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Empowerment or Endangerment? The Nutritional Consequences of Female Employment in Rural India

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Abstract

This paper investigates the relationship between female employment and nutritional status in rural India, using data from the National Family Health Survey-5 (NFHS-5). Constructing a nutrition index that captures the extent of food intake, we find that employed women are nutritionally worse off than their unemployed counterparts. This negative effect persists even after correcting for the potential endogeneity of female employment and nutrition, with robustness checks across different food items, alternative measures such as Body Mass Index (BMI), and district-level economic conditions, proxied by nightlights data. We also find suggestive evidence of greater intra-household food disparity between employed women and their male counterparts. Further analysis reveals that spousal violence—exacerbated by female employment—plays a significant role in undermining women's nutritional outcomes, while the positive effect of increased decision-making power is comparatively weaker. This dynamic is evident across all wealth quintiles, suggesting that higher economic status does not mitigate these adverse effects. The findings highlight the need for employment policies that incorporate nutritional support for working women, as well as interventions to reduce intra-household conflict, ensuring that employment translates into both economic and health gains for women in rural India.

Key words: *Nutritional status, Female employment, Spousal violence, India, NFHS-5, Instrumental Variable.*

JEL: D13, I14, I15, J16

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1. Introduction

Undernourishment among women in India represents a significant societal challenge with far-reaching development consequences. Recent data reveal that over 46% of women in India lack regular protein intake¹. Such Nutritional deficiency might result in productivity losses, wage disparities, and consequently, a reduction in GDP (Horton & Steckel, 2013). The implications of poor nutrition for women extend beyond economic losses; it compromises their quality of life and poses serious health risks, including increased mortality, morbidity, and disability (Shirisha et al., 2022). Additionally, maternal undernutrition is linked to poor intergenerational outcomes, particularly in terms of impaired growth in children (Vir & Malik, 2015; Kim et al., 2017; Harding, Aguayo, & Webb, 2018). While poverty is a recognized driver of undernutrition (Haddad, Ruel, & Garrett, 1999), government interventions like poverty alleviation programs and the public distribution system aim to mitigate this issue by relaxing income constraints for disadvantaged groups.

However, income expansion alone may not guarantee equitable food distribution within households, particularly in the presence of entrenched social norms that discriminate against women. Malnutrition is often tied to these norms, which may manifest as limited control over household resources (Haddad, 1999), prioritization of male members in food allocation (Broussard, 2011), and cultural expectations around food intake (Harris-Fry et al., 2017). For instance, in South Asia, the practice of women eating “last and least” often results in lower nutritional intake and negative health outcomes (Lentz, Narayana, & De, 2019).

This raises critical questions about the interaction between women’s financial empowerment through employment and persistent social norms. In the Indian context, where policy initiatives increasingly promote female employment as a means to achieve gender-equitable development (Broussard, 2019), it is essential to understand whether financial autonomy gained through employment can effectively improve nutritional outcomes for women.

According to the annual Periodic Labour Force Survey (PLFS) report, the labour force participation rate (LFPR) of women in rural India has risen significantly, from 24.6% in 2017-18 to 36.6% in 2021-22². Furthermore, in 2022-23, the female working population ratio was 11.3% higher in rural areas compared to urban areas. Notably, majority of employed women in rural India are exclusively engaged in the agricultural sector.

Interestingly, the recent National Family Health Survey (NFHS-5) reports that the proportion of women with a low Body Mass Index (BMI) has decreased from 20.7% in NFHS-4 to 18.7%. Yet, these aggregate figures likely obscure significant heterogeneity in employment patterns and their implications for nutrition. For instance, women engaged in physically demanding, low-wage work may not experience the positive effects of increased income, as the arduous nature of their jobs could offset any nutritional gains (Imai et al., 2014; Dahiya & Biswanathan, 2015). Studies like Tebekaw (2010) have noted that women in less physically demanding white-collar jobs tend to have better nutritional status than those in non-white-collar occupations, due to the intensity of physical work

¹ [https://clearinghouse.unicef.org/sites/ch/files/ch/teams-IND-Nutrition-knowledge%40UNICEF%20%28nutrition%29-UNICEF%20reports-2023 Trends and patterns in consumption of foods among Indian adults Insights from NFHS 2005 06 to 2019 21-5.0.pdf](https://clearinghouse.unicef.org/sites/ch/files/ch/teams-IND-Nutrition-knowledge%40UNICEF%20%28nutrition%29-UNICEF%20reports-2023%20Trends%20and%20patterns%20in%20consumption%20of%20foods%20among%20Indian%20adults%20Insights%20from%20NFHS%202005%2006%20to%202019%2021-5.0.pdf)

² In urban areas, the LFPR for women also increased, albeit more modestly, from 20.4% to 23.8% during the same period.

involved. Given this context, rural areas provide a relatively more substantial sample of employed women and offer a consistent occupational group for comparing nutritional status.

Importantly, the friction between female employment and existing social norms is an underexplored aspect in the context of nutrition. Employed women may face "male backlash" in the form of spousal violence, as men in patriarchal societies may perceive their authority to be threatened when women spend more time outside the home. Attempts to reassert control could manifest as violence, which could further exacerbate the already skewed food allocation against women, leading to even greater nutritional deprivation (Chin, 2012; Guarnieri & Rainer, 2018; Pal, 2019).

To assess female nutrition, we use NFHS-5 data, which covers 636,699 households, including 724,115 women aged 15-49 years and 101,839 men aged 15-54 years. We focus on data from 57,693 married couples as familial conflict is likely to capture the friction of employment with social norms. To estimate nutritional intake, we construct a nutrition index based on the frequency of food intake, rather than relying solely on BMI or anemia, as genetic factors significantly influence BMI variations (Silventoinen et al., 2022). Our findings reveal that unemployed women are nutritionally better off than their employed counterparts after accounting for possible confounders. This effect remains consistent across different food items and alternative measures of nutrition, such as BMI.

