



PRIMARY RESEARCH

A study of female workforce and their employment composition, with special reference to Madhya Pradesh

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Abstract

As a developing country, India has experienced significant transformations in the structure of female workforce across different segments of employment. This study analyzes the trend of changing structure of female work force and its determinants with empirical evidence from Madhya Pradesh. The identified parameters comprises female labor, workforce participation Rate, unemployment rate, own account worker, unpaid family labor, self-employed, regular wage/ salaried worker and casual labor over the time. Descriptive and inferential techniques have been used for analysis. Regional variations and binary logistics regression model were incorporated to analyze the probability of women being employed as own account workers. The study observed that agriculture remains the primary source of employment for women in rural areas. Overall women's participation is low often due to the scarcity of employment opportunities, rural to urban migration over time. Economic crisis identified as the reason for unemployment fluctuations over the time. The absence of accessible employment to identify their own means of livelihood, that drop the regular wage employment rate in acquiring the secured jobs resultant intricacies of gender equality occurred. Furthermore, factors such as religions, age, education and vocational training also shaped the economic differentiation. The study recommends progressive entrepreneurship policies, along with additional support for older women. Investment in skill enhancement and vocational training programs can accelerate women's participation in own-account work and self-employment. Implementing policies for family support system, customized interventions for marginalized group can foster inclusive entrepreneurship and reduce gender disparities. This study is among the first to comprehensively examine the effects of each selected variables on the dynamics of female participation across various employment categories.

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INTRODUCTION

The process of female participation in the labor force and access to decent work is deeply interlinked with economic development and its progression. It is also essential for fostering inclusive and sustainable development in any country. In India, female labor force participation has witnessed significant changes over the years, which reflect socio-economic shifts within the societal fold. Although the Female Labor Force Participation Rate (FLPR) remains lower than the global average, it has shown a gradual upward trend in recent decades. However, this growth is not uniform, and a declining trend has been observed particularly in rural areas,

despite higher economic growth in the broader Indian labor market. This paradox indicates underlying socio-economic and structural challenges that require deeper examination. In this light, the present research attempts to study the changes in the labor force in the state of Madhya Pradesh over a specific time frame, i.e., from 1993-94 to 2022-23. The study also focuses on examining the changing structure of female self-employment and the determinants that influence it across sectors, industries, and skill levels. According to Klasen (2019), the female labor force participation rate in India has declined since the 1990s despite strong economic growth, a fall in fertility rates, expansion in education, and

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improved access to infrastructure. He identifies FLPR as one of the crucial metrics that drive sustained economic growth. Similarly, Rahul Menon (2019) supports this by asserting that social norms, rather than job scarcity, are a key factor keeping rural married women out of workforce, reinforcing the view that gendered expectations continue to shape labor market outcomes in India.

Adding to this, the McKinsey Global Institute's report *The Power of Parity: Advancing Women's Equality in Asia Pacific* points out that more than 70 percent of the economic potential in Asia-Pacific could be unlocked by increasing women's participation in the labor force by just 10 percentage points. In this context, Madhya Pradesh must focus on actively encouraging the female population to participate in the labor market by removing institutional and societal barriers.

Over the last few decades, there has been a noticeable decline in the Work Participation Rate (WPR) of women in India. According to the 38th and 68th rounds of the National Sample Survey, the female WPR fell from 29.6 percent in 1983 to 21.9 percent in 2011–12. This downward trend continued, reaching approximately 16 percent according to the Periodic Labor Force Survey (PLFS) 2017–18. Addressing gender discrimination in the labor market and facilitating meaningful female participation is not just a question of equity but also one of economic necessity. Esteve-Volart (2004) and Tansel (2002), suggest that a greater role for women in the workforce can significantly improve a nation's productivity and growth trajectory. Similarly, Desai and Jain (1994), Peters, Astone, Malik, Maret, and Heller (2016), and Mammen and Paxson (2000) argue that active female engagement in economic activities enhances women's decision-making power, autonomy, and overall empowerment.

Despite Madhya Pradesh's consistent economic growth, the state appears to lag in translating this progress into gains for the female labour force, particularly in rural areas. Several government programs have been launched to address this issue. Ministry of Statistics and Programme Implementation (2023a) lists schemes such as Ujjawala, Beti Bachao Beti Padhao, Pradhan Mantri Janani Suraksha Yojana, Pradhan Mantri Matru Vandana Yojana, and the Swadhar Greh Scheme, which are aimed at improving the conditions of women. As a result of these efforts, female labor force participation in India rose from 235.39 lakh in 1993–94 to 416.79 lakh in 2022–23. However, in numerical terms, this growth remains modest when compared to male participation level and has shown signs of stagnation in recent years.

