

Variations in the Occupational Structure and Gender Segregation in India and the States: Analysis Based on Census of India 2001 and 2011

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Abstract

The proportion of workers engaged in various occupations pictures the socio-economic development of a region. Occupational gender segregation is said to exist when women and men are distributed across occupations disproportionately without considering the nature of the distribution of occupations. According to the census of India, workers are distributed according to the occupation in which they are engaged into four broad categories namely, cultivators, agricultural labourer, household industrial workers and other workers. The main objective of the study is to measure the state occupational gender segregation, in this article; the occupational differentiation and segregation by sex are measured through different indices. The study showed that even though the regional distribution of occupations in the different states of India are more or less even, the occupational gender segregation exists in almost all the states in varying degrees. Throughout the states of India, male workers are more than female workers, however, the distribution of population by sex shows that almost equal proportion of both sexes are engaged in each state. Occupational gender wise integration is a sign of progress which ensures proportionate participation of women in economic activities. So, measures should be taken by the planners and policy makers to absorb more women in modern large enterprises and thereby expand economic development.

Keywords: Occupational gender segregation; Gender ratio; Occupational differentiation

Introduction

The utilization of human resources for the socio-economic progress of a nation through industrial and occupational structure, labour force participation has of immense importance. The proportion of workers engaged in various occupations pictures the socio-economic development of a region. Occupation always related to agriculture, industry and service sectors. The distribution of workers among different occupational categories along with regional disparities relating to the occupational structure explains the lopsided development of different parts of India.

The occupation and industry are clearly two distinct points of view from which the economic activity of the population may be regarded, the first is what the individual does, and the second shows the position of the worker in the economic structure of the country. Occupation is the kind of work performed by an individual while industry is the branch of economic activity to which he is connected [1]. Occupational gender segregation is said to exist when women and men are differently distributed across occupations regardless of the nature of job allocation [2]. Occupational sex segregation measures the extent to which men and women occupy different positions in the division of labour and, as a result, have systematically different opportunities to obtain social and material rewards. Sex segregation operates both as an intrinsic measure of social inequality and as a precursor to gender differences in the distribution of earnings, opportunities of promotion, workplace authority and other stratification outcomes [3].

According to 2001 and 2011 census of India, the reference period for determining a person as worker or non-worker is one year proceeding to the date of enumeration. Workers are then, classified as main workers and marginal workers. Those who worked for more than 6 months (183 days) in the reference period are termed as main workers. Workers who worked for less than 6 months (183 days) in the reference period are the marginal workers. Workers are distributed according to the occupation in which they are engaged into four broad categories namely, cultivators, agricultural labourer household industrial workers

and other workers. If a person engaged in cultivation of land owned or leased from government, private persons or institutions for payment of money, or share of the harvest is classified as cultivators. A person who works on another person's land for wages in money or kind or share is regarded as agricultural labourer. Household industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas. All workers other than those who are not in the above categories are termed as other workers.

Literature Review

Recently, occupational gender segregation and occupational structure receive greater attention because studies relating to these areas are scarce. Some of the studies relating to present article are mentioned here. Nicole and Huberman [4] identified the dimensions of occupational gender segregation along with women's progress in wages. Women were concentrated in a number of occupations and strata within organizations. Horizontal segregation has stagnated and vertical segregation improved steadily.

Cotter et al. [5] came to the conclusion that the earnings were affected by the segregation through lowering the earnings of workers in female dominated occupations and by lowering the earnings of all workers in highly segregated labour markets. Segregation effects contributed to inequality. Gender segregation intensifies labour market inequality. Cohen and Huffman [6] proved that gender devaluation were strongest in highly gender segregated labour markets. In

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segregated markets, men were in a stronger position to benefit from devaluation while women were less able to resist it. Higher levels of occupational segregation at the labour market level were associated with a significantly increased tendency to evaluate women's work roles.

Cohen [7] found that when women moved to labour market, gender segregation became higher. The movement of women from household to the labour market was a driving force in the changing nature of gender inequality.

Gender differences in occupational attainment resulted from voluntary choices of men and women and from long term changes in the labour market such as the simultaneous growth of white collar occupations and women labour force participation rates [8].

Men remained the top in respect of pay but women were in the top in terms of stratification which means women's occupations were healthier and permitted greater access to higher status net-works and involved working with better educated people than men's occupation. Occupational gender segregation increased gender earnings' inequality by increasing men's earnings significantly and decreasing women's earnings to a smaller degree. Occupational segregation has positive effects on women particularly in terms of social positioning [9-11].

Due to the reduction in occupational segregation, there were improvements in the wellbeing of the women. From 1990 onwards those women with university level of education had lower segregation than that with lower education [12].

The study by Lakshmana [13] about the gender inequality in employment and to link the gender relations in Indian states of Madhya Pradesh and Karnataka showed that in Karnataka, the percentage of male workers were higher and so the percentage gap between male and female workers were more. This higher gender gap will adversely affect the empowerment and socio-economic development of women. In both the states, wide gender gap was visible in wage rates too. As a conclusion, the author suggested that more employment opportunities are to be opened to the workers of both the states in the non-agricultural sectors.

Sonali Chakraborty and Molly Chattopadhyay found that in India, occupational segregation was low among educated persons and among the permanent workers.

The trends in occupational segregation by gender in the urban and rural sectors of labour market were analyzed by Tushar Agrawal and Ankush Agrawal [14]. The authors concluded that the level of occupational segregation was higher in the urban sectors. By decomposing the effects, they opined that the increase in the segregation be attributed to changes in both occupation mix and sex composition effects.

The extent of occupational segregation for gender and social group in India was examined by Tushar Agrawal [15] and concluded that occupational segregation and social group segregation were higher in urban sectors than in the rural sectors especially among females. Across the social group, the segregation was higher among scheduled caste and scheduled tribes. At the same time, by nature of employment and age groups, the regular workers and the elderly were the most segregated ones.

Duraisamy and Duraisamy [16] examined the gender wage gap in India across different segments of the labour market over the wage distribution. The productive characteristics of men and women were converged sticky floor rather than glass ceiling phenomenon

was observed in all segments of the labour market. Also higher discrimination was faced by women at the bottom of the distribution.

