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Regional Variation in Female Workforce Participation in India: Evidence from PLFS Survey

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Abstract

India is a country of diversity spread over many states. In this research study an attempt has been made to understand the variation in female employment in different major states. For this study all the annual survey reports of the periodic labour force survey of seven years from 2017-18 to 2023-24 have been taken as secondary data. In this study the trend of female employment in different states of India has been seen and on the basis of this trend an attempt has been made to find out the current scenario of regional variation. A comparative study of female employment has been done by the compound annual growth rate of female workforce participation rate of major states. Variance and standard deviation have been used as a statistical method to find out regional variation of female employment. In the research paper an attempt has also been made to understand the rural-urban disparity regarding female employment through various diagram based on PLFS surveys. The study attributes regional variation in female employment across the various major states in aspect of socio-economic, geographical, political, cultural and structural etc. Further the study emphasizes the need for comprehensive changes in such various policies adopted by the central and state governments so that reduce FWFPR related variations across the states.

Keywords: Female workforce participation, regional variation, Periodic labour force survey, standard deviation

Introduction and background of the study

India, as one of the fastest-growing economies in the world, has experienced significant social and economic transformations in recent decades. However, despite these advancements, the situation of female workforce participation in India is extremely considerable and alarming. Even among SAARC countries, India lags behind other countries. India currently has a demographic dividend globally, but its optimum utilisation will be possible only when we ensure their participation in the country's GDP by connecting half of the country's population with direct productive activities. India is currently the largest country in the world in terms of population and seventh largest country in terms of area. The states of India are different on the basis of region, as well as on the basis of language, culture, standard of living,

political and social environment. In such a situation it becomes important to look at and underline how much regional variation is there in India based on female workforce participation. One of the peculiar features of FWPR in India is its regional variation. Certain states, such as Himachal Pradesh, Chhattisgarh, and Tamil Nadu, report higher FWPRs, whereas states like Bihar, Uttar Pradesh, and Punjab exhibit alarmingly low participation rates. The reasons behind these disparities are multifaceted, including differences in educational attainment, socio-cultural factors, economic development levels, and labour market structures.

For instance, in southern states like Tamil Nadu and Karnataka, industrialization and the growth of the service sector have created more employment opportunities for women. In contrast, states such as Uttar Pradesh and Bihar, have deeply ingrained patriarchal norms that restrict women's mobility and access to employment. Additionally, agricultural labour participation among women varies significantly, with states like West Bengal and Odisha exhibiting higher involvement due to historical agrarian practices, whereas Punjab and Haryana, with their mechanized agricultural systems, show lower participation.

There is also a distribution of population on rural and urban basis in the states so we have to take cognizance of the rural and urban female workforce participation also within the states. Understanding regional variation in female workforce participation is very crucial for policy makers, researchers, social institutions and social organisations. Buy identifying the causes responsible for regional variation and regional disparities, targeted policy interventions can be designed to improve female labour participation across the different regions.

This study not only provides an empirical basis for policy formulation but also highlights the importance of addressing structural and cultural barriers to women's economic empowerment.

Literature review

Regional disparities in female employment in India have been widely studied. Female work force participation rate(FLFPR) in India varies significantly across states and rural-urban areas, influenced by factors such as industrialization, education, cultural norms, and government policies. Neff, Sen and Kling (2012) in Feminist Economics analyse how regional variations in female employment can be linked to agrarian distress and economic restructuring. They argue that women's participation in agriculture is higher in states like West Bengal and Odisha, while industrialized states like Tamil Nadu and Maharashtra exhibit higher engagement in formal employment.

Klasen and Pieters (2015) in their paper published in examine the declining trend of female employment in urban India despite economic growth. They attribute this decline to structural transformation, where traditional agricultural jobs decline, but new service-sector jobs fail to absorb women due to skill gaps and cultural barriers.

Eswaran et al. (2013) in The Journal of Economic development emphasise that female employment rates are lower in states with more rigid patriarchal norms, such as Haryana and Bihar. In contrast, Kerala and Tamil Nadu demonstrate higher participation due to progressive social attitudes and better educational attainment.

Kingdon and Unni (2001), in their study published in The Journal of Development Studies, highlight demand side of labour force with the role of education in shaping regional variations in FLFP. They find

that while higher education levels improve employability, social norms in states like Uttar Pradesh and Rajasthan distrain women from seeking employment despite educational gains.

Das and Desai (2003) in their work published in Economic and Political Weekly discuss how states with robust industrialization, such as Gujarat and Maharashtra, show greater female employment in manufacturing and services. They highlight that urbanization and female employment are positively correlated, but restrictive social norms in northern states prevent many women from benefiting from these opportunities.

Mukhopadhyay and Sinha (2016) in Oxford Development Studies argue that India's employment guarantee schemes, such as MGNREGA, have had a mixed impact. While they increased rural female labour force participation in states like Andhra Pradesh and Chhattisgarh, their impact was minimal in patriarchal societies like Rajasthan due to local implementation challenges. Afridi, Dinkelman, and Mahajan (2018) in Journal of Human Resources evaluate the impact of India's Beti Bachao Beti Padhao (BBBP) and Skill India initiatives. They find that while these programs have improved awareness and skill acquisition, they have not significantly boosted female employment due to persistent socio-cultural barriers and limited employment opportunities in rural areas. Chowdhary (2020) in The Indian Journal of Labour Economics highlights that microfinance programs have positively influenced female employment in states like West Bengal and Karnataka. Access to credit has enabled women to start small businesses, thereby increasing their economic participation.

Theoretical framework

Structural Transformation Theory (Lewis, 1954) posits that as economies transition from agriculture to industry and services, labour force participation patterns shift. Klasen and Pieters (2015) observe that in India, women's employment has not kept pace with industrial growth, particularly in urban areas, due to barriers in skill acquisition and cultural restrictions.

The Dual Economy Model (Harris & Todaro, 1970) explains how formal and informal sector employment co-exist, affecting FLFP. In India, women are more engaged in informal employment in states like Uttar Pradesh and Madhya Pradesh, whereas formal employment opportunities are higher in urban cities like Mumbai and Bengaluru (Das & Desai, 2003). Amartya Sen's Capability Approach (1999) emphasizes that access to resources, education, and societal freedoms influence workforce participation. Mukhopadhyay and Sinha (2016) found that policies like MGNREGA have improved employment rates for women in Andhra Pradesh and Chhattisgarh, but their impact is less pronounced in patriarchal regions.

