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Gender Differences in Labour Force Participation and Employment in India: An ILOSTAT-Based Analysis

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Abstract

This study examines gender differences in labour-force participation and employment in India over the period 2015–2024, drawing on annual data from the International Labour Organization's ILOSTAT database and ILO Modelled Estimates (ILOEST). It considers female, male and total labour-force participation rates, employment-to-population ratios, unemployment rates and youth unemployment to trace changes in India's labour-market outcomes across the study period. A descriptive and analytical research design is employed, using trend analysis, descriptive statistics and a paired-samples t-test. The results show a notable rise in female labour-force participation, from 26.58% in 2015 to 32.42% in 2024, although male participation continued to remain considerably higher. As a result, the gender gap in labour-force participation narrowed from 51.46 to 45.17 percentage points. Female employment-to-population ratio likewise rose from 24.54% to 31.09%, but the employment gap between women and men remained substantial. By 2024, however, female and male unemployment rates had moved relatively close to each other. Youth unemployment also fell markedly, declining from 24.96% in 2015 to 15.75% in 2024, though it remained considerably above the overall unemployment rate. The paired-samples t-test yielded a t-value of 70.085 with 9 degrees of freedom and a p-value below 0.001, resulting in the rejection of the null hypothesis. The study concludes that women's participation in the labour market and their employment outcomes have improved, but considerable gender disparities persist, particularly in labour-force participation and employment.

Keywords: Female Labour Force Participation, Gender Gap, Employment, Unemployment, ILO Modelled Estimates

1. INTRODUCTION

1.1 Background and Importance of the Study

Labour-force participation is a key measure of economic development as it indicates the extent to which the working-age population is engaged in economic activity or available for work. Participation, however, differs considerably between men and women. These gender differences have wider implications for economic growth, household welfare, poverty reduction, productivity and inclusive development. In India, women's participation in the labour market has received considerable academic and policy attention because it has historically remained well below that of men. Recent research suggests that female labour-force participation in India is shaped by a combination of household characteristics, employment opportunities, social norms, education, income and the organisation of unpaid domestic work [1]. This persistent gender difference is especially significant as India undergoes major demographic and economic transformation. Greater participation among women is needed to make fuller use of the country's working-age population and to realise the potential gains associated with the demographic dividend [2].

Female labour-force participation is not only about whether women enter the labour market. It also concerns the type, quality and continuity of employment available to them. Studies of India show that women's labour-force participation cannot be explained solely through conventional supply-side factors such as education, household income or individual characteristics. Chattopadhyay and Chowdhury found that while education and income affect women's participation, the decline in female labour-force participation over time also points to demand-side and social-institutional constraints [3]. Research on women's labour supply likewise stresses the role of home production and social norms in shaping how women divide their time between market work and household activities [4]. The gender gap in employment therefore needs to be understood within the wider interaction of household responsibilities, labour-market structures and social expectations. A continuing concern in India is the substantial difference between women's and men's participation despite improvements in women's educational attainment. The link between education and women's employment is not necessarily linear or straightforward. Evidence from India indicates that women's employment can have a non-linear relationship with education, with

those possessing intermediate levels of education sometimes experiencing particularly limited employment opportunities because of occupational segregation and the restricted availability of suitable salaried jobs [5-7]. Household characteristics and family structures also shape women's participation. Domestic responsibilities, family members requiring care and the way household work is distributed can constrain women's ability to engage in paid employment [8]. Analysing gender differences in labour-force participation therefore requires attention not only to individual characteristics but also to the institutional and household settings within which employment decisions are made.

The nature of women's employment is equally relevant. A substantial share of women's economic activity may take the form of unpaid family work, self-employment or activities that conventional labour-market measures do not fully capture. Recent evidence from India shows that women's productive activities can fall between the conventional categories of paid employment, unpaid domestic work and economic work carried out within the household [9]. This distinction matters when interpreting labour-force participation statistics because a low measured participation rate does not necessarily indicate that women are economically inactive. Women may undertake considerable unpaid productive and care work while remaining outside conventional measures of paid employment. For this reason, gender differences are better assessed by considering labour-force participation alongside employment and unemployment indicators. The situation is further shaped by women's disproportionate responsibility for unpaid care work. Evidence from India shows that women spend considerably more time than men on caregiving, while additional caregiving responsibilities can substantially reduce their participation in the labour market [10]. Recent research based on time-use data also finds that unpaid domestic and caregiving work lowers the likelihood of women participating in the labour market and contributes to women's time poverty [11]. The gender gap observed in labour-force participation therefore reflects more than differences in willingness or ability to work. It also reflects how unpaid work is distributed within households.

Access to labour-market infrastructure is another factor affecting women's participation. Transportation is particularly relevant in this regard. Evidence from Indian cities shows that improvements in transport infrastructure can have a stronger positive effect on women's labour-market participation than on men's, especially where social and gender norms are more supportive of women working outside the home [12]. Technological development can also open up new possibilities. Recent evidence indicates that the adoption of information and communication technology can increase women's entry into the labour market, particularly among salaried and self-employed workers, partly by reducing travel requirements and allowing greater flexibility in work arrangements [13]. Such findings point to the potential contribution of both physical and digital infrastructure in narrowing gender differences in employment. The sectoral structure of the Indian economy adds another dimension to the issue. Structural transformation, urbanisation, mechanisation and shifts in the relative importance of agriculture, industry and services have affected the distribution of female employment. Recent evidence identifies substantial structural changes in female employment across sectors and associates these changes with education, sectoral economic contribution, urbanisation and mechanisation [14]. A decline in traditional agricultural employment does not automatically result in a comparable rise in women's employment in industry and services. Where suitable non-farm employment opportunities are limited, women may remain outside the labour force or continue to engage in informal and low-productivity activities.