Thus, present study is an attempt to explore the state wise occupational sex segregation in India for the period 2001-2011 using data taken from the reports of the Census of India, 2001 and 2011. The occupational classifications are cultivators, agricultural labourers, household industrial workers and other workers.

Objectives

The main objectives of the study are to measure;

- State-wise occupational gender segregation,
- Extent of occupational differentiation by sex,
- The extent of unevenness in the distribution of occupational group in relation to population.

Research Methodology

In this article, the occupational differentiation and segregation by sex are measured through different indices. They are the Index of Dissimilarity suggested by Duncan and Duncan [17], Entropy or Diversity Index, Karmel and MacLachlan Index [I_p], Index of Occupational Differentiation and the Concentration Index.

Index of dissimilarity [D]

This index was proposed by Duncan and Duncan. This is the most common measure of segregation. It measures the percentage of men [or women] that would have to change occupations to achieve perfect integration. The value of D varies from 0 [if perfect integration] to 100 [if perfect segregation].

$$[D] = \frac{1}{2} * \sum_i^n \left| \left(\frac{W_i}{W} \right) - \left(\frac{M_i}{M} \right) \right|$$

Where 'i' is the number of occupations, W_i and M_i refer to the number of women and men in the i^{th} occupation respectively. W and M refer to the total women and men respectively in all occupations.

Entropy index or diversity index

It measures the differences in the distributions of groups in an area. The calculations involve a multi-step process in which an entropy score [E] for the total area is calculated first:

$$E = \sum [X_j] \ln \left[\frac{1}{X_j} \right]$$

Where X_j is the share of the entire area in each category of the 'n' variables used. This is the diversity score of the entire area. The higher the number, the greater the diverse. The upper limit of the measure is given by the natural logarithm of the number of groups used in the calculation. When all groups are equally distributed the score will reach the upper limit.

The score for each individual unit is calculated as:

$$E_i = \sum [X_j] \ln \left[\frac{1}{X_j} \right]$$

Where x_j is the share of the total of each category of the variable. The entropy Index [H] is calculated by:

$$H = \sum [t_i (E - E_i)] / ET$$

Where t_i represent the total of the variable of sub-unit and T is the

total for the entire area. The measure varies between 0 (if all sub-units have the same composition as the overall area) to one (all sub-units contain only one group). This measure is interpreted as the weighted average deviation of each sub-unit's entropy from the total area's entropy.

Karmel and MacLachlan index [I_p]

The Karmel and MacLachlan Index is a measure of segregation and simple to interpret. It denotes the total level of employment that would have to relocate with replacement to achieve zero segregation by gender but maintains the occupational structure and overall gender shares of employment.

$$[I_p] = \left(\frac{1}{T}\right) \sum_i^n |F_i - a(F_i + M_i)|$$

Where 'a' is the female share of total employment.

Index of occupational differentiation

Occupational differentiation by sex is studied by using the index suggested by Martin and Poston. This index provides controls on both the occupational structure and sex composition of the working force. Standardization by sex is made by the female workers equal to male workers and distributing that to the occupational categories according to the proportion of female occupational category. Thus, each standardized female occupational category (SF_i) equals its proportion multiplied by the total of the male occupational categories.

$$SF_i = \left(\frac{F_i}{\sum F_i}\right) * \sum M_i$$

Where SF_i is the standardized female frequency in the ith occupational category and $\sum F_i$ and $\sum M_i$ are the actual number of females and males in the ith occupational category.

The standardized ratio of actual to expected number of males (SR_i) is calculated by the following formula:

$$SR_i = \left(\frac{M_i}{(M_i + SF_i)}\right) * \frac{1}{2}$$

If equal distribution of females and males are affected in all the categories, the standardized ratio will be one. No variation exists. The greater the departure, the greater is the variation. The standardized ratio greater than one means overrepresentation of males and if it is less than one, females are overrepresented.

The coefficient of relative variation is calculated for comparison of the dispersion scores of the states. The higher the coefficient of relative variation, the greater is the relative dispersion and the occupational differentiation by sex.

Concentration index

$$(CI) = \frac{1}{2} * \sum_1^n |x_i - y_i|$$

Where x_i and y_i represent the percentage distribution of workers and population in each state. If each occupational group of the working force and population are in the same percentage, the value of the index will be zero.

Results and Discussion

The most commonly used measure of economic activity is the work participation rate which measures the ratio of the workers to the total

population. Work participation rates are useful for understanding the participation of men and women in various productive activities.

The state-wise work participation rates by sex according to 2001 and 2011 Census of India are presented in the following Table 1.

In India, only 40 percent of the population is in the working force in 2011. It is 23.50 percent increase in the work participation rate over the period 2001-2011 where the work participation rate was only 32.23 percent in 2001. When half of the males are workers in 2001, it is only less than one fourth for females. Within the next 10 years, about 3 percent point increase is noted in male work participation rate, for females the work participation rate is more than doubled. Even then, it is less than half of male participation rate [18].

State-wise work participation rates showed that in 2001 among males, twelve out of twenty-nine states, it is less than 50 while the number has reduced to 7 in 2011. It is to be noted that in 2011, in Jammu and Kashmir and Mizoram, the WPR has declined. Among females, though the WPR is low in both the periods, within the 10 years period remarkable improvement has been achieved by a good number of states. This low work participation rates among females itself reveal the occupational differentiation in the nation. Therefore, the present study aims to find out the level of occupational differences by sex among the states [19].

