A Study of State-Level Gender Gap in Education and Labor Force Participation

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Abstract

The skewed gender ratio of education and labor force adversely selects a less efficient pool of workers, which lowers the average quality of human capital and has a negative effect on output growth. These disparities are typically far more pronounced in developing nations than in developed ones through allocative inefficiencies that lower overall labor productivity reflected in them. Even in the absence of productivity growth the economy expands when labor and other resources shift from less productive to more productive activities. The gendered or gender-biased labor markets affect not just women workers but also long-term productivity horizons. It is a sign of inefficient resource distribution. Additionally, they keep economies stuck on the 'low road' of labour-intensive growth, which makes it challenging to guarantee the sustainability of growth or to fully reap its benefits. The favourable circumstances surrounding women's employment can provide a more solid foundation for long-term increases in per capita income.

Keywords

Gender gap, human capital, labor force participation rate

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1. Introduction

Gender inequality impedes both individual and national development. The majority of underdeveloped economies that are experiencing slow economic growth are largely characterized by the labour force's skewed composition and the declining marginal productivity of labour as an input. Of course, a number of factors contribute to this downward trend in labour productivity. Some of the enduring factors include the deficiency of human and physical capital, the critical skills that are essential for the industrial and service sectors and the existence of an excess of female labour force that has not been utilized because of poor conversion into human capital. In addition to this, some cyclical and structural changes in the economy result in inefficient labour force reallocation. Education and training are critical for the economic development of the country through the development of innate abilities and skills among the people and thus human capital formation. Investment in human and its development as a creative and productive resource is the core of human capital formation which must include both female and male.

Although the accumulation of physical capital is quite important in the process of economic growth of a country but with the passage of time, it is being increasingly realized that the growth of tangible capital stock depends extensively on the gender just like human capital. In the absence of adequate investment in both female and male human capital, utilization of physical capital will be at a low pace, leading to the retardation of development.

The skewed gender ratio of education and labor force adversely selects a less efficient pool of workers, which lowers the average quality of human capital and has a negative effect on output growth. These disparities are typically far more pronounced in developing nations than in developed ones through allocative inefficiencies that lower overall labor productivity reflected in them. Even in the absence of productivity growth the economy expands when labor and other resources shift from less productive to more productive activities. The gendered or gender-biased labor markets affect not just women workers but also long-term productivity horizons. It is a sign of inefficient resource distribution. Additionally, they keep economies stuck on the 'low road' of labour-intensive growth, which makes it challenging to guarantee the sustainability of growth or to fully reap its benefits. The favourable circumstances surrounding women's employment can provide a more solid foundation for long-term increases in per capita income.

The present discussion focuses on state-wise identification of gender gaps in various levels of education and corresponding labor force participation in education level categories. The data set contains observations for the period of 2017 to 2024, prepared from the Periodic Labor Force Survey published by MOSPI, govt. Of India.

2. Review of Literature

Economists today agree that gender-specific factors have a big impact on growth. Recent theoretical and empirical studies have made it abundantly evident that women's participation in the labor market promotes growth. Gender-specific growth factors were increasingly identified as exogenous to endogenous in growth models. These models endogenize technological advancements by integrating education and labor market participation as growth factors. The ability of a country to develop is negatively impacted by gender disparities in educational attainment, claim Knowles et.al. (2002). When gender-specific differences in schooling are substantial, the rates of return from education for women are higher than those for men due to the declining marginal returns of human capital. Consequently, funding women's education raises a country's capital stock and fosters macroeconomic expansion. The more complex impacts of women's education on a nation's income involve lower fertility rates and increased female workforce participation and earnings. Galor and Weil (1996) combine a model of household decision-making regarding paid work versus unpaid domestic responsibilities with a growth model that factors in the labor supply from both women and men. They illustrate how the involvement of women in the labor market provides households with an additional income stream, allowing for greater savings. The growth of savings enhances the capital stock per worker, which in turn raises overall output.

