(0.028)
Involved in farming (1/0)	0.115	0.106
	(0.125)	(0.125)
Male household members working off-farm (1/0)	0.001	
	(0.092)	
Other women working off-farm (1/0)	0.054	
	(0.016)	
Mean of off-farm employed male members (hours)		-0.001***
		(0.001)
Mean of off-farm employed other women (hours)		-0.002
		(0.003)
Country fixed effects	Yes	Yes
Observations	1151	1151

Notes: Poisson marginal effects with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A9: Poisson estimates of women's wage and self-employment and women's dietary diversity

	(1)	(2)
Woman is self-employed (1/0)	0.260***	
	(0.096)	
Woman is wage-employed (1/0)	0.213	
	(0.202)	
Hours worked in self-employment (log)		0.070**
		(0.027)
Hours worked in wage employment (log)		0.069
		(0.060)
Age of woman (years)	-0.001	-0.001
	(0.002)	(0.002)
Female-headed household (1/0)	-0.021	-0.007
	(0.070)	(0.071)
Woman has at least secondary education (1/0)	0.258***	0.249**
	(0.096)	(0.096)
Household size (number)	0.046***	0.048***
	(0.016)	(0.017)
Household assets (index)	0.088***	0.092***
	(0.019)	(0.019)
Land size (ha)	-0.004	0.000
	(0.028)	(0.028)
Involved in farming (1/0)	0.118	0.012
	(0.125)	(0.006)
Male household members self-employed (1/0)	-0.132	
	(0.094)	
Other women are self-employed (1/0)	-0.079	
	(0.229)	
Male household members wage-employed (1/0)	0.150	
	(0.163)	
Other women are wage-employed (1/0)	0.313	
	(0.252)	
Mean of self-employed male members (hours)		-0.003**
		(0.001)
Mean of wage-employed male members (hours)		0.002
		(0.003)
Other women hours in self-employment (log)		-0.005
		(0.005)
Other women hours in wage employment (log)		0.002
		(0.004)
Country fixed effects	Yes	Yes
Observations	1151	1151

Notes: Poisson marginal effects with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A10: Sensitivity analysis

	Off-farm employment
Panel A: Sensitivity analysis (exogenous controls; Oster, 2019)	
Delta	2.246
R^2_{max}	0.385
Woman controls	Yes
Household controls	Yes
Country fixed effects	Yes
Observations	1151
Panel B: Sensitivity analysis (endogenous controls; Diegert et al., 2022)	
Breakdown point (%)	64.7

Notes: Oster test is performed using the 'psacalc' command in Stata based on Oster (2019). The outcome variable is the dietary score (WDDS), the number of food groups a woman consumes.

Table A11: Women's off-farm employment and food groups consumed

	Starchy staples	Pulses	Dairy	Meat and fish	Eggs	Dark green leafy vegetables	Vitamin A-rich fruits and vegetables	Other fruits and vegetables	Organ meat
Woman is off-farm employed (1/0)	0.003	0.046	0.015	0.082**	0.008	0.013	0.092**	0.026	-0.004
	(0.011)	(0.044)	(0.024)	(0.040)	(0.012)	(0.034)	(0.036)	(0.030)	(0.011)
Age of woman (years)	-0.001	0.001	0.002**	-0.001	0.000	0.001	-0.001*	-0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
Female-headed household (1/0)	-0.015	-0.055	-0.007	-0.048	0.021	0.087***	-0.018	-0.012	-0.007
	(0.010)	(0.035)	(0.017)	(0.036)	(0.014)	(0.031)	(0.025)	(0.033)	(0.013)
Woman has at least secondary education (1/0)	-0.012	0.033	0.076**	0.043	0.018	0.058	0.007	-0.015	0.011
	(0.017)	(0.041)	(0.030)	(0.036)	(0.015)	(0.040)	(0.027)	(0.040)	(0.015)
Household size (number)	0.001	0.012*	0.013***	-0.004	0.007	0.016**	-0.004	-0.000	-0.000
	(0.002)	(0.007)	(0.004)	(0.008)	(0.004)	(0.007)	(0.006)	(0.006)	(0.002)
Household assets (index)	0.001	-0.012*	0.018***	0.034***	0.007**	0.003	0.017***	0.022***	0.002
	(0.002)	(0.007)	(0.004)	(0.007)	(0.003)	(0.006)	(0.006)	(0.007)	(0.003)
Land size (ha)	-0.008	0.002	-0.003	0.002	-0.003	-0.001	0.005	0.001	0.000
	(0.005)	(0.008)	(0.007)	(0.009)	(0.004)	(0.010)	(0.005)	(0.008)	(0.002)
Involved in farming (1/0)	-0.009	0.044	0.020	-0.022	0.001	0.039	-0.016	0.068	-0.016
	(0.011)	(0.048)	(0.026)	(0.042)	(0.014)	(0.037)	(0.037)	(0.049)	(0.016)
Male household members off-farm employed (1/0)	-0.012	-0.007	0.025	-0.017	0.008	0.021	-0.028	0.005	0.007
	(0.013)	(0.039)	(0.024)	(0.039)	(0.015)	(0.032)	(0.031)	(0.033)	(0.009)
Other women are off-farm employed (1/0)	-0.001	0.000	0.048	0.039	-0.021	-0.026	0.002	-0.002	0.032
	(0.024)	(0.039)	(0.051)	(0.089)	(0.025)	(0.081)	(0.066)	(0.073)	(0.034)
R-squared	0.051	0.029	0.109	0.092	0.033	0.312	0.093	0.093	0.080
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1151	1151	1151	1151	1151	1151	1151	1151	1151

