

Trend Analysis of Female Labor Force Participation in India Using World Bank Data

Komal Mohan Mali

Department of Statistics

Willingdon College, Sangli, Maharashtra, India.

komalmali17@gmail.com

Abstract: *This study examines the trend and dynamics of female labor force participation in India using data obtained from the World Bank. The dataset consists of annual observations over a period of several decades, providing a comprehensive view of changes in women's participation in economic activities. The study applies statistical techniques such as trend analysis, growth rate calculation, and linear regression to understand the direction and significance of changes over time. A graphical analysis is also conducted to visualize the pattern of participation. The regression results indicate a significant relationship between time and female labor force participation, highlighting either a declining or increasing trend depending on the period considered. The study highlights that women's participation in the workforce is influenced by social and economic factors. It also suggests that proper policies and awareness are needed to improve women's employment in India. This research is useful for understanding gender inequality and supporting better decision-making in the future.*

Keywords: Female Labor Force Participation, Women Employment, Trend Analysis

I. INTRODUCTION AND LITERATURE REVIEW

Now days Indian economy has significantly changed. There is improvement in urbanization, Literacy rate, Employment, Higher Education facilities. Female Labor Force Participation is an important indicator of development of country. This indicator shows how many women are involved in work and economic activities. It is also defining gender equality of a country. There is Improvement in rate is due to Education, Economic conditions, Social norms, and Government policies although women's role in Economy is underutilization. i.e. women are Educated capable of full time work but working as part time. Unpaid household work has restricted women to participate in work force. Women's participation in the labor force is changes over time. The female labor force participation rate is experienced both growth and decline. Analyzing trend over the time period help to understand growth or decline in rate. The study aims to check patterns, changes, and reasons behind this. The result and conclusion of this study helpful for many researchers, policy makers for increasing women's participation in India.

Many Researcher did work on female Labor force participation. The participation is based on education, income and family responsibilities. Some researcher finds out that Higher Education levels may increase women participations, and others find out that Social norms, household duties decline to participates in work force (Mehrota, S.). The participation rate is varying over the time period, it increases at some years and declines.

For this study secondary data Word Bank data about Female Labor force partition in India is used. The dataset consists of annual (year-wise) data for India over a period of several years. It includes the following key variables: Female Labor Force Participation (FLFP): Percentage of women who are actively working or looking for work, GDP per capita: Measures the average income per person and indicates the economic condition of the country, Female Literacy Rate: Percentage of women who can read and write, representing the education level among women. The dataset may contain some missing values, which are handled during the data cleaning process.



II. STATISTICAL ANALYSIS

The statistical analysis helps to understand pattern, fluctuations in the participation data. Time series analysis (Trend) suggests changes over time and to forecast future trends. The multiple regression analysis gives effect of

GDP and literacy. The correlation examine relationship between variables.

Time series analysis

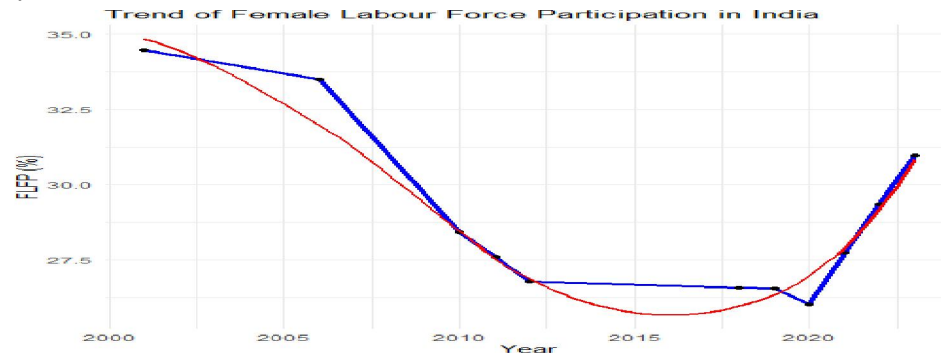


Fig 1: Trend of Female Labor Force Participation in India

The Trend analysis shows that of female labor force participation in India has the pattern of changes over time. The graph indicates that participation has fluctuated across the years, with periods of both increase and decrease. There is no perfectly stable pattern, suggesting that female labor force participation is influenced by changing economic and social conditions. The Augmented Dickey-Fuller test shows that the p-value is greater than 0.05, indicating that the series is non-stationary. Therefore, differencing is required before applying time series models.