Duncan Index of Dissimilarity (D)

Duncan Index of Dissimilarity is the most common measure of

States	Male		Female		Total	
	2001	2011	2001	2011	2001	2011
Andhra Pradesh	51.10	56.98	12.62	36.16	32.22	46.61
Arunachal Pradesh	48.99	49.06	16.69	35.44	34.16	42.47
Assam	51.03	53.59	10.29	22.46	31.98	38.36
Bihar	41.93	46.47	06.86	19.07	25.62	33.36
Chhattisgarh	52.81	55.59	40.04	39.70	46.46	47.68
Delhi	52.40	52.99	09.08	10.58	32.85	33.28
Goa	54.86	56.76	17.96	21.92	37.05	39.58
Gujarat	54.12	57.16	09.11	23.38	33.07	40.98
Haryana	49.52	50.44	10.27	17.19	31.52	35.17
Himachal Pradesh	54.38	58.69	14.96	44.82	36.89	51.85
Jammu and Kashmir	51.80	48.11	09.50	19.11	32.71	34.47
Jharkhand	47.96	49.76	26.41	29.10	37.52	39.71
Karnataka	54.11	59.00	16.06	31.87	35.67	45.62
Kerala	50.78	52.73	13.55	18.23	31.65	34.78
Madhya Pradesh	47.64	53.56	11.70	32.64	30.64	43.47
Maharashtra	52.60	56.00	12.72	31.06	34.00	43.99
Manipur	45.17	51.58	32.78	38.56	38.71	45.09
Meghalaya	38.19	47.17	19.15	32.67	28.74	39.96
Mizoram	55.32	52.35	40.50	36.16	48.09	44.36
Nagaland	45.70	53.42	14.87	44.74	31.91	49.24
Odisha	49.37	56.11	09.76	27.16	30.66	41.79
Punjab	53.42	55.15	09.74	13.91	33.40	35.67
Rajasthan	47.64	51.47	09.24	35.12	29.56	43.60
Sikkim	56.27	60.16	21.42	39.57	40.49	50.47
Tamil Nadu	56.37	59.31	18.42	31.80	37.59	45.58
Tripura	51.78	55.77	12.09	23.57	32.32	40.00
Uttaranchal	46.14	49.67	27.33	26.68	36.92	38.39
Uttar Pradesh	45.08	47.71	06.19	16.75	26.92	32.94
West Bengal	54.07	57.07	11.13	18.08	37.82	38.08
INDIA	50.85	53.26	11.55	25.51	32.23	39.79

Source: Census of India, 2001 and 2011

Table 1: Work force participation rates of India and the states, 2001 and 2011.

occupational gender segregation. It measures the percentage of workers (males or females) that would have to change the occupation in order to achieve perfect integration in occupational distribution. The values of D vary between 0 (perfect integration) and 100 (perfect segregation).

Gender ratio expresses the relative strength of female workers to male workers. It is also used as an indicator of gender segregation. The state wise values of dissimilarity index (D) and the gender ratios (GR) are presented in Table 2.

In India, in order to achieve perfect integration, if all the occupations are taken together, 23.17 percent of the workers irrespective of sexes have to change their occupation in 2001 and it increased to 29.17 percent in 2011. Recently, unevenness in the distribution of workers has increased and so more persons have to change their occupations. In 2001, when Delhi (3.49 percent) shows almost integration, Uttaranchal (43.88 percent) has the highest segregation. Nearly 40 percent of the states showed a D value greater than that of India. The segregation was low in Assam, Kerala, Meghalaya, Mizoram and Punjab [20].

In 2011, among the states, the level of segregation was low in Delhi, Goa, Kerala and Mizoram. The segregation level is high in Uttaranchal even after the ten years' period. Over the period of study, in almost all the states except Assam, Chhattisgarh, Gujarat, Jammu and Kashmir and Punjab the gender segregation has declined. Remarkable decline was noticed in Goa, Haryana, Karnataka, Kerala, Maharashtra and Uttaranchal [21-24].

States	Duncan Index		Gender Ratio	
	2001	2011	2001	2011
Andhra Pradesh	29.73	26.95	61.08	63.00
Arunachal Pradesh	22.83	22.34	64.47	67.77
Assam	12.78	13.59	38.82	40.13
Bihar	22.66	14.74	36.57	37.68
Chhattisgarh	21.27	21.58	74.98	70.74
Delhi	03.49	00.79	14.78	17.33
Goa	20.56	08.24	39.35	37.59
Gujarat	23.84	27.67	46.82	37.59
Haryana	20.56	12.09	46.57	31.00
Himachal Pradesh	36.35	31.89	77.42	74.19
Jammu and Kashmir	22.55	23.25	40.07	35.29
Jharkhand	26.25	24.65	51.79	55.47
Karnataka	30.27	24.90	54.47	52.56
Kerala	12.25	06.00	32.43	37.48
Madhya Pradesh	21.66	21.53	59.27	56.72
Maharashtra	35.30	26.54	53.33	51.54
Manipur	20.14	18.05	79.28	74.17
Meghalaya	13.36	10.64	70.65	68.48
Mizoram	14.48	09.36	77.62	67.40
Nagaland	24.58	20.67	73.38	77.97
Odisha	32.78	30.94	45.65	47.38
Punjab	11.39	11.78	31.14	22.58
Rajasthan	27.95	24.44	61.72	63.34
Sikkim	23.70	20.25	58.73	58.54
Tamil Nadu	27.36	23.50	54.02	53.42
Tripura	21.02	16.40	39.48	40.58
Uttaranchal	43.88	35.85	57.00	51.74
Uttar Pradesh	23.12	15.69	31.73	32.03
West Bengal	23.08	18.70	31.68	30.10
India	23.17	29.17	46.26	45.16

Table 2: Duncan index of dissimilarity [D] values and gender ratio of India and the states 2001 and 2011.

Gender ratio is the ratio of the female workers to male workers. In India, the gender ratio has declined from 46.26 in 2001 to 45.16 in 2011, which means female workers are declining in relation to male workers. Majority of the states follow the national pattern. The gender ratio is the highest in Manipur (79.28) and Nagaland (77.97) in 2001 and 2011 respectively. The corresponding lowest ratio is evident in Delhi in both the periods. From the table it is clear that the inverse relation between changes in gender ratio and the dissimilarity index always exists in India and in majority of the states.

The index of dissimilarity weighs occupations according to their size and so a change in the value of D may be due to changes in the occupational structure or due to changes in the distribution of workers in the occupational structure.