Notes: OLS estimates with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A12: Women's self-employment and food groups consumed – full results

	Starchy staples	Pulses	Dairy	Meat and fish	Eggs	Dark green leafy vegetables	Vitamin A-rich fruits and vegetables	Other fruits and vegetables	Organ meat
Woman is self-employed (1/0)	0.006	0.032	0.009	0.061*	0.006	0.046	0.082**	0.011	-0.005
	(0.008)	(0.040)	(0.025)	(0.041)	(0.016)	(0.039)	(0.038)	(0.040)	(0.009)
Age of woman (years)	-0.000	0.000	0.002**	-0.001	0.000	0.001	-0.001*	-0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
Female-headed household (1/0)	-0.014	-0.055	-0.006	-0.045	0.020	0.083***	0.020	-0.011	-0.007
	(0.013)	(0.037)	(0.021)	(0.033)	(0.015)	(0.029)	(0.029)	(0.037)	(0.010)
Woman has at least secondary education (1/0)	-0.012	0.035	0.077***	0.047	0.018	0.055	0.009	-0.013	0.012
	(0.016)	(0.041)	(0.029)	(0.041)	(0.015)	(0.038)	(0.031)	(0.043)	(0.013)
Household size (number)	0.002	0.012*	0.014***	-0.004	0.007*	0.016***	-0.003	0.001	0.000
	(0.002)	(0.007)	(0.005)	(0.007)	(0.004)	(0.006)	(0.005)	(0.007)	(0.002)
Household assets (index)	0.000	-0.012*	0.020***	0.035***	0.007**	0.003	0.018***	0.023***	0.002
	(0.002)	(0.007)	(0.005)	(0.006)	(0.003)	(0.006)	(0.006)	(0.006)	(0.003)
Land size (ha)	-0.008*	0.001	-0.003	0.001	-0.003	-0.000	0.004	0.001	0.000
	(0.005)	(0.009)	(0.007)	(0.009)	(0.004)	(0.008)	(0.007)	(0.009)	(0.002)
Involved in farming (1/0)	-0.009	0.042	0.016	-0.027	-0.000	0.040	-0.021	0.064*	-0.018
	(0.011)	(0.043)	(0.024)	(0.039)	(0.014)	(0.036)	(0.034)	(0.038)	(0.015)
Male household members self-employed (1/0)	-0.010	-0.014	0.003	-0.027	-0.008	0.007	-0.0057	-0.029	-0.006
	(0.011)	(0.043)	(0.026)	(0.044)	(0.015)	(0.036)	(0.035)	(0.041)	(0.009)
Other women are self-employed (1/0)	-0.014	0.072	-0.034	0.056	-0.012	-0.064	-0.003	-0.058	-0.018
	(0.037)	(0.102)	(0.061)	(0.092)	(0.032)	(0.092)	(0.084)	(0.095)	(0.015)
R-squared	0.05	0.029	0.107	0.092	0.051	0.313	0.094	0.093	0.081
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1151	1151	1151	1151	1151	1151	1151	1151	1151