The participation of young women deserves particular attention because young people form a major part of India's future labour force. Research focusing on young urban women shows that labour-market participation is shaped by family welfare considerations, household income, the number of children, family structure, education and the availability of employment opportunities. The same study points to the relevance of the discouraged-worker effect when suitable employment opportunities are difficult to find [15]. At a broader level, recent research on India's labour market points to a mismatch between the skills possessed by young people and those sought by employers. This makes employability and the quality of available employment important aspects of the country's labour-market challenge [16]. Youth unemployment therefore adds another dimension to an assessment of the wider condition of India's labour market. Gender inequality also extends beyond access to employment. Differences in wages, occupations and employment conditions continue to shape women's economic position. Recent evidence from India's National Sample Survey points to substantial gender-based wage inequality and identifies discrimination as an important component of the observed wage gap [17]. A narrower participation gap, therefore, should not by itself be taken as evidence of complete gender equality. Women's access to decent and productive work, together with fair remuneration, remains equally important.

Employment opportunities can also strengthen women's economic empowerment. Evidence from rural livelihoods programmes in India shows that participation in women's self-help groups is positively associated with female labour-force participation and employment. It is also associated with higher levels of self-employment and lower dependence on casual work [18]. These findings show how institutional mechanisms that improve women's access to credit, information, skills and livelihood opportunities can shape labour-market outcomes. Social norms, however, continue to act as a significant structural constraint. Comparative evidence from South Asia shows that gender attitudes and social expectations remain influential in determining women's economic participation. Conservative views about women's domestic responsibilities and men's role as breadwinners can limit women's

participation even when they possess education and economic resources [19]. More recent research from India similarly shows that women's decisions about work are closely linked to gender roles and the unequal distribution of domestic responsibilities [20-22]. Increasing female participation therefore depends not only on expanding employment opportunities but also on addressing the social and household conditions within which women undertake paid work.

Recent research has also drawn attention to women's agency, reproductive health and access to opportunities[23]. Evidence from South Asia suggests that reproductive healthcare, family planning and higher education can support women's labour-force participation by increasing their ability to make choices and engage in economic activities [24,25]. Research on women's work in India likewise shows that women can negotiate restrictions associated with mobility, respectability, unpaid care work and workplace location when employment opportunities offer suitable conditions and flexibility [18]. Women's labour-market participation can consequently be understood as the result of interactions between individual capabilities, household responsibilities, institutional opportunities and wider social structures.

1.2 Statement of the Problem

Although recent evidence points to an improvement in women's participation in the Indian labour market, a substantial gender difference remains. This raises an important question: to what extent has the improvement in female labour-force participation translated into a reduction in the gender gap in labour-force participation and employment? It is also necessary to establish whether the gender difference observed in annual labour-force participation rates is statistically significant. The present study addresses this issue by examining male and female labour-force participation, employment-to-population ratios and unemployment rates in India during 2015–2024. Youth unemployment is also considered to provide a broader assessment of labour-market conditions. The analysis draws on ILOSTAT ILO Modelled Estimates (ILOEST), ensuring that a consistent statistical source is used throughout the study period. The supplied dataset shows that female LFPR rose from 26.58% in 2015 to 32.42% in 2024, while male LFPR remained substantially higher, leaving a persistent gender gap [26]. The central concern, therefore, is not merely whether female participation has increased, but whether this improvement has been sufficient to bring about a meaningful reduction in the structural difference between women and men.

1.3 Objectives of the Study

The study is undertaken with the following broad objectives:

1. To examine the trends and gender differences in labour-force participation, employment-to-population ratios, unemployment rates and youth unemployment in India during 2015–2024, with particular focus on changes in the gender gap in labour-force participation and employment.
2. To statistically assess the difference between male and female labour-force participation rates in India and draw implications for strengthening women's participation and employment in the labour market.

1.4 Research Hypothesis

Based on the principal objective of the study, the following hypotheses are formulated:
H_0: There is no significant difference between male and female labour-force participation rates in India during 2015–2024.
H_1: There is a significant difference between male and female labour-force participation rates in India during 2015–2024.

1.5 Research Gap

Recent literature offers substantial evidence on the factors shaping and constraining female labour-force participation in India. Previous studies have considered the roles of education, household characteristics, social norms, unpaid care work, reproductive burden, transportation, digital technology, sectoral transformation, self-help groups and women's agency. Much of this work, however, concentrates on particular determinants, specific population groups, individual states, rural or urban contexts, or micro-level household characteristics. There remains scope for a longitudinal, national-level assessment that examines female and male labour-force participation, employment-to-population ratios, unemployment and youth unemployment within a common analytical framework. The present study addresses this gap through a longitudinal assessment of gender differences in India's labour market using annual national-level ILOSTAT/ILOEST data for 2015–2024. The contribution of the study extends beyond simply combining several labour-market indicators or applying a statistical test. Empirically, the study provides a consistent ten-year comparison of male and female labour-market outcomes and traces the magnitude and direction of gender gaps over time. Analytically, it distinguishes improvement in women's labour-market outcomes from actual convergence between women and men. This distinction is important because an increase in female labour-force participation and employment may represent progress while still leaving a substantial gender disparity. Similarly, relatively similar unemployment rates do not necessarily indicate gender equality when female labour-force participation remains considerably below male participation. The study also provides a policy-oriented contribution by identifying the dimensions in which gender inequality remains most pronounced. The evidence indicates that the more persistent differences are found in labour-force participation and employment rather than in unemployment rates. This suggests that addressing gender inequality requires attention not only to unemployment among women who participate in the labour market, but also to the broader conditions that influence women's entry into and continued participation in employment. The study further provides a temporal perspective on the disruption observed in 2020 and the subsequent improvement in female participation and employment. However, these changes are interpreted descriptively rather than causally, as the study does not employ a formal structural-break or causal identification strategy. The empirical evidence shows that female LFPR increased from 26.58% in 2015 to 32.42% in 2024, while male participation remained substantially higher throughout the period [26]. This improvement provides evidence of progress in women's labour-market participation, but the persistence of a large gender difference indicates that progress has not yet resulted in parity. Thus, the principal contribution of the study lies in using a common longitudinal framework to distinguish labour-market improvement from gender convergence and to demonstrate that gender equality cannot be adequately assessed through unemployment alone. The analysis provides an empirical basis for understanding whether the improvement in female participation during the later years represents meaningful convergence with male outcomes or only a partial narrowing of a persistent gender disparity.

1.6 Limitations of the Study

The present study has several limitations that should be considered when interpreting its findings. First, the analysis is based on national-level aggregate data for India. While such data provide a broad picture of gender differences in labour-market outcomes, they do not capture variations across states, regions or local labour markets. Consequently, the findings should not be interpreted as representing the conditions of all states or population groups equally.

