Dynamics of Labour Supply and its Absorption in Gujarat Agriculture

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Abstract

The agricultural sector has undergone a perceptible change since the 1990s, and an apparent shortage of labour is observed in rural farms in India as well as in Gujarat. This study aims to examine the district wise temporal changes in agricultural labour supply during 1981 to 2001 by using district level workers' data and growth rates of labour absorption for different crops in Gujarat from 1990-91 to 2009-10 by using time series data on labour used for different crops. The results revealed that the share of agricultural labourers (both male and female) decreased during 2001 as compared to the year 1981 in most of the districts in Gujarat. The male and female workers depending on agricultural labourers increased across districts from the period from 1981 to 2001. It was also found that the growth rates of agricultural labourers had slowed-down during the 1990s. The results also revealed that the labour absorption declined in case of most of the foodgrain crops, while a reverse situation was observed in case of horticultural crops. Encouragement of micro-agricultural enterprises, integration of production practices with the market through value addition and research, and giving extension priority to female labour friendly farm equipments are the major suggestions that emerged from the present study.

Keywords: **dynamics, labour, supply, absorption, gujarat, agriculture**

JEL Classification : J2, J21

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Agricultural labour constitutes the most marginalized section of our society and contributes immensely, not only to the development of agriculture, but also to the economy as a whole (Shiyani, Kuchhadiya, & Parmar, 2000). Agricultural labourers are at severe risk of poverty due to the skewed distribution of land and seasonality of demand in agriculture. Therefore, as the economy shifts its productive activities from the primary sector to the secondary and tertiary sectors, workers also move from farm to non-farm and from rural to urban areas for their livelihood. Hence, the agricultural sector has undergone a perceptible change in recent years, and an apparent shortage of labour is observed in rural farms in India and in Gujarat as well. On the other hand, the technological changes in agriculture have increased the demand for labour, and it is also seen that the medium and large farmers have intensified their cultivation through double and multiple cropping (Raheem, 2007). This has led to the mechanization of farm operations and a decrease in the employment of farm labour.

Objectives of the Study

Keeping the above-mentioned points in mind, the present study was undertaken with the following objectives :

i) To measure the district wise temporal change in supply of agricultural labour.

ii) To estimate the growth rate of labour absorption for different crops.

Data and Methodology

The study of the temporal changes in supply of agricultural labour at the district-level was made by using the

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Population Census data pertaining to the years 1981, 1991, and 2001. District-level workers' data were collected and were compiled from the Directorate of Economics and Statistics, Gandhinagar. The change in agricultural labourers' supply was examined by using means, standard deviations, and coefficient of variation. The point to point growth rates were calculated to measure the district wise temporal changes in agricultural labour supply in Gujarat.

To study the labour absorption in case of different crops, the time-series data on total labour used per hectare for various crops in Gujarat were collected and compiled from the annual research reports of the Department of Agricultural Economics, Junagadh Agricultural University, Junagadh, whereas the area under cultivation for different crops in Gujarat were collected and compiled from the Directorate of Agriculture, Gujarat State, Gandhinagar for the period from 1990-91 to 2009-10. In order to study the growth rates of labour absorption in case of selected crops, compound growth rates were worked out by fitting an exponential function of the following form :

$$Y = ab^t$$

Where,

Y = Dependent variable for which growth rate is to be estimated,
a = Constant/intercept,
t = Time variable,
b = Regression coefficient,

The compound growth rate was obtained using logarithmic form of the equation as below:

$$\log Y_t = \log a + t \log b$$

Then the percent compound growth rates (g) were computed by using the relationship:

$$g = (\text{Antilog of } \log b - 1) \times 100$$

Where,
g = Compound growth rate per annum in percent.

Results and Discussion

Temporal Change in Supply of Agricultural Labour : According to census data, the share of the agricultural labourers to total main workers (Table 1) at the all India level increased from 24.94% in the year 1981 to 26.40 % in 1991, but it declined dramatically during the year 2001 by around 6% as compared to the 1991 levels. Similarly, in Gujarat, the share of agricultural labourers to total main workers increased slightly from 22.59% in 1981 to 22.91% in 1991, and going further, it sharply declined to 17.91% in 2001.