One significant challenge in our estimation is the potential endogeneity of women's employment. Endogeneity may arise from omitted variable bias or reverse causality. On one hand, employment may improve women's nutritional status, while on the other, better nutrition could enhance their employment prospects due to higher productivity and health gains (Costa-Font & Ljunge, 2018; Nappo, 2019). Additionally, unobserved variables such as social norms and cultural behaviours, which are related to both employment and nutrition, may not be captured in the regression model. In addition to using extensive set of controls, we employ an instrumental variable approach, using leave-out-mean female employment at the district level as an instrument. This measure reflects labour market conditions, peer effects, and cultural attitudes, among other unobservable factors. Our estimates pass the test of instrumental relevance as well as potential exogeneity of the instrument following Conley et. al. (2012). However, if the poor districts have more agricultural opportunities as compared to non-agricultural opportunities, and that makes one district poor on average, then the outcome of nutrition will be worse for districts where more women are working. This is because more women are working due to lack of other sources of income. In India, the participation of women in the labour force is much lower for well-off households. Thus, we additionally estimate the instrumental variable regression across different wealth categories. The results show persistent negative impact of employment on nutrition even among the richer classes. Furthermore, we use the district level night lights data from Socioeconomic High-resolution Rural-Urban Geographic Dataset (SHRUG) on India (2012-2021) so as to measure the economic wellbeing of concerned district and classify the districts into 2 sub-sections: low nightlight districts and high night light districts. We find that our estimates of reduced food intake among employed females strongly holds across different intensities of nightlight.

This study presents three critical findings regarding the relationship between women's employment and nutrition. First, it identifies a robust negative association between women's employment and their nutritional status, with employed women experiencing worse nutrition than their unemployed counterparts, even after adjusting for

confounding factors. Second, spousal violence emerges as a significant factor among employed women, contributing to their poorer nutritional outcomes. This suggests that employment may exacerbate household conflict, potentially negating autonomy gains, even in the case of paid employment, and leading to worse nutritional outcomes. Moreover, there is suggestive evidence of intrahousehold disparity, where employed women face greater nutritional deprivation relative to their male counterparts, compared to unemployed women. Third, the negative impact of employment on nutrition is consistent across different wealth categories, implying that higher economic status does not buffer these adverse effects. These findings highlight the urgent need for policies that address the intersection of women's employment and nutrition. Workplace policies should include provisions for dietary support and address the stress and potential conflicts arising from employment to ensure better health outcomes for female workers.

This study contributes to the existing literature in several important ways. First, while previous research has largely focused on gender disparities in nutrition (e.g., Aurino, 2016; Dercon, 2013; Nguyen et al., 2021), our work shifts the emphasis to within-gender nutritional disparities among women. Specifically, we examine the underexplored relationship between female employment and adult women's food intake in rural India, extending the literature that has primarily focused on child nutrition outcomes for employed mothers (e.g., Saabneh, 2016; Shajan & Sumalatha, 2020). By analyzing the food intake of employed and unemployed women, we highlight a less discussed dimension of nutritional inequality. Secondly, we provide evidence of the complex interplay between female employment, social norms, and food intake, suggesting that employment can inadvertently reduce food intake due to the adverse effects of spousal violence. Building on studies that documented increased intimate partner violence among working women (Krishnan et al., 2011), we show that while employment can enhance autonomy, these gains may be undermined by increased domestic conflict, which in turn diminishes women's food intake. This dual impact of employment adds a new layer to understanding the consequences of female employment in the context of rural India.

The rest of the paper is as follows. Section 2 describes the literature review. In section 3, the data and methodology are discussed and Section 4 reports the estimation result. We offer our concluding observations in Section 5.

2. Literature Review

The unitary model of household behaviour is built on the assumption that intra-household resource allocation is gender neutral as household members have identical preference (Alderman et.al, 1995; Eswaran, 2014). However, in regions with patriarchal social norms resource allocation can be against female members with weaker agency. Here, the household resources are distributed subject to the bargaining power of the individual in a cooperative bargaining model and the model is known as 'Nash bargaining model'. In this context, bargaining power or empowerment depends on the outside option of the individual e.g., education, employment, wealth etc. (Eswaran, 2014).

One can conceive of two types of empowerments. The first measure is known as instrumental empowerment, proxied by the decision-making power within the household and the second measure is called intrinsic empowerment that embodies the status of the women within the household. The extent of the latter is often measured by intimate partner violence (Biswas et al., 2023). While financial capacity through employment, is

likely to be associated with instrumental empowerment, the improvement in intrinsic empowerment is not guaranteed. Studies have noted improving financial autonomy is unlikely to have significant long run impact unless it is accompanied by changes in attitude towards women.

It follows that the increase in earning potential of women members, can raise their power of bargaining through the channel of decision-making (Dhanaraj and Mahambare, 2022). Studies have also found that female autonomy, measured by decision-making power, is positively associated with the status of nutrition (Tebekaw, 2010). Besides, employment in professional sector makes women nutritionally better off than the women who are employed in agricultural sector or unemployed as the former group of women are more educated and consequently, have more decision-making power than the later group (Tebekaw, 2010; Imai et al., 2014).

Female autonomy due to employment, on one hand, increases the nutrition of female member and on the other hand, it disrupts the conventional social thinking about women's role within and outside the household. This disruption affects either one spouse or both. It is believed that the role of women within the household is 'home care' and 'child care'. Deviation from this conventional role makes men more dominant which in turn, increases spousal violence (Bhattacharya, 2015; Lenze & Klasen, 2016; Dhanaraj and Mahambare, 2022) and it indirectly affects the nutrition of women in a negative direction (Lentz et al., 2019). This theory of male dominance is more effective in those societies where exit from marriage i.e., separation or divorce is not plausible (Pal, 2019, Dhanaraj and Mahambare, 2022). This theory suggests that improvement in job opportunity of female member, tend to increase the level of domestic violence (Chin, 2012; Bhattacharya, 2015 and Guarnieri & Rainer, 2018).

Women who consistently suffer from psychological or mental stress due to the violence have reduced food intake (Ackerson & Subramanian, 2008). Whether spousal violence reduces nutrition over and above the female bargaining power, thus, remains an open area of research.

3. Data and Methodology

3.1 Data

We utilize data from the National Family Health Survey 5 (NFHS-5) for India, conducted between 2019 and 2021. The NFHS-5 provides comprehensive information on 636,699 households, including 724,115 women aged 15-49 years and 101,839 men aged 15-54 years. Our study focuses on a sub-sample of 57,693 married couples, 76% of whom reside in rural areas. While occupational diversity is evident in urban regions, approximately 64% of rural women are engaged in agricultural work. By focusing on rural data, we analyze the relationship between employment and female nutrition within the context of married couples. This approach allows us to explore the friction between women's employment and prevailing social norms, which can significantly influence female nutrition. Traditional gender norms, often more rigidly enforced after marriage, are particularly dominant in rural areas, where gender roles tend to be more restrictive (Kaspos et. al., 2016).