In OECD countries, policies such as paid maternity leave, subsidized childcare, and gender equality laws have led to higher FLFP. Olivetti and Petrongolo (2016) in Annual Review of Economics highlight that Scandinavian countries have higher female workforce participation due to proactive government policies, contrasting sharply with India's lower rates. Comparison with other developing nations like Bangladesh and Indonesia reveal that microfinance and garment industry employment have boosted FLFP. Chowdhury (2020) notes that in India, microfinance has increased self-employment in states like Karnataka and West Bengal, similar to trends observed in Bangladesh.

All these theories related to migration female workforce participation have given a new perspective to look at regional variation in female employment.

Recent trends of female workforce participation in various major states India

The table-1 below shows the female workforce participation rate state-wise based on the PLFS annual survey report which has taken from the preliminary PLFS annual survey report of 2017- 18 to the last, recent annual survey report 2023-24. The trend of female workforce participation rates in various major states can be seen in these six years.

Table 1 FWFPR trends across major states in India

States	Female worker population ratio (FWPR)							CAGR
	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	
Andhra Pradesh	40.8	38.2	37.6	43.9	41.8	44.0	43.1	0.92%
Karnataka	24.8	24.2	31.7	34.9	31.0	37.2	37.2	6.99%
Kerala	20.4	25.3	27.1	28.2	32.0	33.5	36.0	9.93%
Tamil Nadu	31.3	34.6	38.3	40.8	39.1	38.6	41.5	4.81%
Telangana	30.3	35.2	41.8	43.4	42.6	43.1	44.3	6.54%
Maharashtra	29.1	29.9	37.7	35.0	37.3	39.8	39.1	5.05%
Gujarat	19.0	21.1	30.7	32.4	33.9	41.7	45.6	15.71%
Himachal Pradesh	47.5	56.3	63.1	61.1	63.8	67.6	62.3	4.62%
Punjab	13.7	17.3	21.8	21.1	21.9	25.2	28.9	13.25%
Uttar Pradesh	13.1	13.3	17.2	21.9	25.8	30.6	33.6	17.00%
Rajasthan	26.3	30.2	37.6	39.0	39.0	46.5	48.9	10.89%
West Bengal	20.1	21.7	23.1	28.1	27.4	33.1	39.2	11.78%
Odisha	18.3	22.8	31.8	32.2	31.4	43.6	48.0	17.44%
Bihar	4.0	4.2	9.4	10.4	9.9	22.0	30.1	39.99%
Madhya Pradesh	31.0	27.5	37.2	40.1	40.6	43.8	51.9	8.97%
Assam	11.0	11.7	14.2	22.9	26.8	19.6	48.1	27.88%
Arunachal Pradesh	13.0	14.6	20.8	25.1	28.2	56.0	62.4	29.88%
All India	22.0	23.3	28.7	31.4	31.7	35.9	40.3	10.61%

Source: PLFS annual survey reports from 2017-18 to 2023-24

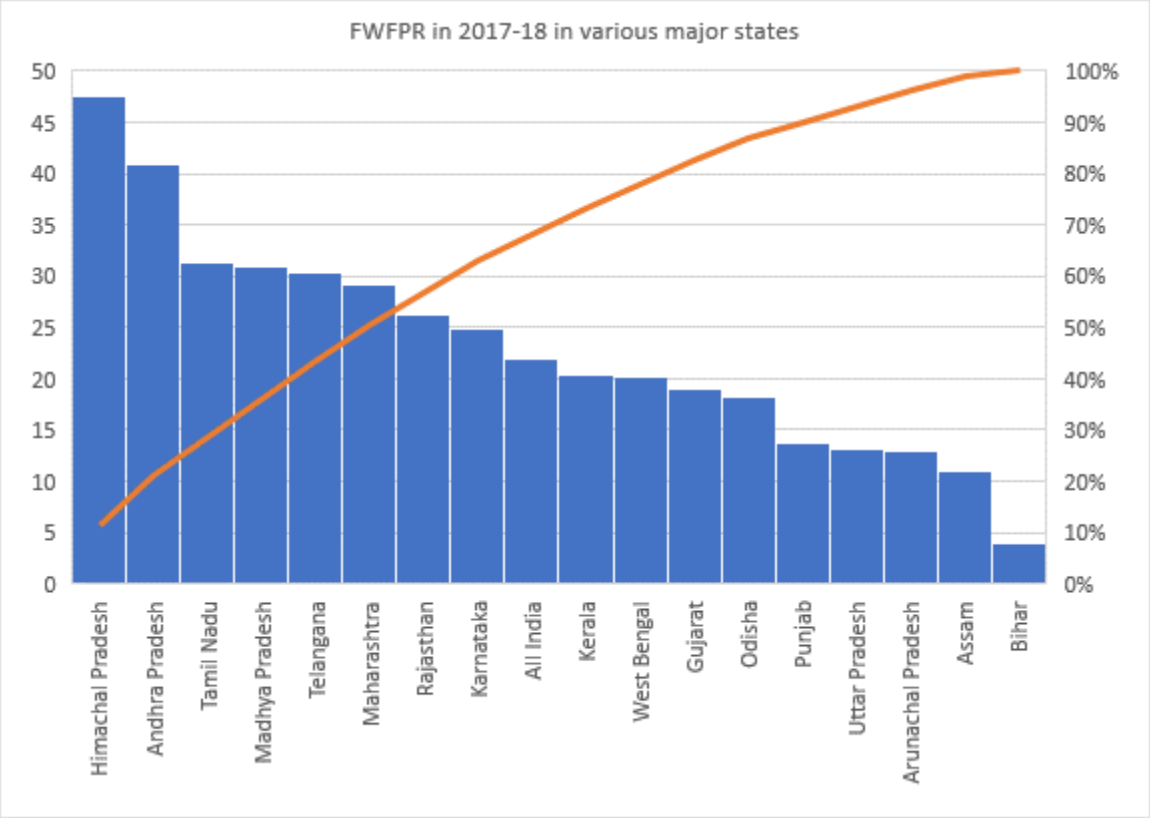

Figure 1

Source: Author`s compilation based on Table 1

According to the given table 1 and histogram figure 1 above, the study can be done easily by dividing states into six parts on the basis of female workforce participation in 2017-18. The first part is the states of Himanchal Pradesh and Andhra Pradesh which have the highest female workforce participation at 47.5% and 40.8% respectively. The second part includes the following states of Tamil-Nadu, Madhya-Pradesh, Telangana and Maharashtra, where the female workforce participation is around 30%. The third part includes Rajasthan and Karnataka where the female workforce participation rate is around 25%. The 4th part includes the states of Kerala, West Bengal, Gujarat and Odisha where the female workforce participation rate is around 20%. The fifth part is occupied by the states of Punjab, Uttar Pradesh, Arunachal Pradesh and Assam where the female workforce participation rate is around 13%. Bihar is the only state in the 6th part that has the lowest female workforce participation rate in India at 4%.