Therefore, a nation's economy experiences faster growth when more women engage in the workforce. According to Klasen and Lamanna (2009), high levels of gender-specific discrimination in employment settings restrict the "talent pool" of a nation's workforce by pushing out potentially highly skilled women in favor of less qualified men. This leads to a lower-than-expected average productivity within the national economy. Consequently, this diminishes a country's competitiveness on the global stage. Research, including Klasen's (1999), supports the positive impact of women's participation in the labor market on economic growth, as suggested by theoretical frameworks. Data from 109 nations and observations spanning from 1960 to 1992 have been utilized. Various (macro and microeconomic) data indicate that men and women complement each other in the manufacturing sector. According to Ostry et al. (2018), diversity is valuable. An increase in the number of women entering the labor force is expected to yield greater benefits than a similar increase in male workers. The estimation findings suggest that gender disparities negatively impact a country's economic prosperity. Hence, narrowing the gender gap in labor force participation is beneficial for both the economy and women.

There are multiple interconnected arguments regarding gender inequality in the labor market. First, studies indicate that this issue, along with disparities in

educational achievements between genders, negatively impacts the economy. Employers are forced to rely on a narrower talent pool, which leads to a decrease in the overall competency of the workforce (Esteve-Volart, 2004). The second argument, which is also closely tied to the first, asserts that demographic factors contributing to gender inequality in employment can obstruct economic growth. A model created by Cavalcanti and Tavares (2007) shows a link between elevated fertility rates and workforce gender disparities, which subsequently hampers economic development. Third, gender disparities in employment access would also prevent countries from using women's labor as a comparative advantage in an export-oriented growth strategy, according to Seguino's (2000) results on the impact of gender pay gaps on international competitiveness. The significance of women's employment and income for their ability to negotiate within families is the subject of a fourth argument.

Studies also show that the relationship between education, female employment, and growth evolves with time. When a nation enters the "industrial" stage of development and women can work in more lucrative industries. Research has shown that there is a U-shaped relationship between the overall economic output and the rise in female labor market participation and education (Goldin 1995; Mammen and Paxson, 2000; Lincove, 2008 and Tam, 2011). A large body of research (Amartya Sen, 1990; Lawrence James Haddad, John Hoddinott, and Harold Alderman, 1997; Duncan Thomas, 1997; Stephan Klasen and Claudia Wink, 2003; and Klasen et al. 2008) reveals that women's employment and earnings increase their bargaining power in the home. In addition to being advantageous to the women in question, this improved bargaining power led to a number of growth-promoting outcomes. These could include greater savings because men and women save and spend differently (Stephanie Seguino and Maria Sagrario Floro, 2003), more profitable investments, responsible credit use and repayment, and greater investments in their children's health and education, which support the human capital of the next generation and, consequently, economic growth. If these findings prove to be robust, greater levels of women's employment could prove beneficial for economic performance in this sense as well. Better distribution of female workers across economic sectors and occupations supports economic growth in addition to women's increased participation in the labor force. For instance, Hsieh et al. (2013) hypothesize that the shifting proportion of women and other underrepresented groups in the workforce may have contributed between 17 and 20 percent of the US economy's growth between 1960 and 2008.

3. Data Sources and Methodology

The trends of gendered human capital formation via education and consequent labour force participation are aimed to be captured at the national level

in India. This analysis is based on the data of 21 states of India excluding the eastern states and union territories. The data set contains observations from 2017-18 to 2023-24, prepared from the Periodic Labor Force Survey published by MOSPI, the government. Of India. The data set covers the population aged between 15-59 for both females and males. Labor force participation rate is covered under the US+PS status in the age group of 15-59. The idea behind it is to trace the relationship between educational attainment and labour force participation of females. The female-to-male ratio at different levels of education and corresponding labor force participation over the period has also been calculated and displayed with the help of a graphical presentation. The bar graphs are based on aggregated ratio values over the study period, so the height of a particular bar is an indication of the better performance of a state. Moreover, the compound annual growth rate of both the dimensions in the corresponding table in various education level categories made it precise and suitable for comparison of inter-state disparities.