The NFHS survey records the frequency of intake of food items like milk or curd, pulses or beans, dark green leafy vegetables, fruits, eggs, fish, chicken or meat, fried food and aerated drink. Anecdotal evidence suggests that Indian women are protein deficient compared to men³. Studies have also pointed out that inadequate nutrition

³ https://www.business-standard.com/article/news-ians/indian-women-eat-13-less-protein-than-men-survey-117030200944_1.html

among women leads to poor metabolic outcomes (Oke & Hardy, 2017), prevalence of anemia (Bernát, 1983; Mulyantoro & Kusriani, 2021; Sharif et al., 2023) and chronic energy deficiency (Izzati & Mutalazimah, 2022; Wati, 2024). Hence, we begin by examining the extent to which employed and unemployed women in rural areas differ in terms of regular intake of food items. We consider the frequency of intake for the items such as milk or curd, pulses or beans, dark green leafy vegetables, fruits, eggs, fish, chicken or meat leaving out aerated drinks and fried foods. For each of these items we assign a code of unity if they are consumed on a regular basis and club occasional, weekly and not consuming the food at all as zero.

Table 1: Percentage of intake of different food items

	Unemployed	Employed	Difference	SE
Food items:				
<i>Milk or curd</i>	0.438	0.418	0.021***	.005
<i>Pulses or beans</i>	0.479	0.443	0.036***	.005
<i>Dark green leafy vegetables</i>	0.562	0.518	0.045***	.005
<i>Fruits</i>	0.093	0.082	0.011***	.003
<i>Eggs</i>	0.038	0.038	0.000	.002
<i>Fish</i>	0.043	0.027	0.016***	.002
<i>Chicken or meat</i>	0.014	0.011	0.003**	.001

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Source: NFHS-5 data

From Table 1 it is seen that each food item is consumed significantly at a greater percentage by unemployed female than the employed female (except the consumption of egg). While disparities in each of these food items are evident, we use a more encompassing index of food intake that considers joint consumption of these items for our empirical exercise. This is because people might prefer to substitute plant-based protein for animal-based nutrient and vice versa according to their preference and food habits. In fact, nutritional status does not mean consumption of one food item rather it is a basket of different food items. Thus, we compute a composite index in order to find out the nutrition status of female.

In constructing the nutrition index, we utilize the frequency of intake for food items such as milk or curd, pulses or beans, dark green leafy vegetables, fruits, eggs, fish, chicken, or meat. The NFHS data classifies frequency as ‘never’, ‘daily’, ‘weekly’, and ‘occasionally’, originally coded as 3, 2, 1, and 0, respectively. To emphasize regular intake, we recode these as 0, 3, 2, and 1, assigning higher weight to daily (3) and weekly (2) consumption compared to ‘never’ (0) and ‘occasionally’ (1). Aggregating the intake of all food items allows us to account for potential substitution between animal and vegetable proteins in achieving nutritional targets. The maximum score across seven food items is 21, and the minimum is 0. The nutrition index is then standardized as the ratio of the difference between an individual's total intake and the minimum possible intake to the range between maximum and minimum intake.

$$\text{Nutrition index} = \frac{\text{Total intake} - \text{Minimum intake}}{\text{Maximum intake} - \text{Minimum intake}}$$

It ranges between zero to one where zero refers to lowest nutritional status and one refers to the highest. The primary variable of interest in our analysis is female employment status, which is a binary variable coded as 1 for currently working or employed, and 0 for not working or unemployed. In the couple data from the rural sample, 31% of women are employed. As additional controls for the nutritional status of married women, we incorporate several socio-economic covariates. Socio-cultural factors significantly influence the distribution of household resources, which, in turn, affects women's nutrition. Age is a key determinant; we classify respondents into three age groups—15-24 (young age), 25-34 (reproductive age), and 35-49 (middle age). While the food intake capacity of women tends to decrease with age (Agarwal & Verma, 2015), older women often have greater command over household resources. Thus, the relationship between age and food intake is ambiguous and requires careful control. Caste also plays a critical role in shaping nutritional outcomes, as it channels the effects of poverty and social stigma. Women from general castes are generally better off nutritionally than those from scheduled castes (SC), scheduled tribes (ST), and other backward classes (OBC) (Dahiya & Biswanathan, 2015; Jungari & Chauhan, 2017). Similarly, religion influences nutritional patterns, with Hindu women—who are more likely to follow a vegetarian diet—facing lower nutrition levels compared to Muslim and other religious groups, which tend to consume more animal protein (Dahiya & Biswanathan, 2015; Bharati et al., 2019; Dandapat et al., 2023). We categorize religion into three groups—Hindu, Muslim, and others—based on the distribution of respondents: 77% Hindu, 10% Muslim, and 13% other religions.

Education is another important factor; as higher educational attainment is associated with better nutritional outcomes. Education fosters awareness of healthy food choices and promotes improved nutritional intake (Bharati et al., 2019; Sangeetha et al., 2019). Wealth status is positively correlated with nutritional outcomes, as wealthier households have the means to purchase higher-quality and more diverse food (Bharati et al., 2019). Here we categorize the wealth index into four groups: poorest, poorer, middle and richest⁴. For married women, their nutritional status may also be influenced by the husband's education and employment status. A husband's education can shape household culture and priorities, while his employment status affects household income, thereby impacting the resources available for nutrition. Thus, at the individual level, we control for factors such as age, caste, religion, and education. At the household level, we include the number of children, husband's education, husband's employment status, and the household's wealth index. Recognizing the potential endogeneity of female employment, we use leave-out-mean of female employment at the district level as an instrument, following the approach of Lenze & Klasen (2016), and Dhanaraj and Mahambare (2022).

Table 2 shows the summary statistics of all variables including the instrumental variable. The average value of the nutrition index of women for the overall married sample is 0.55. Interestingly, the sample weighted average of the nutrition index for unemployed women (0.58) is significantly higher than for employed women (0.56), suggesting a potential inverse relationship between employment and nutritional status in this context.

Table 2: Summery statistics of variables

Variable	Percentage
<i>Dependent variable</i>	

⁴ Richer and richest are clubbed into a single group from the original data, to explain the wealthiest class.

<i>Nutrition index</i>	Standardized value*	0.55
<i>Independent variable</i>		
<i>Employment</i>	Employed	0.31
<i>Individual characteristics</i>		
<i>Women's age group</i>	15-24 years	15.86
	25-34 years	39.02
	35-49 years	45.13
<i>Women's caste</i>	General	15.95
	SC	20.28
	ST	24.40
	OBC	39.37
<i>Women's religion</i>	Hindu	76.98
	Muslim	10.28
	Others	12.74
<i>Women's education</i>	Number of years*	5.84
<i>Household characteristics</i>		
<i>Children under age 5</i>	Number*	0.65
<i>Husband's education</i>	Number of years*	7.38
<i>Husband's employment status</i>	Employed	89.85
<i>Wealth status</i>	Poorest	26.25
	Poorer	26.74
	Middle	22.43
	Richest	24.58
<i>Instrument</i>		
<i>Mean leave-out-female employment</i>	Employment of women at district level*	0.31

Notes: * denotes the quantitative variables whose mean values are reported, while other variables are qualitative and their percentages are reported.