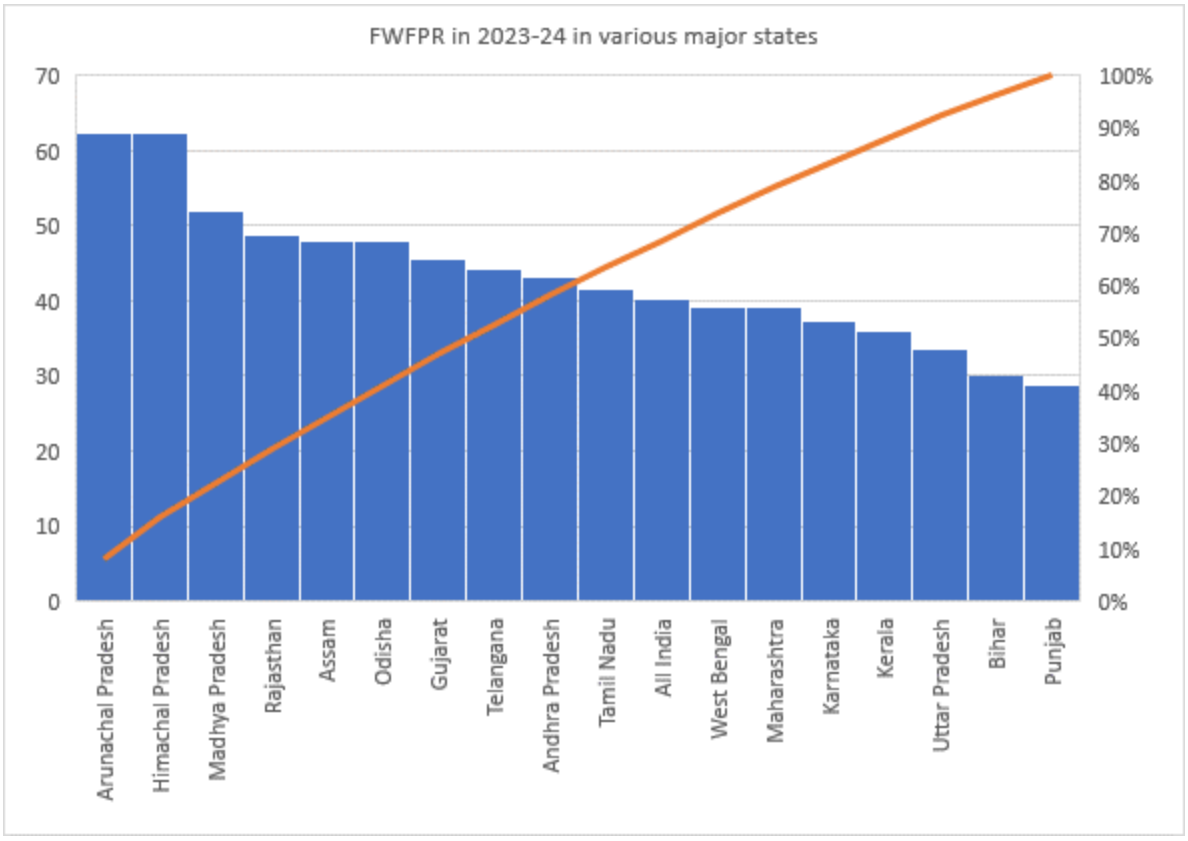

Figure 2

Source: Author`s compilation based on Table 1

Through table 1 and histogram figure 2 given above, we can see the rate of female workforce participation in the 2023-24 and thereby highlight the regional trend of female employment over the last six years. Based on this, the basic trend of female workforce participation rate can be ascertained by dividing the states into six parts. The first part is included by Arunachal Pradesh and Himachal Pradesh, where the female workforce participation rate is around 62% which is highest across all states. The second part includes the states Madhya Pradesh, Rajasthan, Assam and Odisha, where the female workforce participation rate is around 48%. The third part comprises Gujarat, Telangana, Andhra Pradesh and Tamil Nadu where the female workforce participation rate is around 42%. The fourth part includes states West Bengal and Maharashtra where the female workforce participation rate is around 39%. The fifth part includes the states Karnataka and Kerala where the female workforce participation rate is around 37%. Uttar Pradesh, Bihar and Punjab are placed in the sixth part where the female workforce participation rate is around 30%.

Based on the above data analysis the following points emerge: Himanchal Pradesh has the best position in female workforce participation which continues to be at the highest level in India. Among other states in North India, Uttar Pradesh still has a weak female workforce for participation though it has shown a sharp improvement over the recent years. The situation of female workforce participation in Rajasthan is comparatively better than in North India. The situation of female workforce participation is almost uniform in all the states of South India and its concentration is around the average female workforce participation in India. In Madhya Pradesh a state under Central India the female workforce partition rate

is close to 50%. Female workforce participation is surprisingly low in the most developed western Indian states, although there has been a substantial improvement in Gujarat, while in Maharashtra the rate has remained almost stagnant. Among the eastern states, Odisha is better off while West Bengal has average. In Bihar, the female workforce participation rate was only 4% during the first annual PLFS survey which has increased to 30.1% during the recent annual PLFS survey of 2023-24. Thus, there has been a significant improvement in the status of female workforce participation in Bihar. There is a lot of variation in female workforce participation rates in the north eastern states major northeastern states like Assam and Arunachal Pradesh have seen an unprecedented rise in FWPR.

Regional variation of female workforce participation in India: recent trends through PLFS survey