Table 1. Proportional Share of the Agricultural Labourers to Total Main Workers during 1981-2001

Year	Gujarat	India
1981	22.59	24.94
1991	22.91	26.40
2001	17.91	20.31

Source: Primary Census Abstract, Census of India, 1981, 1991 and 2001

Structural Changes in the Percentage of Agricultural Labourers Across Districts : The results of district-wise proportion of male and female workers employed as agricultural labourers in rural and urban areas as well as in Gujarat as a whole are presented in the Tables 2 and 3 respectively. It was found that the proportion of male agricultural labourers in rural areas was higher as compared to the urban areas in all the districts over a period of time. The share of male agricultural labourers in urban areas were less than 5% of the total agricultural labourers in 2001 in all the districts barring two, namely Kheda and Anand districts in the urban areas. It was noticed that in the rural areas, the share of male agricultural labourers was around one-fifth of the total male workers over a period of time in most of

Table 2. District-wise Share of Male Agricultural Labourers to Total Male Main Workers in Gujarat During 1981 to 2001 (Percent)

Sr. No.	Districts	Rural			Urban			Total		
		1981	1991	2001	1981	1991	2001	1981	1991	2001
1	Ahmedabad	33.55	37.35	29.81	1.27	1.36	0.71	9.62	9.95	6.27
2	Amreli	21.84	22.11	21.15	8.28	9.79	3.78	19.21	19.55	17.28
3	Anand	30.09	33.60	36.25	6.40	7.71	**9.59**	25.46	27.72	29.23
4	Banaskantha	14.70	18.59	17.28	3.02	6.91	1.97	13.74	17.52	15.61
5	Bharuch	**43.67**	**42.11**	**36.09**	7.09	5.90	2.28	**36.13**	**33.75**	27.49
6	Bhavnagar	25.18	23.17	19.15	4.32	4.73	1.23	18.63	17.03	12.11
7	Dahod	5.58	8.17	5.71	3.88	3.23	1.64	5.44	7.77	5.28
8	Dang	14.85	13.71	16.23	0.00	**16.32**	0.00	14.85	13.97	16.23
9	Gandhinagar	25.62	25.33	22.85	5.63	4.55	2.47	20.83	18.58	15.92
10	Jamnagar	15.27	17.06	15.47	2.45	2.27	1.50	10.63	11.22	9.39
11	Junagadh	21.73	24.38	22.41	**8.67**	10.04	4.10	18.34	20.41	17.30
12	Kheda	22.97	25.59	27.18	5.67	6.85	7.25	19.93	22.09	23.34
13	Kutchh	23.08	28.25	23.06	2.83	4.42	1.51	17.72	20.75	16.30
14	Mehsana	23.25	22.68	22.47	3.44	4.77	1.87	19.57	18.89	17.89
15	Narmada	28.63	29.03	33.83	6.51	7.71	3.28	26.99	27.03	**30.89**
16	Navsari	26.34	26.53	31.35	3.66	6.07	2.57	20.57	20.87	23.33
17	Panchmahal	10.12	11.38	10.06	4.20	3.99	1.42	9.49	10.55	8.96
18	Patan	26.93	27.28	29.14	5.06	5.39	4.06	23.51	23.86	24.03
19	Porbandar	18.61	21.86	20.54	2.38	5.26	3.01	12.11	14.75	12.24
20	Rajkot	17.95	18.27	16.66	3.53	3.56	1.47	12.20	11.52	8.91
21	Sabarkantha	17.43	17.08	15.74	4.88	5.07	2.67	16.25	15.88	14.29
22	Surat	32.98	31.11	33.05	2.47	1.84	0.75	19.65	16.26	12.30
23	Surendranagar	25.26	27.83	27.46	4.24	5.91	2.88	19.56	21.66	21.01
24	Vadodara	35.66	34.54	33.11	3.80	3.27	1.22	24.56	22.08	18.80
25	Valsad	18.46	19.45	16.32	6.38	5.26	1.28	16.05	16.60	11.71
	Mean	**23.19**	**24.26**	**23.29**	**4.40**	**5.69**	**2.58**	**18.04**	**18.41**	**16.64**
	SD	**8.21**	**7.86**	**8.05**	**2.05**	**3.03**	**2.03**	**6.40**	**5.92**	**6.78**
	CV	**0.35**	**0.32**	**0.35**	**0.47**	**0.53**	**0.79**	**0.35**	**0.32**	**0.41**