4. Contours of Gap in Female Labor Force Participation:

There are two main propositions on what determines female labor force participation. The first strand of literature argues that females participate in the labor market either to maximize their own utility function or to maximize their households' total welfare (Becker, 1965; Bardhan, 1979; Franz & Kawasaki, 1981; Goldin, 1983a, 1983b; Heckman & McCurdy, 1980; Renaud & Siegers, 1984; Kooreman & Kapteyn, 1984). The second strand of literature explains how structural factors determine the female LFPR at macro level, leading to a ''U shape" female labor force participation curve in the course of economic development (Goldin, 1994; Tansel, 2001; Mammen & Paxson, 2000; Tam, 2011; Bhalla & Kaur, 2011; Gaddis & Klasen, 2014; Chaudhary & Verick, 2014).

It is imperative to note that individual data from NSS survey rounds, primarily regarding education, income, employment and cultural factors, have been noted as FLFP's primary motivators. Mehrotra S. & Parida J (2017) investigated micro and macro determinants behind falling FLFP and found that an increasing level of education affects it negatively in the short run. Four important factors have dominated much of the conversation about the declining trends in India: Young women's enrollment in education is increasing, few job opportunities, the impact of increased household income and measurement (Chaudhary and Verick, 2020; Kapsos et al., 2014; Mazumdar and Neetha, 2011). Increased uncertainty about future earnings raises women's LFP, according to the conceptual framework presented by Attanasio et al. (2005), especially when the household lacks savings or access to credit. In rural areas, the participation of women in the labor force also tends to rise during

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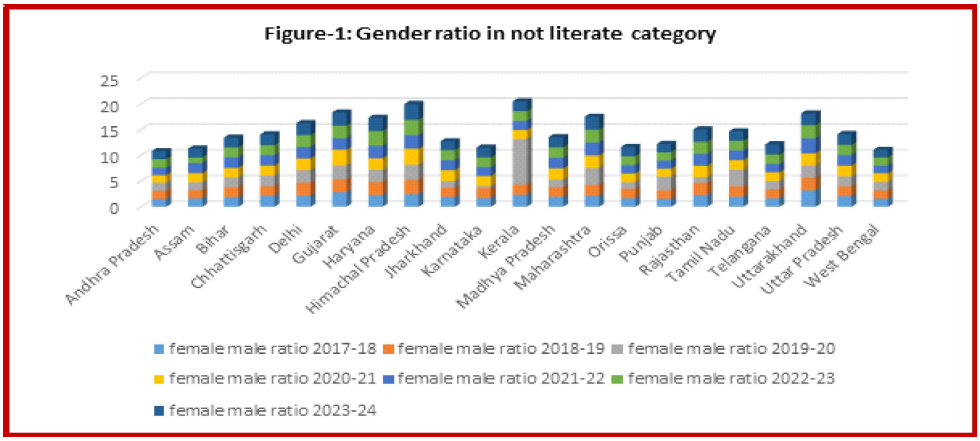
difficult times and decline again when things get better (Himanshu 2011; Bhalotra and Umaña-Aponte 2012). While most states which have seen rapid economic growth, the study (Navin Kumar Jha, Saritha R., Duraisamy, 2019) found a significant Net State Domestic Product (NSDP) as a proxy for employment opportunities. However, other states have also seen a decline in the rate of female labor force participation. This was the result of India's poor employment generation in spite of strong economic growth.

After using logistic regression models to analyze the NSS data for the years 1999–2000, Olsen and Mehta (2006) found a U-shaped curve for employment according to women's educational attainment. Women who are illiterate, have less education, and hold university degrees are more likely to work more than middle-level educated women. Due to cultural ethos, increased household income, and the socio-economic disadvantaged group that they belong to, women are more likely to choose not to work outside the home and to take on more domestic responsibilities. Highly educated women are able to enter the labor market because they can afford to hire domestic help. The study's primary finding is that lower-class households, primarily in rural areas, are experiencing a decline in labor force participation. The fact that women's labor supply serves as a household insurance mechanism is also supported by the declining rates of labor force participation among women whose household economic status improves.