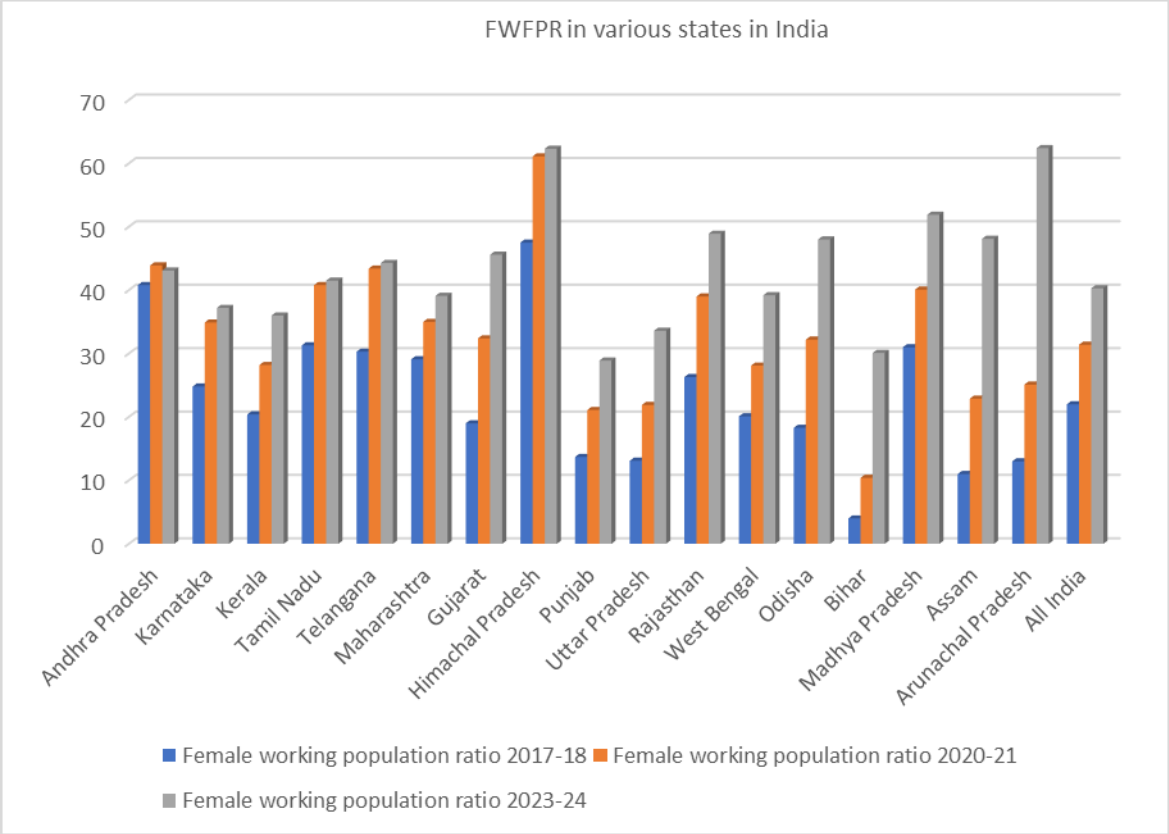

Figure 3

Source: Author`s compilation based on PLFS surveys from 2017-18 to 2023-24

Through table1 and bar chart figure 3 above, an attempt has been made to analyse the regional variation of female workforce participation in India. The figure below shows the data of female workforce participation for the year 2017-18, 2020-21 and 2023-24, which is based on the annual reports of PLFS survey. Best on the given bar diagram we can analyse the regional variation of female workforce participation and its recent trends. There is wide regional variation in India's female workforce participation. There has been a significant variation in FWFPR between different states, with a substantial variation in FWFPR within the state over different time-period. The highest variation in female workforce participation among states in India has been found between Arunachal Pradesh and Bihar over period of 2017-18 to 2023-24. In 2017-18 and 2020-21 The most variation has been found between Himachal Pradesh and Bihar while in 2023-24 this variation scenario is changed partially. In

2023-24 the highest variation has been found between Arunachal Pradesh and Bihar with the 32.3 percent which is partially more than variation between Himanchal Pradesh and Bihar with 32 .2%.

In the above bar chart, we can see that the variation of FWFPR is the lowest among the states of South India. Among the North Indian states, Himachal Pradesh and Rajasthan have higher FWFPR while Uttar Pradesh has much lower FWFPR, thus the regional variation of FWFPR is higher in north-Indian states. In the north-eastern states of Assam and Arunachal Pradesh, there has been some reduction in variation with following substantial improvement in FWFPR. The regional variation between Madhya Pradesh and other states of India is neither too high nor too low, on average.

Comparative study of changes in female workforce participation in various major states: through compound annual growth rate (CAGR)

A comparative study of female workforce participation in different states has been done on the basis of the compound annual growth rate between time period of 2017-18 to 2023-24. The trajectory figure 4 below shows the FWFPR in 2017-18 and 2023-24. The figure 5 below shows the compound annual growth rate of FWFPR among different states between elementary PLFS survey 2017-18 and last final PLFS survey of 2023-24. Since the study is based on the annual data of the PLFS survey over the past seven years, we will not be able to capture the trend of FWFPR on the basis of average annual growth rate as accurately as we will capture it on the basis of compound annual growth rate. From the bar chart figure 5 and trajectory figure 6 below, we can see that Bihar has the highest CAGR of FWFPR which shows a significant change with 39.99%. It is followed by Arunachal Pradesh`s CAGR which is 29 .88%. Assam is at number three with 27.88% CAGR. Thus, we see that two important states of the north-east have made significant efforts towards achieving the desired results in female employment. It is followed by states like Odisha, Uttar Pradesh and Gujarat where the CAGR of female workforce participation rate is around 17%. These states have also made commendable efforts in the given time. In the direction of female employment creation. The compound annual growth rate of FWFPR in the South Indian states is lowest and almost equal within these states. The lowest increase in FWFPR in this region of India is due to the fact that these states were already relatively more educated and developed and women were comparatively more aware about female employment, as a result there was already more FWFPR in these states. That is why, despite the fact that the number of female employments in these states is better, so the rate of increase in FWFPR appears to be low. India’s FWFPR has a compound annual growth rate of 10.5% during this period which Reflects an impressive change in the female workforce participation rate in India.

