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Analyzing gender disparities urban-rural workforce participation in India

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Abstract
Labor force participation rate is an integral component in analyzing distinct phases of transition in the process of development. Through our study, we have tried to highlight the urban-rural disparity in participation rate of male and their feminine counterparts. Furthermore, our study also sheds light on the factors that contribute to this disparity, such as differences in educational attainment, cultural norms, and access to job opportunities. We believe that addressing these underlying factors can play a crucial role in promoting gender equality and inclusive economic growth. Additionally, our findings can assist policymakers in designing targeted interventions to reduce gender disparities and increase labor force participation.

Keywords: Gender gap, urban-rural divide, inter-state disparity

Introduction

The labor force is one of the most integral components of an economy that ensures its growth as without its presence, all other resources shall remain unutilized. LFPR is defined as "a measure of the proportion of a country's working-age population that engages actively in the labor market, either by working or by looking for work." India being endowed with the world's most prominent young working population offers a rosy picture in terms of prospects of growth. Given study, offers a deep and insightful analysis of the Indian labor force. It tries to draw inferences about the Indian workforce from different faces given that the dataset has not been randomly selected but is specifically chosen from reliable sources for the purpose of study taking into consideration the diversity & conditions of our country's workforce. The Dataset includes the Labour force participation rate for rural & urban populations (in terms of Overall LFPR, LFPR for males & LFPR for Females) across all states & Union Territories (as there lie huge differences in Urban & Rural areas that affect labor force participation) for 5 different years. Gilman (1898) [24] asserted that women have been treated as inferior to their men historically highlighting the sexual-economic relation that makes a woman's labor becomes meaningless as determinant of her social and economic status contributing to the "over-sexing" of women. Gilman's theory is not as outdated as we would think and thus the stereotypical housewife is still a reality for many women. As per a United Nations report around the world, women do three out of every four hours of unpaid labor highlighting the invisible economy where women's labor is trapped. The decision and ability of women to participate in the labor force is the outcome of various economic and social factors that interact at both the household and societal levels (Sher Verick, ILO). Women possess inherent agency and knowledge that is overlooked by policy-makers. It is not that this pitiable condition of women is a new phenomenon in the postmodern world, it includes a century-old saga of injustice (Claudia Goldin, 1986) [25]. Another factor is gender discrimination and social norms, which restrict women's ability to enter or stay in the labor force (Desai and Jain 1994; Prillaman *et al.* 2017) [10, 11].

Women residing in regions with high unemployment rates are less likely to enter the labor market and engage in a job search than those living in areas with low unemployment rates (Bičáková 2016; Dagsvik, Kornstad, and Skjerpen 2013) [12, 13]. Conventionally, the discouraged worker effect has been related to the phase of recession in the business cycle, primarily influencing women or the secondary wage earners in a family (Benati 2001) [14].

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Women's labor supply acting as an insurance mechanism for households is also consistent with the declining LFPR and rising household economic status. Bhalotra and Aponte (2012) [9] argue that female participation in rural areas typically rises during times of agrarian distress and decreases when the economy improves. Attanasio (2005) [6] also discussed the rise in women's labor force participation when households lack savings or access to credit due to increased uncertainty about future earnings. In the working world, an equally qualified woman can expect to earn 77% of her male counterparts (Turning promises into action: Gender equality in the 2030 Agenda for Sustainable Development) on investigating gender inequality women are 7 percentage points more likely to be in vulnerable employment than men. The experiences of marriage and parenthood are important drivers of this gender gap. It is generally smaller in richer countries. (Gender and vulnerable employment in the developing world).

The paper is organized as follows: The next section reviews the literature. Section 3 discusses data and methodology. Section 4 gives an estimation and the results. Section 5 discusses the concluding remarks. Section 6 discusses some policy implications and finally the last section includes references and an appendix containing necessary graphical and analytical results.

Literature review
Employment has always figured as a crucial element of the Indian economy's growth and development. India is a highly populous country. Employment becomes a crucial element by acting as a link between economic growth and poverty reduction. It serves as a significant variable in the attainment of inclusive and sustainable growth. The focus on employment in overall development planning emerged around the second half of the 1970s and 1980s when it was felt that unemployment was on the rise. With the initiation of reforms post-1990s, it has generally been analyzed whether the reforms-driven growth of the Indian economy has been job-creating or not. The great recession has further renewed the concerns about unemployment and job creation due to the slowdown, both globally as well as in India. Against this backdrop, this paper aims to compute the employment situation of the Indian economy, over the decades and more specifically for the years between 1993-2012 using the available data. An analysis of the sectoral share of employment over the years reveals that there has been a shift in employment away from agriculture towards manufacturing, construction, and service activities. The share of agriculture has declined continuously from 59.9 percent in 1999-00 to 48.9 percent in 2011-12 whereas the share of the construction sector has consistently risen from 4.5 percent in 1999-00 to 10.6 percent in 2011-12. The industrial sector saw a reasonable increase in its share from 11.9 percent in 199900 to 13.6 percent in 2011-12, notwithstanding a slight dip in 2009-10. Services have also seen an increase in their share, particularly in sub-sectors such as transport, banking, storage and communications, and education services.

It's possible that women's preferences, as well as those of their families, are reflected in their relative lack of employment. A woman's employment may indicate financial strain on the family, prompting her to leave the workforce when household income rises. According to Rangarajan, Kaul, and Seema (2011) [7], this would be the case especially when men's economic opportunities are improving, allowing women to concentrate on the reproductive economy. Olsen and Mehta (2006) [8] find a U-curve for employment by female educational status in the 1999-2000 NSS data, with women who are illiterate, poorly educated or have a university degree more likely than women with secondary education to work.

