

# *Opportunities for Indian Women in Gig Jobs without Using Digital Platforms: The Importance of Vocational Training*

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Flexible working hours can provide a better option for Indian women entering the workforce. This can be accomplished by engaging in gig jobs without depending on a digital platform, as many individuals have limited access to technology. Casual labourers and self-employed workers are considered gig workers who can perform their jobs without utilising digital platforms. The Probit model identifies the factors that can enhance the likelihood of such gig jobs occurring without the use of a digital platform for Indian women. By employing a Bivariate Probit regression model based on Periodic Labour Force Survey data for 2022–23 and addressing endogeneity, the paper demonstrates that both formal and informal vocational training positively influence women's participation in gig jobs without relying on any digital platform. However, the impact of informal training is more pronounced.

*Keywords:* gig job, own-account worker, casual wage labourer, unpaid household job, formal vocational training, bivariate probit regression

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## **Introduction**

The participation rate of the female labour force is low compared to that of their male counterparts. Globally, the labour force participation rate for men is 72%, while for women it is only 47% (International Labour Organization 2022). India is no exception in this regard. The Periodic Labour Force Survey (PLFS) of 2022–23 (National Sample Survey Office 2023) has revealed that the overall male labour force participation rate in India stands at 78.5%. In contrast, it is merely 22% for females (aged 15 and above). The reasons behind this low female labour force partic-

ipation rate in India include the dilemma between fulfilling household duties and contributing to family income (Kapsos et al. 2014), maternity and childcare (Sudarshan and Bhattacharya 2009), migration due to marriage (Premi 1980), lack of high-level skills, and various cultural and socio-economic factors. These constitute supply-side factors, whereas demand-side factors involve several institutional norms for women, labour market regulations, and gender-specific jobs for male candidates, among others. Occasionally, the jobs preferred by educated women are in shorter supply compared to those sought by educated male job seekers. Consequently, many women withdraw from the labour force (Klasen and Pieters 2015).

The fifth goal of the 17 Sustainable Development Goals within the 2030 Agenda is to achieve 'gender equality'. Women's empowerment is a crucial aspect of this (UN Women 2018). However, women's economic empowerment is not confined to their participation in the labour market; it also encompasses their role in the household economy. Traditionally, it has been believed that only women are responsible for the unpaid household task of nurturing the family. This also encompasses domestic chores and all forms of care work, including caring for elderly individuals, children, and sick household members (Sengupta 2016). Household work, being unpaid, is not recognised as an economic activity. Consequently, such work is not reflected in national statistics. In contrast, domestic duties performed by a domestic worker in exchange for cash or in-kind benefits are considered economic activities, and an appropriate activity status code has been assigned to them (National Sample Survey Office 2014). Setting aside those supply and demand factors, women in India are 'time-poor' due to the burden of unpaid household and care work. 'Time Poverty is the shortage of time available to devote to purely personal requirements, including leisure and relational activities' (Ghosh 2016, 1). It is challenging for working women to balance their professional and household responsibilities. Therefore, a gig job can be more suitable for them due to its flexible work arrangements. Gig workers can establish their schedules and flexible working hours to supplement their income for themselves and their families (DoorDash 2021).

The primary motivation for this study is grounded in the facts presented by the report *India's Booming Gig and Platform Economy* (National Institution for Transforming India, NITI Ayog, 2022). The report indicates that gig jobs will represent approximately 4.1% of the Indian workforce by 2030. 'Gig job' is generally defined as 'on-demand labour

services and precarious jobs, where a job is an actual task that needs to be done. According to the International Labour Organisation (International Labour Organization 2011), a 'precarious job is defined by uncertainty regarding the tenure of employment, an ambiguous employer-employee relationship, a lack of access to social security benefits, low pay, and legal and practical obstacles to joining a union and bargaining collectively.' The report further explains that gig jobs are performed on a short-term, task-based (specific assignment or duty) basis, often (though not always) facilitated by a digital platform, where workers are not traditional employees but independent contractors or service providers.

The Government of India introduced the Social Security Code in 2020, which recognised the gig job for the first time in the Indian labour market. This law defines a gig job holder as an individual engaged in income-generating activities outside the traditional employer-employee relationship (Ministry of Law and Justice, 2020, 8, Section 1(35)). However, this law does not specify whether a gig job will always be digital platform-based, and provides a separate definition of platform workers who use an online platform (Ministry of Law and Justice 2020, 10, Section 1(60 and 61)). Furthermore, gig job holders frequently participate in both offline and online modes. For instance, a platform taxi driver may sometimes also provide rides offline when there is low online demand or when the platform assigns fewer tasks (Arya 2023).

Examining the composition of the Indian labour force in 2019–20 reveals that 86% of urban informal workers were deprived of social security benefits, while the remaining 14% were formal jobholders (Roy and Kundu 2023). The Periodic Labour Force Survey (2021–22) data show that about 35% of the informal labour force are own-account workers, and 23% are casual workers. In both types of jobs, there is no traditional employer-employee relationship. In the National Institution for Transforming India (2022), these workers are categorised as non-platform gig workers as they do not require any online platform for their work. Thus, these two types of workers can be identified as gig workers, but they are not termed as platform workers (Gupta 2023, 20–21). On the other hand, online platforms generally offer hyperlocal jobs related to driving and delivery. Consequently, these roles require access to the internet and smartphones, which many women find challenging in a male-dominated society like India. According to the Mobile Gender Gap Report (Global System for Mobile Communications Association 2024), only 37% of women in India are mobile internet users, resulting in a gender

gap of approximately 30% in mobile internet adoption. Many women lack access to two-wheeler vehicles, which are typically advantageous for delivery purposes. The most pressing concern is the safety of women platform workers. They often fear for their security, especially in the evening when the demand for work or assignments is high. In many instances, they are also denied social security benefits from the platforms to which they are connected. Most surveys on gig job holders in India indicate a minimal presence of female workers in platform-based gig jobs. In a study on food delivery platform work conducted by the National Council of Applied Economic Research (National Council of Applied Economic Research 2023), 99% of the 924 respondents are male workers across 28 major cities in India. Most women engage in female-centric jobs, even on these platforms, such as cleaning and care-taking (Hunt and Samman 2019). They are also involved in beauty and wellness but are marginalised in the delivery and ride-hailing sectors of the gig economy (Chaudhary 2021). However, jobs in the beauty industry accounted for only 1.17% of the total jobs created in 2019 (BetterPlace 2019). Furthermore, according to the TeamLease EdTech (n.d.) study, female delivery partners earn 8–10% less per month than their male counterparts in India, highlighting the presence of the gender wage gap. Considering these factors, it can be concluded that a gig job that does not utilise online platforms could be a suitable job opportunity for Indian women.