From a legal standpoint, the Indian Constitution affirms the principle of gender equality through various provisions such

as Articles 14, 15, and 42 (Kabeer, 2021). It also supports affirmative action policies intended to dismantle long-standing discrimination. Notably, the 73rd and 74th Constitutional Amendments have reserved seats for women in local self-governments, thereby enhancing their participation in political decision-making (Hazarika, 2011). These structural changes have contributed positively to female labor force participation, as also evidenced by the increasing number of women in various occupational fields (Chand & Singh, 2022).

However, the issue of women's workforce participation is further complicated by the U-shaped relationship between women's education and labor market participation. While higher educational attainment correlates with increased labor participation, women with moderate level of education often withdraw from the labor market. This trend may be influenced by income effects, whereby women marry into wealthier households and opt out of employment or by a lack of suitable job opportunities for educated women (Chatterjee, Desai, & Vanneman, 2018). Moreover, the recent COVID-19 pandemic has deepened these challenges. Sahai, Abraham, Jha, and Vira (2023) highlight that young woman in both rural and urban India experienced severe job losses and slow recovery post-pandemic period, underscoring the fragility of female employment in the face of economic disruptions.

Amidst these multifaceted challenges, the case of Madhya Pradesh presents a crucial opportunity to investigate the micro and macro level determinants affecting female labor force participation, especially in self-employment. Despite numerous policy efforts and national economic growth, the rural female labor market in Madhya Pradesh continues to exhibit persistent structural constraints. By examining sectoral shifts, industrial patterns, and skill-based trends, this research aims to uncover the underlying causes behind the slow progress in female employment outcomes. It also seeks to evaluate the efficacy of government schemes and identify gaps that hinder women's integration into the labor market. Thus, the significance of this study lies not only in tracing employment patterns over the past three decades but also in understanding how socio-cultural, institutional, and economic variables intersect to shape women's labor force participation. The insights gained through this research are expected to inform more effective gender-inclusive employment policies, contribute to reducing gender disparities, and support sustainable economic development at both state and national levels.

Objectives of the Study

Keeping all the above facts in mind the specific objectives set for this study are:

1. To analyze changes in the labor force in Madhya Pradesh during a specific time period to determine the causes of expansion or contraction.
2. To examine the composition of the female workforce, analyzing changes in female employment across sectors, industries and skill levels.
3. To analyze the factors influencing female employment as own account workers in Madhya Pradesh.

This study also offers policy recommendations based on observed labor force changes, unemployment trends and gender-specific dynamics, offering guidance for crafting more inclusive and effective labor market policies in Madhya Pradesh. This study undertakes a longitudinal, sectorally disaggregated analysis of female labor force participation in Madhya Pradesh between 1993–94 and 2022–23.

REVIEW OF LITERATURE

An analytical and focused review of the most important studies on female workforce in India as follows that address issues in the process of economic development. A substantial body of literature has emerged in recent decades examines various aspects of this complex matter.

Boserup (1970), focusing on women participation in economic sectors, not only assessed their contributions but also highlighted the inherent, biases within development policies.

Goldin and Schultz (1995) argues that during the process of expansion, both income and substitution effects occur. The higher wages of men lead to an increase in household income, causing a decline in the labor participation of women who then dedicate themselves to child care and domestic work.

In the historical context of India, societal stratification has manifested through the segregation of various social groups (Deshpande, 2001; Committee, 2006; Kijima, 2006; Gaiha, Imai, Kulkarni, & Thapa, 2007; Gang, Sen, & Yun, 2008; Desai & Kulkarni, 2008), delineated by factors such as castes, religions, and ethnic identities, each exhibiting heterogeneous characteristics. Extensive economic disparities based on caste, religion, and ethnicity has been well documented in the literature. Consequently, it becomes imperative to scrutinize the role of these social variables in explaining earning differentials among the working-age population in India.

The Seventeenth International Conference of Labour Statisticians (2003) established criteria for defining informal employment. It encompasses remunerative activities such

as wage employment and unregistered self-employment. Workers in the informal sector are not covered by legal regulation and lack social security, employment guarantees, and worker benefits.

According to Sudarshan and Bhattacharya (2009) and Rangarajan et al. (2011), research indicates a growing trend where more women are opting to withdraw from the labor force primarily to perform 'domestic duties,' highlighting the strong influence of household and nurturing responsibilities on women's labor market participation.

According to Mehrotra (2015), measurement errors and the difficulties in distinguishing between paid economic work and unpaid household responsibilities are responsible for the significant decline in women's participation in the workforce.