Various problems associated with women going out and working like child rearing, safety issues of children at home, taking care of their household chores, and others either do not allow women to participate in the labor market or if they participate, they end up doing work which requires less of their time and effort (Raza *et al*, 2019) [5]. The existence of the U-shaped phenomenon has been affirmed by the extant literature of first-generation articles using cross-sectional data across countries to test this relationship (Mammen and Paxson, 2000; Goldin, 1994) [17, 4]. Tansel (2002) [26] verified this relationship within provinces in Turkey across three time periods (Tam, 2011) [18]. We look at the decline in women's labor force participation rate (LFPR) in India despite the country's expanding economy to explain this. This decline is attributed to existing gendered notions of labor as well as persistent patriarchal and traditional values that discourage women from re-entering the labor force in the industrial and service sectors. As a means of reducing poverty, increasing women's political and social participation, and improving access to health care, gender inequality has emerged as a central component of development plans. In order to achieve gender equality in the developing world, women's participation in the labor force must be accompanied by conditions that give women the freedom and mobility they need to participate in the labor market. We explain in this article that, while women's participation in the labor force is important for gender equity, it is not the only way to ensure gender equality.

Women tend to have higher rates of unemployment than men, and are far more affected by underemployment, inactivity and vulnerable employment (ILO, 2016) [20]. Women unemployment impacts family cohesion, poverty and different social problems like violence, prostitution, breakup of families and alcoholism due to hopelessness, accompanied by bad occupational prospects and impending economic deprivation, placing the wellbeing of a future family at risk (Schmitt, 2008) [21].

Our study contributes to the literature on the following fronts. It revists and approves the existence of tremendous gender disparities. It links gender and rural-urban disparities and also provides empirical support to above mentioned phenomena by analyzing agriculture and manufacturing sector activities.

Data and Methodology
The labor force participation rate is an estimate of an economy's active workforce. The formula is the number of people aged 16 and over who are employed or actively seeking employment divided by the total non-institutionalized, civilian working-age population.

$$LFPR = LF/P$$

The data was formatted, and graphs were created to represent the LFPR and population of different states. Descriptive statistics were used to analyze the data, and inferential statistics were employed to test the hypothesis based on a particular level of significance.
The dataset is obtained from official government publication

based on NSSO findings (Link to the dataset is attached in the references section). It includes overall male and female participation in rural and urban areas and also the distribution of workforce in different sectors in both urban & rural sectors namely Agriculture, Mining & Quarrying, Trade, Financial Services, Trade auxiliaries, Manufacturing, Construction & Electricity (Note: these are general & broad categories that include almost all sources of livelihood in rural & urban areas). This study is not only concerned with analyzing the participation of people willing & able to work in economic activities but also delves into deeper cross-sectional analysis not only in terms of Gender or Urban-Rural divide but also in a more specific analysis of the inner distribution of the above working population into different sectors during different time periods: 1993-94, 1999-00, 2004-05 and 2009-10.

As the dataset chosen for the study was large, we tried to format it to make it easier for us to draw needed graphs and analyze the dataset, we initiated our study by calculating the average (mean & median) of LFPR and population dependent of each state during different time periods. It also provided us with a representative value on which later mathematical & statistical analyses can be based. Relevant graphs (as per the dataset or data analyzed) are created from the altered dataset. Later, using the Data Analysis tool package to analyze the average of different states as obtained above, gave us a summary of descriptive analysis having the following Mean, Standard Error, Median,

Standard Deviation, Sample Variance Kurtosis, Skewness, Range, Minimum, Maximum, Sum, Count, Confidence Level (95.0%).

In the end, a representative sample containing a few states & UTs is framed out of all states & UTs, and using the above sample further analysis is done. We used the methods of inferential statistics to obtain an interval in which the Parameter will lie based on a particular level of significance and the Hypothesis is framed & tested with the same level of significance. In this way, we have concluded our analysis (including both inferential and descriptive statistics).

Results and interpretation
Labor force participation rate (Rural Overall)
The table given below presents the magnitude of the correlation that exists between the LFPR of rural women & the overall LFPR of Rural regions and the LFPR of rural males & rural females. It is clear from here that not much strong relationship exists between LFPR of male and Female populations but a strong relationship between LFPR of the female population & LFPR overall exists can be easily traced. So it can be intuitively said that Gross LFPR rises, LFPR for the female population rises, and vice versa. The standard error for rural overall is 9.12266, the standard deviation is 53.970, the mean LFPR for rural overall is 437.8228, the sample variance is 2912.808, the confidence level (95%.0) is 18.5394.
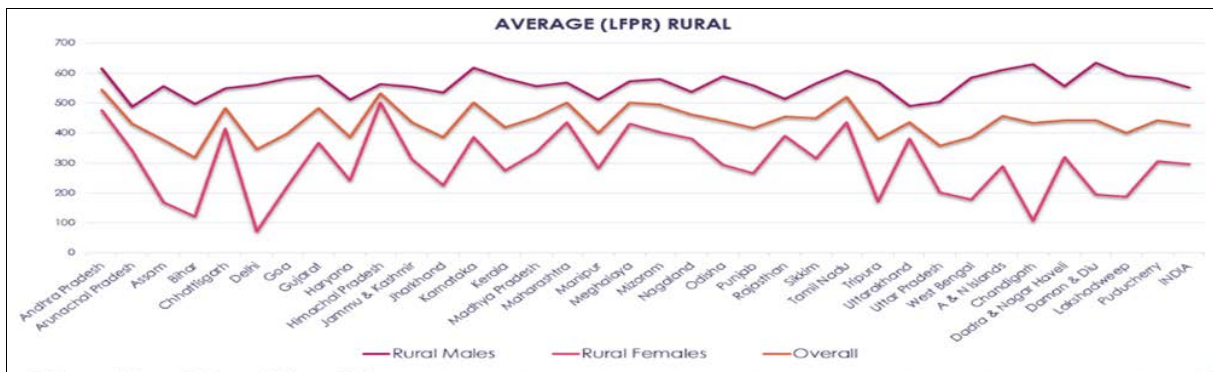

Fig 1: Labor force participation rate (Rural Overall)