Notes: IV estimates with bootstrapped standard error in parenthesis. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A13: Women's wage employment and food groups consumed – full results

	Starchy staples	Pulses	Dairy	Meat and fish	Eggs	Dark green leafy vegetables	Vitamin A-rich fruits and vegetables	Other fruits and vegetables	Organ meat
Woman is wage-employed (1/0)	0.014	0.088	-0.030	0.117	0.007	-0.144*	0.052	0.076	0.024
	(0.011)	(0.088)	(0.053)	(0.076)	(0.038)	(0.075)	(0.090)	(0.071)	(0.037)
Age of woman (years)	-0.000	0.001	0.001**	-0.001	0.000	0.000	-0.001*	-0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
Female-headed household (1/0)	-0.014	-0.050	-0.005	-0.040	0.021	0.088***	0.030	-0.011	-0.006
	(0.013)	(0.037)	(0.028)	(0.035)	(0.016)	(0.030)	(0.030)	(0.035)	(0.011)
Woman has at least secondary education (1/0)	-0.012	0.035	0.076***	0.048	0.018	0.061	0.013	-0.015	0.010
	(0.017)	(0.039)	(0.028)	(0.038)	(0.015)	(0.037)	(0.030)	(0.042)	(0.013)
Household size (number)	0.001	0.013*	0.013***	-0.003	0.007*	0.017***	-0.003	-0.001	0.000
	(0.002)		(0.005)	(0.007)	(0.004)	(0.006)	(0.005)	(0.007)	(0.002)
Household assets (index)	0.001	-0.012*	0.019***	0.036***	0.006*	0.004	0.018***	0.022***	0.002
	(0.002)	(0.006)	(0.004)	(0.007)	(0.003)	(0.006)	(0.006)	(0.006)	(0.002)
Land size (ha)	-0.008*	0.002	-0.003	0.002	-0.003	-0.002	0.004	0.002	0.001
	(0.005)	(0.009)	(0.007)	(0.009)	(0.004)	(0.009)	(0.007)	(0.009)	(0.002)
Involved in farming (1/0)	-0.008	0.041	0.021	-0.025	0.000	0.035	-0.020	0.072*	-0.015
	(0.011)	(0.043)	(0.022)	(0.041)	(0.014)	(0.035)	(0.035)	(0.041)	(0.014)
Male household members wage-employed (1/0)	-0.014	0.011	0.081*	-0.040	0.029	0.039	0.007	0.028	0.025
	(0.020)	(0.056)	(0.046)	(0.062)	(0.028)	(0.052)	(0.051)	(0.053)	(0.024)
Other women are wage-employed (1/0)	0.026**	-0.175	0.226	0.006	-0.044***	0.071	0.013	0.122	0.060
	(0.012)	(0.119)	(0.156)	(0.165)	(0.017)	(0.107)	(0.123)	(0.149)	(0.098)
R-squared	0.051	0.029	0.117	0.090	0.053	0.315	0.086	0.094	0.081
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1151	1151	1151	1151	1151	1151	1151	1151	1151

Notes: IV estimates with bootstrapped standard error in parenthesis. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%.

Table A14: Women's employment and household income

	Per capita income (log)
Woman is off-farm employed (1/0)	0.838***
	(0.181)
Age of woman (years)	0.022***
	(0.005)
Female-headed household (1/0)	0.837***
	(0.188)
Woman has at least secondary education (1/0)	0.107
	(0.209)
Household size (number)	-0.592***
	(0.054)
Household assets (index)	0.052
	(0.032)
Land size (ha)	0.086**
	(0.032)
Involved in farming (1/0)	-0.195
	(0.208)
Male household members off-farm employed (1/0)	-0.077
	(0.123)
Other women are wage employed (1/0)	-0.636**
	(0.256)
R-squared	0.393
Country fixed effects	Yes
Observations	1151

Notes: OLS regression results with robust standard errors in parentheses. ** denotes significance at 5%, and *** denotes significance at 1%.