Chatterjee et al. (2018) investigate the U-shaped relationship between women's education and labor force participation in India. They find that moderately educated women are less likely to participate in the labor market, partly due to the "other family income effect," where such women marry into wealthier households. However, this doesn't fully explain the decline. The study also points to a lack of suitable job opportunities and occupational segregation as major barriers for moderately educated women, highlighting the need for further policy attention and research.

According to Bonnet, Vanek, Chen, et al. (2019) globally, most men work in the informal economy but in India the situation is reversed with a higher proportion of women engaged in informal sectors compared to men. Molishree (2020) highlights the need for integrated national and state-level interventions to promote women's entrepreneurship through education, financial support, knowledge-sharing, and networking. Despite growing opportunities, cultural and gender biases continue to limit women's entrepreneurial growth. The study calls for targeted programs that build capacity, support micro and solo enterprises, and scale rural and urban women-led ventures to drive inclusive development and social transformation.

Jadhav (2020) found that women are particularly affected, as they are more commonly found in unstable occupations such as street vending, waste picking, home-based work, construction, domestic jobs, beauty parlors, gyms, head-loading, and other short-term contracts. According to WIEGO (2020a), women, facing limited access to resources and opportunities, face challenges in accessing credit, land, technology, savings, and decision-making power compared to men. Nevertheless, a significant number of women engage in this sector, and in some cases earn equal to or more than men while contributing to household support.

Das and Mohapatra (2022) highlight the challenges faced by female agricultural laborers, including wage disparities, long working hours, and dual responsibilities at home and on the farm. Their study emphasizes the need for equal access to resources such as land, finance, technology, and knowledge to ensure gender equity and strengthen the rights of women in agriculture.

(Yadav & Singh, 2022) emphasize that societal awareness is essential for improving women's status and achieving inclusive development. They argue that despite policy efforts, women still face deep-rooted social challenges and gendered expectations that hinder their autonomy, dignity, and equal participation in society.

(Business Standard, 2024), the study found out that how economic activities in which women represent a larger proportion of the work force are also those in which gender gaps are larger. Despite of their overall low labor force participation, certain fields employ high number of women by rural/urban status. Agriculture is the most favorable employer of working women with approximately 76 percent in 2022-23, largely due to men shifting towards the non-agriculture sector.

Even though such studies have used different parameters to analyze participation of women, those parameters are not enough compatible in the Madhya Pradesh state. So this research is to make an attempt to fill the research gap and provides important avenues for the further research. Therefore, this research will identify and examine the appropriate factors that determine women's participation decisions.

DATA AND METHODOLOGY

In exploring the complexities of female workforce engagement and employment categories in Madhya Pradesh, comprehensive data collection is the fundamental building block of this research initiative. The authors identified key parameters for studying the trend in the female workforce, which include Female Labor Workforce Participation Rate (FLWR), Workforce Participation rate (WPR), Unemployment rate and its sector wise composition which includes Own Account Worker Employer, Unpaid Family Labor, Self Employed, Regular Wage/Salaried Worker and Casual Labor in Madhya Pradesh over the time period.

The authors collected and calculated data by combining unit level data from different National Sample Survey Organization (NSSO) rounds of the Employment & Unemployment (E & U) survey and the Periodic Labor, Force Survey (PLFS). This study encompasses a multi-decade time frame, spanning from 1993-94 to 2022-23. The historical data from 1993-94 to 2011-12 has been sourced from the E & U survey

while recent data spanning from 2017-18 to 2022-23 is sourced from the PLFS unit level datasets.

The tools for analyzing the data in this study were both descriptive and inferential (econometrics model) statistical analysis. The basic descriptive statistics are used to present an overview of Female Labor Force Participation (FLFP) trends over the selected time period. The study analyzed regional variations in female employment categories, distinguishing between rural and urban areas to identify disparities and trends. Further a temporal analysis tracks the evolution of female employment categories and the factors that factors shaping them.

Binary logistic regression is a type of logistic regression, that is used when the dependent variable is dichotomous (i.e., has two categories) and the independent variables may be dichotomous, trichotomous, polychotomous or continuous (Hosmer, Hosmer, Le Cessie, & Lemeshow, 1997). The binary logistics regression model is employed to analysis the factors driving the transition from unpaid work to more advantageous employment categories.

Model

The binary logistic regression model is essentially a specific form of the broader multinomial logistic regression framework. While both models are suited for qualitative dependent variables, the multinomial model is particularly appropriate when the variable has more than two outcome categories, with the probability of each category being estimated separately. In the present study, the binary logistic regression model was employed to examine the factors influencing female employment as own account workers within a specified region. This model was used to predict the likelihood of women being engaged in own account work based on a set of independent explanatory variables.