Setting those matters aside, a question arises concerning the role of skill acquisition in women's participation in the job market. In today's world, skill acquisition is crucial for securing employment. In this context, the classic theoretical model by Galor and Zeira (1993) discusses the investment in human capital and an individual's decisions regarding skill formation. However, skills can be developed in various ways. One significant method is through vocational training. Vocational training can take both formal and informal forms. Workers in India with formal vocational training earn higher wages than those without such training (Bahl et al. 2021). Informal vocational training has been academically overlooked and is chosen by those who are educationally disadvantaged and lack economic capital (Bazaz and Akram 2022). Despite this, informal training equips a large segment of the workforce in the informal sector with valuable skills. Budget 2024–25 (Ministry of Finance 2024) considers 'Employment and Skilling' one of the priorities for Viksit Bharat (Developed India – a visionary initiative by the Government of India),

with over 2 million youth set to be skilled over five years under the Skill-ing Programme.

Against this backdrop, the paper aims to investigate the possible factors that lead a woman (18–45 years) to choose a gig job as a livelihood without using any digital platform. The investigation will utilise PLFS data for 2022–23 (National Sample Survey Office 2023). In addition to other demographic and socio-economic factors, the paper will also examine whether vocational (both formal and informal) training plays a significant role in enhancing the participation of women in gig jobs that do not rely on digital platforms for operation.

The study is organised as follows: the next section summarises the literature review on female labour force participation, gig jobs, and the importance of vocational training. This is followed by a description of the data and the methodology used. The results section discusses the significance of formal and informal vocational training concerning women's participation in gig jobs without using online platforms. Finally, concluding remarks, along with policy recommendations, are presented.

### **A Brief Review of the Literature**

It has already been mentioned that female labour force participation in India is markedly lower than that of males. Most women in India are compelled to undertake unpaid domestic jobs due to patriarchal societal norms, which dictate that women are solely responsible for household chores (Kabeer 2012). The burden of unpaid domestic work is significantly higher in the Eastern and Northern states compared to the Southern states (Mukherjee and Majumder 2015). The findings further suggest that faster economic growth, higher market wages, and improved education can reduce the proportion of unpaid work. Less educated women and those from society's lower wealth quintile tend to engage in unpaid domestic labour (Singh and Pattanaik 2020). However, the relationship between the female labour force participation rate (FLFPR) and monthly per capita consumption expenditure (MPCE) deciles is not U-shaped; instead, it is negative. Even women who are primarily graduates and belong to the higher-income class exhibit lower LFPR, illustrating the dominance of the income effect over education (Chatopadhyay and Chowdhury 2022). Both men and women are more likely to exit the labour market if they come from households with better economic conditions over the past decade, with this effect being more

pronounced for women (Chattopadhyay et al. 2023). Women in India are 12 to 23 percentage points less likely to take up a suitable job if they face a one-hour commute. They predominantly seek part-time, flexible roles close to home (Chatterjee and Sircar 2021). Conversely, Rey et al. (2021) have confirmed an inverted U-shaped relationship between the duration of maternity leave and female labour force participation, with a maternity leave threshold of around 30 weeks, beyond which female participation declines. Nonetheless, an increase in maternity leave results in higher female participation below this threshold. In contrast, according to National Institution for Transforming India (2022), women are more inclined to engage in gig jobs after their education and marriage. This is indeed a positive finding, as the macroeconomic trend indicates that married Indian women withdraw from the labour force due to caregiving responsibilities and to facilitate the family's upward social mobility.

In this context, some existing literature on female gig workers will be discussed. Kasliwal (2020) addresses the flexibility provided by gig platforms. The paper also offers suggestions to ensure social security benefits, as well as digital and physical safety for female gig workers. Similarly, women with young children prefer platform jobs due to their flexibility and attractive earning potential. However, it can be difficult for digitally illiterate women to participate in platform work (Institute for Financial Management and Research 2020). Female teachers (especially in the age group of 30-35 years) had fewer working hours than men across all age categories at Skyneq, the largest online English language learning school in Eastern Europe (Dokuka et al. 2022). The findings also indicate that women work less in the evenings within the gig economy. Signes (2017) examines whether those engaged in the gig economy are considered employees or self-employed and provides suggestions for new special labour regulations. Companies that connect customers directly with individual service providers conduct their business through workers they refer to as self-employed. Moreover, female employment has increased across all job categories: self-employed (34%), casual labourer (38%), salaried temporary job (39%), and permanent salaried job (26%) in urban areas during the unlock period of the pandemic. Additionally, the rise in casual labour for women is significantly higher in rural areas (Bansal and Mahajan 2023).

The paper by Hyland et al. (2020) has shown the global picture of gender discrimination by the law. Using the World Bank data, they find

positive correlations between more equal laws concerning women in the workforce and more equal labour outcomes. Occupational gender segregation exists in Slovenia, and females are in a better position concerning occupational segregation (Kovac et al. 2009). Field et al. (2021) explore how increasing control over earnings incentivises a woman to work in rural India. Women with paid, inflexible job have significantly better mental health than those who do unpaid household job only (Wang and Lu 2023).

Some studies examine whether vocational training enhances female labour force participation. Women at all education levels who have vocational training are more likely to be part of the workforce than those without such training (Fletcher et al. 2017). Kumar et al. (2019) reveal that formal vocational training is associated with higher wages, with the most substantial effect observed in the primary sector. Access to formal vocational training among youth is concentrated in the higher expenditure quintile and among those with advanced education levels. Unfortunately, young people from underprivileged backgrounds struggle to access formal vocational training. Although males dominate informal training uptake, women are more likely to pursue formal training. Therefore, to serve as a policy instrument for skilling women, their access to formal training needs to be expanded (Endow and Dhote 2024).

Moreover, the COVID-19 pandemic has accelerated the trend of shifting from full-time employment to gig work. Boston Consulting Group (2020) estimated that the number of gig economy jobs is about 8 million in India. This could increase to about 90 million jobs in the non-farm sector in the next 8 to 10 years. Therefore, it can be said that the gig job is the future. On the other hand, the Indian government also adopted the Skilling India Initiative to skill the workforce through vocational training courses. The scheme highlights the provisions for female workers, such as building new institutes specially for women, increasing female trainers, flexible training hours, etc.

From the existing literature, it is evident that none of the literature focuses on the relevance of gig jobs for women who are not using any digital platform as a possible opportunity for job creation. However, the paper considers this, acknowledging the challenges of platform jobs faced by Indian women. The present study also explores whether one possible way to increase the participation of women in gig jobs without using platforms is through enhancing their skills, which can be achieved with the help of vocational training. Most of the literature treats formal voca-

tional training as an exogenous covariate. The present paper treats it as an endogenous variable because women's participation in such training depends on their household's monthly consumer expenditures, which is used as a proxy for household income.