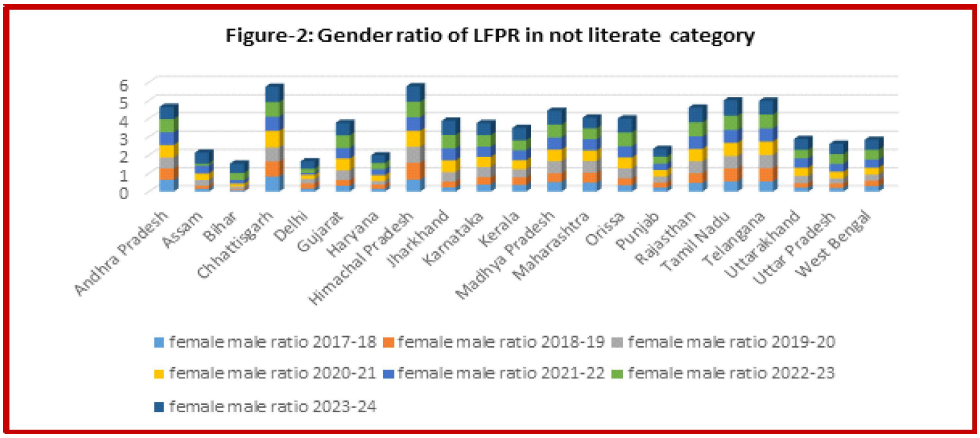
The importance of education is pivotal as it plays a role in promoting economic development through the means of improving human capital level as well as increasing the quality of the labor force. States have recorded a growing change in educational participation of females at all levels of education and the ratio has improved over the years. The increased accessibility of educational institutions and facilities had a positive effect on the curtailment of the gender gap curtailment especially for school enrolments. The figures pertaining to gender gaps in educational levels and labor force participation rate clearly indicate the divide at the regional level.

4.1. Skewed Gender Ratio of Educational Level vis-à-vis Labor Force Participation Rate in the Not Literate category

The comparative analysis of the female-male ratio of the non-literate and their Labor Force Participation from 2017–18 to 2023–24 exhibits significant disparities between literacy-related gender gaps and labor market outcomes. States like Himachal Pradesh, Gujarat, and Uttarakhand continuously show high ratios of non-literate females compared to males, indicating greater illiteracy among women. However, these states also show relatively higher LFP ratios, suggesting that with poor literacy, the majority of women participate in non-skilled work.



Conversely, Bihar, Assam, and Delhi reflect a stark difference. These states exhibit moderate to high female-male illiteracy ratios but their LFP ratios remain extremely low, pointing towards a compounded disadvantage for women in accessing employment.



States like Chhattisgarh, Tamil Nadu, Rajasthan, and Telangana show a positive coincidence between illiterate female population and labor participation over time, pointing towards women's participation in menial jobs in agriculture and allied activities. Maharashtra and Madhya Pradesh also demonstrate moderate to high female illiteracy while maintaining increasing LFP ratios, especially in later years. In summary, while high female labor participation among the illiterate is visible in several states, it highlights the urgent need for targeted interventions in education and skilling so that the employment paradigm can be shifted for skill-based work opportunities for females.