Labor force participation rate (Urban Overall)
LFPR for the labor force in urban regions presents huge disparities across states, even analyzing the rate of change between different years, it is clear that there has been no consistency as no particular trend has been followed, it is

positive in one year and negative in the next year. The standard error for urban overall is 7.6367, the mean LFPR for urban overall is 547.390, the standard deviation is 45.176683, the sample variance is 2040.94, and the confidence level (95.0%) is 15.51876.
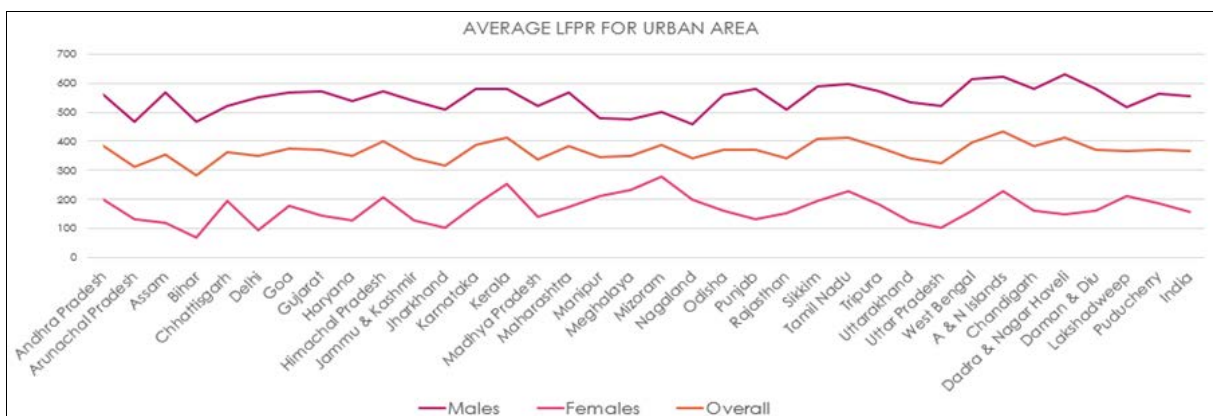

Fig 2: Labor force participation rate (Urban Overall)

Distribution of workforce (Urban Overall)

The given dataset presents information about the sectors of the economy from which people of Urban regions derive their livelihood, namely Agriculture (88/1000), In manufacturing (235/1000), Population dependent on Agriculture & Mining and Quarrying sectors has consistently declined. Contrary to it, the population dependent on sectors like Construction, Electricity, Manufacturing, Financial services, etc. has risen. Reasons can be traced by looking at the trajectory of governmental reform packages since 1991. Due to NEP, the industrial sector boomed, opening new scope for the service sector. Although both of these sectors grew, agriculture, or the primary sector was neglected, resulting in population shifting from primary to secondary and tertiary.

Empirical Relationships can be easily established between populations dependent on different sectors as economist theorists state there exist exists a negative relationship between the growth rate of distinct sectors (in terms of Output, Dependence, etc.)The agriculture and Manufacturing sector show a negative relationship across the globe and this can also be traced from the given data sets. Correlation Coefficient between the two sectors is 0.239 (approx.)

The correlation Coefficient between Agriculture $ Manufacturing is -0.23972673

Distribution of workforce (Rural Overall)

Given dataset presents the information about the sectors of economy from which people of Urban regions derive their livelihood, these sectors are namely Agriculture (171/1000), Mining & Quarrying (4/1000), Manufacturing (266/1000), Electricity (4/1000), Construction (43/1000), Trade Auxiliaries (448/1000), Trade (17/1000), Financial services (34/1000), Community services (334/1000) etc. Population dependent on Agriculture & Mining and Quarrying sectors has consistently declined. Contrary to it, the population dependent on sectors like Construction, Electricity, Manufacturing, Financial services etc. have risen although slightly less than for rural reasons. Reasons can be traced by looking at the trajectory of urban migration especially rural males to developed cities since 1991 to get higher income in the industrial or service sector but as both of these sectors grew, Agriculture or Primary sector was in stark neglect due to which population shifted from Primary to secondary and Tertiary sector. Agriculture is getting more feminized with the passage of time. Agriculture and Manufacturing sectors show negative relationships across the globe and this can also be traced from given data sets. Correlation Coefficient between the two sectors is 0.6018 (approx.)

Hypothesis testing (with 5% Level of Significance)

A) Analyzing Gender disparities at rural areas

H_o: Mean LFPR of Rural male – Mean LFPR of Rural Female = 0

H_A Mean LFPR of Rural male – Mean LFPR of Rural Female is not equal to 0

By using F test, it is ascertained that variances are not equal and thus we use two sample T test (assuming unequal variances)

T(calculated) = 13.49287 and T(critical) = 2.016692 Clearly T(calculated) > T(critical)

Thus we reject H_o: Mean LFPR of Rural male – Mean LFPR of Rural Female = 0

So with given evidence, we conclude that the Mean LFPR of Rural males & females are not equal. This can be owing to the chauvinistic attitude of rustic people that bars women to earn a living for their families.

B) Analyzing Gender disparities at Urban areas

H_o: Mean LFPR of Urban male – Mean LFPR of Urban Female = 0

H_A: Mean LFPR of Urban male – Mean LFPR of Urban Female is not equal to 0 by using F test, it is ascertained that variances are not equal and thus we use two sample T test (assuming unequal variances)

T (calculated) = 34.277 and T(critical) = 1.99546

Clearly T(calculated) > T(critical)

Thus we reject H_o: Mean LFPR of Urban male – Mean LFPR of Urban Female = 0

So with given evidence we conclude that Mean LFPR of Urban males & females are not equal. This can be owing to the Patriarchal structure of our society that bars women to earn a living for their families.