Table A15: Women's employment and household income control

	Crop income	Livestock income	Off-farm income	Remittances
	(1)	(2)	(3)	(4)
Woman is off-farm employed (1/0)	0.007	0.011	0.051**	0.007
	(0.032)	(0.035)	(0.028)	(0.028)
Age of woman (years)	0.002***	0.003***	0.001*	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Female-headed household (1/0)	0.122***	0.104**	0.133***	0.139***
	(0.017)	(0.025)	(0.018)	(0.021)
Woman has at least secondary education (1/0)	0.042*	0.017	-0.031	0.028
	(0.024)	(0.033)	(0.023)	(0.026)
Household size (number)	-0.011*	-0.012*	-0.008	-0.006
	(0.006)	(0.007)	(0.006)	(0.006)
Household assets (index)	0.008*	0.011*	0.009**	0.007
	(0.004)	(0.006)	(0.005)	(0.005)
Land size (ha)	-0.003	0.013*	0.002	0.009
	(0.008)	(0.006)	(0.006)	(0.006)
Involved in farming (1/0)	0.049	0.011	0.029	-0.005
	(0.042)	(0.006)	(0.030)	(0.026)
Male household members off-farm employed (1/0)	-0.054	-0.082	-0.052	-0.051
	(0.036)	(0.046)	(0.034)	(0.032)
Other female members off-farm employed (1/0)	0.125***	0.044	0.112***	0.081**
	(0.022)	(0.056)	(0.021)	(0.033)
Country fixed effects	Yes	Yes	Yes	Yes
R-squared	0.076	0.074	0.071	0.075
Observations	1049	715	1097	1097

Notes: OLS regression results with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%

Table A16: Farm level production diversity by off-farm employment

	Full sample (1)	Off-farm (2)	No off-farm (3)	Difference (2)-(3)
Farm production diversity	2.74 (0.13)	2.92 (0.12)	2.69 (0.05)	0.22*
Number of crop species	1.83 (0.03)	1.92 (0.07)	1.81 (0.03)	0.12*
Number of livestock species	1.45 (0.03)	1.45 (0.03)	1.46 (0.06)	-0.01

Notes: * denotes significance at 10%.; Standard deviations in parentheses

Table A17: Women's off-farm employment and men's time allocation – full results

	Household chores	Self care and maintenance	Leisure	Rest and sleeping	Cooking	Care work	Own farm work	Off-farm work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Woman is off-farm employed (1/0)	0.151 (0.143)	-0.178 (0.111)	-0.559** (0.249)	-0.030 (0.218)	0.090 (0.127)	-0.009 (0.022)	-0.426 (0.320)	0.287 (0.290)
Age of woman (years)	0.000 (0.143)	0.003 (0.003)	-0.001 (0.008)	0.028*** (0.007)	-0.009*** (0.003)	-0.001 (0.001)	-2.41*** (0.008)	-0.019*** (0.005)
Female-headed household (1/0)	0.449** (0.170)	-1.16*** (0.121)	-1.14*** (0.315)	-0.838** (0.334)	-0.056 (0.106)	-0.039** (0.019)	-1.57*** (0.310)	-0.377 (0.225)
Woman has at least secondary education (1/0)	-0.106 (0.189)	-0.033 (0.102)	0.304 (0.264)	-0.502* (0.299)	-0.034 (0.133)	0.056** (0.023)	-0.209 (0.293)	-0.165 (0.221)
Household size (number)	0.010 (0.189)	0.022 (0.021)	0.002 (0.046)	0.043 (0.052)	0.006 (0.025)	-0.004 (0.004)	0.089 (0.058)	-0.139*** (0.042)
Household assets (index)	0.027 (0.024)	0.027 (0.019)	0.081 (0.047)	-0.218*** (0.029)	0.005 (0.020)	0.000 (0.005)	0.091 (0.055)	0.058 (0.045)
Land size (ha)	0.036 (0.043)	0.036 (0.029)	-0.096 (0.068)	0.048 (0.065)	0.019 (0.022)	-0.012 (0.011)	0.119 (0.087)	0.048 (0.075)
Involved in farming (1/0)	0.369* (0.194)	-0.113 (0.144)	0.043 (0.281)	0.368 (0.293)	0.315 (0.20)	-0.058 (0.073)	0.474* (0.281)	-0.898** (0.437)
Male household members off-farm employed (1/0)	0.286** (0.133)	-0.192 (0.132)	-1.38*** (0.231)	-0.488** (0.212)	-0.003 (0.101)	-0.033 (0.023)	-1.36*** (0.240)	3.43*** (0.383)
Other female members off-farm employed (1/0)	0.252 (0.374)	-0.298 (0.216)	-0.031 (0.499)	0.262 (0.838)	0.069 (0.243)	0.023 (0.031)	-0.938* (0.552)	-0.667 (0.499)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.144	0.112	0.086	0.119	0.132	0.095	0.100	0.237
Observations	938	938	938	762	938	762	938	938