The dependent variable is defined as: "1 if a female is employed as an own-account worker, and 0 otherwise". Thus, in the model equation, this variable represents the outcome that is predicted using the independent variables:

$$\begin{aligned} &\text{Logit(Probability of being employed as own account worker)} \\ &= \beta_0 + \beta_1 \cdot \text{Age} + \beta_2 \cdot \text{Age}^2 + \beta_3 \cdot \text{Schooling Year} + \beta_4 \cdot \text{Vocational Training} \\ &+ \beta_5 \cdot \text{HH Size} + \beta_6 \cdot \text{ST Dummy} + \beta_7 \cdot \text{SC Dummy} + \beta_8 \cdot \text{OBC Dummy} + \beta_9 \cdot \\ &\text{Rural Sector Dummy} + \beta_{10} \cdot \text{Islam Dummy} + \beta_{11} \cdot \text{Jain Dummy} + \beta_{12} \cdot \\ &\text{Religion Other} + \beta_{13} \cdot \text{Survey Year (2018-19)} + \beta_{14} \cdot \\ &\text{Survey Year (2019-20)} + \beta_{15} \cdot \text{Survey Year (2020-21)} + \beta_{16} \cdot \\ &\text{Survey Year (2021-22)} + \beta_{17} \cdot \text{Survey Year (2022-23)} + \epsilon \end{aligned}$$

Where:

1. Logit represents the natural logarithm of the odds ratio,
2. $\beta_0, \beta_1, \beta_2, \dots, \beta_{17}$ are the regression coefficients estimated for each independent variable,
3. The independent variables include age, age2, schooling year, vocational training, HH size, ST dummy, SC dummy, OBC dummy, Rural sector dummy, Islam dummy, Jain dummy, Religion other, Survey year 2018-19, Survey year 2019-20, Survey year 2020-21, Survey year 2021-22, and survey year 2022-23).
4. ϵ represents the error term in the model.

Limitations of the Model

- The limitation of logistic regression model is the inability to establish causality.
- The model relies on assumptions, including of multicollinearity, which may lead to biased parameter estimates and inaccurate predictions.
- If the sample is not representative of the population of interest, the result may not generalize well to broader populations.
- The predictive accuracy of the model may be compromised, if it is influencing variables of female employment are omitted from the analysis.
- The measurement errors in the variables may reduce the reliability of the findings.
- The Endogeneity or the simultaneous causality presence between variables, may bias the estimated coefficients.

RESULTS AND DISCUSSION

To fulfill the objectives of this study, the analysis focused on the female labor force in Madhya Pradesh. This sec-

tion presents the key findings. As economies transition from agrarian to industrial structures, a notable decline in female labor force participation often occurs. In Madhya Pradesh, this trend is evident when examining changes between 1993–94 and 2022–23. Table 1 illustrates a decline in both the Female Labor Force Participation Rate (FLPR) and Work Participation Rate (WPR) from 1993–94 to 2011–12, followed by a gradual recovery in recent years.

This shift is largely attributable to the transformation from cottage-based industries to centralized, large-scale industrial production systems. In households where women are predominantly illiterate or have limited education, domestic employment opportunities remain scarce. However, with rising family incomes and improved educational attainment among women, their participation in the labor force particularly in non-manual and service-oriented roles has increased. This pattern supports the U-shaped relationship between female labor force participation and economic development proposed by Goldin (1994).

The study further finds that a significant portion of women's employment continues to reflect traditional household roles, reinforcing the notion that many women engage in work that extends their domestic responsibilities. Supporting this, Kabeer, Narain, Arora, and Lal (2019) observe that women's labor force participation in India is highest among the poorest households, driven by economic necessity and often concentrated in unpaid or low-paid care work. As household incomes improve, women tend to withdraw from the workforce, underscoring the deep-rooted influence of gender norms and the complex interplay between economic conditions and societal expectations.