Trajectory of FWFPR in 2017-18 and 2023-24

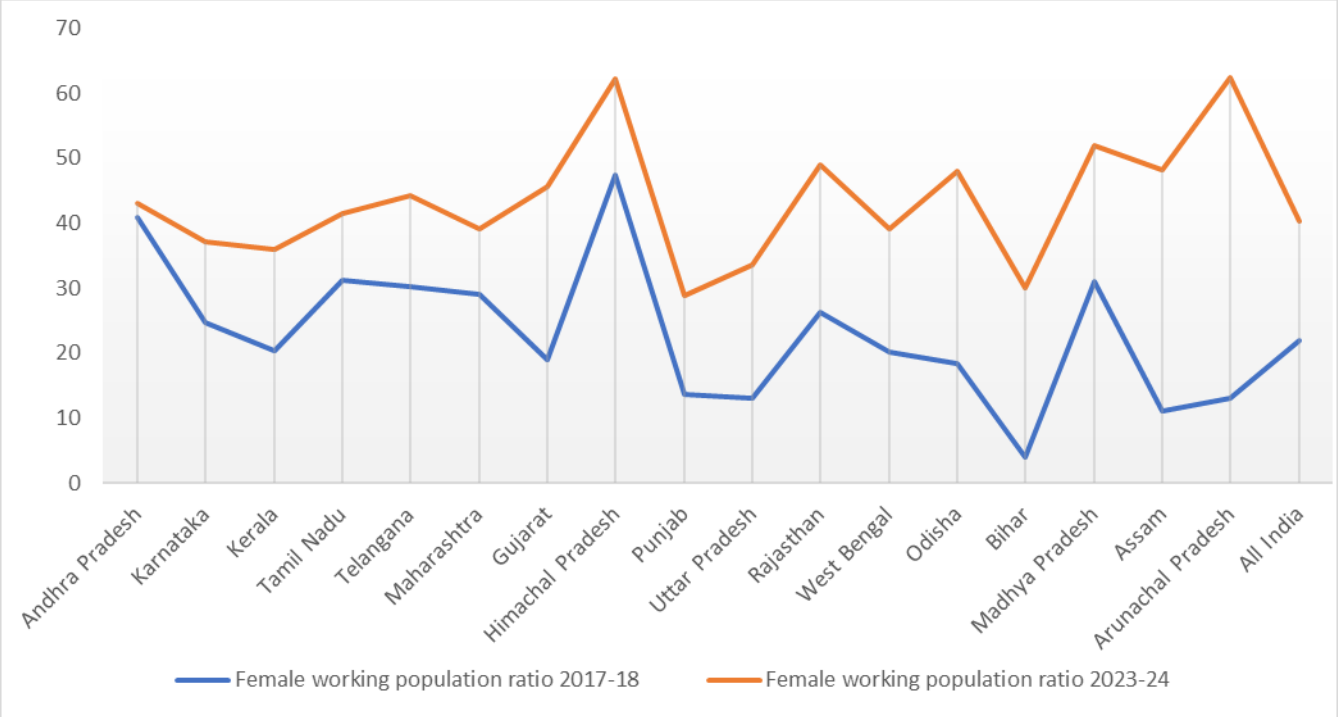

Figure 4

Source: Author`s compilation based on Table 1

CAGR of FWFPR across the various major states

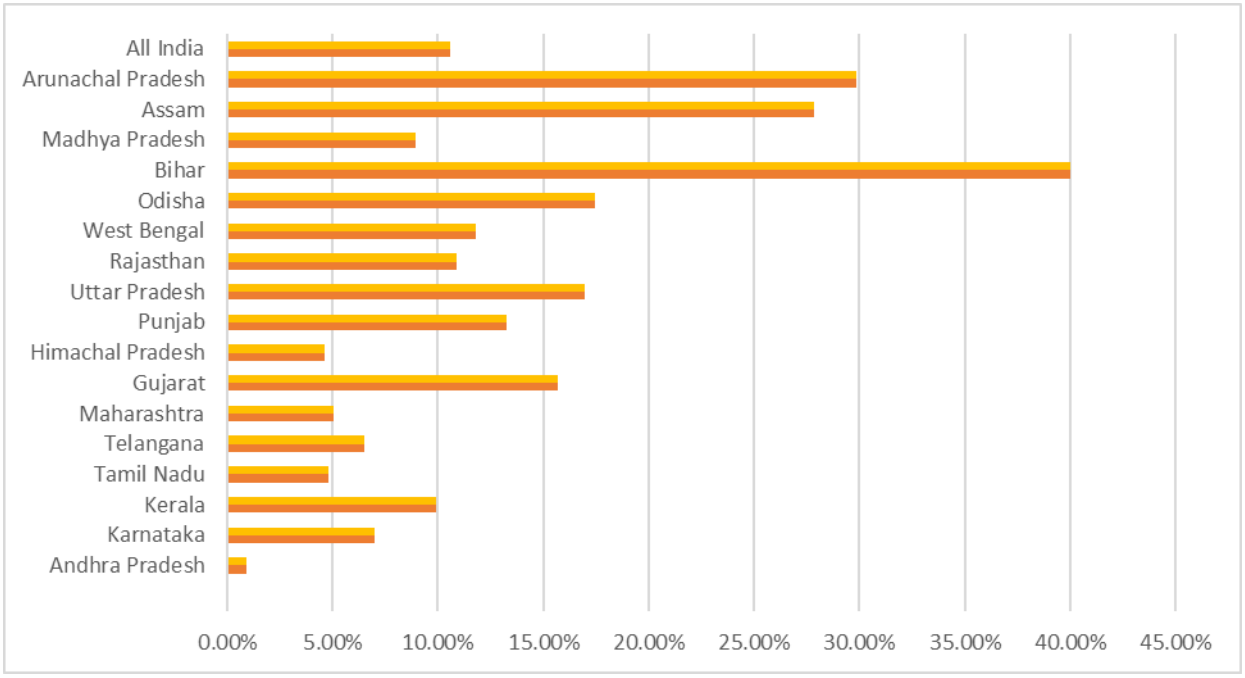

Figure 5

Source: Author`s compilation based on Table 1

Trajectory of CAGR in FWFPR across the various major states

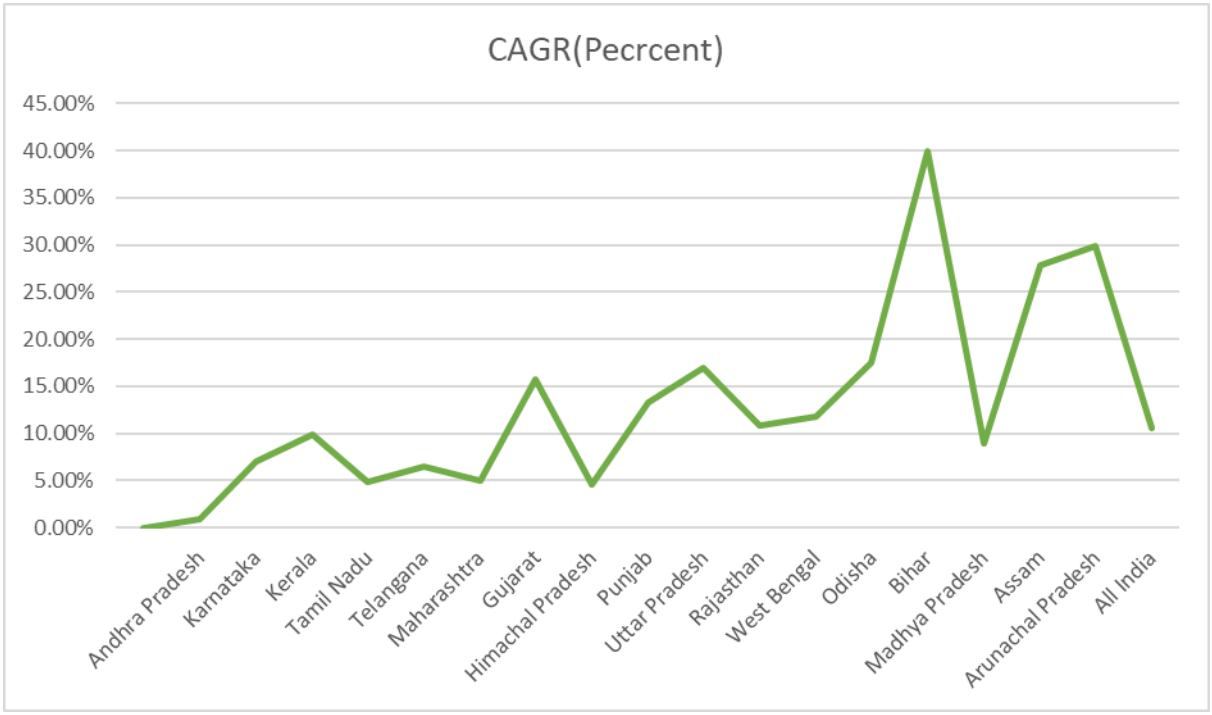

Figure 6

Source: Author`s estimation based on table 1

Regional variation of female workforce participation in India: A statistical analysis

In table 2 below which is based on all the annual reports of the PLFS survey published so far, which started in 2017-18 and the last survey report for 2023-24, the variation of female workforce participation in different states of India in these six years has been ascertained through statistical analysis. In order to find out this variation, the variance and standard deviation of FWFPR has been derived in all the major states of India during this period. The following formula is used to determine variances of FWFPR in the different major states:

The formula for population variation (also known as population variance) is:

$$\sigma^2 = (\sum (x - \mu)^2) / N,$$

where: σ^2 represents the population variance

$\sum$: is the summation symbol, meaning "add up all the values of"

x: represents each individual data point in the population

μ: represents the population mean

N: represents the total size of the population

In addition, an attempt has been made to look at variation of FWFPR through the standard deviation in the different major states. Standard deviation is also known as variation of coefficient. The formula to find out this is as follows This is followed by regional variation of FWR in Odisha Gujarat Bihar and Uttar Pradesh where standard deviation is 9.71%, 9.04%, 8.95% and 7.56% respectively. The standard deviation in Madhya Pradesh and Rajasthan is almost equal to each other which is 7.48% and 7.47% respectively.