C) Analyzing Rural-Urban 'Gendered' Disparities

H_o: Mean LFPR of Rural Female – Mean LFPR of Urban Female = 0

H_A: Mean LFPR of Rural Female – Mean LFPR of Urban Female is not equal to 0

By using F test, it is ascertained that variances are not equal and thus we use two sample T test (assuming unequal variances)

T(calculated) = -3.5179 and T(critical) = 2.02107

Clearly |T(calculated)| > T(critical)

Thus we reject H_o: Mean LFPR of Rural female – Mean LFPR of Urban Female = 0

So with given evidence we conclude that Mean LFPR of Rural & Urban females are not equal owing to the prevalent chauvinistic attitude in rural areas that bars women to earn a living for their families, though Gender disparity exists in Urban regions too but the conditions are less pitiable than rural regions.

D) Analyzing Rural-Urban disparities

H_o: Mean LFPR of Rural (Overall) – Mean LFPR of Urban (Overall) = 0

H_A: Mean LFPR of Rural (Overall) – Mean LFPR of Urban (Overall is not equal to 0

By using F test, it is ascertained that variances are not equal and thus we use two sample T test (assuming unequal variances)

T(calculated) = 6.72110 and T(critical) = 2.00324

Clearly |T(calculated)| > T(critical)

Thus we reject H_o: Mean LFPR of Rural male – Mean LFPR of Rural Female = 0

So with given evidence we conclude that LFPR for rural regions is much higher than that of urban areas.

Conclusion

However, women in India struggle to enter, remain in, and advance in the workforce due to man-made obstacles forcing women not to work. In addition to the financial burden it places on women and society as a whole, it makes it harder for employers to select workers from a larger pool. This holds back economic expansion. As a result, society, businesses, and the government must intervene. The desperation of finding arrangements is further exacerbated

by the employment misfortunes brought about by the Covid pandemic. With rural and urban women in mind, policymakers and civil society must collectively rethink ways to boost the economy. Working conditions, wage parity, gender biases, work-life balance, skill training, job search, type of job, job security, and gender-specific challenges are all faced by females. In addition, low-skilled women work in the informal economy, where they face an even greater risk of exploitation and do not have access to formal safety nets. This gender gap in employment is a social, economic, and structural problem. Equal employment opportunities for men and women with comparable abilities ought to exist in a just society.

It can thus be concluded that LFPR for both males and their feminine counterparts has risen across the given time period though the rate of growth has been inconsistent during this passage of time for all states, for both rural & urban areas. While observing the inner distribution we observed the trajectory followed by the workforce in which the rise in population dependent on a particular sector is accompanied by the fall in the relative share of other sectors. Overall descriptive analysis and tests of hypotheses revealed the prevalent rural-urban divide and existing gender inequality through the graphical analysis. It cannot be denied that women's participation in every economic activity is much lower than males. Moreover, participation is much higher in rural regions highlighting the paucity of resources, lack of opportunities & prevailing social structure.

The study showed a strong correlation between female LFPR and overall LFPR in rural regions. LFPR for the labor force in urban regions presented huge disparities across states, and no particular trend was observed. The population dependent on agriculture and mining and quarrying sectors consistently declined, while the population reliant on sectors like construction, electricity, manufacturing, and financial services rose. Empirical relationships were established between populations dependent on different sectors, as economists and theorists state that there exists a negative relationship between the growth rate of distinct sectors.

The way forward

Women face discrimination in real life, such as decreased job opportunities, lower valuations of services and labor, financial freedom, and freedom of expression. It is imperative to keep women out of rigid social norms and structures that limit their ability to enter the workforce, take advantage of economic opportunities and advance themselves in society. Due to the institutional changes in OECD countries since the 1980s, women have been able to combine work and childcare more efficiently. Studies have found that societal-level responses such as changing perspectives towards working mothers, a rise in childcare availability, and implementation of paid parental leaves have resulted in a change in the relationship between FLFP and TFR from negative to positive in the 1980s (Ahn and Mira 2002; Brewster and Rindfuss 2000) [22, 23]. It need not be emphasized that women can play a major role in changing this world into a better place to live in as several studies have demonstrated.

Based on the results and interpretation presented, here are some possible ways forward:

1. Increase awareness and focus on the importance of female labor force participation: Given the strong relationship between LFPR for women and overall LFPR, there is a need to focus on increasing women's participation in the labor force. This could be done through policies that promote equal opportunities for women, such as providing access to education, training, and affordable childcare.

2. Address the disparities in urban LFPR across states: The analysis showed that there are significant disparities in LFPR across metropolitan regions, and no consistent trend has been identified. It would be imperative to investigate the reasons for these disparities and work towards policies that promote consistent growth in urban LFPR across all states.

3. Encourage the growth of the service sector: The data showed that there has been a shift in the distribution of the workforce from the primary sector to the secondary and tertiary sectors. Given the negative relationship between agriculture and manufacturing, there is a need to encourage the growth of the service sector. This can create new employment opportunities and contribute to economic growth.

4. This study conducted a correlation analysis but did not examine the factors affecting LFPR. Conducting further analysis to identify the factors affecting LFPR could provide insights into the barriers women face in accessing employment opportunities. This could help us to design more targeted policies to address these barriers.

Alison Gilchrist (2000) [27] states that community development can be redefined as enhancing people's capacity to network individually, collectively, and through social institutions. Against the backdrop of the gradual breakdown of traditional family child-care arrangements, a community-based approach to the provision of child-care services can be looked into. Therefore, households must use family planning, promote women to attend higher education, create public or private daycare centers for children, and access credit for women.