Source: NFHS-5 data

To account for the possibility that food intake and employment patterns are influenced by economic development, we utilize nighttime luminosity data from the SHRUG dataset at the district level. Night light intensity is commonly employed as a proxy for electrification (Bhukta et al., 2023), urbanization (Dhamija et al., 2023; Gupta et al., 2024), and GDP growth (Henderson et al., 2011), making it a useful indicator of economic well-being. In this study, we leverage it as an alternative measure of district-level economic development to test the robustness of our primary results. The luminosity data, obtained from the Visible Infrared Imaging Radiometer Suite (VIIRS) program of the National Oceanic and Atmospheric Administration (NOAA), spans the years 2012 to 2021 for 610 districts in India. Luminosity values range from 0 (lowest) to 63 (highest) per 1 km × 1 km grid cell (Asher et al.,

2021). We standardize the district level ‘mean night light’ data for each year from 2012-2019⁵ (Roy & Mukherjee, 2023), then the average of the standardized value at district level is merged with NFHS-5 data. The standardized night light variable can be written as:

$$SNL_i = \frac{NL_i - NL_i^{min}}{NL_i^{max} - NL_i^{min}},$$

Where SNL_i is the standardized night light at district i , NL_i is ‘mean night light’ at district i , NL_i^{min} is minimum night light at district i and NL_i^{max} is maximum night light at district i . For the empirical analysis, districts are classified into two quintiles—low night light and high night light districts—based on the average SNL_i (per square kilometer) at the district level (Anukriti et al., 2023).

3.2 Estimation Strategy

To analyze the relation between women employment and nutritional status, the following baseline model is estimated as:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 W_i + \mu_d + \varepsilon_i \quad \text{----- (1)}$$

where dependent variable Y_i represents nutritional status of i^{th} women measured by nutrition index; X_i refers to women employment status; W_i is the vector of control variables; μ_d includes the district dummies to reduce the bias related to district level characteristics and ε_i is the error term. Here β_1 is the coefficient of interest, measures the association between employment and nutritional status of female.

Initially, the study estimates the parameters of the baseline regression equation using Ordinary Least Squares (OLS). However, the explanatory variable—female employment—may be endogenous with respect to nutrition due to potential reverse causality or omitted variable bias. Specifically, while female employment might impact nutritional status, with literature indicating that employed women can be more undernourished compared to their unemployed counterparts (Imai et al., 2014; Dahiya & Biswanathan, 2015), improved nutrition and its associated benefits, such as enhanced productivity and health, might also positively influence employment status (Costa-Font & Ljunge, 2018; Nappo, 2019). This implies the possibility of bidirectional causality between employment and nutrition. Additionally, unobserved factors, such as social norms or cultural beliefs, could concurrently affect both women's employment and their nutritional status.

To overcome this problem of endogeneity, the instrumental variable approach i.e., the method of two stage least square (2SLS) is used. The first stage regression equation is written as:

$$X_i = \alpha_0 + \alpha_1 Z_d + \alpha_2 W_i' + \mu_s' + \varepsilon_i' \quad \text{----- (2)}$$

⁵ We exclude the data of night light for the year 2020 and 2021 because these years might absorb the impact of pandemic Covid-19 which might give us biased estimates.

Here Z_d is the instrument defined as the leave-out-mean⁶ of female employment at the district level such that $cov(Z_d, \varepsilon'_i) = 0$. This district level rural female employment captures the culture of employment in the rural area of the concerned district, condition of market for the female labour and attitude towards female employment that unexpected to hamper the nutrition of female (Lenze & Klasen, 2016; Dhanaraj and Mahambare, 2022).

The instrument helps control for omitted variables such as cultural norms within the community, particularly patriarchal beliefs that negatively affect women's empowerment (Gupta & Yesudian, 2006; Chaudhry & Nosheen, 2009). Higher female employment at the district level influences individual women's employment through the channel of community culture, which can, in turn, affect women's nutritional outcomes. This approach assumes no direct relationship between community-level workforce participation and individual nutrition. However, there may still be unobserved district-level factors that influence both district-level female employment and nutrition, which could indirectly affect individual nutrition. To address this potential concern, we include district-level control variables, such as the mean years of women's education and median household wealth, in the baseline regression. These controls account for broader socio-economic conditions at the district level. After including these district-level controls, we find the results remain insignificant (Table A1, Appendix A), suggesting that the potential endogeneity from district-level factors is minimal.

The estimated women employment at individual level is then substituted in Eq. (1) to get the 2SLS equation. The equation is as followed:

$$Y_i = \beta_3 + \beta_4 \hat{X}_i + \beta_5 W_i'' + \mu_s'' + \varepsilon_i'' \quad \text{----- (3)}$$

Here β_4 is the coefficient of interest and it measures the association between employment and nutrition of women.

4. Results

4.1 Baseline Regression and Two Stage Regression

To examine the association between nutrition and employment econometrically, we begin by using the OLS method to estimate the baseline regression specified in Eq. (1). The results of these regressions are presented in Table 2.

In the first column, we report the estimates of the nutrition index on employment without accounting for district fixed effects or control variables. The results indicate that, on average, employed women have lower nutrition levels compared to their unemployed counterparts.

In the second column, district fixed effects are included, and in the third column, control variables are added along with the district fixed effects. In both cases, the estimated coefficients maintain the same negative sign as observed in the initial estimation, confirming the robustness of the negative association between employment and nutrition across different model specifications.

⁶ The i^{th} individual is excluded before estimation of mean value to avoid the correlation between the employment status of the concerned woman and average female employment at district level.

The results in Table 3 clearly show that employed women in the age groups 25–34 and 35–49 have lower nutrition levels compared to the reference group of women aged 15–24. This may be attributed to the higher protein intake requirements among younger women, as suggested by Bhandari et al. (2016). Additionally, the findings indicate that employed women from the general caste have significantly lower nutrition levels than women from Scheduled Castes (SC) and Scheduled Tribes (ST). Religious differences are also notable, with women belonging to Muslim and other religious groups consuming foods more frequently compared to Hindu women. Furthermore, the OLS estimates reveal that an increase in years of education and higher wealth status are positively associated with better nutrition among employed women.