Second, the study covers only ten annual observations from 2015 to 2024. The relatively short time series limits the scope for identifying long-term structural patterns and reduces the reliability of statistical inference based on annual observations. In addition, the observations are chronological and show temporal dependence, which means that the conventional paired-samples t-test should be interpreted cautiously rather than as evidence based on ten independent observations. The inferential result is therefore treated as supplementary to the descriptive and trend analysis.

Third, the study relies on ILOSTAT/ILO Modelled Estimates (ILOEST) for the selected labour-market indicators. Modelled estimates provide a consistent basis for cross-year comparison, but they are not equivalent to primary survey observations collected directly by the researchers. The results are therefore dependent on the underlying methodology, assumptions and estimation procedures used in the ILO modelled series.

Fourth, the study is primarily descriptive and comparative and does not identify the causal determinants of gender differences in labour-force participation, employment or unemployment. The observed changes over time cannot therefore be attributed to particular economic, social, demographic, institutional or policy factors. Similarly, the improvement in female participation after 2020 cannot be interpreted as a causal effect of any specific policy or of the COVID-19 pandemic.

Fifth, the aggregate nature of the dataset prevents the study from examining state-level, sectoral, educational, rural–urban and other socioeconomic heterogeneity. Differences associated with education, age,

household characteristics, income, occupation, industry, social conditions and geographical location may influence women's and men's labour-market outcomes, but these dimensions are outside the scope of the present national-level analysis.

Finally, the study focuses on a selected set of labour-market indicators, namely labour-force participation, employment-to-population ratios, unemployment and youth unemployment. These indicators provide important evidence on gender differences, but they do not capture all dimensions of labour-market inequality, such as the quality of employment, wages, working hours, occupational segregation, informality, job security or career progression. Future research could therefore extend the analysis using longer time series, state-level and rural–urban comparisons, sectoral and socioeconomic disaggregation, and explanatory or causal methods to identify the factors underlying gender differences in India's labour market.

2. RESEARCH METHODS

2.1 Research Design

The present study adopts a descriptive and analytical research design to examine gender differences in labour-force participation and selected labour-market indicators in India during the period 2015–2024. The study is longitudinal in nature, as it considers annual observations over a continuous ten-year period. The descriptive component is used to trace changes and trends in male and female labour-force participation, employment and unemployment. The analytical component examines the extent of gender differences and statistically assesses the difference between male and female labour-force participation rates.

The study considers India at the national level and does not extend the analysis to individual states or specific socio-economic groups. The selected period allows the study to capture labour-market changes before, during and after the COVID-19 period and to examine the direction of recovery over time.

2.2 Data Source and Study Period

The study relies entirely on secondary data obtained from the International Labour Organization (ILO) ILOSTAT database, particularly the ILO Modelled Estimates (ILOEST). The dataset covers India for the period 2015–2024 and contains ten annual observations. The source information accompanying the dataset identifies ILOSTAT, ILO Modelled Estimates (ILOEST), November 2025 as the principal data source. The main labour-market indicators refer to the population aged 15 years and above, while the youth unemployment indicator covers the 15–24 years age group. Using a consistent ILOSTAT/ILOEST series allows the selected indicators to be compared across the entire study period without combining estimates from different statistical systems. The study covers the period 2015–2024 and provides a ten-year longitudinal assessment of gender differences in labour-market outcomes in India. The period includes the pre-COVID years (2015–2019), the COVID-19 disruption year (2020), and the subsequent recovery period (2021–2024). This temporal coverage enables the study to examine whether the direction and magnitude of gender differences changed around the pandemic period. However, the study does not attempt to estimate the causal effect of COVID-19. The pre-/during-/post-COVID classification is therefore used as a descriptive analytical framework for interpreting changes in the observed labour-market indicators.

2.3 Variables and Measurement of Gender Gap

The study examines female and male labour-force participation rates, total labour-force participation rate, female and male employment-to-population ratios, female and male unemployment rates, total unemployment rate and youth unemployment rate.

The gender gap is calculated using the following formula:

$$\text{Gender Gap} = \text{Male Indicator} - \text{Female Indicator}$$

This formula is applied to the labour-force participation and employment-to-population ratios. A positive value indicates that the male indicator is higher than the female indicator. For unemployment, a negative value indicates that female unemployment is higher than male unemployment. The supplied dataset follows this approach in measuring gender differences across the selected labour-market indicators.

This measure allows the study to assess whether the difference between male and female labour-market outcomes has widened or narrowed during the study period.

2.4 Tools of Data Analysis

The study uses descriptive and inferential statistical techniques to examine the selected labour-market indicators. Annual trend analysis is first used to trace changes between 2015 and 2024. Female and male participation and employment are then compared to assess the direction of gender convergence over the study period. Descriptive statistics, including mean, minimum, maximum and standard deviation, are also calculated for the selected labour-market indicators.

A paired-samples t-test is used as a supplementary inferential procedure to examine the mean difference between male and female labour-force participation rates across the ten matched annual observations. The pairing reflects the fact that male and female LFPR values correspond to the same year. Before interpreting the test, the distribution of the paired differences was examined using the Shapiro–Wilk test. The test produced a statistic of $W = 0.901$ ($p = 0.224$), providing no statistically significant evidence of non-normality. However, given the small number of annual observations ($n = 10$), the normality assessment is interpreted cautiously.

Because the observations constitute a chronological time series rather than independently sampled cross-sectional observations, temporal dependence was also considered. The lag-one autocorrelation of the paired LFPR differences was 0.989, and the Durbin–Watson statistic was 0.134, indicating strong positive temporal dependence. Consequently, the conventional paired-samples t-test is treated as a supplementary descriptive-inferential assessment of the average gender difference rather than as evidence based on ten independent observations. The statistical significance of the t-test is therefore interpreted cautiously and alongside the observed magnitude and trend of the gender gap.

3. DATA ANALYSIS AND DISCUSSION

This section presents the analysis of labour-market indicators in India for the period 2015–2024, with particular attention to gender differences in labour-force participation and employment. The analysis examines annual trends in male and female labour-force participation, employment-to-population ratios, unemployment and youth unemployment, followed by descriptive statistics and hypothesis testing. The discussion considers the changes observed over the study period and the extent to which the gender gaps in participation and employment have narrowed.