The ARIMA model is used to analyze the time series data of female labor force participation. The estimated coefficients represent the relationship between current and past values of the series. The model selection criteria, such as AIC and BIC, are used to choose the best-fitting model. Lower values of AIC and BIC indicate a better model fit. Here The ARIMA model (1, 0, 0) is selected based on the data. This model captures the time-dependent structure of female labor force participation.

Parameter	Estimate
AR	0.8144
MA	0
Intercept	30.6017

Table No. 1: ARIMA Model

The AR coefficients influence of past values on the current values of the series. The results suggest that previous observations play an important role in determining future participation levels. The AIC and BIC values are used for model selection. The selected ARIMA model has the lowest AIC (51.41) and BIC (54.84) values, indicating that it provides the best fit to the data compared to other models.

Year	Forecast
2024	34.6549
2025	32.7445
2026	30.3129

Table No. 2: Future Forecasting Values



FLFP Forecast (2024–2026)

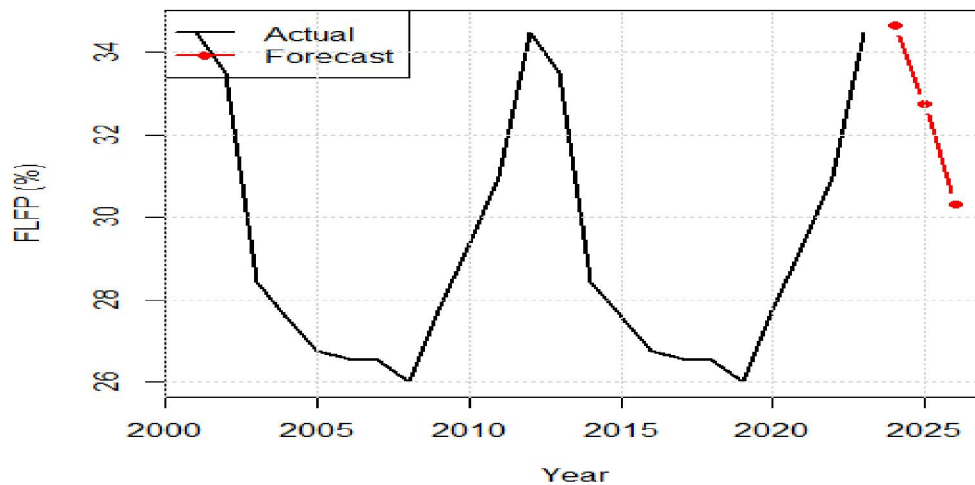


Fig 2: Forecasting values over years.

Forecast values indicate the expected level of female labor force participation in the coming years. The results show a gradual decrease trend.

Correlation Table:

	FLFP	GDP	Literacy
FLFP	1.00		
GDP	-0.5635	1.00	
Literacy	-0.5596	0.9885	1.00

Table No. 3: Correlation Table

As income levels increase, more women may withdraw from low-paying or informal jobs due to higher household income, increased education, or social factors. This phenomenon is often observed in developing countries. The correlation results indicate a negative relationship between female literacy rate and female labor force participation. The result reflects the issue of underutilization of educated women in the labor market, where increasing literacy does not always translate into employment due to lack of appropriate job opportunities.

III. REGRESSION ANALYSIS

The regression results show that the coefficients of GDP per capita and female literacy rate are not statistically significant at the 5% level, as their p-values are greater than 0.05. This indicates that these variables do not have a strong impact on female labor force participation in the given dataset.

IV. CONCLUSION

The analysis finds that both economic growth and improvements in female literacy do not automatically lead to higher participation of women in the workforce. In fact, the observed negative relationships suggest that many women may remain outside the labor market despite better education and rising income levels. The regression results indicate that these factors are not statistically strong predictors on their own, which means that female labor force participation is influenced by a wider set of conditions such as job availability, social norms, and institutional support. This study analyzes the pattern and key factors influencing female labor force participation in India using time series data. The time series model provides future estimates, showing that participation is likely to follow a gradual trend in the coming



years. Overall, there is a need for better employment opportunities, supportive policies, and an enabling environment that allows women to actively engage in economic activities.

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