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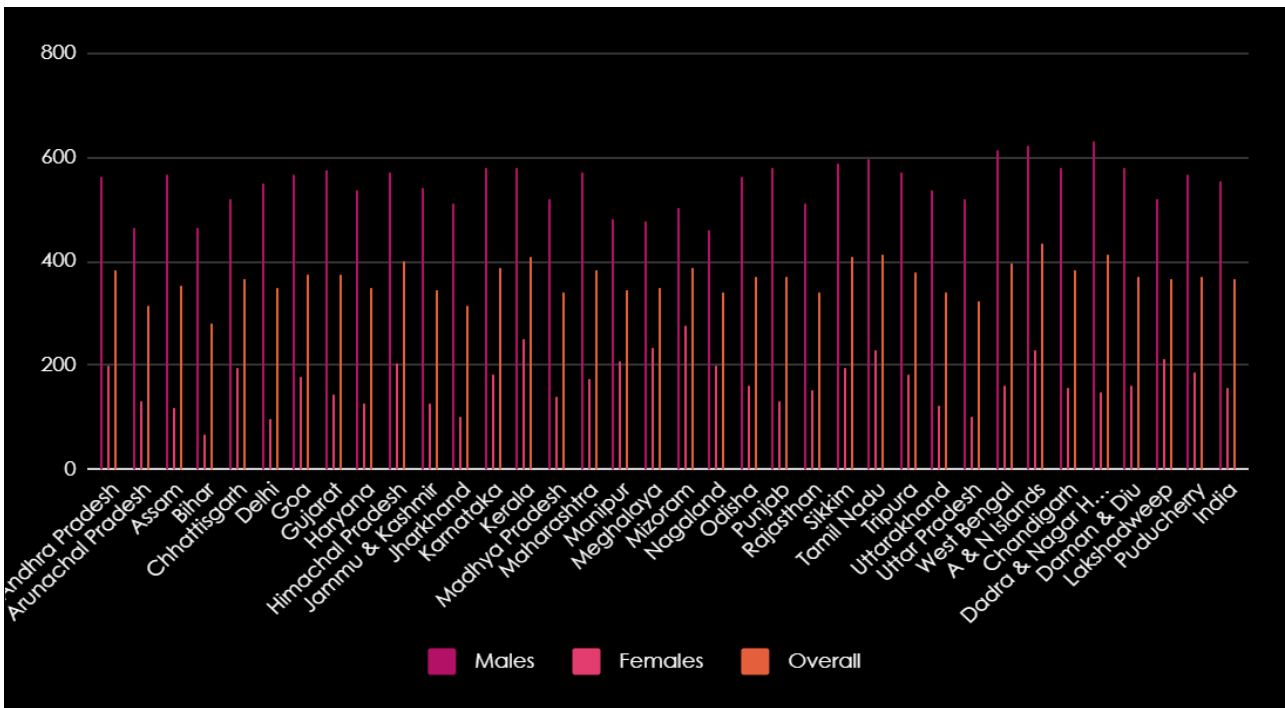
Appendix
Urban Regions

Table 1: Showing Urban gender disparity in overall participation rate

Urban male		Urban female	
Min	458.4	Min	67.2
Q1	518.7	Q1	131.7
Median	561	Median	162.6
Q3	579.3	Q3	197.6
Max	630	Max	276.8
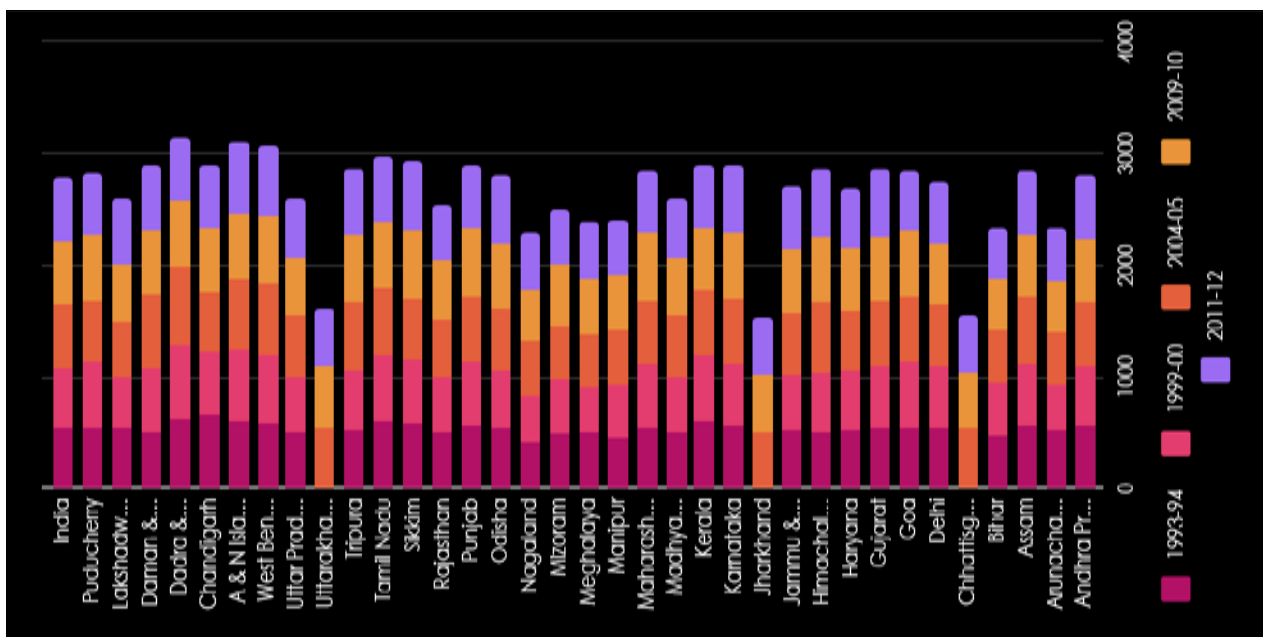
Bar Graph 1: Showing Urban gender disparity in overall participation rate