Table 1. Labour Force Participation Rate in India by Sex, 2015–2024
(Percentage of population aged 15 years and above)

Year	Female (%)	Male (%)	Total (%)	Gender Gap (Male–Female)
2015	26.58	78.04	53.03	51.46
2016	26.58	77.69	52.85	51.11
2017	26.58	77.34	52.67	50.76
2018	26.57	76.97	52.48	50.4
2019	26.54	76.61	52.28	50.07
2020	26	75.69	51.55	49.69
2021	27.72	75.96	52.52	48.24
2022	29.35	76.5	53.59	47.15
2023	30.98	77.12	54.7	46.14
2024	32.42	77.59	55.64	45.17

Source: ILOSTAT, ILO Modelled Estimates (ILOEST), November 2025; India. The corresponding World Bank series identifies ILOEST/ILO as the source.

The data presented in Table 1 show a persistent and substantial gender disparity in labour-force participation in India during 2015–2024, although the overall trend points to a gradual narrowing of the gap between male and female participation. Female labour-force participation remained almost unchanged during the first five years of the study period, standing at 26.58% in 2015 and remaining at the same level in 2016 and 2017, before declining marginally to 26.57% in 2018 and 26.54% in 2019. The female LFPR declined further to 26.00% in 2020, which was the lowest value recorded during the study period. This pattern indicates that there was very

limited improvement in women's participation during the pre-2020 period. A noticeable change, however, emerged from 2021 onwards, when female LFPR increased from 27.72% in 2021 to 29.35% in 2022, 30.98% in 2023 and finally 32.42% in 2024. Across the entire study period, female LFPR therefore increased by 5.84 percentage points, reflecting a relatively strong improvement during the later years. Male labour-force participation, in comparison, remained consistently high throughout the period. Male LFPR declined from 78.04% in 2015 to 77.69% in 2016, 77.34% in 2017 and 76.97% in 2018, reaching 76.61% in 2019 and 75.69% in 2020. After 2020, male participation recovered moderately, increasing to 75.96% in 2021, 76.50% in 2022, 77.12% in 2023 and 77.59% in 2024. The comparison indicates that the more substantial change during the study period occurred in female rather than male participation. Total labour-force participation also moved upwards during the later years, increasing from 53.03% in 2015 to 55.64% in 2024. This rise in total LFPR coincided with the substantial improvement in female participation during the post-2020 period. The movement in the gender gap is particularly noteworthy. The difference between male and female LFPR declined from 51.46 percentage points in 2015 to 51.11 in 2016, 50.76 in 2017, 50.40 in 2018 and 50.07 in 2019. Even in 2020, when both female and male participation declined, the gap narrowed slightly to 49.69 percentage points. The reduction became more pronounced thereafter, falling to 48.24 percentage points in 2021, 47.15 in 2022, 46.14 in 2023 and 45.17 percentage points in 2024. Between 2015 and 2024, the gender gap therefore declined by 6.29 percentage points, indicating a movement towards greater convergence in labour-force participation. Nevertheless, the size of the remaining difference shows that the improvement has not resulted in gender parity. In 2024, female LFPR stood at 32.42%, compared with 77.59% for males, leaving a difference of 45.17 percentage points. The findings suggest that although women's participation improved considerably during the later years of the study, the Indian labour market continued to show a pronounced gender imbalance in labour-force participation. The results in Table 1 consequently provide the basis for examining whether this improvement in participation was also reflected in employment outcomes, which are assessed through the employment-to-population ratio in the subsequent table.

Table 2. Employment-to-Population Ratio in India by Sex, 2015–2024
(Percentage of population aged 15 years and above)

Year	Female (%)	Male (%)	Total (%)
2015	24.54	72.1	48.99
2016	24.54	71.8	48.83
2017	24.53	71.45	48.66
2018	24.52	71.1	48.47
2019	24.93	71.52	48.88
2020	24.24	69.47	47.5
2021	26.23	70.86	49.17
2022	28	72.75	51
2023	29.73	73.86	52.42
2024	31.09	74.33	53.32

Source: ILOSTAT, ILO Modelled Estimates (ILOEST), November 2025; India. The female and male series are identified as ILO-modelled employment-to-population ratios.

The figures in Table 2 indicate a clear improvement in the employment-to-population ratio for both women and men in India during 2015–2024, although male employment remained considerably higher throughout the period. The female employment-to-population ratio stood at 24.54% in 2015 and changed very little during the initial years, declining marginally to 24.52% by 2018. A modest improvement occurred in 2019, when the ratio rose to 24.93%, but it fell again to 24.24% in 2020, which was the lowest female employment-to-population ratio recorded during the study period. From 2021 onwards, the indicator followed a consistent upward movement, rising to 26.23% in 2021, 28.00% in 2022, 29.73% in 2023 and reaching 31.09% in 2024. Between 2015 and 2024, female employment relative to the working-age population therefore increased by 6.55 percentage points, showing substantial improvement during the latter part of the study period. Male employment-to-population ratios, by comparison, remained considerably higher, starting at 72.10% in 2015 and gradually declining to 69.47% in 2020. The male ratio then recovered, reaching 70.86% in 2021, 72.75% in 2022, 73.86% in 2023 and 74.33% in 2024.

Unlike the female indicator, the increase in the male ratio over the full study period was relatively modest at 2.23 percentage points. The total employment-to-population ratio showed a comparable pattern, falling from 48.99% in 2015 to 47.50% in 2020 before rising steadily to 53.32% in 2024. The different movements in the female and male indicators are particularly noteworthy because the female ratio recorded a larger absolute increase across the study period. Despite this progress, the difference in employment between men and women remained substantial. In 2015, the difference between male and female employment-to-population ratios was 47.56 percentage points, while it remained approximately 43.24 percentage points in 2024. The improvement in female employment after 2020 was therefore not sufficient to remove the structural disparity in employment outcomes. The simultaneous rise in female employment and decline in the male-female employment gap indicate gradual movement towards greater gender convergence in the Indian labour market. Even so, the continuing difference shows that higher female labour-force participation has not yet translated into employment levels comparable with those of men. This distinction is important for the subsequent analysis because labour-force participation reflects engagement with the labour market, whereas the employment-to-population ratio gives a more direct indication of the proportion of the working-age population that is actually employed.