Against this backdrop, there are some research questions:

- (1) *What factors might influence Indian women to choose gig jobs without relying on a digital platform, rather than solely engaging in unpaid domestic duties? Does the educational qualification of women play any significant role in opting for such a gig job?*
- (2) *It is also necessary to investigate whether females require skills to engage in such gig jobs. In this regard, does vocational training (both formal and informal) play any role in the involvement of women in gig jobs in India, particularly for those who lack access to any digital platform?*

## **Data and Methodology**

### **DATA**

To address the aforementioned research objective, this investigation utilised unit-level data from the Periodic Labour Force Survey (PLFS) report for 2022–23 (National Sample Survey Office 2023). The primary aim of the PLFS is to provide detailed insights into employment and unemployment indicators in India, as well as information on various demographic and socioeconomic factors affecting individuals. The PLFS data encompasses four quarters, spanning from July 2022 to June 2023. In urban areas, a rotational panel sampling design has been implemented, while a cross-sectional survey is used in rural areas. Workers from both rural and urban regions have been included. Data from visit 1 of all four quarters of the PLFS, 2022–23, have been extracted to prevent the repetition of the same households in the sample. The Usual Principal Activity Status is employed here to estimate individuals' employment and unemployment status.

The PLFS data categorises workers' employment status in India into three broad categories: (i) self-employed workers, (ii) casual wage labourers, and (iii) regular wage/salaried employees. However, self-employed workers are further divided into three subcategories: (a) own-account workers, (b) employers, and (c) unpaid helpers in household enterprises.

Therefore, to address the research objectives, it is crucial to know the definition of the following workers:

- *Own-account workers* manage their enterprises independently or with one or a few partners, without hiring labour during the entire reference period. They may have unpaid helpers to assist them. They have autonomy and economic independence in their job. Being the sole owner of their enterprises, they do not make avail of social security benefits like provident funds, gratuity, etc., and do not have a traditional employment relationship with another person or entity.<sup>1</sup> They may enter into contracts with their customers, but not typical employment contracts on a personal basis. They do not receive any fixed salary from an employer but earn income based on the services they render or the products they sell. Some other examples of own-account workers are plumbers, electricians, beauticians, tailors, etc.
- *Casual Wage Labourers* are workers engaged in others' farm or non-farm enterprises (both household and non-household) and receive in return wages according to the terms of a daily or periodic job contract. They are generally employed daily for specific tasks in an establishment. Even so, they do not have a regular employer-employee relationship with the establishment concerned and have no job security. Though they enjoy some benefits, such as health care, casual labourers in the informal sector are deprived of drawing social security benefits like the provident fund. For example: construction workers, farm labourers, factory workers, etc.

Here, *Unpaid female household caregivers* are considered the reference category in this paper.<sup>2</sup> According to the *Female Labour Utilisation in India Report* (Ministry of Labour and Employment 2023), about 44.5% of women in India are not included in the labour force because of 'child care/personal commitments in homemaking', 3.4% because of social reasons, and 33.6% of women want to pursue their studies.

In this investigation, informal female gig workers who do not use online platforms have been captured. Therefore, individuals who receive social security benefits, like provident funds and gratuity, are excluded from the dataset. The literature suggests that most gig workers belong to the age group of 18–45 years.<sup>3</sup> Hence, the sample has been restricted to only that working age group of women for this analysis. Following the definition of gig workers who do not use platforms, the data on indi-

viduals who belong to the status codes<sup>4</sup> of own-account workers (PLFS code-11), casual labourers in ‘public works’<sup>5</sup> other than MGNREGA (code-41) and casual labourers in ‘other types of works’ (code-51) have been extracted from the existing dataset. Moreover, to represent the unpaid female domestic caregivers, the data on individuals who are engaged in ‘domestic duties only’ (code-92) and ‘attended domestic duties along with a free collection of goods (vegetables, roots, firewood, cattle feed, etc.), sewing, tailoring, weaving, etc. for household use’ (code-93) have also been extracted.

The unpaid helpers in household enterprises and employers in the self-employed category are not considered here because they do not receive regular wages in return for the work performed. They do not run their household enterprise but assist the related person living in the same household in running the household enterprise. However, the employers work on their own by hiring labour. So, there is a possibility of having an employer-employee relationship in that case, which does not satisfy the definition of a gig job. The rest of the status codes are excluded from the analysis because individuals assigned with these codes are either unemployed or not included in the labour force, other than women engaged in domestic duties. So, the extracted dataset is ready to serve the research objective.

#### DESCRIPTION OF THE SAMPLE AND ITS DESCRIPTIVE STATISTICS

This section focuses on the description of the sample and information regarding the participation of women in gig jobs without using any digital platform based on their educational qualifications and vocational training, with the help of descriptive statistics. The paper considers a sample of 109,122 individuals, constituting 82.79% of the females who perform domestic duties, and 17.21% who are gig workers (who do not use an online platform for work) in the traditional informal sector. About 64.7% of females reside in urban areas, and 35.3% are from rural areas. Nearly 26.67% of rural females have entered the workforce as gig workers, whereas this figure is only 12.04% for urban females. For young females aged 18–25 years, only 8.92% engage in a gig job without using a digital platform, whereas the number is about 18.91% for females aged 26–45 years. The sample consists of about 72.08% of females who belong to the Hindu community, and 18.38%, and 9.54% of the individuals who belong to the Muslim and other communities, respectively. However, only 17.41% and 9.81% of Hindu and Muslim females, respectively, engage in

such gig jobs, and the remaining women manage their unpaid domestic duties, i.e. they are not in the labour force. Moreover, it is evident from the data that females from SC (Scheduled Castes) and ST (Scheduled Tribes) (combined 40.25%) and OBC (Other Backward Classes) (40.5%) communities are more interested in gig jobs. In contrast, only 19.25 % of females from the ‘General’ category are willing to pick up such jobs, and most prefer to engage in unpaid domestic responsibilities.

Education is one of the key determinants of employment; therefore, we shall examine whether in India, there exists any association between various levels of education and the participation of women in gig jobs which do not require an online platform to function. From Figure 1, it is quite surprising that at lower levels of education, the participation of women in such a gig job is much higher. Specifically, most females who have completed their graduation and post-graduation studies prefer to remain at home instead of joining the labour force. This may occur due to a lack of suitable employment opportunities or income and substitution effects.

Moreover, as women’s education increases, the possibility of being employed also increases for salaried jobs, whereas an increase in education results in a decrease in women’s labour force participation rate in the case of casual wage labour and jobs on family farms and in businesses.