Entropy index (H)

An entropy score is a measure of diversity and an entropy index measures the weighted average deviation of each unit's entropy from the total wide entropy expressed as a fraction of the total distribution of groups. Therefore, the entropy index involves a multi-step process which is calculated with the help of entropy scores.

The entropy scores and the entropy indices for India and the states are calculated and presented in the following Table 3. In India, the sex wise entropy scores (E) reveal that the diversity is high among females than among males in both the periods. In both cases, irrespective of sexes, the value of the entropy score is declining showing chances of decline in the diversity.

The state wise entropy scores (E_i) for males has shown that the diversity is more in Odisha in 2001 and in Uttar Pradesh in 2011 and the lowest in Delhi in both the periods. Among females, it is the highest again in Uttar Pradesh in 2011 but in 2001 it is in Manipur and the lowest being again in Delhi in both the periods.

Using the entropy scores of India and the different states, the entropy index (H) for the occupational distribution for males is calculated as 0.0559 in 2001, which means that regardless of the size of each group, the occupational groups are more or less evenly distributed in India across the states and the diversity is declined in 2011 to 0.0221. Or, virtually, there is no diversity in the distribution of occupational groups throughout the country. In the case of females, the diversity in the distribution of occupational groups is increased from 0.0548 in 2001 to 0.0694 in 2011, though there is less diversity.

Karmel and MacLachlan index (Ip)

In India, the Ip index values showed a declining trend from 2001 to 2011 among cultivators, household industrial workers and other workers. But, segregation was found to be increasing among agricultural labourer.

It is clear from Table 4, other workers are the most segregated one in 2001, but in 2011 segregation was the highest among agricultural workers. It means, in 2001, 5.15 percent of the other workers needed to be relocated to achieve a structure of the employment across these occupations consistent with the gender shares of all employment, in both the periods, the least segregated occupation are the household industries. According to Ip index, from 2001 onwards, almost perfect integration was attained by household industries.

When 3.79 percent of agricultural workers were to be relocated in 2001, it increased to 4.55 percent in 2011, a 0.76 percent point increase. The decline in segregation was the highest for cultivators where 1.09

States	Male[E]		Male[H]		Female[E]		Female[H]	
	2001	2011	2001	2011	2001	2011	2001	2011
Andhra Pradesh	1.1785	1.1296	-0.0013	-0.001	1.137	1.0823	0.005	0.01
Arunachal Pradesh	0.8725	0.9158	0.0003	0.0002	0.7267	0.9117	0.0004	0.0004
Assam	1.0536	1.0772	0.0023	0.0010	1.2279	1.2540	0.0001	-0.001
Bihar	1.1742	1.1338	-0.001	-0.0010	1.0066	1.0752	0.0073	0.0101
Chhattisgarh	1.1401	1.1623	0.0003	-0.0010	1.0225	1.0193	0.0042	0.0101
Delhi	0.1888	0.2168	0.0121	0.0120	0.3244	0.2497	0.0022	0.0043
Goa	0.5329	0.4432	0.0007	0.0010	0.9698	0.6716	0.0002	0.0012
Gujarat	1.0587	1.0451	0.005	0.0040	1.1835	1.1050	0.0023	0.0030
Haryana	1.0503	1.0630	0.002	0.0010	1.1628	1.1223	0.0011	0.0010
Himachal Pradesh	0.8985	0.9342	0.001	0.0010	0.5235	0.7176	0.0041	0.0041
Jammu and Kashmir	1.0439	0.9975	0.001	0.0010	1.0769	1.1732	0.0013	0.0001
Jharkhand	1.1891	1.1709	-0.001	-0.0010	1.1380	1.1794	0.0011	0.0004
Karnataka	1.1147	1.0824	0.002	0.0020	1.2356	1.1982	0.0002	0.0003
Kerala	0.7732	0.6534	0.009	0.0110	0.9359	0.7171	0.0003	0.0100
Madhya Pradesh	1.1712	1.1887	-0.001	-0.0040	1.1270	1.1208	0.0040	0.0100
Maharashtra	1.0687	1.0808	0.008	0.0030	1.172	1.1911	0.0040	0.0002
Manipur	1.0728	0.9984	0.0001	0.0002	1.3173	1.2819	-0.0010	-0.0002
Meghalaya	1.0882	1.0714	0.0001	0.0001	1.1069	1.1287	0.0002	0.0002
Mizoram	0.9121	0.9722	0.0002	0.0001	0.9144	1.0184	0.0003	0.0002
Nagaland	0.8805	0.9488	0.0004	0.0002	0.7939	0.9223	0.0010	0.0010
Odisha	1.1979	1.2062	-0.001	-0.0030	1.1704	1.0909	0.0010	0.0030
Punjab	1.0576	1.0340	0.0022	0.0020	1.0715	1.0291	0.0010	0.0020
Rajasthan	1.0071	1.0507	0.007	0.0030	0.9394	1.0982	0.0110	0.0100
Sikkim	0.9337	0.9189	0.0001	0.0001	0.9154	1.0459	0.0001	0.0001
Tamil Nadu	1.0977	0.9947	0.0040	0.0100	1.2427	1.1821	-0.0003	0.0010
Tripura	1.0829	1.0505	0.0002	0.0002	1.2601	1.1787	-0.0002	0.0004
Uttaranchal	1.0077	1.0215	0.0010	0.0010	0.729	0.9566	0.0020	0.0020
Uttar Pradesh	1.1910	1.2309	-0.005	-0.0200	1.2347	1.2881	0.0004	-0.0100
West Bengal	1.1326	1.1318	0.0020	-0.0010	1.3151	1.2276	-0.0022	-0.0020
INDIA	1.1593	1.1172	0.0559	0.0221	1.2419	1.1935	0.0548	0.0694

Table 3: Entropy score and entropy index for India and the states, 2001 and 2011.