Table 3. Unemployment Rate in India by Sex, 2015–2024
(Percentage of respective labour force)

Year	Female (%)	Male (%)	Total (%)
2015	7.693	7.609	7.629
2016	7.678	7.59	7.611
2017	7.69	7.605	7.626
2018	7.713	7.632	7.652
2019	6.073	6.653	6.51
2020	6.749	8.219	7.859
2021	5.394	6.72	6.38
2022	4.587	4.907	4.822
2023	4.057	4.216	4.172
2024	4.088	4.207	4.173

Source: ILOSTAT, ILO Modelled Estimates (ILOEST), November 2025; India.
Note: The World Bank indicator page confirms the female unemployment series is sourced from ILOEST/ILO.

The figures in Table 3 show a substantial decline in unemployment rates for both women and men in India during 2015–2024, although the series experienced some fluctuations over the period. Female unemployment remained relatively high and stable during the initial years, falling only marginally from 7.693% in 2015 to 7.678% in 2016 and 7.690% in 2017, before rising slightly to 7.713% in 2018. A marked change occurred in 2019, when female unemployment fell to 6.073%, followed by an increase to 6.749% in 2020. From 2021 onwards, female unemployment declined to 5.394% in 2021, 4.587% in 2022 and 4.057% in 2023, before increasing marginally to 4.088% in 2024. Female unemployment therefore declined by 3.605 percentage points between 2015 and 2024. The pattern for male unemployment was somewhat different. It remained close to 7.6% during 2015–2018, fell to 6.653% in 2019 and then increased considerably to 8.219% in 2020, the highest male unemployment rate recorded during the study period. After 2020, male unemployment declined steadily to 6.720% in 2021, 4.907% in 2022, 4.216% in 2023 and 4.207% in 2024. Over the full period, the male unemployment rate declined by 3.402 percentage points. The year 2020 represents an important disruption point in the unemployment series. Female unemployment increased from 6.073% in 2019 to 6.749% in 2020, while male unemployment increased more sharply from 6.653% to 8.219%. The total unemployment rate also reached its highest level of 7.859% in 2020. Following this disruption, unemployment declined for both women and men, indicating an improvement in labour-market conditions during the subsequent recovery period. However, the observed decline after 2020 should be interpreted as a change in the trend rather than as evidence of a causal effect of the COVID-19 pandemic, since the present study does not employ a formal structural-break or causal estimation technique. The comparison between the sexes also shows a change in their relative unemployment position. During 2015–2018, female unemployment was marginally higher than male unemployment, although the difference was very small. In 2019,

female unemployment moved below male unemployment, and the difference became more pronounced in 2020 and 2021. Thereafter, the difference narrowed considerably, and by 2024 female unemployment stood at 4.088%, compared with 4.207% for males, leaving a difference of only 0.119 percentage points. Thus, female and male unemployment rates became relatively close in the later years of the study period. However, this similarity in unemployment rates should not be interpreted as evidence of gender equality in the labour market. The unemployment rate is a conditional labour-market indicator, as it refers to unemployed persons within the labour force. Individuals who are outside the labour force are not included in the unemployment rate. This distinction is particularly important when interpreting the position of women in India because female labour-force participation remained substantially below male participation throughout the study period. In 2024, female LFPR was only 32.42%, compared with 77.59% for males, resulting in a gender gap of 45.17 percentage points. Therefore, the near similarity in unemployment rates indicates that women and men who participate in the labour force experienced relatively similar levels of unemployment, but it does not indicate that women and men participated in the labour market to a similar extent. This distinction is further supported by the employment outcomes. In 2024, the gender gap in the employment-to-population ratio remained substantially larger than the unemployment gap. The contrast between the very small unemployment difference and the large participation and employment differences shows that unemployment alone cannot provide a complete assessment of gender equality. A relatively low female unemployment rate may coexist with substantial gender inequality when a large proportion of women remains outside the labour force. Consequently, the unemployment results in Table 3 should be interpreted together with the participation and employment indicators presented in Tables 1 and 2.

Table 4. Gender Gap in Selected Labour Market Indicators in India, 2015–2024

Year	LFPR Gap (percentage points)	Employment Gap (percentage points)	Unemployment Gap (percentage points)
2015	51.46	47.56	-0.084
2016	51.11	47.26	-0.088
2017	50.76	46.92	-0.085
2018	50.4	46.58	-0.081
2019	50.07	46.59	0.58
2020	49.69	45.23	1.47
2021	48.24	44.63	1.326
2022	47.15	44.75	0.32
2023	46.14	44.13	0.159
2024	45.17	43.24	0.119

Source: Calculated Data based on ILOSTAT ILO Modelled Estimates (ILOEST).

Table 4 presents the gender gap in selected labour-market indicators in India during 2015–2024, with the gap measured as the male indicator minus the female indicator. The table brings together gender differences in labour-force participation, employment and unemployment and shows that the size and nature of these differences vary considerably across the three indicators. The LFPR gap is the largest and remains positive throughout the study period, confirming that the male labour-force participation rate was consistently much higher than the female rate. In 2015, the LFPR gap stood at 51.46 percentage points, indicating that male participation exceeded female participation by more than fifty percentage points. The gap then declined gradually from 51.46 percentage points in 2015 to 51.11 in 2016, 50.76 in 2017 and 50.40 in 2018. It fell further to 50.07 percentage points in 2019 and 49.69 percentage points in 2020. The decline became more pronounced after 2020, with the gap reducing to 48.24 percentage points in 2021, 47.15 in 2022, 46.14 in 2023 and 45.17 percentage points in 2024. Over the ten-year period, the LFPR gender gap therefore narrowed by 6.29 percentage points, from 51.46 to 45.17 percentage points. While this represents measurable progress, the remaining gap of 45.17 percentage points in 2024 shows that the difference between male and female labour-force participation continues to be substantial. The employment gap follows a broadly similar pattern, although at a somewhat lower level. In 2015, the difference between male and female employment-to-population ratios was 47.56 percentage points. It declined successively to 47.26 percentage points in 2016, 46.92 in 2017 and 46.58 in 2018. There was a marginal increase to 46.59 percentage points in 2019, followed by a decline to 45.23 percentage points in 2020. The gap then reached 44.63 percentage points in 2021,