Table 3: Effect of female employment on nutrition- OLS estimates

	Nutrition		
	(1)	(2)	(3)
Employed	-.005*** (.002)	-.008*** (.001)	-.003* (.001)
Age group			
(25-34)			-0.004** (0.002)
(35-49)			-0.005*** (0.002)
Caste			
Scheduled caste			0.020*** (0.002)
Scheduled tribe			0.014*** (0.003)
OBC			-0.000 (0.002)
Religion			
Muslim			0.077*** (0.004)
Other			0.009** (0.004)
Respondent's Education			0.001*** (0.000)
Husband's Education			-0.000 (0.000)
Husband's employment			
Employed			-0.001 (0.002)

Number of children			0.003*** (0.001)
Wealth index			
Poorer			0.017*** (0.002)
Middle			0.027*** (0.002)
Richest			0.037*** (0.003)
District fixed effects	x	✓	✓
Control variables	x	x	✓
Constant	.555*** (.001)	.556*** (.002)	0.512*** (0.004)
Observations	43,581	43,581	41,228
R-squared	.0003	.237	0.330

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

The 2SLS estimates, presented in Table 4, produce results consistent with the OLS estimates, confirming that employed women have lower nutrition levels compared to their unemployed counterparts, even after accounting for endogeneity. Importantly, the 2SLS coefficient is larger in absolute magnitude than the OLS coefficient, suggesting that the negative impact of employment on nutrition is more severe when employment is treated as endogenous. This implies that the nutrition of employed women deteriorates further once endogeneity is properly accounted for. In the 2SLS model, state fixed effects are included instead of district fixed effects, as district-level female employment—used as an instrument—captures district-specific characteristics.

The bottom panel of Table 4 presents the tests for relevance and validity of the instrument. The p-value for the endogeneity test is statistically significant, leading to the rejection of the null hypothesis that the variables are exogenous. This confirms the endogeneity of the instrument and supports the use of the instrumental variable approach. The first-stage F-statistic (Sanderson-Windmeijer F test) exceeds the rule-of-thumb threshold of 10, indicating that the null hypothesis of weak instruments is rejected. Additionally, both the Kleibergen-Paap rk LM statistic and the Cragg-Donald Wald F statistic are significant, further validating the instrument's relevance and strength. These results collectively suggest that the mean rural female employment at the district level is a valid and relevant instrument for exploring individual-level employment status.

Table 4: Effect of female employment on nutrition- 2SLS estimates

Nutrition

	(1)	(2)
Employment	-0.069*** (0.014)	-0.052*** (0.016)
Constant	0.613*** (0.007)	0.515*** (0.009)
State fixed effects	✓	✓
Control variables	x	✓
Observations	43,581	41,228
R-squared	0.201	0.238
<i>Tests of relevance</i>		
First stage coefficient	0.675*** (.029)	0.600*** (.029)
Robust regression F (Endogeneity test)	18.857 (0.000)	9.757 (0.000)
<i>Tests of instrument validity</i>		
F test of excluded instrument		
Sanderson-Windmeijer F test	556.32 (0.00)	419.18 (0.00)
Under-identification test		
Kleibergen-Paap rk LM statistic	371.32 (0.00)	304.330 (0.00)
Weak- identification test		
Cragg-Donald Wald F statistic	1020.87	758.704
10% maximum IV value	16.38	16.38

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

To further investigate whether the food intake patterns vary across different economic classes, the total sample is divided into four wealth groups: poorest, poorer, middle, and richest. The 2SLS estimates (Table 5) reveal that employed women have lower nutrition levels compared to their unemployed counterparts across all wealth groups. Importantly, the results indicate a consistent negative impact of employment on nutrition, even among the wealthiest classes. This finding suggests that the adverse effect of employment on nutrition is persistent regardless of wealth level or economic status. Therefore, economic status does not appear to mitigate the nutritional disadvantages faced by employed women.

Table 5: Effect of employment on nutrition- Wealth status wise

	Poorest	Poorer	Middle	Richest
Employment (2SLS)	-0.025 (0.025)	-0.067*** (0.025)	-0.053** (0.024)	-0.088*** (0.033)
State fixed effects	✓	✓	✓	✓
Observations	10,924	10,259	10,924	10,259

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

4.2 Plausibly exogeneity test

To address concerns regarding the exogeneity of our instrument, we employ the plausible exogeneity approach as outlined by Conley et al. (2012). This method allows us to assess whether the impact of employment on nutrition remains significant, even under potential violations of the strict exogeneity assumption of the instrument. Specifically, we explore whether the negative effect of employment on nutrition persists when our instrument, district-level female employment, is not fully exogenous. We begin by estimating a reduced form equation in which the instrument is directly regressed on nutrition, controlling for all covariates, but excluding the endogenous variable, individual employment. The coefficient from this reduced form regression is then used as the lower bound (minimum gamma) in Conley's framework, while the upper bound (maximum gamma) is set to zero, assuming no direct effect of the instrument on nutrition. Using the `plausexog` command in Stata, we estimate the second-stage coefficient (β) of employment on nutrition, which ranges between -0.072 and 0.019. Additionally, we estimate the maximum bound of $\gamma(\gamma_{max})$ as -0.019, which corresponds to approximately 61% of the reduced form effect. These results suggest that the negative impact of employment on female nutrition is robust to a significant degree of instrument endogeneity. In particular, even if the instrument has a direct effect on nutrition accounting for a substantial portion of the reduced form relationship, our main finding remains valid.

Table 5: Plausible exogeneity of instrument

<i>Dependent Variable</i>	Nutrition
$\hat{\gamma}$	-0.031*** (.009)
Control variable	✓
State fixed effects	✓
Observations	41,228
β (Lower bound)	-0.072
β (Upper bound)	0.019
γ_{max}	-0.019

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

4.2 Further Robustness check

4.2.1 Effect of employment on various food items

We investigate whether the relationship between nutrition and employment remains consistent when considering individual food items separately. The regression estimates show that employed women have greater consumption of non-vegetarian food items compared to unemployed women, with significant reductions observed in milk, vegetables, and pulses. However, the intake of eggs is positively and significantly related to employment (Table A3, Appendix). When accounting for the endogeneity of employment using the 2SLS method, the results indicate that unemployed women are more nourished than employed women in terms of both vegetarian and non-vegetarian food items. Specifically, employed women have lower protein intake, whether from plant-based or animal-based sources. All coefficients are negative except for fruit, with significant reductions noted for milk and fish.