Occupational Group	2001	2011
Cultivators	03.53	02.44
Agricultural Laborers	03.79	04.55
Household Industrial Workers	00.73	00.59
Other Workers	05.15	04.11

Table 4: Karmel and MacLachlan Index [Ip] 2001-2011.

percent point decline was effected, whereas among household industrial workers the decline was only 0.14 percent point. This low decline is due to the already low segregation in 2001 itself. From these analyses it is to be noted that though there is less diversity in the distribution of occupational categories among the states of India, gender segregations prevalent in all the occupational categories at varying degrees. So, the occupational differentiation by sex is analyzed to understand the distribution of workers in different occupations and how it changes over time. For India the entropy score (E) describes the diversity in the occupational distribution. The maximum level of the entropy score equals to the natural logarithm of the number of groups used in the calculation. Here, in this analysis, four occupational groups are used and so the maximum entropy score is 1.3863. The maximum score attains when all groups are equally represented in India that is each occupational group comprises 25 percent each of the total workers.

Occupational differentiation by sex

Occupational differentiation by sex explains the empirical differences in the occupational composition of male and female labour force. The value of the index would be one, if males and

females are distributed equally in all the occupational groups or there is no variation in the occupational distribution by sex. If the value of the index exceeds one, it means, males are overrepresented in that particular occupation. The following Table 5 provides the values of the index of occupational differentiation by sex with mathematical control on both structure and sex composition of the labour force for India and the different states for the census period 2001 and 2011. In India, by 2001, females are overrepresented in the occupational categories cultivators, agricultural laborer's and household industries whereas male dominance exists in the occupational category of other workers. In 2011 also same pattern is followed by all the categories except among cultivators where preponderance of males was observed. The state-wise distribution has shown that, in 2001, in one third of the states, men are overrepresented by cultivators but in 2011 it rose to more than half of the states of India. In 2001, Assam, Gujarat, Madhya Pradesh, Tripura and Uttaranchal have more females in cultivation but the situation has changed to male dominance in 2011. Though females are more among cultivators in the remaining states, the index value showed that it is less when compared to 2001. That is gradually more males are moving to cultivation than females. Agricultural laborers are more among males in Himachal Pradesh, Jammu and Kashmir and Uttaranchal throughout the period of study. Unlike cultivators, among agricultural labourer, preponderance of females is more apparent in 2011. In household industries, the values of the indices are above one in Chhattisgarh, Himachal Pradesh, Rajasthan and Sikkim, in 2001 indicating male overrepresentation but in 2011 the situation has changed in Rajasthan and Sikkim with preponderance of women.

States	Cultivators		Agro. Labour		HHI		Other Worker		Coeff.-Variation	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Andhra Pradesh	1.089	1.126	0.696	0.734	0.638	0.675	1.430	1.335	34.53	28.32
Arunachal Pradesh	0.762	0.818	0.878	0.824	0.838	0.797	1.452	1.288	27.91	25.59
Assam	0.965	1.128	0.856	0.775	0.396	0.449	1.155	1.059	33.18	29.12
Bihar	1.152	1.197	0.810	0.901	0.704	0.613	1.464	1.174	29.19	28.01
Chhattisgarh	1.001	1.041	0.682	0.753	1.023	1.039	1.529	1.424	28.62	27.39
Delhi	0.547	0.892	0.523	0.805	0.754	0.953	1.019	1.004	28.00	25.33
Goa	0.582	0.723	0.482	0.636	0.761	0.860	1.135	1.048	33.64	25.21
Gujarat	0.982	1.140	0.614	0.601	0.768	0.745	1.283	1.248	27.49	25.70
Haryana	0.853	0.890	0.746	1.059	0.854	0.864	1.243	1.157	20.48	27.12
Himachal Pradesh	0.731	0.736	1.065	1.029	1.181	1.124	1.644	1.470	34.27	27.11
Jammu and Kashmir	0.813	0.721	1.155	1.046	0.636	0.473	1.257	1.221	26.01	27.82
Jharkhand	0.913	0.910	0.721	0.766	0.778	0.705	1.526	1.411	32.58	27.95
Karnataka	1.124	1.155	0.568	0.617	0.568	0.654	1.315	1.200	37.25	28.14
Kerala	1.235	1.249	0.785	0.818	0.516	0.725	1.066	1.022	30.43	27.69
Madhya Pradesh	0.991	1.069	0.699	0.757	0.745	0.786	1.499	1.349	32.27	27.47
Maharashtra	0.820	0.880	0.617	0.684	0.739	0.800	1.476	1.327	36.84	27.42
Manipur	1.013	1.036	0.768	0.655	0.351	0.351	1.262	1.181	39.63	28.37
Meghalaya	0.919	0.933	0.886	0.883	0.709	0.736	1.218	1.137	19.62	27.83
Mizoram	0.892	0.931	0.800	0.879	0.847	0.793	1.196	1.112	16.61	27.25
Nagaland	0.834	0.419	0.875	0.887	0.699	0.712	1.452	1.298	29.91	27.92
Odisha	1.259	1.374	0.657	0.672	0.555	0.753	1.348	1.250	36.86	30.37
Punjab	1.291	1.372	0.942	0.890	0.526	0.583	0.959	0.971	31.18	30.34
Rajasthan	0.835	0.877	0.614	0.650	1.010	0.867	1.499	1.369	33.83	30.24
Sikkim	0.805	0.813	0.767	0.730	1.102	0.950	1.300	1.206	22.24	29.89
Tamil Nadu	0.974	0.981	0.688	0.644	0.583	0.580	1.332	1.234	32.48	29.96
Tripura	0.972	1.161	0.722	0.767	0.447	0.455	1.252	1.101	35.14	30.07
Uttaranchal	0.612	1.168	1.220	1.119	0.934	0.656	1.598	1.413	33.28	30.04
Uttar Pradesh	1.083	1.167	0.674	0.838	0.728	0.656	1.340	1.102	28.40	29.79
West Bengal	1.192	1.374	0.823	0.901	0.376	0.400	1.184	1.103	37.31	30.10
INDIA	0.971	1.019	0.698	0.503	0.657	0.681	1.349	1.236	30.06	30.23

Table 5: Values of the index of occupational differentiation by states and occupation, India 2001 and 2011.