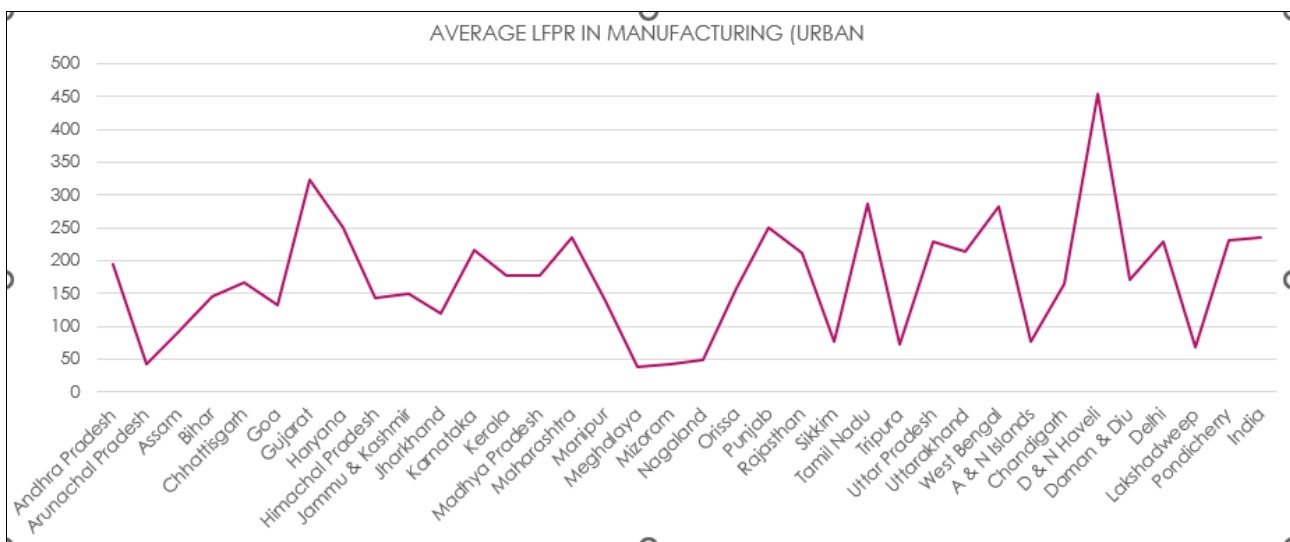**Bar Graph 2:** showing Urban Male, Female and overall participation rate

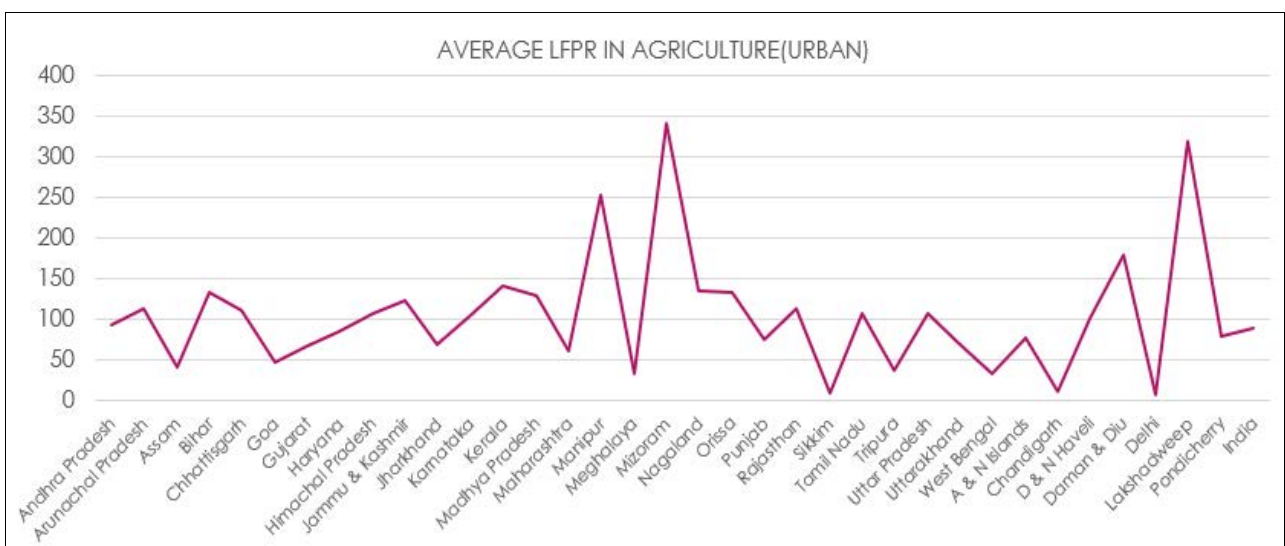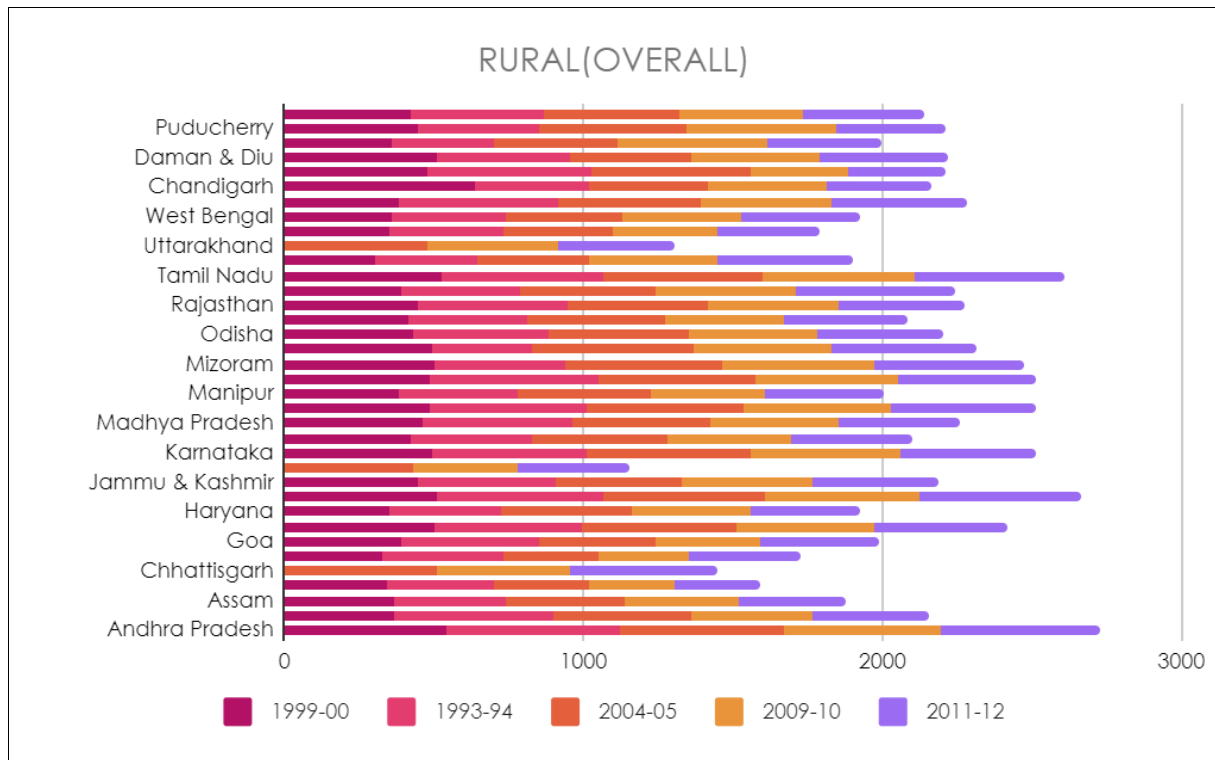**Fig 1:** Depicting average Labor Force participation in Urban Manufacturing sector