TABLE 1. Change in labor force, workforce, and unemployment in Madhya Pradesh

Year	FLPR %	WPR %	Unemployment rate %	Labour force (Lakh)	Workforce (Lakh)	Unemployed (Lakh)
1993-94	45.86	45.29	1.24	236.39	233.46	2.94
2004-05	43.69	43.30	0.89	282.76	280.24	2.52
2011-12	38.85	38.50	0.90	284.96	282.39	2.57
2017-18	41.83	39.97	4.45	337.21	322.21	14.99
2018-19	39.82	38.41	3.54	325.55	314.02	11.53
2019-20	44.07	42.76	2.97	365.33	354.47	10.86
2020-21	45.79	44.90	1.94	384.82	377.34	7.48
2021-22	46.02	45.07	2.06	391.71	383.63	8.09
2022-23	48.38	47.61	1.59	416.79	410.16	6.63

A sharp increase of 4.45 percent in the unemployment rate in 2017-18 highlights significant economic challenges. The subsequent decline to 1.59 percent in 2022-23 suggests a recovery in the economy, driven by improvements in the labor

market according to Ministry of Statistics and Programme Implementation (2023b). Complex factors such as global economic trends and local job market dynamics significantly influence these fluctuations in this region, supporting this

by Hoover Institution (2023)). Directorate General of Employment (2022) argues that in rural areas there is a growing tendency among workers to move away from underemployment in the agricultural sector, driven by both push and pull factors. Additionally, many rural workers are attempting to escape disguised unemployment in agriculture. Furthermore, the steady growth in the total labor force is indicative of both demographic changes and broader economic expansion in India (Ministry of Statistics and Programme Implementation, 2023b).

The Table 3 presents, the transformation in the participation of females in labor force in Madhya Pradesh. The pro-

portion of females in the labor force experienced a notable decline from 35.04 percent in 1993-94 to 20-83 percent in 2011-12. This trend indicates demographic changes due to scarcity of jobs opportunities, suggesting a less voluntary withdrawal from the labor force compared to income effect explanations. Apart from the influence of income changes and measurement challenges, the primary factor behind the decreasing female labor force participation rate is the shift in local job opportunities. Rural-to-urban migration in India, as part of urbanization, reduces farming opportunities in small villages and creates intermediate spaces.

TABLE 2. Change of females in labor force, workforce and unemployment in Madhya Pradesh

Year	Labour force	Workforce	Unemployment
Share in population (%)			
1993-94	35.04	34.87	0.49
2004-05	31.72	31.63	0.28
2011-12	20.83	20.72	0.53
2017-18	23.39	22.89	2.14
2018-19	20.76	20.42	1.64
2019-20	28.03	27.64	1.39
2020-21	30.25	29.98	0.89
2021-22	30.24	29.97	0.89
2022-23	33.43	33.03	1.20
Number (Lakh)			
1993-94	86.22	85.80	0.42
2004-05	97.99	97.71	0.28
2011-12	73.68	73.29	0.39
2017-18	90.41	88.48	1.93
2018-19	81.01	79.69	1.33
2019-20	112.58	111.01	1.57
2020-21	124.00	122.89	1.11
2021-22	125.52	124.40	1.12
2022-23	138.90	137.24	1.66

Research indicates that women's labor force participation, although typically lower, tends to increase during economic crises, demonstrating its counter-cyclical nature. This finding is consistent with the works of Abraham (2013) and Bansal and Mahajan (2021), who suggest that economic downturns lead to a rise in female labor force participation, particularly in agriculture and other low-wage sectors. In Madhya Pradesh, the percentage of women in the workforce started to recover, reaching 33.03% in 2022-23, as shown in Table 3. This follows a period of decline. The unemployment rate also fluctuated during this period, peaking at 2.14% in

2017-18. This spike was largely due to the increase in agricultural employment, as women in rural areas, where agriculture is the primary employer, absorbed jobs in the sector after male workers migrated to the non-agricultural sectors. Following the economic slowdown, the unemployment rate declined to 0.89% in 2020-21 and remained relatively stable at 1.20% in 2022-23, indicating a gradual recovery.

The economic crisis had a gendered impact, as reflected in the data, which show that the share of women working in agriculture increased during the pandemic years 2019-20 and 2020-21, before experiencing a slight decline in 2021-

22. This increase in female agricultural employment was temporary, as improving economic conditions led to a return to non-agricultural work in the following years. These patterns demonstrate that women's labor often serves as a form of economic insurance for poorer households during periods of low income, with women engaging in flexible and low-wage labor during such crises (Klasen, 2019). The trends observed in Madhya Pradesh are consistent with findings by Sahai et al. (2023), who argue that economic necessity drives

women into the workforce, often in roles that reflect their traditional domestic duties.

The other objective of the study focused on the changing composition and workforce of females in Madhya Pradesh over a span of several years that has been shown in the Table 3. This indicates a substantial positive change in female entrepreneurship during this period. The significant marginal growth rate of 13.15 percentages was observed between 2017 to 2022.