Table 2 Measure of variation in FWFPR across major states through PLFS survey from 2017-18 to 2023-24

State	Female work force participation (PLFS Survey from 2017-18 to 2023-24)	
	Variance	Standard deviation
Andhra Pradesh	5.86	2.42
Karnataka	24.99	4.99
Kerala	24.3	4.92
Tamil Nadu	11.1	3.33
Telangana	23.81	4.88
Maharashtra	16	4
Gujarat	81.75	9.04
Himachal Pradesh	36.83	6.06
Punjab	21.04	4.58
Uttar Pradesh	57.22	7.56
Rajasthan	55.8	7.47
West Bengal	39.48	6.28
Odisha	94.41	9.71
Bihar	80.14	8.95
Madhya Pradesh	56.08	7.48
Assam	142.67	11.94
Arunachal Pradesh	335.6	18.31
All India	36.39	6.03

Source: Author`s estimation based on PLFS survey annual data from 2017-18 to 2023-24

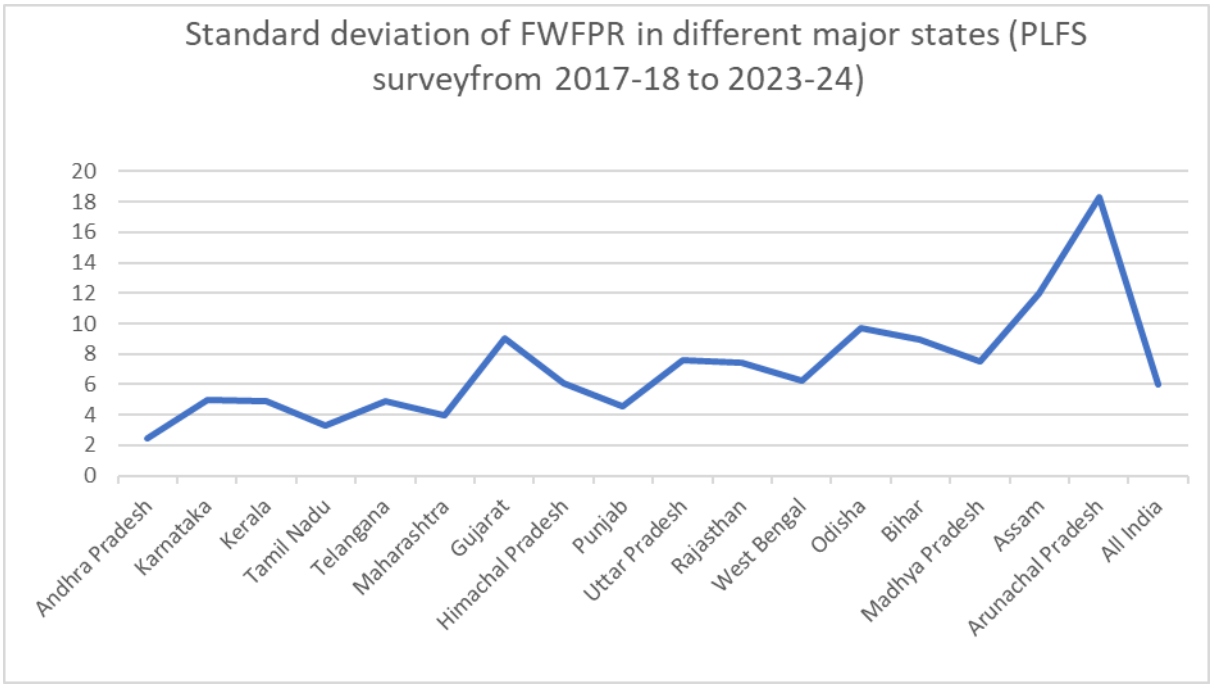

Figure 7

Source: Author`s estimation based on table 2

Since the variance and standard deviation of these states have been ascertained by incorporating the report of all the seven years of PLFS survey So this method is more suitable for accurate representation of the regional variation than the CAGR method which described above. As we know the result in the CAGR method are based on the PLFS survey`s first report of 2017-18 and last report of 2023-24. In the above table we can see that the highest variation of female workforce participation rate has occurred in Arunachal Pradesh and Assam where the standard deviation is 18.31% and 11.94% respectively. In Himachal Pradesh where the female workforce participation rate is found to be the highest, the standard deviation of FWFPR is 6.06%. The cheats of South India and Maharashtra have the lowest standard deviation of FWFPR which is varying between 3% and 5%. Andhra Pradesh has the lowest standard deviation of FWFPR at 2.42%. The Standard deviation of FWFPR in Maharashtra is 4%. On the basis of the above statistical analysis we find that the variation of FWFPR is the lowest in states which are educationally enhanced and industrially developed such as states of South India: Andhra Pradesh, Kerala, Tamil Nadu, Karnataka, Telangana and Maharashtra from western India.