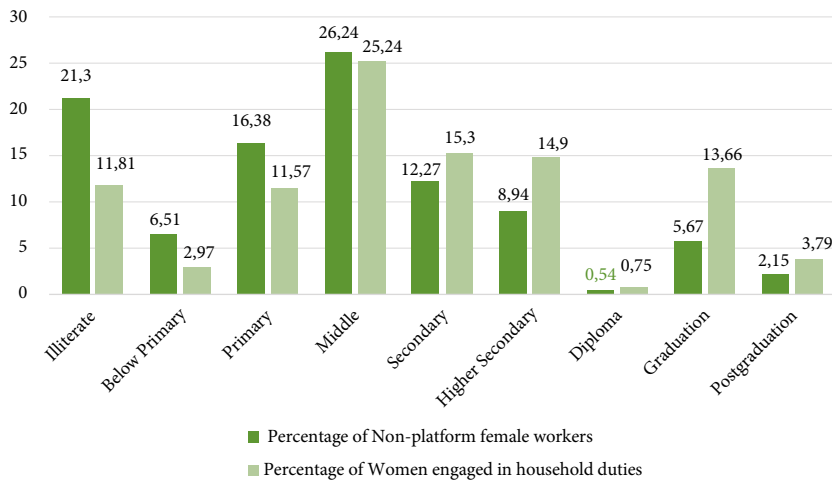


FIGURE 1 Educational Qualifications of Female Workers Working without Using Any Digital Platform and Women Engaged in Household Duties (15-45 years) (in %)

SOURCE Estimated by the authors using PLFS 2022-23 data

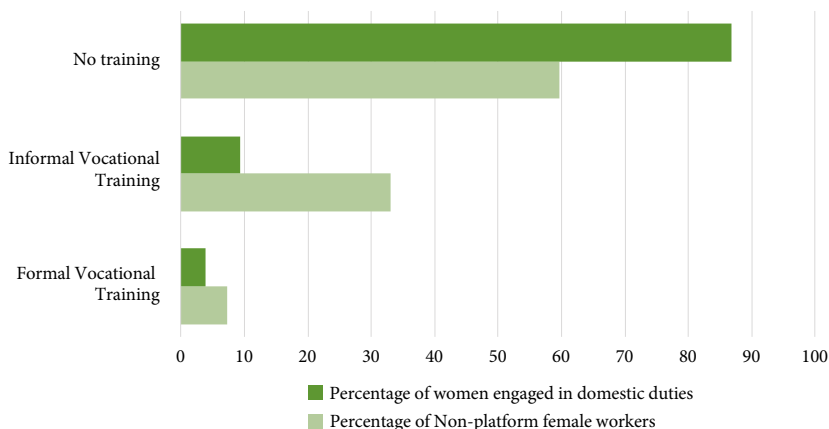


FIGURE 2 Formal and Informal Vocational Training Among Female Workers Working without Using Any Digital Platform and Women Who Engage in Domestic Duties

SOURCE Authors' Estimation using PLFS (2022–23) data.

Women do not engage in manual labour if they receive moderate levels of education (Chatterjee et al. 2018).

Next, we shall explore the relationship between women's participation in gig jobs without using a digital platform and their formal and informal vocational training statuses. In this context, Figure 2 clearly shows that women who have participated in formal and informal vocational training have a much higher participation rate in such gig jobs than those who do not have any vocational training.

The paper will discuss whether females, as the head of their families, take up the job of gig workers to run their families, or engage in such a job as spouses of the head of their families, to augment family income (shown in Table 1).

TABLE 1 Percentage of Female Workers (working without using any digital platform) Based on Their Relation to the Head of the Family

Relation to Head	Percentage of female non-platform workers	Percentage of females who engage in domestic duties
Self (if the concerned woman is the head of the family)	13.39	2.56
Spouse of the head	62.09	58.10
Others	24.52	39.34
Total	100	100

SOURCE Authors' calculation using PLFS (2022–23)

It is observed from Table 1 that 13.39% of female workers who engage in gig jobs are the head of their families, and 62.09% of them are the spouses of their families' heads. However, females who engage in household duties are more likely to be the spouses of the head or other household members. A minimal percentage (2.56%) of females prefer unpaid household duties over participation in the job market, being the head of the family.

#### METHODOLOGY

According to India's legal system, the terms 'employee' and 'worker' have different legal meanings. The former refers to the organised sector, while the latter pertains to the unorganised sector. Gig workers are a subset of unorganised workers (Gupta 2023). According to PLFS data for 2022–23, 30.7% of working women are own-account workers, and 36.7% serve as unpaid helpers in family businesses in India. Furthermore, 16.7% of women engage in casual labour, whereas only 15.9% hold regular salaried jobs. The female labour force participation rate is higher in rural areas compared to urban ones in India; however, most women in rural regions are involved in low-paying, unpaid family and own-account jobs, whereas urban areas predominantly offer higher-paying, regular salaried roles (Fernandez and Puri 2023). It is important to note that most formal, regular salaried jobs require skilled and specialised workers, yet the majority of Indian women are low-skilled (Kumar 2022). However, individuals aged 18–40 working in precarious jobs in Slovenia report low satisfaction, including increased incidences of depression, anxiety, and emotional exhaustion symptoms (Umicevic et al. 2021).

Given the nature of gig jobs, this paper discusses the importance of vocational training for Indian women, particularly those aged 18 to 45, as they consider gig jobs that do not require digital platforms instead of remaining unpaid household caregivers. This shift allows them to contribute to their family's income while fulfilling their household responsibilities. A simple probit model (Section 4) has been employed to identify the factors that encourage women to participate in gig work, focusing on the role of education as the first research objective. Additionally, a bivariate probit model (Section 5) has been utilised to examine the influence of formal and informal vocational training on women's engagement in gig jobs.

TABLE 2 Description of the Variables Used in Various Regression Equations

**Sector**

- The variable Sector indicates the residing area of the *i*th woman, i.e. whether she is from an urban or a rural area. The rationale behind selecting this variable is to identify from which sector women are more inclined to gig job without using an online platform.
- Sector=1 if the *i*th woman resides in an urban area and 0 otherwise
- (Ref: Rural area).

**Household size (hh\_size)**

- The variable represents the household size of the *i*th woman, i.e. the number of individuals residing in her family. The paper explores whether a woman is more willing to take up gig work when her household size increases. If the coefficient is positive, it indicates that a woman will take up gig jobs when her household size increases. This may happen because of the high dependency ratio in her family.