Notes: OLS regression results with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%

Table A18: OLS estimates of women's off-farm employment and women's time allocation

	Household chores	Self care and maintenance	Leisure	Rest and sleeping	Cooking	Care work	Own farm work	Self-employment	Wage employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Woman is off-farm employed (1/0)	-0.466*** (0.156)	-0.279*** (0.077)	-0.749*** (0.191)	-0.530** (0.231)	-0.191** (0.092)	-0.399*** (0.072)	-0.294 (0.226)	2.224*** (0.227)	0.498*** (0.114)
Age of woman (years)	-0.017*** (0.004)	0.004* (0.002)	0.002 (0.004)	0.039*** (0.004)	-0.152 (0.099)	-0.014*** (0.002)	0.007 (0.005)	-0.006** (0.003)	-0.001 (0.002)
Female-headed household (1/0)	-0.353** (0.157)	-0.080 (0.071)	0.275 (0.184)	0.387** (0.191)	-0.314 (0.091)	-0.031 (0.002)	-0.171 (0.201)	0.023 (0.150)	0.117 (0.082)
Woman has at least secondary education (1/0)	-0.300 (0.208)	0.180** (0.070)	-0.246 (0.167)	-0.170 (0.221)	-0.051 (0.109)	-0.103 (0.088)	0.020 (0.221)	0.350 (0.210)	0.130 (0.096)
Household size (number)	0.001 (0.031)	-0.003 (0.014)	-0.077** (0.034)	0.052 (0.035)	-0.018 (0.019)	0.066*** (0.014)	0.038 (0.031)	-0.098*** (0.019)	0.025 (0.018)
Household assets (index)	-0.016 (0.025)	0.029** (0.013)	0.132*** (0.039)	-0.306*** (0.033)	0.024 (0.015)	0.020* (0.011)	0.049 (0.039)	0.025 (0.023)	0.034** (0.016)
Land size (ha)	0.025 (0.040)	0.011 (0.022)	-0.020 (0.039)	-0.080* (0.045)	0.026 (0.024)	-0.072*** (0.015)	0.095 (0.059)	0.075** (0.035)	-0.043*** (0.015)
Involved in farming (1/0)	0.116 (0.181)	-0.162 (0.099)	0.038 (0.158)	-0.880*** (0.244)	0.179 (0.096)	-0.113 (0.127)	0.947*** (0.175)	-0.226 (0.197)	-0.168 (0.116)
Male household members off-farm employed (1/0)	0.288* (0.151)	-0.068 (0.093)	-0.376** (0.158)	0.409* (0.229)	0.003 (0.077)	0.144 (0.090)	-0.362* (0.190)	0.012 (0.154)	-0.003 (0.085)
Other women are off-farm employed (1/0)	0.601** (0.257)	-0.024 (0.157)	-0.404 (0.354)	-0.041 (0.440)	-0.018 (0.205)	0.332 (0.228)	-0.209 (0.397)	-0.251 (0.335)	-0.135 (0.123)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1151	1151	1151	1151	1151	1151	1151	1151	1151

Notes: OLS regression results with robust standard errors in parentheses. * denotes significance at 10%, ** denotes significance at 5%, and *** denotes significance at 1%