Fig 2: depicting average Labor Force participation in Urban Agriculture sector
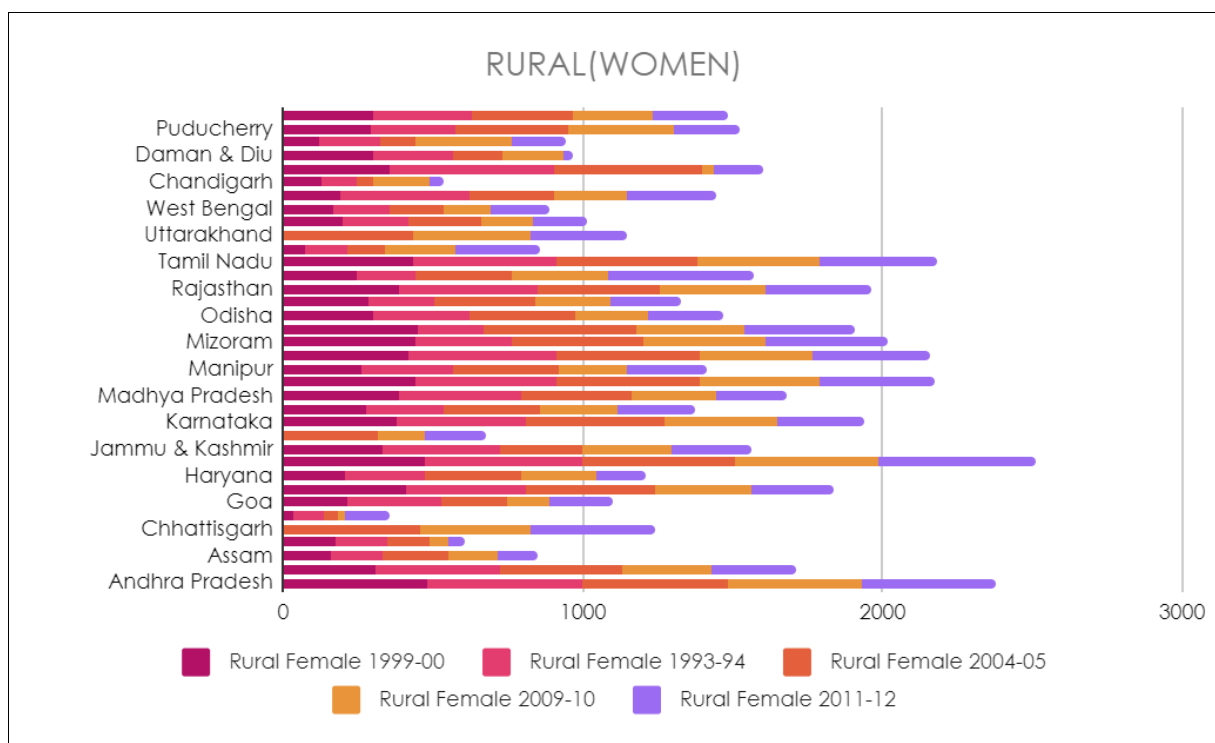
Rural regions

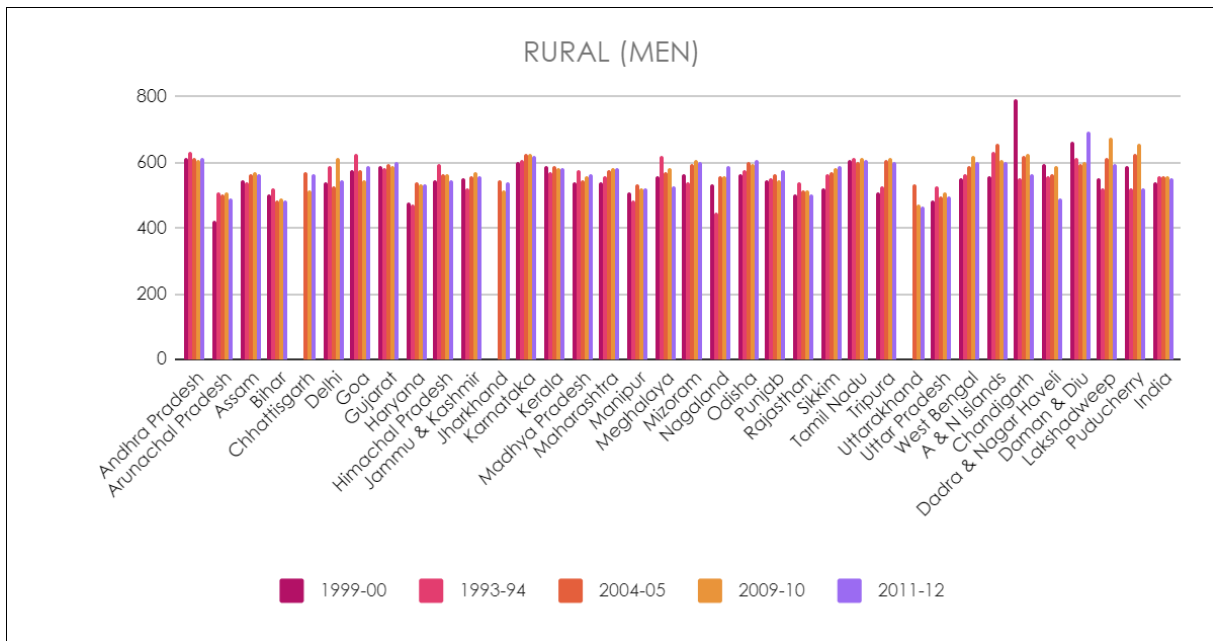**Table 2:** Showing rural gender disparity in overall participation rate