**Religion**

- Hindu=1 if the *i*th woman belongs to the Hindu religion and 0 otherwise (Ref: she belongs to the non-Hindu religion).
- Muslim=1 if the *i*th woman belongs to the Muslim religion and 0 otherwise (Ref: she belongs to the non-Muslim religion).
- In this analysis, mainly two religions have been focused on because in India, about 79.8% of the total population is Hindu, 14.23% are Muslims, and the remaining 5.97% constitutes religions such as Buddhism, Jainism, Christianity, etc. (Ministry of Home Affairs 2011). The paper seeks to identify which religion's women are more interested in the gig economy.

**Social Group: SC-ST category, OBC category**

- SC-ST = 1 if the *i*th woman belongs to the SC-ST (Scheduled Castes and Scheduled Tribes) category,  
= 0 if she belongs to other social groups.
- OBC = 1 if she belongs to the OBC (Other Backward Classes) category,  
= 0, otherwise.
- SC and ST communities are combinedly treated as the dummy variable, SC-ST. A social group is also considered an important variable to explore whether women from any backward classes of society are more willing to participate in a gig job than those from other groups. In India, SC communities are disadvantaged groups and have faced severe discrimination in the past; STs are tribal communities, and OBCs are socially and educationally backward communities, but they do not fall under SC and ST categories.

**Relation to Head: Self, Spouse of the Head**

- Self = 1 if the *i*th woman is the head of the family and 0 otherwise.
- Spouse of Head = 1 if the *i*th woman is the spouse of the head of the family and 0 otherwise.
- The main objective behind selecting this variable is to find whether a female head of a family finds a gig job, a means of earning to sustain her family. When she is the spouse of the family's head, she is interested in a gig job to supplement her family's income.

**Age (18–45 years)**

- This variable represents the age of the *i*th woman. It indicates whether the tendency to engage in a gig job increases (decreases) with the increase (decrease) in the age of a woman or vice versa.

**Agesq**

- This is the square of the age variable. This is used to examine the fact that as age increases, the probability of joining as a gig worker (without using a platform) increases (decreases) at a decreasing (increasing) rate or not.

TABLE 2 Continued

**General education**

- This is a categorical variable that represents the general education level of the *i*th woman.

Education Level: Below the primary

- Education Level: Below primary =1 if she has received education below the primary level.

Education Level: Primary

- Education Level: Primary=1 if completed primary school education.

Education Level: Middle

- Education Level: Middle=1 if completed middle school education.

Education Level: Secondary

- Education Level: Secondary=1 if completed secondary education.

Education Level: Higher Secondary (HS)

Education Level: Higher Secondary=1 if completed higher secondary education.

Education Level: Diploma

- Education Level: Diploma=1 if holding a diploma.

Education Level: Graduate

- Education Level: Graduate=1 if completed graduation degree.

Education Level: Post-graduate

- Education Level: Post Graduate=1 if completed post-graduation degree.
- (Ref: If the *i*th woman is illiterate=0.)
- This variable indicates whether women with low educational levels prefer a gig job or whether the tendency to engage in a gig job is more prevalent among women with higher education levels.

**Informal Vocational Training\***

- Informal Vocational Training=1 if she has any informal vocational training. It is considered a Dummy variable.
- (Ref: Does not have any informal vocational training.)

**Formal Vocational Training\***

- Formal Vocational Training=1 if a woman has formal vocational training, and it is 0 if she does not have any formal vocational training (Reference category).

**Household's Usual Monthly Consumer Expenditure# (hh\_consumer\_exp): It is here used as an Instrumental Variable of Formal Vocational Training**

- includes monthly usual consumer expenditure on the purchase of goods and services for households (excluding footwear and clothing), the imputed value of usual consumption in a month from homegrown stock like rice, milk, firewood, etc. and also from wages in kind, free collection gifts, etc.; annual expenses on clothing, footwear and household durables like furniture, vehicles, TV, mobile, etc. (annual expenses should be divided by 12).

NOTES \* Both informal and formal vocational training lead to skill enhancement. Therefore, these two are important indicators of the participation of women in the job market. The detailed description is given in Section 5.  
# The rationale behind choosing this variable as an instrument is discussed in detail in Section 5.

SOURCE Prepared by authors using PLFS data for 2022–23.

## Factors Influencing Women's Participation in Gig Jobs without Using Online Platforms

### SIMPLE BINARY PROBIT MODEL

Initially, a simple probit model is employed to explore the impact of various explanatory variables (narrated in Table 2) on the participation of female job seekers in gig jobs that do not require online platforms. In this case, explanatory variables comprise several demographic and socio-economic variables and different general education levels.

A probit model is derived from a binary response model:

$$FPNPG_i^* = X_i \beta + \varepsilon_i, \quad (1)$$

where  $FPNPG_i^*$  is the latent dependent variable;  $X_i$  represents the vector of independent variables, and  $\varepsilon$  is the random error term. Here,  $FPNPG_i^*$  is unobservable because the net benefit received from joining a gig job or the ability of a worker to take up a gig job is unobserved. However, the outcome can be observed easily. Hence, it is denoted by a binary dependent variable,  $FPNPG_i$ .

$FPNPG_i = 1$  when there is participation of the  $i^{\text{th}}$  female worker in gig jobs without using online platforms, and it takes the value of '0' for unpaid female caregivers who devote their entire time to household duties. The binary probit model is as follows, where both formal and informal vocational training of the respondent is excluded:

$$\begin{aligned} FPNPG_i = & \alpha_0 + \beta_1 \text{sector}_i + \beta_2 \text{hh\_size}_i + \beta_3 \text{hindu}_i \\ & + \beta_4 \text{muslim}_i + \beta_5 \text{SC\_ST}_i + \beta_6 \text{OBC}_i \\ & + \beta_7 \text{hh\_consumer\_exp}_i + \beta_8 \text{self}_i + \beta_9 \text{spouse of head}_i \\ & + \beta_{10} \text{age}_i + \beta_{11} \text{age}_i^2 + \beta_{12} \text{below\_primary}_i + \beta_{13} \text{primary}_i \\ & + \beta_{14} \text{middle}_i + \beta_{15} \text{secondary}_i + \beta_{16} \text{HS}_i + \beta_{17} \text{graduate}_i \\ & + \beta_{18} \text{post\_graduate}_i + u_i. \end{aligned} \quad (2)$$

The potential decision-making factors that may influence the dependent variable are outlined in Equation (2). Equation (2) is estimated using the Simple Probit Model, and its result is presented in Table 3.