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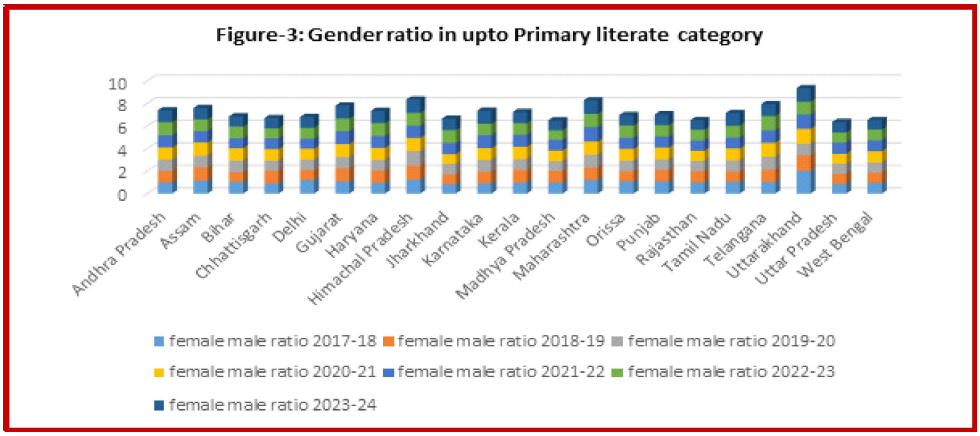
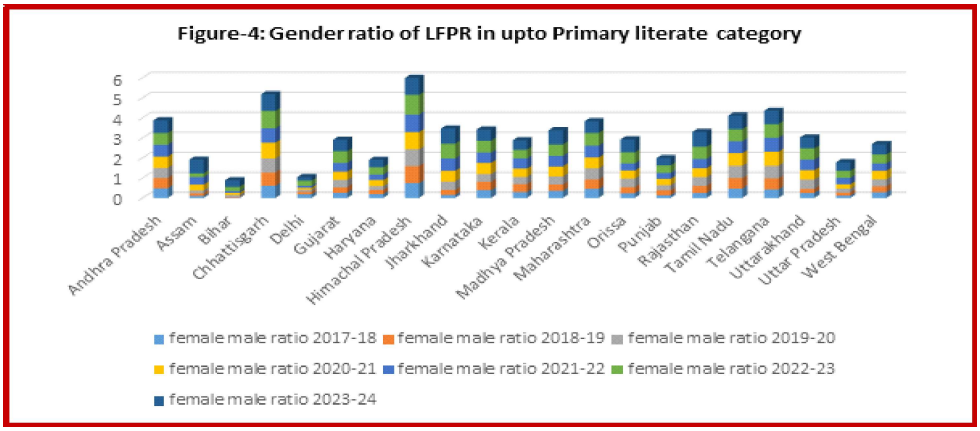
4.2. Skewed Gender Ratio of Educational Level vis-à-vis Labor Force Participation Rate in the up-to-primary educated category

The comparative analysis of the female-male ratio of up-to-primary-level educated and corresponding Labor Force Participation exhibits a mixed pattern across Indian states.



Himachal Pradesh, Chhattisgarh Telangana and Tamil Nadu consistently earmark a relatively balanced female-to-male education ratio and strong labor force participation ratios. Suggesting that even limited education enables higher female economic participation. Uttarakhand and Maharashtra also maintain strong LFP among primary-educated women.



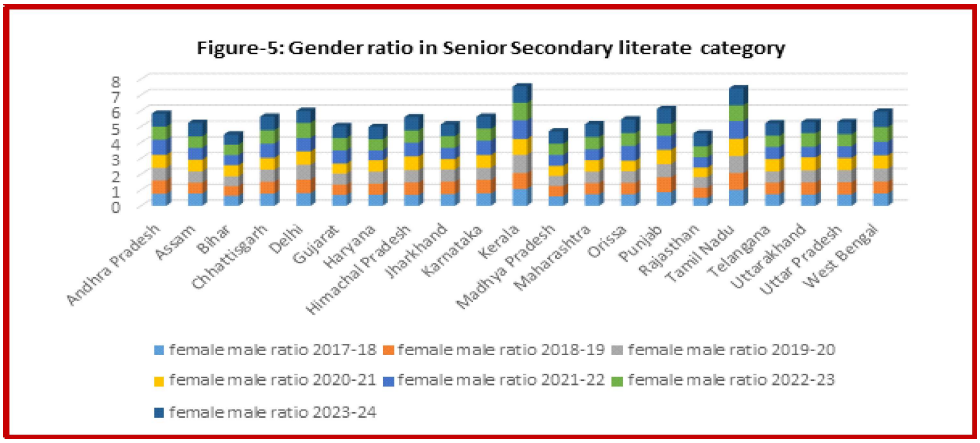
Contrary to this, Delhi, Bihar, and Uttar Pradesh show persistent low female LFP ratios despite having moderate or improving female education ratios, marking structural and social barriers beyond education.

Assam presents a notable shift: while the education ratio stabilizes, the LFP ratio increases significantly in 2023–24, probably due to labor market restructuring. Uttarakhand, despite having the highest female-to-male education ratio in several years, shows only moderate gains in LFP, highlighting an education–employment disconnect.

States like Gujarat, Karnataka, and Madhya Pradesh by indicating to a positive correlation, show a gradual increase in both education and LFP ratios. Meanwhile, Rajasthan and Jharkhand register high LFP ratios despite lower and fluctuating education ratios, implying other factors are also relevant. In summary, while increased female education at the primary level goes hand in hand with labor force participation in some states, others lag due to persistent non-educational barriers that inhibit women's entry into the workforce.