TABLE 3. Change in Composition and Workforce of Females in Madhya Pradesh

Year	1: Own account worker	2: Employer	3: Unpaid family labour	Self Employed	4: Regular wage/ salaried worker	5: Casual Labour
Share in total workforce (%)						
1993-94	6.45	0.44	52.69	59.58	3.31	37.07
2004-05	6.91	0.32	50.58	57.81	6.55	35.65
2011-12	10.11	0.01	46.17	56.29	7.34	36.37
2017-18	9.56	0.19	47.85	57.60	10.56	31.83
2018-19	13.94	0.48	44.19	58.61	10.66	30.73
2019-20	12.64	0.13	50.62	63.39	10.42	26.19
2020-21	13.84	0.13	49.44	63.41	8.42	28.17
2021-22	13.71	0.27	54.65	68.63	7.67	23.70
2022-23	17.02	0.29	53.44	70.75	7.67	21.58
Worker by type (lakh)						
1993-94	5.53	0.38	45.21	51.12	2.84	31.81
2004-05	6.75	0.31	49.42	56.48	6.40	34.83
2011-12	7.41	0.01	33.84	41.26	5.38	26.66
2017-18	8.46	0.17	42.34	50.96	9.34	28.16
2018-19	11.11	0.38	35.21	46.70	8.49	24.49
2019-20	14.03	0.14	56.19	70.37	11.57	29.07
2020-21	17.01	0.16	60.76	77.93	10.35	34.62
2021-22	17.06	0.34	67.99	85.38	9.54	29.48
2022-23	23.36	0.40	73.34	97.10	10.53	29.62

Whereas, the limited growth in the employer category suggests that changes were relatively stable. This low volatility could be due to the challenges and barriers faced by women in becoming employers. In addition, the rapid decline in female involvement in the labor market has led to a significant and swift increase in gender inequalities. However, women's participation in unpaid family labor increased by 5.59 percent from 2017 to 2022. On the other side regular wages/ salaried workers and casual labor category experienced a decrease of 2.89 percent and 10.25 percent respectively. This suggests a shift away from precarious and daily-wage employment.

The data under Table 4 suggest that in the rural sector, there was a decrease in the percentage of female employers because Government funding schemes are typically one-time opportunities, but running a business requires continuous financial assistance. This creates obstacles in establishing their enterprises, resulting in a marginal percentage decrease of approximately -26.67 percent in 1993-94 to 2022-23, which was mirrored by a significant reduction of about -82.69 percent in the urban sector in the same time period.

There was also a noticeable trend towards self-employment among rural females, with a marginal percentage increase of approximately 19.83 percent from 2018-19 to 2022-23. However, the situation in the urban female workforce remained largely unchanged.

Despite these improvements, a substantial gender gap in workforce remains. (Madhya Pradesh Planning Commission, 2022)) data reveals that in rural areas, the proportion of women in the workforce is relatively low indicating that gender equality in employment persists. Furthermore, the share of female regular wage/salaried workers in the rural sector reached from 4.67 percent in 2018-19 to 4.09 percent in 2022-23 which followed a negative trend. This suggests a growth in formal employment in rural areas may be limited, which in turn could restrict women's access to stable and well-paying positions compared to urban areas. While the transition from casual labor to self-employment might appear advantageous in certain aspects, it could also signify that women are pushed into self-employment due to lack of accessible formal employment opportunities, which can often be more risky and less secure.

Descriptive summary of Binary Logistic Regression Model

For fulfilling the final objective of the study, binary logistic regression analysis was applied, as depicted in Table 4 which

contains the estimate of the binary regression coefficient (β), Standard Error of Estimates S.E. (β), p -value and odds ratio with 95 percent Confidence Interval (C.I) for each explanatory variables.

TABLE 4. Sector-wise change in composition and workforce of Females in Madhya Pradesh