### REGRESSION RESULT OF SIMPLE PROBIT MODEL

From Table 3, it is evident that women from urban areas are less likely to take up the job of gig workers who do not use online platforms to sus-

**TABLE 3** Determinants of the Likelihood of Participation of Females in Gig Jobs (without using online platforms) in India

Simple Probit Model		
Dependent Variable: Participation of women in non-platform gig jobs		
Variables	Value of Coefficients	Marginal Coefficients
Sector	-0.54552*** (0.01051)	-0.11842*** (0.00223)
Household size	-0.02907*** (0.00328)	-0.00631*** (0.00071)
Household's usual consumer expenditure in a month	5.88e-07 (8.21e-07)	1.28e-07 (1.78e-07)
Religion		
Hindu	-0.3296*** (0.01601)	-0.07155*** (0.00346)
Muslim	-0.58438*** (0.02122)	-0.12686*** (0.00457)
Social group		
SC-ST	0.26429*** (0.01428)	0.05737*** (0.00309)
OBC	0.16482*** (0.012605)	0.03578*** (0.00273)
Relation to head		
Self	0.69706*** (0.02446)	0.15131*** (0.00526)
Spouse of the Head	0.230025*** (0.01483)	0.04993*** (0.00321)
Age (18–45 years)	0.1926*** (0.0067)	0.04181*** (0.00145)
Age2	-0.00244*** (0.000099)	-0.00053*** (0.000022)
General Education		
Below Primary	0.13907*** (0.02518)	0.03689*** (0.00685)
Primary	-0.052*** (0.01755)	-0.0129*** (0.00435)
Middle	-0.16639*** (0.01584)	-0.03946*** (0.00385)
Secondary	-0.19814*** (0.01844)	-0.04638*** (0.00433)
HS	-0.30643*** (0.01992)	-0.06861*** (0.00444)
Graduate	-0.46122*** (0.022617)	-0.09656*** (0.00458)
PG	-0.29729*** (0.03295)	-0.06682*** (0.00686)
Constant	-3.17596*** (0.10868)	Number of Observations-109122
LR $\chi^2$ (17)	14849.12***	
Pseudo R <sup>2</sup>	0.1482	

NOTES The standard errors are provided in the parentheses. \*\*\* denotes significant at the 1% level, \*\* significant at the 5% level and \* significant at the 10% level.

SOURCE Estimated by authors using PLFS data for 2022–23.

tain their livelihood than those from rural areas. As observed, women in rural areas are more likely to pick up gig jobs like own-account workers or casual wage labourers. They are less interested in regular-salaried jobs (Bairagya et al. 2019). About 67% of the urban population uses the internet, whereas this figure is just 31% for the rural areas (Oxfam India 2022). Therefore, a gig job without an online platform is more convenient for rural females compared to a platform job. When household size increases, women aged between 18 and 45 years are less inclined towards gig jobs. This may occur because there may be more children and elderly persons in the family. Therefore, a woman is compelled to look after her family members. It creates a hindrance for her in joining the job market. On the other hand, when there are more male-earning members in the family, the income effect pushes the female out of the workforce and forces her to engage in unpaid household chores. Similarly, women who belong to Hindu and Islamic religions are less likely to take up non-platform-based gig jobs relative to other religions, and this tendency is more dominant among Muslim women.

However, women from backwards castes like SC - ST, and OBC communities are more interested in participating in gig jobs to earn their livelihood (0.26429). Women from the ST community work the most. The highest unemployment rate is among the upper caste (National Sample Survey Office 2023). When a woman is the head of the family or the spouse of the family head, she is more inclined towards gig jobs, where a digital platform is not required to get a job. Then she has acquired the power to make decisions regarding participation in the job market. Women aged 18 to 45 are more interested in performing gig jobs without using any digital platform. However, this tendency is concave as it is increasing at a decreasing rate considering job seekers' age. This supports the National Institution for Transforming India, NITI Ayog (2022) report, where it was mentioned that gig workers generally belong to the younger section of the workforce.

It is observed that education is one of the main determinants of female participation in the labour market. However, Table 3 depicts that the coefficients of different levels of education are negative and statistically significant, except for the 'Below Primary' level. It is evident from the result that as the education level rises, women prefer not to engage in informal gig jobs. This tendency is more dominant if the woman has a graduation degree. The research by Herrmann et al. (2023) indicates that signalling higher levels of educational attainment does not have a

statistically significant impact on the income levels of gig job seekers. The regression result has also established that 'hh\_consumer\_exp' has no significant impact on women's participation in non-platform-based gig jobs.

Next, the paper will further investigate whether this variable has any indirect effect on a woman's participation in a gig job or not. In this context, a second research objective is considered. Here, the model incorporates both formal and informal vocational training. It is suspected that women's participation in formal vocational training is endogenous. If that is true, a bivariate / seemingly unrelated bivariate Probit regression model is the most suitable technique to address the endogeneity issue. Otherwise, it will produce a biased estimate of the impact of formal vocational training on women's participation in informal gig jobs. The details will be discussed in the following section.

### **Importance of Formal and Informal Vocational Training behind Women's Participation in Gig Jobs without Using Online Platforms**

Vocational training represents a significant option for Indian women seeking job opportunities, as it equips them with practical skills and promotes economic independence. This training can facilitate their entry into the job market as own-account workers or casual workers, without reliance on digital platforms. The formal vocational training is acquired through institutions/organisations and is recognised by national certifying bodies, leading to diplomas/ certificates and qualifications. For example: ITI (Industrial Training Institute) training, beautician courses, tailoring, tourism, handicrafts, electrical power and electronics, etc. (National Sample Survey Office 2023). Diploma holders and individuals taking vocational training are not identical. A person acquires informal vocational training through 'self-learning' (acquires expertise in a vocation through their effort, without any formal training), 'learning on the job' (acquires expertise while in their current or past job, either through informal training by the employer or through the exposure of their job), through 'hereditary' sources (acquiring marketable expertise by an individual, which enables them to carry out the occupation of their ancestors over generations) and so on. To accomplish the second research objective, the application of the bivariate probit model is necessary (discussed in following section).