4.3. Skewed Gender Ratio of Educational Level vis-à-vis Labor Force Participation Rate in the senior secondary educated category

The comparative analysis of the female-male ratio of senior secondary education and labor force participation (LFP) during 2017–24 reveals a persistent disconnect between educational attainment and economic engagement of women in most Indian states.



States like Tamil Nadu and Kerala are able to maintain a favourable or near-equal female-to-male education ratio at the senior secondary level (above 1.0), though, their LFP ratios remain modest (around 0.4–0.46), highlighting that education alone does not guarantee workforce participation. Himachal Pradesh claims to be an exception, combining a steadily improving education ratio with one of the highest LFP ratios (0.81 in 2023–24), pointing towards effective translation of education into labor participation.

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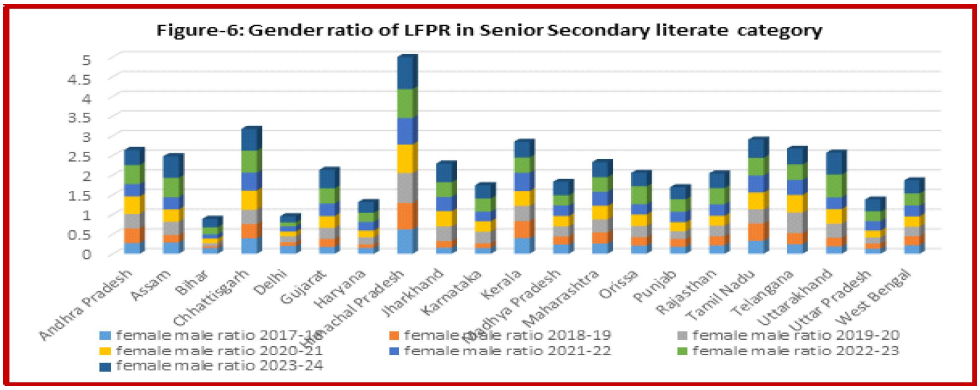
Opposite to this, states such as Bihar, Uttar Pradesh, and Delhi reported low education ratios (below 0.8) and correspondingly low LFP ratios (below 0.3), showing an aggregated gender gap. Chhattisgarh and West Bengal demonstrated humble gains in both indicators. Despite moderate increases in female education, Gujarat, Maharashtra, and Rajasthan have registered participation.

Improvements in LFP ratios point to the possible effect of policy or economic interventions for employment. Telangana shows a unique trend with a dip in the education ratio in recent years but a relatively steady LFP, suggesting female workforce participation is less dependent on senior secondary education in the state.

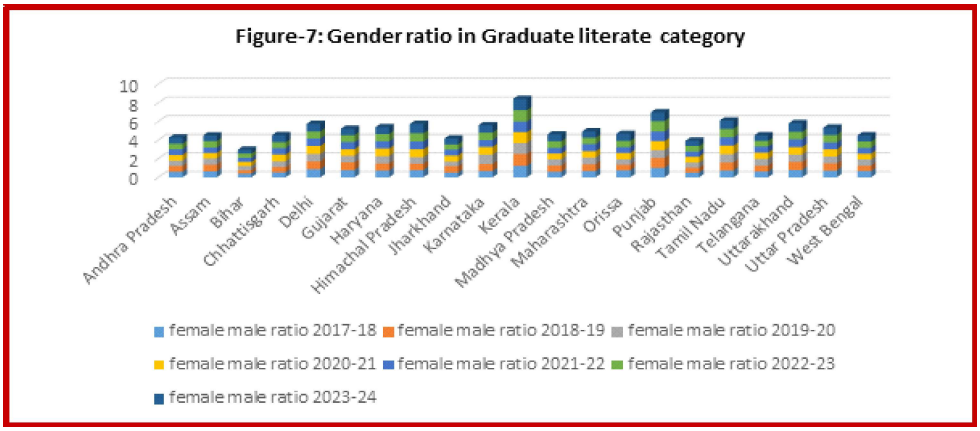


Overall, while some states revealed a parallel improvement in education and LFP ratios, the broader trend reflects that higher female educational attainment at the senior secondary level is not strongly translated into workforce inclusion, indicating deeper socio-cultural and structural impediments that persist across much of India.