Note: Per cent means percentage of male main workers in agricultural labourers to total male main workers calculated by taking the ration of the number of male workers in each district to total male workers in Gujarat state. SD: Standard Deviation, CV: Coefficient of Variation (= Standard Deviation/Mean)

the districts, except the districts of Dahod, Panchmahal, Jamnagar, Sabarkantha, Dang, Valsad, Rajkot, and Banaskantha. A mixed pattern of change was found in the share of male agricultural labourers from 1981 to 2001 across districts. The share of male agricultural labourers in rural, urban, and as a whole in Gujarat decreased from 1991 to 2001 in most of the districts, except in Dang, Kheda, Patan, Navsari, Surat, Narmada, and Anand districts in case of rural areas, Kheda and Anand districts in case of urban areas, and Narmada, Anand, Kheda, Navsari, Dang, and Patan districts in case of whole of Gujarat. The lowest share of male agricultural labourers was observed in Dahod district over a period of time, while the highest share was observed in Bharuch district during the time period from 1981 to 1991, and it was replaced by Narmada district in 2001. These results depicting the declining share of male agricultural labourers in rural areas are in conformity with the findings of Sharma (2009) for the state of Himachal Pradesh.

The decline in agricultural labourers at the aggregate level may be due to the fact that after July 1991, there were a

series of the economic reforms that were introduced in India (Chadha, 2003), and the non-farm economy sharply increased in Gujarat during this period (Jha, 2006). Moreover, due to the increase in non-farm activities in the semi-urban and urban areas as a result of development of transport and communication facilities, and as a result of the expansion of the social network of labourers, there was a rapidly increasing trend of out-migration of agricultural labourers. Though, most of these labourers were gaining employment in the urban informal sector, the number of days of employment available as well as earning was much higher in such employment. For example, in the textile industry in Ahmedabad, people can get a regular/permanent job with higher wages as compared to what they can earn after being employed in the agricultural sector.

The reason for the increase in the share of agricultural labourers varies from district to district. However, common

Table 3. District-wise Share of Female Agricultural Labourers to Total Female Main Workers in Gujarat during 1981 to 2001

(Per cent)

Sr. No.	Districts	Rural			Urban			Total		
		1981	1991	2001	1981	1991	2001	1981	1991	2001
1	Ahmedabad	75.58	73.44	46.95	6.36	5.48	2.19	40.39	38.96	17.10
2	Amreli	44.37	43.62	34.65	29.41	30.27	9.19	42.68	42.16	31.72
3	Anand	70.60	62.05	38.72	25.52	26.62	**20.73**	64.46	57.63	35.67
4	Banaskantha	42.93	45.18	21.00	9.45	11.41	5.93	41.06	43.74	20.48
5	Bharuch	80.70	**79.53**	**64.94**	24.97	21.28	5.97	**74.56**	**73.96**	**57.32**
6	Bhavnagar	52.96	53.93	39.55	19.96	19.41	5.58	48.78	49.81	33.16
7	Dahod	**18.14**	29.40	**16.22**	12.78	11.39	8.06	17.97	28.80	15.88
8	Dang	25.67	**18.68**	18.76	0.00	30.06	0.00	25.67	19.06	18.76
9	Gandhinagar	62.77	46.66	21.04	15.33	11.46	5.99	55.27	40.47	18.74
10	Jamnagar	33.97	33.53	22.55	12.21	9.96	4.22	29.19	29.31	18.93
11	Junagadh	46.09	44.29	34.34	**30.44**	**31.93**	12.71	43.70	42.61	31.28
12	Kheda	63.22	50.36	27.93	16.56	18.40	16.34	56.61	47.17	26.96
13	Kutchh	51.30	51.87	37.34	13.00	15.75	7.40	46.05	46.21	32.05
14	Mehsana	51.76	43.26	23.13	19.13	17.82	6.39	48.97	41.47	21.85
15	Narmada	42.97	55.98	46.90	18.59	14.47	8.64	42.30	54.56	45.18
16	Navsari	57.63	55.25	54.14	14.25	24.03	7.73	53.14	51.57	46.93
17	Panchmahal	37.36	38.86	18.58	16.27	14.77	2.32	36.14	36.03	17.72
18	Patan	64.53	55.23	37.03	18.41	20.02	9.52	58.38	51.89	34.41
19	Porbandar	48.41	43.82	33.58	9.50	18.81	11.12	35.91	37.02	27.15
20	Rajkot	35.76	32.10	25.73	14.07	9.66	4.73	32.17	28.06	20.88
21	Sabarkantha	54.13	46.52	22.59	15.81	24.05	6.34	52.25	45.67	21.74
22	Surat	61.66	59.29	55.99	16.60	14.04	5.51	55.02	51.28	43.21
23	Surendranagar	60.59	55.20	43.49	23.36	21.45	8.34	54.30	50.87	39.43
24	Vadodara	**81.06**	72.12	53.85	12.96	8.48	3.85	67.83	57.27	39.30
25	Valsad	36.27	37.15	28.75	17.27	13.20	3.66	34.44	34.92	25.20
	Mean	**52.02**	**49.09**	**34.71**	**16.49**	**17.77**	**7.30**	**46.29**	**44.02**	**29.64**
	SD	**15.92**	**13.78**	**13.21**	**6.73**	**7.05**	**4.37**	**13.16**	**11.33**	**10.81**
	CV	**0.31**	**0.28**	**0.38**	**0.41**	**0.40**	**0.60**	**0.28**	**0.26**	**0.36**