Here also, the value of the index is approaching to one in almost all the states proving improvement in the entry of more males into household industries. Contrary to all these, male overrepresentation is visible among the other workers' category in both the periods in all the states, the only exception is Punjab. Here also the value is declining which means the entry of more females to this occupational category. The above results implied that in spite of the entry of more women, those jobs which require ample skills are dominated by males throughout the states irrespective of their socio-economic progress.

The degree of occupational differentiation by sex is identified by the coefficient of variation. The higher the value, the greater will be the occupational differentiation by sex. The coefficient of relative variations computed for the different states for the census years concerned revealed that there is no improvement in India for occupational differentiation throughout the period. The largest occupational differentiation by sex is in Manipur in 2001 and in Odisha in 2011. Majority of the states have occupational differentiation by sex above the national level in 2001. However, in 2011, the differentiation by sex is declining in all the states, only in Odisha, Punjab and Rajasthan values of the indices are above the national level.

From all the above analyses, it is revealed that in India, throughout the states occupational differentiation by sex is high which implies that women are reluctant to enter into jobs especially skilled jobs.

The relative degree of unevenness in the distribution of occupational groups to the distribution of population is measured by estimating the

concentration index by sex using the percentage of workers in each occupational category and the percentage of general population in a particular state. The index value will be zero which indicates that both the percentages are the same. The State-wise distribution of working population by broad occupational groups and by gender and indices of concentration of India for the census periods 2001 and 2011 are presented in Tables 6a and 6b.

Among males, in 2001, the least concentrated occupation is household industries and the remaining occupational groups have more or less same level of concentrations. But in 2011 the highest concentration score is observed in the category of agricultural labourer and the remaining ones have slight variations in their respective concentration scores.

State-wise distribution has shown that among males, in Andhra Pradesh irrespective of the time periods considered, all the occupations except cultivation had shown higher concentration. There is heavy concentration of agricultural labourer indicating that while 6.82 percent of the total male population of India is in Andhra Pradesh, the agricultural labourer constitute 11-13 percent of whole of India. In Maharashtra, Tamil Nadu and West Bengal though cultivators are less, the concentration of other workers are heavy. Among females also the concentration of workers is heavy in agricultural and household industries. Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu have higher percentage of other workers than the total share of their respective general population. Anyway, the concentration index values

States	Cultivators		Agri Labour.		Household Industries		Other Workers		Percent of Population
	2001	2011	2001	2011	2001	2011	2001	2011	
	Male	Male	Male	Male	Male	Male	Male	Male	2001/2011
Andhra Pradesh	06.09	05.27	11.26	13.20	08.12	06.57	07.53	07.06	06.82
Arunachal Pradesh	00.16	00.18	00.02	00.03	00.04	00.04	00.03	00.11	00.11
Assam	02.85	03.75	01.45	01.83	01.53	02.10	02.65	02.62	02.55
Bihar	07.67	06.95	15.23	20.41	07.51	07.78	03.76	03.92	08.69
Chhattisgarh	02.89	02.93	02.15	03.81	01.32	01.16	01.37	01.44	02.06
Delhi	00.03	00.08	00.02	00.01	01.29	01.56	03.08	02.91	01.44
Goa	00.03	00.02	00.03	00.02	00.10	00.10	00.26	00.24	00.12
Gujarat	04.57	05.13	04.38	05.92	02.79	02.15	06.33	06.32	05.04
Haryana	02.17	02.16	01.25	01.69	01.51	01.91	02.44	02.42	02.17
Himachal Pradesh	00.98	01.10	00.10	00.17	00.39	00.38	00.62	00.64	00.56
Jammu and Kashmir	01.18	00.93	00.33	00.67	01.44	00.73	01.10	01.23	01.06
Jharkhand	02.82	02.77	02.59	03.80	02.72	02.31	02.05	02.28	02.71
Karnataka	05.66	05.75	04.57	05.33	04.64	04.48	05.97	06.25	04.98
Kerala	00.22	00.66	01.88	01.39	02.19	01.68	04.77	04.39	02.57
Madhya Pradesh	08.06	07.97	06.13	10.24	05.94	05.23	04.27	04.30	06.03
Maharashtra	07.82	09.18	08.59	11.00	06.48	07.06	11.88	11.21	09.36
Manipur	00.25	00.33	00.09	00.07	00.23	00.20	00.20	00.21	00.22
Meghalaya	00.42	00.34	00.16	00.17	00.11	00.10	00.17	0.20	00.24
Mizoram	00.15	00.16	00.02	00.04	00.04	00.04	00.09	00.09	00.08
Nagaland	00.32	00.31	00.03	00.05	00.11	00.10	00.04	00.16	00.17
Odisha	03.92	04.08	04.51	05.65	03.66	04.49	02.87	02.94	03.40
Punjab	02.06	02.12	01.93	02.01	02.04	02.55	03.17	03.09	02.35
Rajasthan	08.27	09.09	01.84	03.46	04.80	03.53	04.99	05.24	05.71
Sikkim	00.08	00.08	00.02	00.02	00.03	00.03	00.02	00.07	00.05
Tamil Nadu	03.82	03.30	07.44	07.86	07.41	06.04	08.04	08.47	05.80
Tripura	00.26	00.28	00.28	00.35	00.17	00.18	00.35	00.37	00.30
Uttaranchal	00.80	00.89	00.33	00.47	00.50	00.71	00.87	00.93	00.83
Uttar Pradesh	20.46	18.76	14.38	22.41	22.26	24.03	10.77	11.61	16.77
West Bengal	05.45	05.44	08.86	12.10	10.48	11.38	09.50	08.71	07.52
Index of Concentration	15.48	12.00	15.18	25.37	11.96	11.37	15.36	13.56	

Table 6a: State-wise distribution of working population by broad Occupational Groups and Indices of Concentration, India 2001 and 2011 - Males.