The above statistical analysis argues that the variation of FWFPR in different states of India is very high. The degree of variation is comparatively low in the South Indian states. If we do a comparative study of the variation of FWFPR, we find that there is a lot of regional variation between the South Indian states and North East states. There is also a high regional variation in FWFPR between South Indian and North Indian states. Due to improvement in FWFPR in Gujarat and Odisha, there is more regional variation here as compared to other states. The FWFPR Bihar is showing a stable trend after significant improvement while the FWFPR of Uttar Pradesh has also shown a significant improvement. Despite substantial reforms in all the states of India. The situation of female workforce participation is alarming and there is considerable variation on the regional ground.

Rural-Urban disparity in regional variation of female workforce participation

Table 3 Trend of rural-urban disparity in regional variation of FWFPR

State	Female worker population ratio								
	2017-18			2020-21			2023-24		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Andhra Pradesh	47.3	27.9	40.8	51.0	29.4	43.9	49.7	28.1	43.1
Kerala	20.8	19.8	20.4	30.7	25.3	28.2	38.8	33.0	36.0
Himanchal Pradesh	50.0	21.3	47.5	64.0	31.1	61.1	65.3	36.9	62.3
Uttar Pradesh	14.0	9.90	13.1	24.8	11.4	21.9	38.5	15.6	33.6
Rajasthan	30.4	13.1	26.3	46.1	15.3	39.0	57.1	26.7	48.9
Bihar	3.8	6.0	4.0	11.0	5.2	10.4	31.7	15.1	30.1
West Bengal	19.5	21.6	20.1	29.6	24.6	28.1	42.9	30.8	39.2
Madhya Pradesh	34.9	19.6	31.0	47.1	22.5	40.1	60.8	27.7	51.9
Assam	10.6	13.6	11.0	23.8	16.6	22.9	50.9	27.8	48.1
All India	23.7	18.2	22.0	35.8	21.2	31.4	46.5	26.0	40.3

Source: PLFS annual survey report of 2017-18, 2020-21, 2023-24

Regional variation in female workforce participation across rural and urban areas of different states in India show wide disparities which can be seen in above table 3. The figures number 7,8 and 9 show the rural and urban status of FWFPR in different major states of India through the trajectory curve for 2017-18, 2020-21 and 2023-24 respectively. A regular time-intervals have been taken to observe the trend of rural urban variation in FWFPR. In figure 7, We can see that in the 2017-18, the lowest rural-urban disparity is found in Kerala. West Bengal also has low level of disparity while Madhya Pradesh Andhra Pradesh and Himachal Pradesh have high levels of disparity. The situation of female workforce participation in Bihar and UP is very worse in both rural and urban areas.