## A BIVARIATE PROBIT MODEL

The paper intends to examine the causal effect of vocational training on women's participation in gig jobs (which do not require online platforms for jobs). As per PLFS data, vocational training can be classified into formal and informal vocational training. A binary response model is specified to investigate the causal relationship. The model is given as follows:

$$FPNPG_i^* = \alpha_0 + \alpha_1 FV_i + \beta' X_i + u_i \quad (3)$$

$FPNPG_i$  is a binary variable that represents the participation of the  $i^{\text{th}}$  female worker in gig jobs without using any platform, and it depends on formal vocational training ( $FV_i$ ) and the vector of covariates, including informal vocational training and other socio-economic explanatory variables (mentioned in Table 2). Here,  $FPNPG_i^*$  is a latent variable,

$$FPNPG_i = \begin{cases} 1 & \text{if } FPNPG_i^* > 0 \text{ i.e. if the } i^{\text{th}} \text{ woman participates} \\ & \text{in gig job without using any platform} \\ 0 & \text{if } FPNPG_i^* \leq 0 \text{ i.e. if the } i^{\text{th}} \text{ woman is engaged} \\ & \text{in unpaid domestic duties.} \end{cases}$$

Most studies consider vocational training as an exogenous covariate. However, in this analysis, Equation (3) is suspected to suffer from an endogeneity problem. In this context, the paper by Bairagya et al. (2021) showed that vocational training promotes female labour force participation, considering both formal and informal vocational training as endogenous covariates. For the participation in formal vocational training, they have used the 'number of registered skill providers within the district' as an instrument, and 'the proportion of informal vocational training holders within the district' (to represent a larger informal vocational training network in that district) has been used as an instrument for participation in informal vocational training.<sup>6</sup> They have employed the Trivariate Probit model to address the concerned endogeneity. In this analysis, the participation of females in formal vocational training is treated as an endogenous covariate, as it may be influenced by several economic conditions of the household to which she belongs. An individual has to incur a cost to pursue formal vocational training. However, participation in informal training is treated here as an exogenous

variable. An individual does not bear any monetary cost while receiving informal vocational training.

Generally, a two-stage least squares-based instrumental variable technique (IV 2SLS) is employed to solve the endogeneity problem when there is a continuous dependent variable concerning continuous endogenous covariates (Wooldridge 2002). When the endogeneity problem arises in a binary dependent variable with continuous endogenous covariates, the problem can be tackled by using an Instrumental Variable Estimation in the Probit Model (IV Probit) (Kundu 2015; Zaghdoudi 2014).

In this investigation, the most important thing is that the dependent variable (FPNPG<sub>1</sub>) here is binary, and the potential endogenous covariate (i.e. participation in formal vocational training) is also binary. The existing literature suggests a ‘bivariate probit model / seemingly unrelated bivariate probit model’ to estimate the impact of the binary endogenous covariate on the binary response model (Arendt and Holm 2006; Torres et al. 2016). In this study, a binary response model with one endogenous covariate has been designed to resolve the endogeneity problem. Therefore, the equation that determines the ‘participation of women in formal vocational training’ ( $FV_i$ ) is shown by Equation (4).

$$FV_i^* = \varnothing_0 + \varnothing_1 hh\_consumer\_exp_i + \varnothing_2 X_i + v_{1i} \tag{4}$$

where  $FV_i^*$  is a latent variable. Equation (4) is also a binary choice model:

$$FV_i = \begin{cases} 1 & \text{if } FV_i^* > 0 \text{ i.e. if } i^{th} \text{ woman participates} \\ & \text{in formal vocational training} \\ 0 & \text{if } FV_i^* \leq 0 \text{ i.e. if } i^{th} \text{ woman does not participate} \\ & \text{in formal vocational training.} \end{cases}$$

Generally, formal vocational training is achieved through formal institutions. Therefore, an individual may incur a certain amount of expenditure to carry out her formal training. The data on the expenditure for formal vocational training are not available in PLFS. However, there is a possibility that a woman’s participation in formal vocational training depends on her household’s monthly income. Due to the unavailability of data on households’ income in PLFS, household’s usual monthly consumer expenditure ( $hh\_consumer\_exp_i$ ) is used as a proxy for the average monthly income of the representative household. In this context,

Equation (4) shows that the participation of women in formal vocational training is regressed on its instrument, a household's usual monthly consumer expenditure ( $hh\_consumer\_exp_i$ ), along with other exogenous independent variables ( $X_i$ ). However, a bivariate probit model is applied to obtain consistent and efficient estimators.

#### REGRESSION RESULTS OF BIVARIATE PROBIT MODEL

A bivariate Probit regression model has two equations: one to determine formal vocational training, and the other to determine the participation of women in gig jobs without using online platforms. These two equations are estimated simultaneously in a bivariate Probit model, and the results will be presented in Table 4. From Table 3, it is already evident that more educated women are reluctant to participate in a gig job which does not use online platforms. Therefore, different levels of education are not considered as an explanatory variable in the bivariate Probit regression model.

Participation in formal vocational training depends on many factors. Here, a household's usual monthly consumer expenditure is considered one of the key determinants of female participation in formal training. Besides that, many socioeconomic factors such as an individual's residential region, caste, religion, marital status, age and so on, influence an individual's decision to receive formal vocational training. Hence, Table 4 depicts the result of the Bivariate Probit model (mainly focusing on determinants of women's participation in gig jobs without using any platform), considering the endogeneity issue between formal vocational training and women's participation in gig jobs.

Table 4 shows that participation in formal vocational training (endogenous covariate) has a positive impact on females' participation in a gig job that does not need online platforms. The correlation coefficient between the error terms of Equations (3) and (4) ( $\text{Athr } \rho$ ) is positive and statistically significant, which exhibits a strong piece of evidence that formal vocational training is endogenous in this analysis. The Wald statistic is also statistically significant and indicates that the model is fitted correctly. The impact of some explanatory variables, such as the individual's residential region, religion, caste, total number of family members, age and her relation to the head of the family, is discussed in the case of Table 3.

It is observed that a woman who receives informal vocational training through self-learning, on-the-job experience, and hereditary sourc-

**TABLE 4** Determinants of the Participation of Women in Gig Jobs (considering formal vocational training as endogenous covariate)<sup>a</sup> without Using Any Digital Platform

Variables	Dependent Variable: Participation of Women in Informal Non-platform-based Gig Jobs Value of Coefficients
Sector	-0.57192*** (0.01232)
Household size	-0.01498*** (0.00346)
Religion	
Hindu	-0.32633*** (0.01603)
Muslim	-0.61286*** (0.02141)
Social group	
SC_ST	0.35872*** (0.01463)
OBC	0.20675*** (0.01307)
Relation to head	
Self	0.78645*** (0.02628)
Spouse of the Head	0.31309*** (0.01595)
Age (18–45 years)	0.17951*** (0.00721)
Agesq	-0.00217*** (0.00011)
Formal Vocational Training	0.37817** (0.15494)
Informal Vocational Training	0.93593*** (0.01266)
Constant	-3.567*** (0.11196)
No. of observations	109122
Wald (11)	18181.68***
Arth $\rho$	0.18349** (0.07527)
P	0.18146** (0.07279)

**SOURCE** Estimated by authors using PLFS data for 2022–23 (using STATA software).

**NOTES** The standard errors are provided in the parentheses. \*\*\* denotes significant at the 1% level, \*\* significant at the 5% level and \* significant at the 10% level.