Note: Percent means percentage of female main workers in agricultural labourers to total female main workers calculated by taking the ratio of the number of female workers in each district to total female workers in Gujarat state. SD: Standard Deviation, CV: Coefficient of Variation (= Standard Deviation/Mean) Source : Compiled by the Authors

factors such as the dearth of job opportunities in the non-agricultural sectors and low level of education and so forth could have pushed workers towards agriculture in Dang and Narmada districts. It may also be due to the fact that agricultural labourers can earn higher wages during the peak season of agriculture as compared to other works and during the off-season of agriculture, part-time jobs are easily available in the local areas or in areas that are near to towns. For example, Anand district is a progressive agricultural district with considerable specialization in food crops and cash crops like tobacco as well as is a booming animal husbandry sector (producing milk and milk products).

It was observed (Table 3) that share of the female agricultural labourers in rural, urban, and as a whole in Gujarat declined in the year 2001 as compared to the year 1981 across the districts, with the exception of the Narmada district, and in case of Gujarat as a whole. It was also noted that the percentage rate of decrease in the share of female agricultural labourers was higher across districts during 1991 to 2001 as compared to 1981 to 1991. Furthermore, it was noticed that in fourteen districts (Kutchh, Mehsana, Bhavnagar, Sabarkantha, Navsari, Surendranagar, Surat, Gandhinagar, Kheda, Patan, Anand, Ahmedabad, Bharuch, and Vadodara), the share of female agricultural labourers was around more than one-half of the total female main workers during 1981 in the rural areas, but this magnitude of share of female workers was observed only in four districts (Vadodara, Navsari, Surat, and Bharuch) in the year 2001. The decreased share of female agricultural labourers in Anand, Sabarkantha, Kheda, Mehsana, and Gandhinagar districts may be attributed to various other factors such as livestock rearing and the increasing trend of female labour employed in the animal husbandry sector. Furthermore, at the aggregate level, these declined shares may be due to the increase in female literacy levels and also due to the economic reform factors, which increased the employment opportunities for women in the non-farm sector. Thus, female workers diversified towards the non-farm sector. The highest share of female agricultural labourers was recorded in the Bharuch district over a period of time, while the lowest share was observed in the Dahod district during 1981 to 2001 and in Dang district during 1991. The lowest share of female agricultural labourers in the Dahod and Dang districts may be due to the fact that the percentage share of female cultivators in total female main workers were higher in Dahod and Dang districts.

It is interesting to note that the share of female agricultural labourers was higher in rural as well as in urban areas across districts as compared to the male agricultural labourers over a period of time. In the rural areas, the prosperity of the households depends upon the prosperity of agriculture and allied occupations, and at times, the rural people are dependent upon agriculture for sustaining their livelihood. It is a fact that the men folk generally migrate to urban or other areas or stay away from the household to earn a living to support their families, thus leaving behind the women folk to take care of agricultural and household works. The above results regarding the declining shares of female agricultural labourers in the rural areas from 1981 to 2001 are in conformity with the findings of Sharma (2009) in Himachal Pradesh.

↳ **Growth of the Agricultural Labourers Across Districts :** The temporal change in agricultural labourers was worked out by calculating the point to point growth rates of agricultural labourers with different base years. The results of the district-wise growth rates of male and female agricultural labourers for the period I to III are presented in the Tables 4 and 5 respectively.