States	Cultivators		Agriculture. Labourer		Household Industries		Other Workers		Percent of Population
	Female	Female	Female	Female	Female	Female	Female	Female	
	2001	2011	2001	2011	2001	2011	2001	2011	2001/2011
Andhra Pradesh	06.34	05.93	14.92	10.68	11.34	09.29	08.18	07.93	07.19
Arunachal Pradesh	00.34	00.42	00.02	00.02	00.03	00.05	00.13	00.15	00.11
Assam	02.62	02.67	00.87	00.87	02.57	03.34	03.36	03.35	02.59
Bihar	04.14	04.03	09.48	06.98	05.40	07.58	02.26	03.72	08.46
Chhattisgarh	04.40	04.39	03.70	03.32	01.01	00.87	01.42	01.47	02.17
Delhi	00.03	00.02	00.01	00.01	00.33	00.34	01.96	01.79	01.33
Goa	00.06	00.03	00.04	00.01	00.07	00.06	00.35	00.29	00.12
Gujarat	04.53	03.34	05.16	03.85	02.26	01.56	07.39	05.12	04.93
Haryana	02.77	01.92	01.14	00.35	01.01	00.89	03.09	01.96	02.02
Himachal Pradesh	02.67	03.21	00.08	00.09	00.23	00.25	00.46	00.61	00.58
Jammu and Kashmir	01.40	01.33	00.11	00.16	01.32	00.95	01.17	00.99	01.00
Jharkhand	03.54	04.23	02.76	02.53	02.36	02.68	01.47	01.89	02.73
Karnataka	04.92	05.08	07.29	04.68	06.75	05.54	07.55	07.84	05.13
Kerala	00.29	00.34	01.10	00.56	02.17	01.27	06.06	05.65	02.96
Madhya Pradesh	09.92	09.04	06.03	07.11	06.26	05.23	03.79	04.22	05.96
Maharashtra	12.25	13.83	11.91	08.11	06.36	06.25	10.03	10.49	09.21
Manipur	00.39	00.52	00.13	00.08	00.93	00.81	00.41	00.39	00.23
Meghalaya	00.51	00.60	00.16	00.11	00.14	00.13	00.35	00.39	00.25
Mizoram	00.30	00.28	00.03	00.02	00.04	00.05	00.23	00.17	00.09
Nagaland	00.66	00.77	00.03	00.04	00.15	00.16	00.19	00.24	00.16
Odisha	02.15	02.02	04.85	03.94	04.65	04.02	02.82	02.99	03.54
Punjab	00.72	00.50	00.78	00.42	01.89	01.59	04.79	02.64	02.23
Rajasthan	14.51	16.95	02.97	03.39	03.15	03.33	04.58	05.48	05.63
Sikkim	00.15	00.15	00.02	00.02	00.02	00.03	00.10	00.10	00.05
Tamil Nadu	04.42	04.21	08.82	05.76	10.36	09.04	09.73	10.05	06.14
Tripura	00.22	00.19	00.23	00.17	00.25	00.29	00.37	00.44	00.31
Uttaranchal	02.11	02.35	00.14	00.14	00.35	00.53	00.56	00.72	00.85
Uttar Pradesh	11.19	09.86	10.43	07.42	13.21	18.04	07.50	10.84	16.20
West Bengal	02.38	01.71	04.62	03.31	15.28	15.68	09.24	07.63	07.57
Index of Concentration	26.34	19.64	20.42	19.12	20.06	17.12	21.16	14.18	

Table 6b: State-wise Distribution of Working Population by Broad Occupational Groups and Indices of Concentration, India 2001 and 2011 - Females.

of the occupations in India reveal that females are more concentrated than males. This may be due to their preference to remain in their own places even accepting lower jobs.

When comparing the occupational structure of each state with that of India (Tables 7a and 7b), it is found that for males the highest concentration score is in Delhi followed by Goa and Kerala in 2001 and 2011. However, the value of the index has declined for Delhi and Goa but increased to Kerala. Throughout the period, the concentration score is the lowest for Karnataka. For females, the highest concentration score is again for Delhi followed by Himachal Pradesh and the lowest being in Uttar Pradesh in 2001 and Andhra Pradesh in 2011.

Conclusions

Labour force participation has important economic and social implications. Even after mechanization, the role of labour intensive

measures is apparent in certain economic activities. Throughout the states of India, male workers are more than female workers; however, the distribution of population by sex shows that almost equal proportion of both the sexes in each state. In India, the literacy level and life expectancy of women improved a lot. However, females are more into traditional occupations and certain regions of the country are still in backward level of development. So, majority of the women's contribution to economic productivity of the nation is low. The whole analyses concluded that even after 60 years of the initiation of Five Year Plans with prioritization on different sectors of the economy, the occupational gender segregation exist in India. Occupational gender wise integration is a sign of progress which ensures proportionate participation of women in economic activities. So, measures should be taken by the planners and policy makers to absorb more women in modern large enterprises and thereby expand economic development.