These results confirm that the negative relationship between employment and nutrition is robust across different food categories, highlighting that the adverse impact of employment on nutritional status persists regardless of the type of food consumed.

4.2.2 Effect of employment on BMI

The use of Body Mass Index (BMI) as an indicator of nutritional status is well-established in the literature (Nube & Boom, 2003; Kshatriya & Acharya, 2016; Biswas et al., 2017; Kibria et al., 2019). In our study, undernourishment is defined as a BMI below 18.5 kg/m², while a BMI between 18.5 and 24.9 kg/m² is categorized as nourished, and a BMI above 24.9 kg/m² is considered overnourished. Given that our focus is on protein intake allocation rather than food scarcity or availability, we classify the sample into two categories: undernourished (BMI < 18.5) and non-undernourished (BMI ≥ 18.5). BMI is treated as a binary variable, with 0 indicating undernourished and 1 indicating non-undernourished. Using a logit model, we find that the probability of being non-undernourished is lower for employed women compared to unemployed women, as shown in Column 1 of Table A4 (Appendix), consistent with our earlier findings.

Since employment is also endogenous with respect to BMI, we address this issue using the two-stage residual inclusion (2SRI) method, appropriate for scenarios where both the outcome variable and the endogenous variable are binary or non-linear. This method is similar to 2SLS but incorporates the predicted values and residuals from the first stage as additional instruments. In the first stage, we estimate the equation using a logit model. The predicted values and residuals from this stage are then used as instruments in the second stage to estimate the coefficient of interest (Terza et al., 2008). The 2SRI estimates, presented in Column 2 of Table A4 (Appendix), reaffirm the negative association between employment and nutrition. This confirms the robustness of our results, highlighting that the negative impact of employment on nutrition remains consistent even after addressing endogeneity using the 2SRI method.

4.2.3 Effect of employment on nutrition controlling the interview timing

Additionally, we include the timing of the interview in the model to determine whether the COVID-19 pandemic influenced women's nutritional status. Specifically, 69% of the NFHS interviews were conducted before the epidemic, while 31% occurred during the pandemic. Given the significant job losses and income reductions associated with the pandemic (Karim and Tasnim, 2022; Picchioni et al., 2022), there may be systematic changes in nutrition related to the timing of the survey that reflect the pandemic's impact.

To address this concern, we incorporate the timing of the survey as an additional control in the 2SLS regression. Despite this adjustment, the timing of the interview does not affect the direction of the association between nutrition and employment (Table A5, Appendix). This result is consistent regardless of whether the explanatory variable is considered exogenous or endogenous. Therefore, the negative relationship between employment and nutrition remains robust, even after accounting for the potential effects of the COVID-19 pandemic.

4.2.4 Effect of employment on nutrition- Sub sample: Nightlight districts

We categorize the full sample based on the economic condition of the area, as indicated by the number of night lights. The districts are divided into two quintiles: those with low night lights (below median) and those with high night lights (above median) per square kilometer.

When examining the association between employment and nutrition, we observe a negative but insignificant relationship in both low and high night lights districts, assuming employment is exogenous (Upper panel of columns 1 & 2, Table A6, Appendix). However, after addressing the endogeneity of employment, the estimates reveal a significant negative impact on nutrition in both districts.

These results indicate that women's nutrition is influenced primarily by their employment status rather than the economic conditions of the area, as reflected by the number of night lights. This confirms the robustness of our original findings, demonstrating that the negative relationship between employment and nutrition remains consistent across different measures of economic conditions.

4.3 Mediating channels

Female employment may influence nutrition through two potentially opposing channels. On one hand, employment might enhance a woman's bargaining power, potentially increasing her autonomy in household decision-making. On the other hand, employed women could face punitive measures aimed at extracting additional labour to compensate for the time spent outside the home. These punitive actions, which may include spousal violence could arise as a means to avoid the household incurring additional costs to maintain domestic chores. This scenario might be more prevalent in rural contexts where women have limited exit options, restricting their bargaining power within the household (Rahaman et al., 2011; Fakir et al., 2016; Bargvall, 2024). In our analysis, partner violence is used as a potential indicator of such punitive actions. We hypothesize that the effects of female employment on nutrition might operate through these channels, and the observed negative association

between employment and nutrition could occur if the benefits of increased autonomy are outweighed by male backlash, manifested as spousal violence.

While employment may lead to greater female autonomy, it is important to note that nearly 20% of the rural sample we analyze are engaged in unpaid work. To examine the specific effect of paid employment, we generate the variable "*Paid*," which takes the value of one if the woman is in paid employment and zero if she is either in unpaid work or unemployed. Decision-making power is measured using responses to questions about household decisions, including who decides on "the respondent's healthcare," "large household purchases," "visits to family and relatives," and "how the money her husband earns is spent". A woman is coded as unity, i.e. having decision-making power if she either makes all four household decisions alone or jointly with her husband; otherwise, she is coded as zero.

We report the results of OLS as well as 2SRI (that estimates binary endogenous regressor) that shows a positive association between paid employment and decision-making power (Table 6), suggesting that women who are employed and paid tend to have greater autonomy in household decision-making. These findings are consistent with previous studies, which suggest that employed women typically have more decision-making authority compared to their unemployed counterparts, likely due to an increase in bargaining power through financial empowerment (Tebekaw, 2010; Mamun and Hoque, 2022; Gupta & Roy, 2023). Whether employment is exogenous or endogenous, it appears to enhance women's decision-making power within the household.

Table 6: Influence of employment on decision-making power

	Decision making	
	(1)	(2)
	logit	2SRI
Paid	.013**	.016**
	(.006)	(.008)
Control variables	✓	✓
District fixed effects	✓	-
State fixed effects	-	✓
Observations	41,228	41,228

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Next, we examine the relationship between female employment and reported spousal violence. Spousal violence is measured based on the female respondent's experience of violence in the last 12 months, as well as throughout the entire period of marriage up to the time of the survey. The indicators of violence, include: "Spouse pushed, shook, or threw something," "Spouse twisted her arm or pulled her hair," "Spouse slapped," "Spouse punched with fist or something harmful," "Spouse kicked, dragged, or beat," "Spouse tried to choke or burn," "Spouse

threatened or attacked with a knife, gun, or other weapon,” “Spouse physically forced sex when not wanted,” “Spouse forced other sexual acts when not wanted,” and “Spouse threatened or forced in any other way to perform sexual acts when not wanted.” If a woman responds ‘yes’ to at least one of these questions, the presence of spousal violence is coded as 1, otherwise as 0.