increased slightly to 44.75 percentage points in 2022 and subsequently declined to 44.13 percentage points in 2023 and 43.24 percentage points in 2024. Across the study period, the employment gap consequently decreased by 4.32 percentage points. The reduction in both the LFPR and employment gaps indicates that the difference between men and women in participation and employment narrowed over time, although the remaining differences are still considerable. The unemployment gap, by contrast, is much smaller than the other two indicators. Between 2015 and 2018, the gap was negative, at −0.084, −0.088, −0.085 and −0.081 percentage points respectively. Since the gap is calculated as male unemployment minus female unemployment, these negative values indicate that female unemployment was marginally higher than male unemployment during these years. The differences, however, were extremely small, indicating that unemployment rates for men and women were almost the same. In 2019, the unemployment gap became positive at 0.580 percentage points, showing that male unemployment had moved above female unemployment. The largest unemployment gap during the study period was recorded in 2020 at 1.470 percentage points, followed by 1.326 percentage points in 2021. The difference then narrowed considerably to 0.320 percentage points in 2022, 0.159 percentage points in 2023 and only 0.119 percentage points in 2024. The pattern of the unemployment gap is therefore clearly different from the large and persistent differences observed in LFPR and employment. By 2024, the unemployment difference between men and women had become very small, whereas the gaps in participation and employment remained extremely large. This distinction is important when assessing gender inequality in the labour market because unemployment is measured among those who are already part of the labour force. The large LFPR gap shows that a much greater proportion of men than women participate in the labour market, while the sizeable employment gap reflects a similarly large difference in the proportion of the working-age population that is employed. The table therefore indicates that the main gender disparity during the study period lies in labour-force participation and employment rather than unemployment. At the same time, the narrowing of the LFPR and employment gaps, particularly after 2020, points to a gradual reduction in the disparity. The persistence of gaps of 45.17 percentage points in LFPR and 43.24 percentage points in employment in 2024 nevertheless shows that the improvement represents a reduction in inequality rather than the achievement of gender parity. The results complement Tables 1–3 by bringing the male-female differences together within a single comparative measure and offering a clearer view of how gender inequality in India's labour market changed during the study period. An important implication of these contrasting gaps is that gender equality cannot be assessed using unemployment alone. The unemployment gap measures differences among individuals who have already entered the labour force, whereas the LFPR gap reflects the much broader difference in labour-market participation between women and men. Consequently, the near convergence of female and male unemployment rates in the later years should not be interpreted as convergence in overall labour-market outcomes. The persistence of a 45.17 percentage-point LFPR gap and a 43.24 percentage-point employment gap in 2024 indicates that the principal gender disparity remained concentrated in participation and employment rather than unemployment.

Table 5. Youth Unemployment Rate in India, 2015–2024
(Age group 15–24 years; percentage of youth labour force)

Year	Youth Unemployment Rate (%)
2015	24.96
2016	25.23
2017	25.59
2018	26
2019	22.95
2020	24.67
2021	20.82
2022	17.73
2023	15.6
2024	15.75

Source: ILOSTAT, ILO Modelled Estimates (ILOEST), indicator **SL.UEM.1524.ZS**.
Note: The World Bank series identifies this as youth unemployment for ages 15–24 based on the ILO modelled estimate.

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Table 5 presents the youth unemployment rate in India during 2015–2024 among young people aged 15–24 years, measured as a percentage of the youth labour force. The figures show that youth unemployment remained high throughout the study period, although there was a clear decline over the decade, particularly after 2020. In 2015, the youth unemployment rate was 24.96%, indicating that nearly one-fourth of the youth labour force was unemployed. The rate rose slightly to 25.23% in 2016 and then to 25.59% in 2017, reaching a peak of 26.00% in 2018. This initial rise shows that youth unemployment was already a significant labour-market concern before the subsequent changes in the series. The rate then declined to 22.95% in 2019, a reduction of 3.05 percentage points from the 2018 peak. This improvement was not sustained in 2020, when youth unemployment increased again to 24.67%. The 2020 figure was therefore considerably higher than the 2019 level and marked a temporary reversal of the decline recorded in the previous year. From 2021 onwards, the figures show a stronger and more consistent fall in youth unemployment. The rate decreased from 24.67% in 2020 to 20.82% in 2021, representing a reduction of 3.85 percentage points within a single year. It fell further to 17.73% in 2022 and 15.60% in 2023. In 2024, the rate rose marginally to 15.75%, but the increase of only 0.15 percentage point was small in comparison with the reductions recorded during 2021–2023. Across the study period, youth unemployment declined from 24.96% in 2015 to 15.75% in 2024, a reduction of 9.21 percentage points or approximately 36.9% from the initial level. The difference between the highest and lowest values is also notable, with the highest youth unemployment rate recorded at 26.00% in 2018 and the lowest at 15.60% in 2023. These figures indicate a substantial change in the youth labour market over the ten-year period. Even so, the 2024 rate of 15.75% remained considerably above the unemployment rates for the overall labour force shown in Table 3, where total unemployment stood at 4.173% in the same year. This comparison points to the particular challenges faced by young labour-market participants. Since the youth unemployment rate is calculated among the youth labour force rather than the entire youth population, it specifically measures unemployment among young people who are participating in the labour market. The relatively high rate should not, therefore, be interpreted as meaning that a similar proportion of all young people are unemployed, since many may be outside the labour force because they are studying, engaged in other activities or not seeking employment. In the present study, the youth unemployment trend provides an additional dimension to the assessment of India's labour market. While Tables 1–4 concentrate mainly on gender differences in participation, employment and unemployment, Table 5 considers young people as a distinct age group within the labour market. The results show that youth unemployment remained above 20% for most of the period from 2015 to 2021 before falling below 20% from 2022 onwards. The decline from 26.00% in 2018 to 15.75% in 2024 amounts to an improvement of 10.25 percentage points from the peak. Nevertheless, the youth unemployment rate remained above 15% in 2024, indicating that the employment position of young labour-market participants continues to require attention. The small increase between 2023 and 2024 should also be considered in relation to the much larger decline since 2020 rather than viewed as a major reversal. Table 5 therefore shows a substantial decline in youth unemployment over the study period, with the strongest improvement occurring after 2020. At the same time, the comparatively high level of youth unemployment relative to overall unemployment indicates that age remains an important dimension of labour-market inequality and that aggregate unemployment figures alone do not fully reflect the challenges faced by young people participating in the labour market.