States	Cultivators		Agriculture Labourer		Household Industries		Other Workers		Index of Concentration	
	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Andhra Pradesh	24.01	18.02	29.79	33.62	03.28	02.66	42.92	45.71	09.05	11.87
Arunachal Pradesh	46.43	43.64	03.52	05.25	01.08	01.18	48.97	49.93	19.43	18.27
Assam	38.34	36.29	12.12	13.22	01.95	02.41	47.60	48.08	09.96	09.02
Bihar	31.52	22.78	42.62	49.84	03.21	03.02	22.65	24.36	22.26	27.97
Chhattisgarh	44.59	33.98	22.82	32.87	02.09	01.59	30.50	31.57	15.51	20.18
Delhi	00-68	00.58	00.28	00.66	02.84	03.21	96.20	95.56	51.29	45.32
Goa	06.85	04.49	04.26	03.53	02.40	02.34	86.50	89.64	41.58	39.26
Gujarat	26.99	23.58	17.34	20.27	01.68	01.17	54.00	54.98	09.08	06.31
Haryana	32.47	26.28	12.55	15.30	02.31	02.74	52.68	55.68	09.17	06.66
Himachal Pradesh	49.47	44.35	03.30	05.04	02.02	01.82	45.22	48.79	18.19	17.84
Jammu and Kashmir	37.48	23.96	07.10	12.97	04.71	02.23	50.70	60.21	13.74	10.14
Jharkhand	36.12	27.20	22.30	27.80	03.57	02.68	38.01	42.33	06.91	08.33
Karnataka	31.72	26.02	17.20	17.97	02.66	02.40	48.42	53.61	04.17	04.33
Kerala	07.75	06.47	13.89	10.15	02.47	01.95	75.89	81.43	30.98	31.10
Madhya Pradesh	42.50	32.71	21.73	31.32	03.21	02.54	32.57	33.43	12.35	17.37
Maharashtra	24.88	23.28	18.34	20.77	02.11	02.12	54.67	53.83	09.76	05.63
Manipur	40.64	40.71	09.47	06.62	03.90	03.00	45.99	49.67	14.16	15.13
Meghalaya	44.86	39.41	15.99	15.11	01.65	01.34	37.51	44.14	13.80	10.18
Mizoram	49.62	44.54	04.86	07.73	01.32	01.34	44.20	46.39	18.57	16.44
Nagaland	55.41	47.40	03.27	05.82	01.88	01.73	39.44	45.05	24.33	19.30
Odisha	34.15	28.36	26.39	29.25	03.26	03.69	36.19	38.70	08.72	11.69
Punjab	25.33	21.72	15.86	15.35	02.57	03.09	56.24	59.85	11.07	09.60
Rajasthan	48.06	41.09	07.18	11.66	02.85	01.89	41.90	44.87	23.78	13.23
Sikkim	42.31	32.58	05.29	06.63	01.72	01.52	50.69	59.27	19.97	16.55
Tamil Nadu	18.02	12.75	23.52	22.59	03.58	02.76	54.88	61.90	13.04	15.55
Tripura	26.58	21.89	19.56	20.48	01.78	01.67	52.07	55.95	09.38	07.49
Uttaranchal	34.29	28.82	09.54	11.23	02.19	02.72	53.98	57.24	13.36	10.75
Uttar Pradesh	42.65	31.12	20.12	27.69	04.75	04.72	32.48	36.47	23.70	13.92
West Bengal	20.79	16.84	22.69	27.90	04.10	04.17	52.42	51.09	09.38	11.27
India	31.06	24.92	20.85	18.56	03.18	02.95	44.92	47.20		

Table 7a: State-wise Distribution of Working Population by Broad Occupational Groups and Indices of Concentration by all India as base, 2001 and 2011 – Males.

States	Cultivators		Agriculture. Labourer		Household Industries		Other Workers		Index of Concentration	
	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female
Andhra Pradesh	20.09	14.01	55.76	58.00	07.04	05.22	17.11	22.77	17.48	09.85
Arunachal Pradesh	75.53	63.13	04.50	07.50	01.51	01.78	18.46	27.60	42.11	46.17
Assam	41.11	28.06	16.16	20.89	07.91	08.33	34.82	42.72	22.71	27.27
Bihar	23.18	15.27	62.57	60.77	05.92	06.83	08.33	17.13	23.71	13.74
Chhattisgarh	44.47	31.32	44.09	54.44	02.00	01.47	09.44	12.76	16.77	14.37
Delhi	01.81	00.72	00.78	00.98	04.70	03.53	92.71	94.77	70.97	72.64
Goa	16.72	07.93	13.44	07.57	03.90	03.10	65.94	81.40	44.20	59.28
Gujarat	27.97	17.78	39.13	47.14	02.74	01.97	30.16	33.11	08.70	10.98
Haryana	43.67	32.78	21.10	13.60	03.11	03.59	32.12	40.55	21.12	31.94
Himachal Pradesh	85.81	76.24	02.95	04.75	01.42	01.42	09.82	17.59	52.89	59.29
Jammu and Kashmir	54.66	42.55	05.22	11.83	10.08	07.21	30.04	38.42	33.65	36.33
Jharkhand	43.03	32.60	39.60	44.81	05.61	04.91	11.76	17.67	10.84	15.65
Karnataka	24.71	19.03	43.45	40.33	06.68	04.94	25.16	35.71	08.22	13.58
Kerala	04.85	03.89	21.54	14.68	07.07	03.42	66.54	78.01	45.41	56.39
Madhya Pradesh	43.29	28.47	40.44	51.47	05.36	03.92	10.91	16.14	11.94	11.52
Maharashtra	35.84	29.61	41.14	39.92	03.65	03.18	19.38	27.29	04.68	12.66
Manipur	39.58	37.88	15.24	13.58	18.27	14.08	26.91	34.45	23.63	34.57
Meghalaya	52.78	45.10	20.12	19.10	02.95	02.30	24.15	33.50	22.26	32.47
Mizoram	61.64	51.09	06.86	09.85	01.78	02.03	29.73	37.04	36.69	39.91
Nagaland	77.45	65.20	04.16	07.29	03.53	03.13	14.86	24.38	44.53	48.25
Odisha	20.11	12.92	53.90	57.78	08.53	06.10	17.46	23.20	17.09	10.02
Punjab	13.94	09.94	17.80	19.14	07.15	07.50	61.11	63.43	40.06	43.09
Rajasthan	67.00	52.64	16.19	24.22	02.85	02.46	13.96	20.68	34.08	35.69
Sikkim	62.83	47.53	08.46	11.52	01.41	01.93	27.30	39.03	35.46	40.42
Tamil Nadu	18.96	13.24	44.81	41.61	08.71	06.76	27.53	38.40	13.97	17.32
Tripura	28.13	15.81	34.58	32.89	06.23	05.66	31.05	45.64	09.31	23.52
Uttaranchal	77.84	64.00	06.08	08.84	02.52	03.41	13.56	23.75	44.92	47.05
Uttar Pradesh	36.05	22.21	39.65	38.43	08.34	09.67	15.96	29.69	05.74	11.53
West Bengal	14.08	07.67	32.18	34.03	17.69	16.69	36.05	41.52	25.54	30.42
India	32.93	24.01	38.87	55.21	06.46	05.71	21.75	29.18		

Table 7b: State-wise distribution of working population by broad occupational groups and indices of Concentration by all India as base 2001 and 2011 - Females.

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