Table 7 shows a positive association between female employment and spousal violence, indicating that employed women are more likely to experience spousal violence than their unemployed counterparts. This finding suggests that increased exposure outside the home may exacerbate male dominance, leading to higher incidences of violence against employed women. It implies that as women gain more autonomy and independence through employment, they may also face greater resistance or backlash from their spouses, resulting in higher levels of violence.

Table 7: Influence of employment on spousal violence

	Spousal violence (ever)		Spousal violence (last 12 months)	
	(1)	(2)	(3)	(4)
	logit	2SRI	logit	2SRI
Paid	.062*** (.006)	.083*** (.008)	.051*** (.006)	.060*** (.007)
Control variables	✓	✓	✓	✓
District fixed effects	✓	-	✓	-
State fixed effects	-	✓	-	✓
Observations	32,786	33,102	32,637	33,102

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

To assess how the relative strength of bargaining power and spousal violence influences nutritional outcomes among employed women, we first incorporate both employment status and the interaction term between decision-making power and spousal violence into the nutrition equation, while addressing the endogeneity of employment using Two-Stage Least Squares (2SLS). Subsequently, we analyze the model excluding the employment variable to examine the sign of the interaction term.

If paid employment is associated with both increased bargaining power and spousal violence, then we would expect the interaction effect between decision-making power and spousal violence to be significant in the absence of employment. In line with this expectation, the first two columns in Table 8 show that the interaction term is negative but statistically insignificant when employment is included in the model. This suggests that the effects

of bargaining power and spousal violence are not clearly separated when employment is accounted for. However, in columns 3 and 4, where employment is omitted from the model, the interaction term becomes significantly negative. This significant negative interaction term indicates that spousal violence appears to outweigh the potential gains in autonomy from paid employment. These findings highlight the complex dynamics between employment, bargaining power, and spousal violence, suggesting that spousal violence may have a more substantial impact on nutritional outcomes than the benefits of increased autonomy through employment.

Table 8: Effect of interaction of decision making and spousal violence on nutrition

	Nutrition			
	2SLS (1)	2SLS (2)	OLS (3)	OLS (4)
	Spousal violence (ever)	Spousal violence (last 12 months)	Spousal violence (ever)	Spousal violence (last 12 months)
Paid	-0.070*** (.023)	-0.070*** (.023)	-	-
Interaction term of Decision making and Spousal violence	-.003 (.003)	-.004 (.004)	-0.006** (.003)	-0.006* (.003)
Control variables	✓	✓	✓	✓
State fixed effect	✓	✓	-	-
District fixed effects	-	-	✓	✓
Observations	33,102	33,102	33,102	33,102

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

4.4 Heterogeneity check

Occupational variation and place of residence may influence women's nutritional status, which we examine through sub-sample analysis. First, we categorize the working women into two groups based on their job profile: white-collar and non-white-collar jobs. As shown in Table 9, women employed in white-collar jobs exhibit better food intake compared to those in non-white-collar occupations when the employment variable is treated as exogenous. The results remain consistent even after accounting for the endogeneity of employment.

To validate these findings, we explore potential mediating channels and find that the estimates remain robust. White-collar women experience lower levels of spousal violence and possess greater decision-making power within the household, leading to enhanced bargaining power over household resources. This, in turn, results in better nutrition compared to non-white-collar women. The results highlight that women in white-collar jobs, due to their greater financial independence, face reduced male dominance in the household, further improving their nutritional outcomes.

Table 9: Sub-sample analysis - Occupation wise**Effect of employment on nutrition and spousal violence and decision-making power**

	Nutrition		Spousal violence (ever)	Spousal violence (last 12 months)	Decision-making power
	(OLS)	(2SLS)	(logit)	(logit)	(logit)
White collar	0.023*** (0.004)	.078** (.031)	-0.059*** (0.015)	-0.035** (0.015)	0.059*** (0.014)
District fixed effects	✓	-	✓	✓	✓
State fixed effects	-	✓	-	-	-
Observations	16,245	16,245	12,827	12,630	16,063

Notes: The instrument is used here as the mean white-collar job at district level. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Secondly, to account for regional differences in food intake behaviour across India, we classify the states into five regions: Northern, Eastern, Western, Southern, and North-Eastern. The estimates for each region are presented in Table 10. The OLS results are consistent with the original regression, showing that employed women tend to have lower nutritional status compared to unemployed women in three regions, with the exception of the Western region, where the coefficient is positively significant, indicating that employed women have better nutrition.

When accounting for the potential endogeneity of employment status using a Two-Stage Least Squares (2SLS) approach, the results remain consistent with the OLS estimates. However, the coefficients become stronger under 2SLS, suggesting that the relationship between employment and nutrition is more pronounced once the endogeneity of female employment is addressed.

Table 10: Sub-sample analysis – Region wise

	Northern state	Eastern state	Western state	Southern state	North-eastern state
Employment (OLS)	-0.004 (0.004)	-0.011*** (0.003)	0.010*** (0.003)	-0.011*** (0.004)	-0.010** (0.004)
District fixed effects	✓	✓	✓	✓	✓
Observations	9,876	10,393	6,031	8,759	5,767

Employment	0.071	-0.147***	0.102***	-0.314***	-0.091***
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(2SLS)

	(0.052)	(0.025)	(0.017)	(0.061)	(0.028)
State fixed effects	✓	✓	✓	✓	✓
Observations	8,759	5,767	9,876	10,393	6,031

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

4.5 Influence of Male Nutrition

If nutritional inadequacy is more of an allocation issue than one of scarcity, it becomes important to assess how female nutrition is impacted by employment when conditioned on male nutrition. To explore this, we introduce an interaction term between female employment and male nutrition. The male nutrition index is constructed in the same manner as the female nutrition index. The model can be written as:

$$Y_i = \beta_0 + \beta_1(X_i \times M_i) + \beta_2 W_i + \mu_d + \varepsilon_i \text{ ----- (5)}$$

Where M_i is the nutrition index of the i^{th} woman's husband. The negatively significant β_1 coefficient (Table A2, Appendix A) indicates that the nutrition of employed women declines as their husband's nutrition improves. This implies that resources may be disproportionately allocated in favour of the male household member, particularly in households where the woman is employed.