Table 6. Descriptive Statistics of Selected Labour Market Indicators in India, 2015–2024

Indicator	Mean	Minimum	Maximum	Std. Deviation
Female LFPR (%)	27.932	26	32.42	2.224
Male LFPR (%)	76.951	75.69	78.04	0.761
Total LFPR (%)	53.131	51.55	55.64	1.215
Female Employment-to-Population Ratio (%)	26.235	24.24	31.09	2.498
Male Employment-to-Population Ratio (%)	71.924	69.47	74.33	1.433
Female Unemployment Rate (%)	6.172	4.057	7.713	1.547
Male Unemployment Rate (%)	6.536	4.207	8.219	1.526
Youth Unemployment Rate (%)	21.93	15.6	26	4.159

Source: Author's calculation based on ILOSTAT ILO Modelled Estimates (ILOEST), 2015–2024.

Table 6 reports the descriptive statistics for selected labour-market indicators in India over the ten-year period from 2015 to 2024, based on ten annual observations. The statistics bring together the central tendency, range and variation in female and male labour-force participation, employment, unemployment and youth unemployment during the study period. The mean female LFPR was 27.932%, compared with a considerably higher mean male LFPR of 76.951%, indicating an average gender difference of approximately 49 percentage points in labour-force participation. Female LFPR ranged from a minimum of 26.00% to a maximum of 32.42%, with a standard deviation of 2.224 percentage points. The relatively higher standard deviation of female LFPR reflects greater movement in women's participation over the ten-year period, particularly the rise recorded during the later years. Male LFPR, by comparison, varied within a much narrower range of 75.69% to 78.04% and had a standard deviation of only 0.761 percentage points. This shows that male labour-force participation was comparatively stable, with much less variation than female participation. Total LFPR had a mean of 53.131%, ranging from 51.55% to 55.64%, with a standard deviation of 1.215 percentage points. These values indicate moderate variation in overall labour-force participation compared with the more noticeable change in female participation. The employment-to-population ratios further demonstrate the substantial difference between women and men. The mean female employment-to-population ratio was 26.235%, while the corresponding male average was 71.924%. Female employment ranged from 24.24% to 31.09%, with a standard deviation of 2.498 percentage points, the highest standard deviation among the gender-specific participation and employment indicators in the table. This greater variation is consistent with the considerable increase in female employment during the later years of the study period. Male employment-to-population ratio, in contrast, ranged from 69.47% to 74.33%, with a standard deviation of 1.433 percentage points. The difference between the mean female and male employment ratios was approximately 45.69 percentage points, showing that the gender disparity in employment remained substantial despite the improvement in female employment over the period. The unemployment indicators show a different pattern. Female unemployment had a mean of 6.172%, with values ranging from 4.057% to 7.713% and a standard deviation of 1.547 percentage points. Male unemployment recorded a slightly higher mean of 6.536%, ranging from 4.207% to 8.219%, with a standard deviation of 1.526 percentage points. The similar standard deviations indicate broadly comparable year-to-year variation in male and female unemployment, although male unemployment had a slightly higher average and a higher maximum value. The difference between the mean female and male unemployment rates was only about 0.364 percentage points, considerably smaller than the corresponding differences in labour-force participation and employment. This indicates that gender differences are not of the same magnitude across all labour-market indicators. Participation and employment show large average differences between women and men, whereas unemployment rates are comparatively close. Youth unemployment has the highest overall mean among the indicators reported in the table. The youth unemployment rate averaged 21.930% during 2015–2024, with a minimum of 15.60% and a maximum of 26.00%. Its standard deviation of 4.159 percentage points was also the highest among all the indicators, indicating substantial variation in youth unemployment over the ten-year period. The difference between its minimum and maximum values was 10.40 percentage points, reflecting a considerable change across the study period. These descriptive statistics consolidate the patterns observed in the preceding tables. Labour-force participation and employment show large and persistent gender differences, with female averages remaining substantially below male averages, while unemployment rates show much smaller differences between the sexes. The comparatively higher variability in female LFPR and female employment also indicates that women's labour-market participation and employment changed more noticeably than those of men during the period. The statistics further point to the distinct position of young labour-force participants, whose average unemployment rate was considerably higher than the overall unemployment averages for both women and men. Table 6 therefore confirms that the main structural difference between male and female labour-market outcomes during 2015–2024 lies in participation and employment, while unemployment shows a considerably smaller gender difference. The mean, minimum, maximum and standard deviation values provide a clear measure of both the level and variation of the selected indicators and form the statistical basis for the subsequent hypothesis testing of the difference between female and male LFPR.

4. TESTING/IMPLICATIONS

This section presents the statistical testing of the gender difference in labour-force participation rates in India during 2015–2024. A paired-samples t-test is applied to the annual male and female labour-force participation rates to determine whether the observed difference is statistically significant. The test results are then considered in relation to the study objectives and the broader implications of the continuing gender gap in labour-force participation.

Hypotheses

H_0: There is no significant difference between male and female labour-force participation rates in India.
H_1: There is a significant difference between male and female labour-force participation rates in India.

Table 7. Paired-Samples t-Test of Male and Female Labour Force Participation Rates in India, 2015–2024

Particulars	**Value**
Number of paired observations	10
Mean Female LFPR	27.93%
Mean Male LFPR	76.95%
Mean Difference (Male − Female)	49.019 percentage points
Standard Deviation of Difference	2.212
Shapiro–Wilk W	0.901
Shapiro–Wilk p-value	0.224
Lag-1 Autocorrelation of Differences	0.989
Durbin–Watson Statistic	0.134
t-statistic	**70.085**
Degrees of Freedom	**9**
p-value (two-tailed)	**< 0.001**
Significance level	5%
Decision	**Reject H_0**
Conclusion	**Significant difference exists**

Source: Calculated Data based on ILOSTAT ILO Modelled Estimates, 2015–2024.