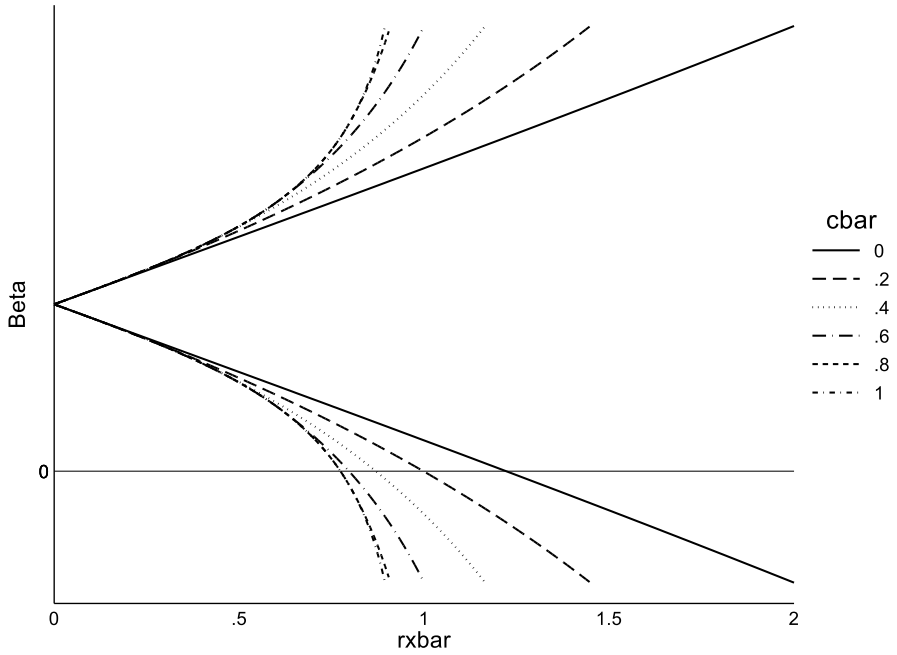

Figure A1: Sensitivity test following Diegert et al. (2022)

Notes: The values of *rxbar* represent the magnitude of how large the selection on unobservables relative to observables would have to be to overturn our results (breakdown point). The different line patterns indicate different levels of assumed endogeneity between included controls and omitted variables (*cbar*). The dotted line is the strictest setting, with full endogeneity assumed.

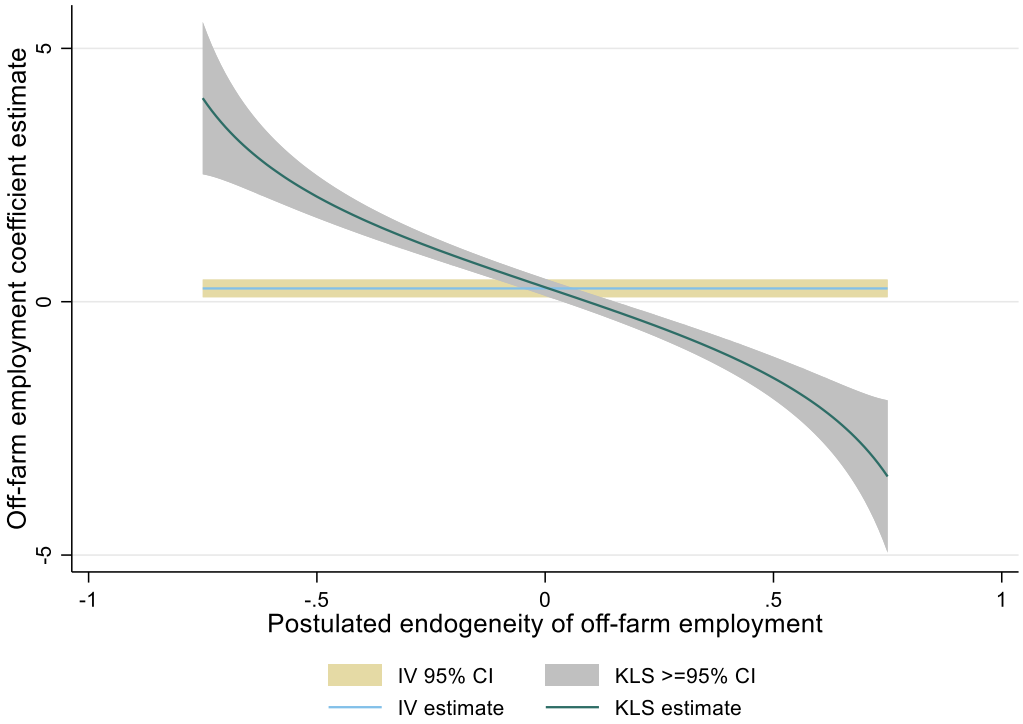

Figure A2: KLS and 2SLS coefficient estimates and confidence intervals