Share in total workforce (%)														Worker by type (lakh)													
Sector	Year	Share in total workforce (%)					Worker by type (lakh)					Share in total workforce (%)					Worker by type (lakh)										
		1: Own account worker	2: Employer	3: Unpaid family labour	Self Employed	4: Regular wage/ salaried worker	5: Casual Labour	1: Own account worker	2: Employer	3: Unpaid family labour	Self Employed	4: Regular wage/ salaried worker	5: Casual Labour	1: Own account worker	2: Employer	3: Unpaid family labour	Self Employed	4: Regular wage/ salaried worker	5: Casual Labour								
Rural	1993-94	5.2	0.45	55.46	61.11	1.15	37.7	4.04	0.35	43.12	47.52	0.89	29.31	5.2	0.45	55.46	61.11	1.15	37.7								
	2004-05	5.38	0.34	53.36	59.08	3.17	37.75	4.66	0.29	46.24	51.2	2.75	32.71	5.38	0.34	53.36	59.08	3.17	37.75								
	2011-12	7.7	0	49.87	57.57	2.7	39.74	4.85	0	31.39	36.24	1.7	25.02	7.7	0	49.87	57.57	2.7	39.74								
	2017-18	7.26	0.16	53.37	60.79	4.42	34.78	5.39	0.12	39.64	45.15	3.28	25.83	7.26	0.16	53.37	60.79	4.42	34.78								
	2018-19	10.76	0.45	50.23	61.44	4.67	33.89	7.17	0.3	33.48	40.95	3.11	22.59	10.76	0.45	50.23	61.44	4.67	33.89								
	2019-20	9.77	0.02	58.33	68.12	4.12	27.77	9.06	0.02	54.11	63.19	3.82	25.76	9.77	0.02	58.33	68.12	4.12	27.77								
	2020-21	11.09	0.16	54.69	65.94	3.57	30.49	11.49	0.17	56.64	68.29	3.7	31.58	11.09	0.16	54.69	65.94	3.57	30.49								
	2021-22	11.54	0.28	60.79	72.61	2.77	24.63	12.4	0.3	65.3	78	2.98	26.46	11.54	0.28	60.79	72.61	2.77	24.63								
	2022-23	15.21	0.18	58.24	73.63	3.4	22.97	18.3	0.22	70.09	88.61	4.09	27.64	15.21	0.18	58.24	73.63	3.4	22.97								
	2023-24	18.5	0.43	25.92	44.85	24.22	30.93	1.49	0.03	2.08	3.61	1.95	2.49	18.5	0.43	25.92	44.85	24.22	30.93								
Urban	2004-05	18.9	0.14	28.77	47.81	33	19.18	2.09	0.02	3.18	5.29	3.65	2.12	18.9	0.14	28.77	47.81	33	19.18								
	2011-12	24.77	0.07	23.72	48.56	35.55	15.89	2.56	0.01	2.46	5.03	3.68	1.65	24.77	0.07	23.72	48.56	35.55	15.89								
	2017-18	21.58	0.34	19	40.92	42.66	16.42	3.06	0.05	2.7	5.81	6.06	2.33	21.58	0.34	19	40.92	42.66	16.42								
	2018-19	30.18	0.63	13.31	44.12	41.26	14.62	3.94	0.08	1.74	5.76	5.38	1.91	30.18	0.63	13.31	44.12	41.26	14.62								
	2019-20	27.27	0.68	11.47	39.42	42.4	18.18	4.98	0.12	2.09	7.2	7.74	3.32	27.27	0.68	11.47	39.42	42.4	18.18								
	2020-21	28.59	0	21.25	49.84	34.42	15.74	5.52	0	4.1	9.62	6.65	3.04	28.59	0	21.25	49.84	34.42	15.74								
	2021-22	27.42	0.23	15.77	43.42	38.71	17.87	4.65	0.04	2.68	7.37	6.57	3.03	27.42	0.23	15.77	43.42	38.71	17.87								
	2022-23	29.9	1.04	19.23	50.17	38.1	11.73	5.05	0.18	3.25	8.48	6.44	1.98	29.9	1.04	19.23	50.17	38.1	11.73								

TABLE 5. Binary logistic regression model results

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Dependent variable= if female employed as own account worker then 1 otherwise 0				
Intercept	-0.6983	0.1838	14.44	0
Age	0.0379	0.0072	27.62	<.0001
Age2	-0.0003	0.0001	9.41	0.002
Schooling Year	0.0434	0.0042	107.69	<.0001
Vocational training if yes =1	0.4294	0.0347	153.16	<.0001
HH Size (family size)	-0.1033	0.0081	163.76	<.0001
ST_ dummy	0.1235	0.0585	4.46	0.035
SC dummy	-0.266	0.0584	20.76	<.0001
OBC dummy	-0.1536	0.0492	9.73	0.002
Rural sector Dummy	-0.9924	0.0393	637.2	<.0001
Islam Dummy	0.5562	0.0715	60.52	<.0001
Jain Dummy	-0.5355	0.2271	5.56	0.018
Religion Other	0.1413	0.2715	0.27	0.603
Survey_year_2018-19	0.0965	0.0635	2.31	0.129
Survey_year_2019-20	-0.0142	0.0587	0.06	0.809
Survey_year_2020-21	-0.0459	0.0572	0.64	0.423
Survey_year_2021-22	-0.0996	0.0564	3.11	0.078
Survey_year_2022-23	0.0476	0.0551	0.75	0.388
Likelihood Ratio	2133.86***			
Score	2237.04***			
Wald	1818.29***			
Per cent Concordant	78.2			
Somers' D	0.568			
Gamma	0.57			
Tau-a	0.204			
C	0.784			

The overall model performs well, demonstrating good predictive accuracy and goodness of fit, as indicated by the likelihood ratio, score and Wald statistics. According to the fitted model that aims to understand the variables that influence

whether females are employed as "own-account workers" or not. An increase in age is associated with a higher likelihood of being employed as an own account worker. The coefficient for age has a positive effect 0.0379, indicating that as

age increases, the odds of being in this employment category also increases.