Table 7 presents the paired-samples t-test comparing male and female labour-force participation rates in India during 2015–2024. The analysis is based on ten annual matched observations, with the male and female LFPR values corresponding to the same year. The mean female LFPR was 27.932%, while the mean male LFPR was 76.951%, resulting in a mean difference of 49.019 percentage points. The standard deviation of the paired differences was 2.212, indicating that the gender difference remained large and relatively stable across the observed years. Before interpreting the paired t-test, the distribution of the paired differences was examined using the Shapiro–Wilk test. The result ($W = 0.901$, $p = 0.224$) provides no statistically significant evidence of non-normality. However, the annual observations form a chronological time series rather than independently sampled observations. The lag-one autocorrelation of the paired differences was 0.989, while the Durbin–Watson statistic was 0.134, indicating strong positive temporal dependence. Therefore, the independence assumption of the conventional paired-samples t-test cannot be considered fully satisfied. The conventional paired-samples t-test produced a t-statistic of 70.085 with 9 degrees of freedom and a two-tailed p-value below 0.001. Under the conventional test framework, the null hypothesis of no mean difference between male and female LFPR is rejected. However, given the strong temporal dependence, this statistical result is interpreted cautiously and is treated as a supplementary inferential assessment rather than as evidence based on ten independent observations. The substantive importance of the finding is reflected primarily in the magnitude and persistence of the gender difference. The mean gap of 49.019 percentage points demonstrates a substantial disparity in labour-force participation. At the same time, the descriptive results show that the LFPR gap narrowed from 51.46 percentage points in 2015 to 45.17 percentage points in 2024, indicating gradual convergence without gender parity. Thus, the statistical significance of the t-test should not be interpreted as evidence about the causes or determinants of gender inequality. Rather, the test complements the descriptive evidence by statistically assessing the average difference, while the magnitude and direction of the gap provide the more important substantive interpretation. The result should also be considered alongside the employment and unemployment indicators. Although male and female unemployment rates became relatively close in the later years, the gender differences in labour-force participation and employment remained considerably larger. Consequently, similar unemployment rates should not be interpreted as evidence of gender equality because unemployment rates are calculated among persons participating in the labour force. Overall, Table 7 supports the finding that a large and persistent gender difference

in labour-force participation existed during 2015–2024, while the declining gap indicates partial but incomplete convergence.

The inferential analysis adds to the descriptive findings by providing a formal assessment of the average gender difference in labour-force participation across the observed period. While the annual LFPR values and gender-gap measures directly demonstrate the existence of a gender disparity, the paired comparison quantifies the average difference across the ten matched years and assesses whether this difference is statistically distinguishable from zero under the conventional test framework. The mean difference of 49.019 percentage points indicates that the disparity was not only persistent but also large relative to the year-to-year variation in the paired differences. However, because the observations are chronological and exhibit strong temporal dependence, the inferential result is interpreted cautiously and is not treated as evidence based on independent observations. The broader analytical contribution of the study therefore extends beyond the t-test. By examining labour-force participation together with employment-to-population ratios, unemployment and youth unemployment, the study shows that labour-market progress does not occur uniformly across gender or across indicators. Female participation and employment improved during the later years, and the corresponding gender gaps narrowed, but the remaining differences continued to be substantial. At the same time, the relatively small gender difference in unemployment in the later years demonstrates why unemployment alone cannot provide a complete assessment of gender equality. The study consequently distinguishes between improvement in women's labour-market outcomes and convergence towards gender equality.

5. CONCLUSION

The study examined gender differences in labour-force participation and employment in India during 2015–2024 using ILOSTAT ILO Modelled Estimates (ILOEST), covering labour-force participation, employment-to-population ratios, unemployment and youth unemployment. The findings present a mixed picture of progress and continuing gender inequality. Female labour-force participation and employment improved, particularly during the later years of the study period, and the corresponding gender gaps narrowed. However, the remaining differences between women and men continued to be substantial. In contrast, female and male unemployment rates became relatively close towards the end of the study period. This indicates that the principal gender disparity was concentrated more strongly in labour-force participation and employment than in unemployment. Youth unemployment also improved over the study period but remained considerably higher than overall unemployment. The study contributes to the existing evidence by providing a longitudinal national-level comparison of gender differences across multiple labour-market indicators within a common analytical framework. The analysis highlights the distinction between improvement and convergence. Rising female participation and employment indicate progress, but they do not by themselves imply gender parity. Similarly, relatively similar unemployment rates do not indicate equal labour-market participation because unemployment is measured among those already in the labour force. The findings therefore demonstrate the importance of assessing gender inequality through participation, employment and unemployment together rather than relying on unemployment alone. The findings have important policy implications for inclusive labour-market development in India. Policy attention should extend beyond reducing unemployment among women already participating in the labour force to addressing the conditions that influence women's entry into, participation in and continued engagement with employment. Measures that improve access to employment opportunities and reduce the structural and social barriers affecting women's labour-market participation remain important. More broadly, progress in gender equality should be evaluated through improvements in participation and employment as well as unemployment outcomes. The study has several limitations. It is based on national aggregate data and only ten annual observations from 2015 to 2024, and it relies on ILOSTAT ILO Modelled Estimates. The analysis therefore cannot capture state-level, sectoral, educational, rural–urban or wider socioeconomic differences. It also does not identify the causal determinants of gender differences or establish a causal effect of the COVID-19 period. The paired-samples t-test is consequently treated as a supplementary inferential assessment alongside the descriptive analysis. Future research could extend the present analysis using longer time-series data and more disaggregated state-level, sectoral, rural–urban and socioeconomic information. Further explanatory and causal studies could examine the roles of education, household characteristics, social norms, occupation, income and other structural factors in shaping gender differences in India's labour market. Such research would help explain not only whether gender gaps are narrowing, but also the factors underlying the pace and extent of gender convergence. The broader concern remains that economic progress should be assessed alongside its distributional outcomes, particularly where improvements in aggregate performance coexist with persistent inequalities [27].

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