Rural male		Rural female	
Min	487	Min	71
Q1	543.2666667	Q1	211.3
Median	565	Median	305.4
Q3	587.1	Q3	384.7
Max	633.6	Max	502.6

Bar Graph 3: Showing Rural overall participation rate over period of time

Bar Graph 4: Showing Rural female participation rate overtime

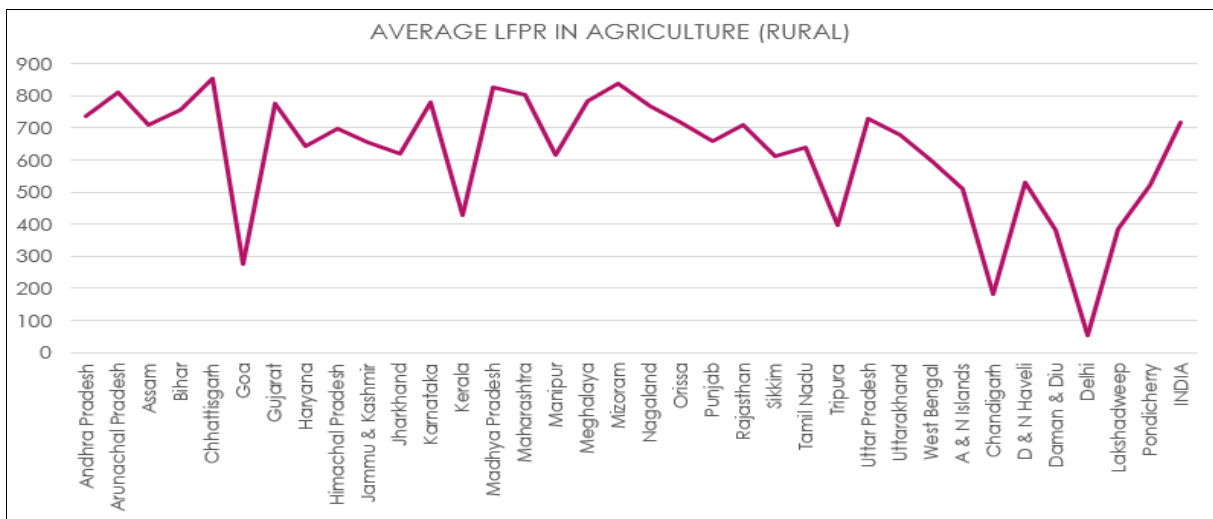**Bar Graph 5:** Showing Rural Male participation rate overtime

Fig 3: Depicting average Labor Force participation in Rural Agriculture sector
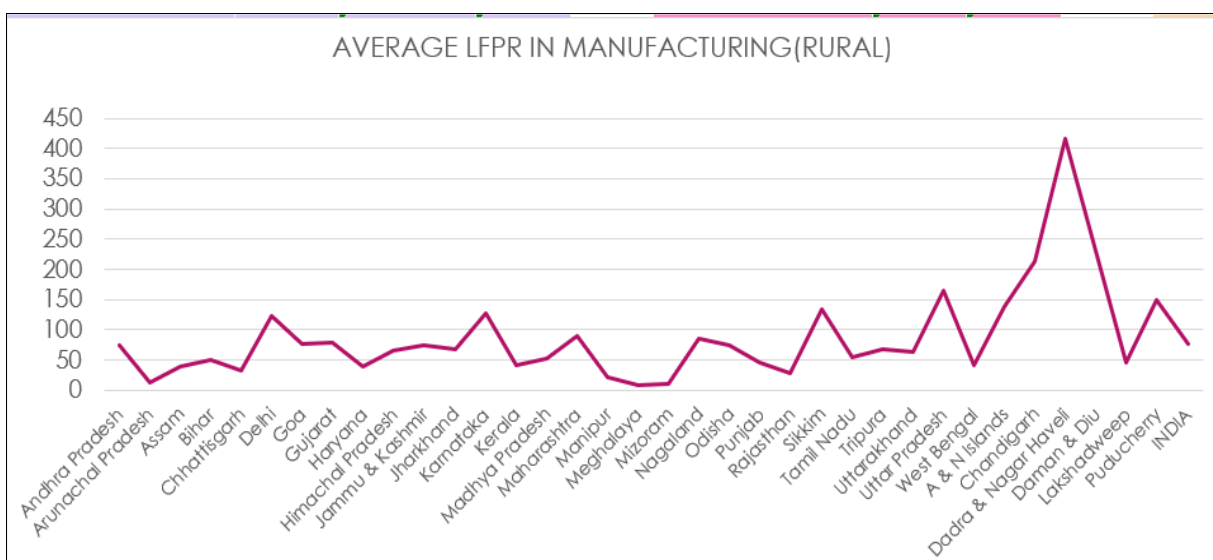

Fig 4: Depicting average Labor Force participation in Rural Manufacturing sector