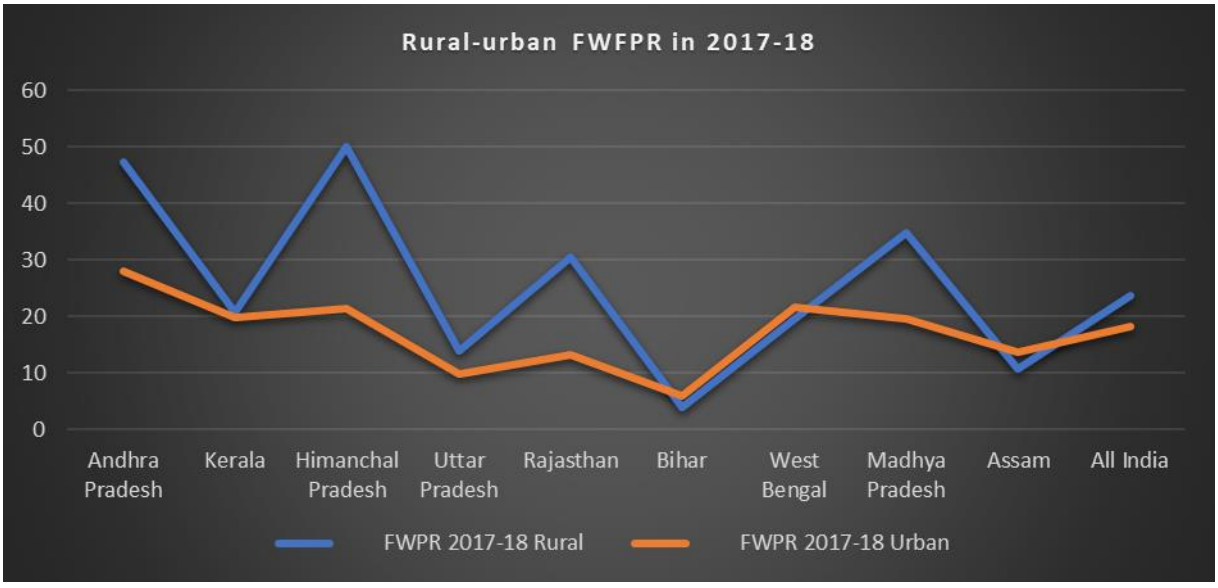

Figure 8

Source: Author`s compilation based on table 3

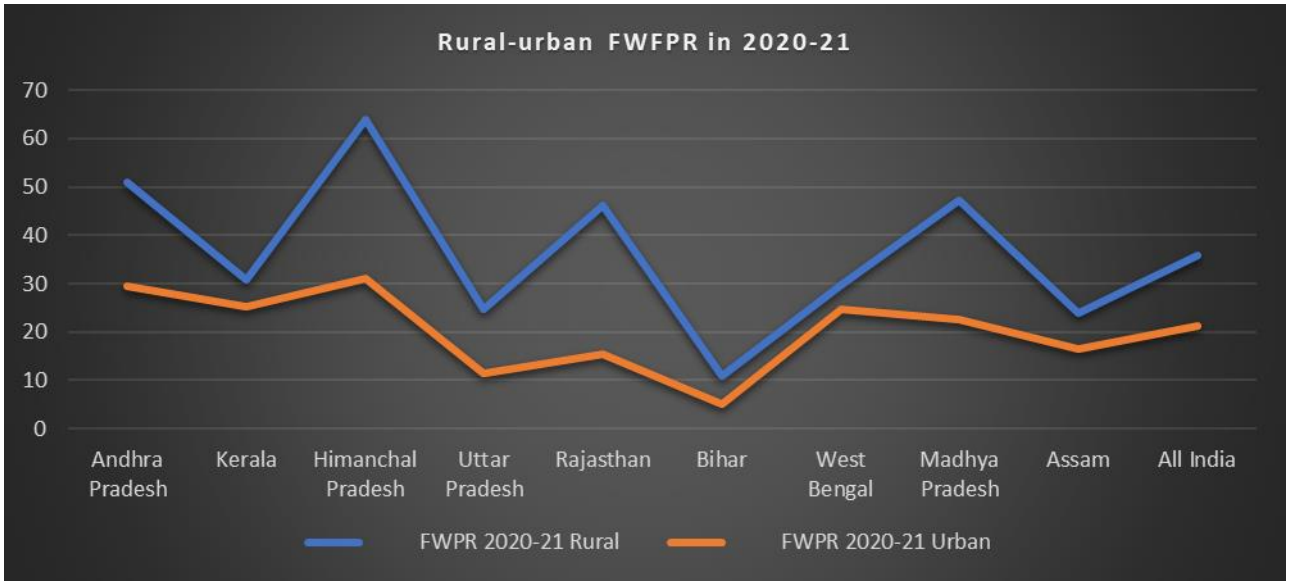

Figure 9

Source: Author`s compilation based on table 3

Through the trajectory is given in figure 9 above Kerala and West Bengal have the lowest disparity in rural urban FWFPR as before. There has been an increase in the level of rural-urban disparity in Rajasthan and Madhya Pradesh. In Uttar Pradesh and Bihar, there has been an increase in female workforce participation rates in both rural and urban areas, but in urban areas, this increase is partial. In Andhra Pradesh this disparity is stable as before.

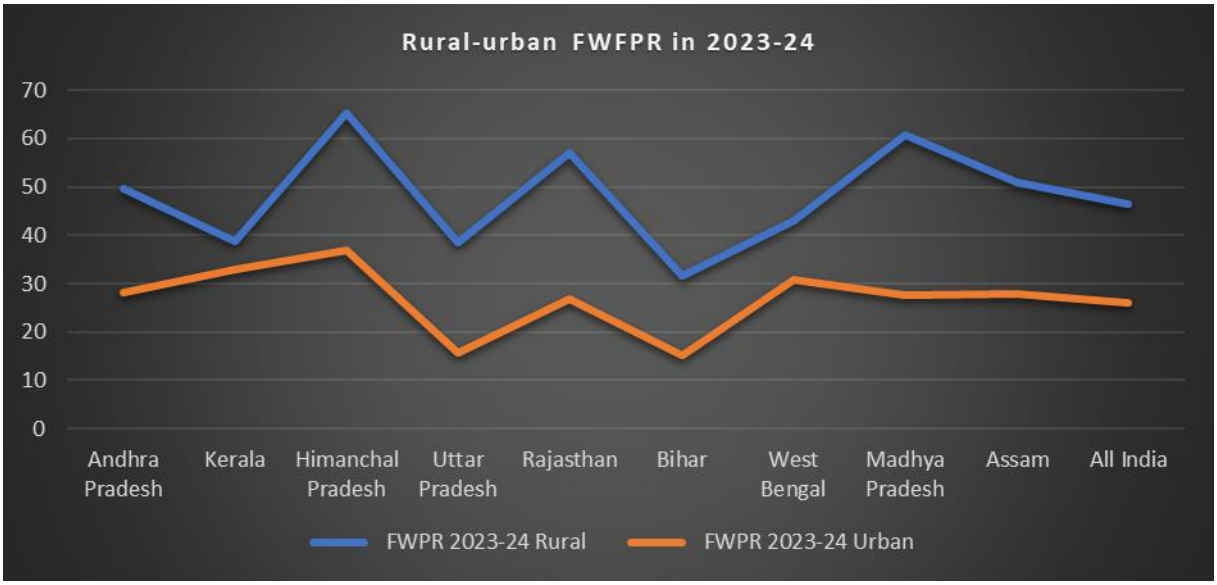

Figure 10

Source: Author`s compilation based on table 3

Given above the trajectory of figure 10 depicts the rural urban disparity of FWFPR of 2023-24 based on the annual report of the PLFS survey published recently in September 2024. There has been a significant increase in both rural and urban FWFPR in 2023-24 But the increase has not been uniformity across states. Kerala has the lowest rural-urban FWFPR Disparity which shows that significant efforts have

been made in the direction of providing employment opportunities in the urban areas of Kerala and meaningful steps have been taken by the state to absorb the high educational attainment of the state. There has been a slight increase in rural urban disparity in FWFPR in West Bengal due to comparatively lower growth in urban areas. In Rajasthan and Madhya-Pradesh the rural urban disparity has remained the same as before though there has been a significant increase in FWFPR. India's most populous state Uttar Pradesh has seen an increase in rural-urban FWFPR disparity due to low growth in FWFPR in urban areas and comparatively higher growth in rural areas. During this period two states Bihar and Assam are very important to mention as there has been an unprecedented increase in the FWFPR although in urban areas the FWFPR. In Bihar the women's welfare programs run by the state government have led to a major improvement in the direction of female employments there. There has been a significant increase in the FWFPR in rural areas of Assam.

If we compare the trajectory of all the three period, It is clear that the female workforce participation rate has increased but at the same time the rural urban disparity has also increased.

Conclusion and policy recommendations

There is wide regional variation in female workforce participation across different states of India, which is majorly influenced by variables such as factor endowment, socio-economic structure, cultural differences, status of education and skill development etc. States that have made major investments in motivating female education through basic to higher education, focusing on female health, have seen a desirable increase in the female workforce participation rate. In almost all the states of India the socio-cultural barrier hinders the development of female employment in the form of patriarchal society, for its eradication we should carry out many types of awareness program extensively. To achieve gender equality with rapid and inclusive economic growth in India policies need to be designed and implemented keeping and considering regional disparities. Setting up a small and medium enterprises, imparting agricultural education, promoting technological advancement, skill and innovation in rural areas of India can bring about an effective increase in female workforce participation. There is a need to displace the unpaid self-employment of females in both rural and urban areas through regular wage employments. Targeted policy should be formulated and implemented by identifying the geographical, social and economic factors of different states so that it can create employment for women in the state specific situation. There should be multi-faceted investment in the direction of women empowerment so that women in every field can come forward and join the direct productive work of the country and contribute to the country's economy according to their potential. The more we are able to reduce the regional variation in FWFPR, the faster our economy will grow.

Abbreviations

FWFPR- Female workforce participation rate

FWFP-Female workforce participation

PLFS- Periodic labour force survey

SD- Standard deviation

CAGR-Compound annual growth rate

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