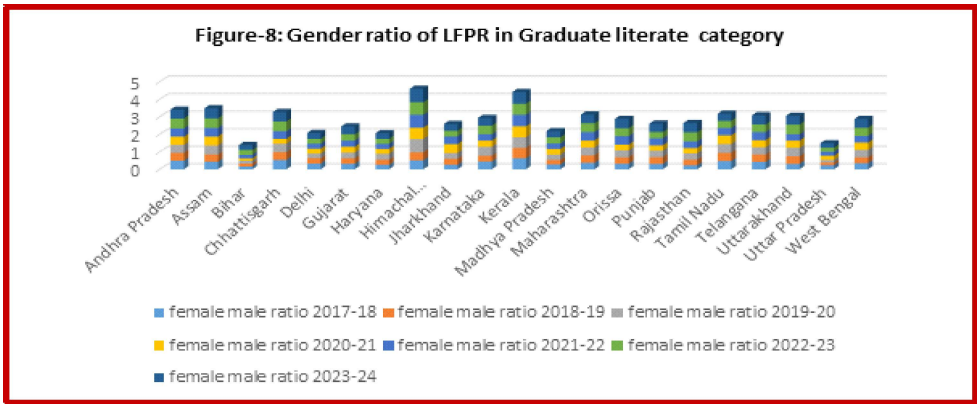
4.4. Skewed Gender Ratio of Educational Level vis-à-vis Labor Force Participation Rate in the graduate-educated category

The comparative analysis of the female-male ratio in graduate-level education and corresponding labor force participation (LFP) across Indian states over the study period reveals significant gender disparities and uneven translation of educational attainment into economic engagement of females. States of Kerala and Punjab persistently show high female-to-male ratios in graduate education (above 1.0 in several years), reflecting gender parity in education. Interestingly, their LFP ratios remain moderate (0.63–0.67 for Kerala and 0.31–0.48 for Punjab), pointing towards a gap between education and workforce integration.

Himachal Pradesh outshines as a positive outlier, showing both an increasing graduate education ratio (up to 0.99 in 2023–24) and one of the highest LFP ratios (0.77), marking a successful integration of educated women into the labor market.



In contrast, Bihar, Uttar Pradesh, and Rajasthan display both low graduate education ratios (mostly below 0.6) and consistently poor LFP ratios (ranging between 0.16–0.28), indicating to deep-rooted structural barriers for women in both education and employment. States of Delhi, Gujarat, and Haryana demonstrate medium to high graduate education ratios (0.68–0.88) but trailing low LFP ratios (often below 0.35), highlighting socio-cultural constraints limiting female economic participation despite educational attainment. Chhattisgarh, Assam, and Jharkhand show moderate gains in both domains, pointing to some level of progress, whereas, Tamil Nadu shows near parity in education (0.91 in 2023–24) but stagnant LFP (around 0.41), underscoring



An employment bottleneck. Finally, while some states show encouraging trends, the broader picture reflects a strong disconnect. Despite the improvements in graduate-level education for women, it does not equally translate into labor force participation, underlining the need for more focused policies addressing workplace inclusion, gender norms, and economic opportunities for educated women.

Conclusion

The scenario under study, period from 2017-18 to 2021-22, has been subject to the COVID pandemic for some time, and certain unusual economic-financial policy shocks. The economy observed a high level of unemployment and displacement of labor in this period. The possibility that the displaced workers may end up in even lower-productivity activities, cannot be denied. Resultantly it can also not be denied that the possible gains from human capital growth in the form of enrolment ratios are diluted as labor moves in the wrong direction, from more productive to less productive activities. The states are comparatively larger in economic size and characterized by predominance of labor-intensive economic activities coupled with a deficiency of physical and human capital spans in the north and central part of India. It is worth noting that per capita fixed capital formation is lower for these states. So far, is the question of human capital, these states rely more upon a highly educated labor force. The female labor force with a low educational background is the main contributor to the NSDP of these states. The higher education level female labor force has come up as a significant contributor to the NSDP of better-performing states.

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