Similarly, coefficient of education has a positive effect with a coefficient of 0.0434, suggesting that higher education attainment increases the probability of own-account work. In addition, vocational training emerges as a strong predictor of own-account worker status.

A larger family size was associated with lower likelihood of being employed as an "own account worker". Furthermore, belonging to the Scheduled Caste (SC) or Other Backward Class (OBC) categories reduces the likelihood of being in this employment category (-0.2660) and (-0.1536) respectively in Madhya Pradesh region. However, rural residence was also strongly associated with a reduced likelihood of being an "own account worker" with a coefficient of (-0.9924). This implies that people in rural areas are less likely to be self-employed compared to those in other locations.

Moreover, the Islamic faith was associated with a higher probability (0.5562), indicating a positive association with self-employed, while being Jain was associated with a lower likelihood (-0.5355). The economic differentiation constitutes one of the primary sources explaining the distinct status of various religions. This is because the ownership of assets, occupation and income prospects at the household level crucially influences the essential living conditions of women.

These fluctuations suggest that external factors or year-specific economic conditions may have influenced employment patterns. The findings provide insights into the relative importance of key determinants of female employment in Madhya Pradesh.

CONCLUSION

The analysis of the labor market in Madhya Pradesh over the past three decades reveals complex factors affecting female workforce participation and employment patterns. The state's shift from an agrarian to an industrial economy has had a noticeable impact. Initially, there was a decline in female labor force participation, followed by signs of recovery. Agriculture is still the main employer of women in rural areas, as male workers have shifted to non-agricultural sectors. Many women opt for home-based work, which suits their domestic duties. This has led to the growth of "invisible or unrecorded work." This makes it difficult to distinguish between market-oriented work and non-market domestic care-giving tasks.

Formal work options in rural areas have grown slowly, leading to a decrease in women in regular wage employment. As a result, fewer women are seeking secure employment op-

portunities. There has been a shift towards self-employment in rural areas, while urban areas remain stable. The decrease in female salaried workers and casual labor reflects a move away from precarious wage work. These changes highlight the complexities of gender equality in the labor market. The counter-cyclical nature of local employment opportunities has influenced women's decisions to leave the labor force.

The research also suggests that economic differentiation has shaped the status of various religious groups. Age is identified as a key predictor of changes in employment patterns. The study also emphasizes education and vocational training as important factors in empowering women economically. The growth of the service industry has created more opportunities for female employment. During this process, both income and substitution effects have emerged alongside industrialization in the labor market.

Madhya Pradesh's journey to increase female workforce participation shows both progress and challenges. Policies promoting entrepreneurship among older women may be beneficial, though additional support may be required for them compared to younger women. Investing in female education can help increase their participation in entrepreneurship and self-employment. Vocational training programs tailored to women's needs can improve their skills and confidence. Policies supporting work-life balance, childcare, and flexible work arrangements can encourage more women to engage in entrepreneurship. Targeted interventions for marginalized social or religious groups can promote inclusive entrepreneurship and reduce gender disparities. Ensuring gender parity and social progress requires a comprehensive strategy to ensure sustained employment opportunities for women.

Limitations of the study

This study has some limitations. It focuses only on Madhya Pradesh, so the findings may not apply to other states with different socio-economic and cultural conditions. The study mainly relies on secondary data from government surveys. This may overlook informal work, such as home-based or "invisible" or "unreported" work, that are not always captured in official statistics. The research does not explore the qualitative reasons behind women's employment decisions, which could provide deeper insights.

Suggestions for Future Research

Future studies could overcome these limitations by using primary data collection methods such as interviews or surveys. A comparison across different states would help identify key

drivers of regional differences in female labor force participation. Research could also focus on the long-term effects of vocational training and entrepreneurship programs on women's empowerment, particularly in rural areas. Exploring the role of digital platforms in providing employment

and entrepreneurial opportunities for women would offer new perspectives. Longitudinal studies tracking women's participation over time could provide deeper insights into the impact of policy changes and economic shifts.

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