To further investigate this dynamic, we assess whether employed women experience greater nutritional disadvantage compared to their male counterparts within the same household. We construct a deprivation index, which measures the relative deprivation of women compared to men in terms of nutrition. The deprivation index is expressed as:

$$\text{Deprivation index} = \frac{\text{Female nutrition index} - \text{Male nutrition index}}{\text{Male nutrition index}}$$

$$> 0, \text{ if Female nutrition} > \text{Male nutrition}$$

$$\leq 0, \text{ if Female nutrition} \leq \text{Male nutrition}$$

We also consider an alternative deprivation measure based on the regularity of food intake, where the nutrition index is assigned a value of unity if food intake is regular and zero otherwise. The regression results indicate that the coefficient of female employment is negatively significant for these deprivation measures. This suggests that employed women are more likely to experience nutritional deprivation relative to men within the household. The finding further reinforces the notion that employment does not necessarily translate into improved nutritional outcomes for women, highlighting a potential intra-household resource allocation bias.

5. Conclusion

In this paper, we explore the relationship between female employment and food intake using NFHS data for married couples in rural India. Our findings reveal a significant negative impact of employment on women's nutritional intake, with employed women consuming less food compared to their unemployed counterparts. This result holds up to extensive robustness checks, including analyses across wealth categories, proxied by sample wealth quintiles and district-level nightlights, suggesting that the negative employment effect on nutrition persists even among women from higher economic strata. We address potential endogeneity concerns and provide evidence indicating that male backlash in rural areas often outweighs the autonomy gains that women might derive from employment, leading to a reduced command over food resources for working women. Additionally, we observe skewed intra-household food allocation, where employed women receive significantly less food relative to their male counterparts.

The negative association between female employment and nutrition reflects deeper issues related to intra-household resource allocation and gender dynamics. In settings where male-dominated social norms persist, female employment may provoke household conflicts and spousal violence, limiting women's access to food and other essential resources. This suggests that the mere increase in employment opportunities for women is not sufficient to improve their well-being. The economic benefits of employment may be undermined by the adverse effects of gendered power imbalances within households, where working women may be compelled to shoulder additional household responsibilities or face punitive measures from their spouses, reducing their ability to translate income into better nutrition.

From a policy perspective, our findings underscore the need for more comprehensive interventions that extend beyond merely increasing employment opportunities for women. First, workplace policies should be designed to address nutritional deficiencies among employed women directly. Given that many employed women spend significant time outside the home and often face spousal violence, providing dietary support at the workplace—such as through subsidized meals or workplace nutrition programs—can help mitigate the adverse nutritional effects of employment. In this context, strengthening the nutrition norms outlined in the Occupational Safety Health and Working Conditions (OSHC) Code of 2020, and expanding these protections to informal sector workers through self-help groups, would be an important policy step. Moreover, promoting sector-specific implementation of the EatRight campaign, which emphasizes sustainable production and consumption of healthy food, could further improve dietary standards for working women⁷.

Additionally, addressing the psychosocial stress and conflicts that arise from employment is crucial. Policies such as workplace counselling services, support groups, and conflict-resolution mechanisms could help reduce the household tensions that employed women face, particularly in settings where spousal violence is a concern. These interventions would not only improve women's mental health but could also indirectly enhance their physical health and nutritional status.

One important limitation of our research is the lack of detailed data on the actual quantity of food intake. This information would have allowed us to better understand the degree of energy deprivation among working women

⁷ <https://www.gainhealth.org/sites/default/files/publications/documents/Existing-workforce-nutrition-policies-in-India-and-opportunities-for-improvement.pdf>

and to determine whether the nutritional trade-offs vary by job type or family structure. Addressing this gap would provide more nuanced insights into how employment impacts women's nutrition, especially across different sectors and social contexts. Future research should aim to fill this gap, contributing to a more detailed understanding of how employment conditions influence women's health and well-being.

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Appendix

Table A1: Exogeneity test: Effect of female employment on nutrition-District level

	Mean nutrition at district level
	(OLS)
Mean female employment- district	-.040 (.027)
Mean education of women- district	.004** (.002)
Median wealth- district	.001 (.004)
State fixed effects	✓
Observations	43581

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Table A2: Effect of male nutrition on female nutrition

	Nutrition
	(OLS)
Female employment \times Male nutrition index	-.016* (.010)
District fixed effects	✓
Control variables	✓
Observations	41,228

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Table A3: Influence of employment on various food items

	Milk or curd	Pulse or beans	Green leafy vegetables	Fruits	Eggs	Fish	Chicken or meat
Employment (OLS)	-0.041*** (0.011)	-0.017 (0.012)	-0.020* (0.012)	-0.040*** (0.011)	0.023** (0.009)	0.007 (0.009)	0.008 (0.009)
Observations	41,228	41,228	41,228	41,228	41,228	41,228	41,228
District fixed effects	✓	✓	✓	✓	✓	✓	✓
Employment (2SLS)	-0.690*** (0.113)	-0.020 (0.118)	-0.043 (0.125)	0.097 (0.105)	-0.080 (0.099)	-0.388*** (0.098)	-0.032 (0.096)
Observations	41,228	41,228	41,228	41,228	41,228	41,228	41,228
State fixed effects	✓	✓	✓	✓	✓	✓	✓

Here the standardized value of food items is used as dependent variable.

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Table A4: Effect of employment on BMI

	BMI	
	(logit)	(2SRI)
Employment	-0.011*** (0.004)	-0.013*** (0.004)
District fixed effects	✓	-
State fixed effects	-	✓
Observations	39,275	40,546

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Table A5: Effect of female employment on nutrition controlling timing of interview

	Nutrition	
	(OLS)	(2SLS)
Employment	-0.003*	-0.059***
	(0.001)	(0.016)
Control variables	✓	✓
Time of interview	✓	✓
District fixed effects	✓	-
State fixed effects	-	✓
Observations	41,228	41,228

Notes: Timing of interview along with all control variables are taken into account. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data

Table A6: Effect of employment on nutrition- Sub sample: Nightlight districts

	Nutrition	
	Average nightlight (Below median districts)	Average nightlight (Above median districts)
	(1)	(2)
Employment (OLS)	-.001	-.002
	(.002)	(.002)
Control variables	✓	✓
District fixed effects	✓	✓
Observations	17,072	16,498
Employment (2SLS)	-.045*	-.057*
	(.023)	(.031)
Control variables	✓	✓
State fixed effects	✓	✓
Observations	17,072	16,498

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data and SHRUG data

Table A7: Influence of employment on deprivation of nutrition among women

	Deprivation	
	Standard nutrition index	Regular nutrition index
	(OLS)	(OLS)
Employment	-0.008* (0.005)	-0.032*** (0.012)
District fixed effects	✓	✓
Observations	41,224	32,500

Notes: ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Robust standard errors clustered at PSU level are in parentheses.

Source: NFHS-5 data