<sup>a</sup> As a bivariate probit regression model is estimated by capturing two equations together.

es (PLFS 2022-23) has a higher probability of joining the workforce as a non-platform-based gig worker. In this context, the paper by Das and Kundu (2023) discusses hidden forms of child labour among poor households. One such form involves children participating in agricultural activities and family enterprises, receiving informal training primarily from elderly family members. The study further suggests that hidden child labour allows families to earn higher incomes than those without hidden child labour. Although such work is unpaid, it serves as a vital source of informal training that women, particularly in poorer segments of society, have gained through experiential learning since childhood. Consequently, informal vocational training can be a significant factor in women's participation in gig work without relying on any platforms in their adulthood.

The coefficient of the instrument (household monthly income used as a proxy for household-level consumer expenditure) is positive and statistically significant, although the impact is marginal (0.000235\*\*\*). Therefore, a woman is more likely to participate in formal vocational training when her household's monthly income improves. Moreover, formal vocational training increases the likelihood of Indian women taking up non-platform-based gig jobs. However, our results suggest that the impact of informal vocational training (0.93593) is considerably stronger than that of formal training, which is only 0.37817 for entering gig jobs without using any platform. It is noteworthy that a woman with formal vocational training has a greater chance of participating in informal gig jobs without using a platform. To address the skills gap, it is crucial to enhance skills among female job seekers to generate quality employment and foster their independence in a country like India. Target 4.3 of the Sustainable Development Goals advocates for equal access to affordable technical, vocational, and higher education by 2030. Nevertheless, in 1977, the Vocational Training Programme for women was launched to engage women in economic activities (Ministry of Skill Development and Entrepreneurship 2015a). According to the ASER (Pratham [UK, 2024](#)) report, in countries such as Germany and Italy, young populations are approximately ten times more likely to be enrolled in vocational courses. Therefore, India needs to elevate this proportion to reap the benefits of its demographic dividend. Furthermore, the Indian Government has introduced several skill-enhancement programmes, such as the National Policy for Skill Development and Entrepreneurship (Ministry of Skill Development and Entrepreneurship 2015a), aimed at empowering indi-

viduals through extensive skilling and fostering sustainable livelihoods for all citizens via a culture of innovation-based entrepreneurship. Additionally, the Pradhan Mantri Kaushal Vikas Yojana (Ministry of Skill Development and Entrepreneurship 2015b) provides free short-term skill training to youth. The Union Budget (2024-25) has allocated over Rs 3 trillion for schemes that benefit women and girls, aimed at eradicating the low participation of women in the workforce.

### **Concluding Remarks with Policy Recommendations**

The paper identifies possible reasons for women's participation in gig jobs that do not require online platforms. In this patriarchal society, women are 'time-poor'. They invest a significant amount of their time in unpaid domestic duties and do not have sufficient time to engage in the labour market to contribute to their family's income. In this context, gig jobs, with their flexible hours and absence of traditional employer-employee relationships, present a suitable option for women, encouraging them to participate in the workforce. Although gig jobs are a viable option, these positions do not entitle workers to any social security benefits, raising concerns about quality, job security, and social protection. Despite these limitations, the paper primarily focuses on the positive aspects of non-platform gig jobs. It observes that socioeconomic factors such as religion, caste, and an individual's general education significantly influence women's participation in non-platform gig jobs. Highly educated women are less likely to engage in such roles. Both formal and informal vocational training increase the likelihood of a woman participating in gig jobs without using any digital platform. However, the effectiveness of informal vocational training is much greater than that of formal training, illustrating that informal vocational training has a substantial influence on female labour force participation. Participation in formal vocational training is endogenous in this context. The paper demonstrates that a household's monthly consumer expenditure positively impacts participation in formal vocational training. It also shows that formal vocational training among women can enhance their chances of joining gig jobs without using any digital platform. Therefore, the Government should undertake essential initiatives to encourage women to engage in formal vocational training programmes, thereby increasing their participation in gig jobs, which are renowned for their flexibility and autonomy. The Indian Government has launched the Skill India Mission to enhance the employment conditions of female job seekers

through skill development and vocational training. Furthermore, the National Education Policy from 2020 aims to promote gender equity and ensure equitable access to quality education for all students. The Government should organise more formal vocational training programmes free of charge or at minimal cost for Indian women. Based on the study, it can be concluded that women with formal vocational training can participate in the Indian labour force through self-employment.

In India, we lack separate data on gig workers as defined by the International Labour Organisation's definition of a gig job. Therefore, we rely on the Periodic Labour Force Survey data to continue our analysis of gig job participants who do not require digital platforms for their work.

The present paper examines the relevance of gig jobs without a platform for Indian women. However, it is possible to conduct a comparative study on working conditions between platform-based female gig workers and female gig workers who receive job assignments without using any platform.

### Notes

- 1 Suppose a woman is engaged in making pappad at home. She does not work under any employer or on the premises of the employer but markets the homemade products by herself or through other members of her household to earn a profit; she is considered an own-account worker (NSSO 2023).
- 2 They are involved in producing goods and services that are potentially marketable and hence are economic. When they are outsourced for payment by any household, they are embraced in both estimates of national income and employment (Ghosh 2016).
- 3 The NITI Aayog (2022) Report suggests that gig workers mainly belong to the 18–45 age group.
- 4 In this analysis, we have considered the broad status of employment instead of National Occupation Classification (NOC) codes, as the focus is given to gig workers who do not use online platforms rather than platform workers following the definition of gig workers under the Code on Social Security (Ministry of Labour and Employment 2020). As per the DP-WEE Report, an unorganised work is 'a home-based job, self-employed job, or casual wage job in the unorganised sector' (S.2 (m); Ministry of Labour and Employment 2008). Even a platform and gig worker belonging to the organised sector with more than ten workers would still be an unorganised worker as none of the Acts like protection of the Workmen's Compensation Act, 1923; the Industrial Disputes Act, 1947; the Employees' State Insurance Act, 1948; the Employees'

- Provident Funds and Miscellaneous Provisions Act, 1952; the Maternity Benefit Act or the Payment of Gratuity Act, 1972; (Schedule II; Ministry of Labour and Employment 2008) covers her. The Niti Aayog (2022) Report has selected some occupations that have gig workers from the NOC 2004. Some data on occupation codes are missing in NSSO (2023).
- 5 Here, public jobs refer to those activities which are sponsored by the government or local bodies to generate wage employment under a poverty alleviation programme. It covers work like the construction of roads, dams, digging of ponds under schemes like Sampoorna Grameen Rozgar Yojana and so on. Here, the casual labourers in MGNREGA jobs (code-42) are excluded because this activity code is applicable only in the Current Weekly Status, but here, Usual Principal Activity status is considered (NSSO 2023).
  - 6 The data for the instrument of formal vocational training are collected from National Career Service, 2020 though they have used PLFS data for 2017–2018 to conduct the entire analysis.

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