It was observed (Table 4) that the male agricultural labourers registered positive growth rates in rural as well as in whole of Gujarat during the overall period in almost all the districts, with the exception of the Bhavnagar district. As far as the urban areas are concerned, a reverse situation was noticed in most of the districts excluding the districts Anand, Banaskantha, Gandhinagar, Jamnagar, Kheda, Navsari, Patan, and Porbandar during the overall period. It was also observed that the growth rates of male agricultural labourers in rural, urban, and whole of Gujarat were found to be positive during the 1980s across the districts with the exception of Dang and Gandhinagar districts in case of rural areas, and Dahod district in case of urban areas. Whereas, a reverse trend was observed during the 1990s in 9 districts in case of rural areas, in 23 districts in case of urban areas, and in 13 districts in case of whole of Gujarat. Moreover, the rate of increase of male agricultural labourers was lower during the 1990s in 11 districts (Amreli, Anand, Banaskantha, Jamnagar, Junagadh, Kheda, Kutchch, Mehsana, Porbandar, Rajkot, and Surendranagar) ; in case of rural areas, the same was lower in 2 districts (Anand and Kheda); and in case of urban areas, the rate of increase was lower in 9 districts (Anand, Banaskantha, Jamnagar, Junagadh, Kheda, Mehsana, Narmada, Navsari, and Surendranagar) in whole of Gujarat, while the remaining districts showed an increased rate of male agricultural labourers as compared to the 1980s.

Table 4: District-wise Growth Rates of Male Agricultural Labourers in Gujarat during 1981 to 2001 (per cent /annum)

Sr. No.	Districts	Rural			Urban			Total		
		I	II	III	I	II	III	I	II	III
1	Ahmedabad	2.51	-2.06	0.40	3.28	-3.50	-0.34	2.59	-2.20	0.33
2	Amreli	1.90	0.15	2.06	4.35	-7.69	-3.67	2.13	-0.44	1.68
3	Anand	2.19	0.80	3.00	4.93	4.28	9.42	2.34	1.05	3.41
4	Banaskantha	4.80	0.66	5.49	12.60	-8.80	2.69	4.99	0.43	5.45
5	Bharuch	1.28	-0.67	0.61	1.25	-7.09	-5.93	1.28	-0.86	0.41
6	Bhavnagar	1.15	-2.41	-1.29	3.82	-10.73	-7.32	1.36	-2.95	-1.63
7	Dahod	6.23	-3.37	2.66	-0.01	-3.87	-3.88	5.94	-3.38	2.35
8	Dang	-0.08	3.94	3.85	0.00	0.00	0.00	1.16	2.67	3.85
9	Gandhinagar	-1.37	3.81	2.39	3.66	-2.01	1.58	1.56	2.09	3.68
10	Jamnagar	1.93	0.23	2.17	1.41	-1.22	0.17	1.89	0.12	2.02
11	Junagadh	2.89	1.39	4.32	4.12	-6.40	-2.54	3.05	0.61	3.67
12	Kheda	2.67	1.08	3.78	4.30	1.41	5.77	2.76	1.10	3.89
13	Kutchh	3.29	0.21	3.5	8.49	-8.16	-0.37	3.56	-0.19	3.37
14	Mehsana	1.78	0.84	2.64	7.15	-7.48	-0.87	2.00	0.53	2.54
15	Narmada	2.03	2.69	4.78	6.38	-6.90	-0.96	2.13	2.52	4.70
16	Navsari	2.11	2.36	4.52	8.63	-7.60	0.37	2.50	1.82	4.36
17	Panchmahal	2.96	-0.48	2.46	1.91	-7.84	-6.08	2.91	-0.71	2.18
18	Patan	1.74	-0.89	0.84	2.24	-1.14	1.08	1.76	-0.90	0.84
19	Porbandar	2.58	0.01	2.58	10.55	-3.07	7.16	3.44	-0.41	3.01
20	Rajkot	1.35	0.60	1.95	3.74	-5.13	-1.58	1.65	-0.05	1.60
21	Sabarkantha	1.49	-0.17	1.31	2.69	-4.47	-1.90	1.52	-0.29	1.23
22	Surat	1.44	1.68	3.14	1.92	-2.29	-0.42	1.46	1.49	2.97
23	Surendranagar	2.63	2.02	4.71	5.64	-5.87	-0.56	2.83	1.58	4.46
24	Vadodara	0.92	-0.34	0.57	1.90	-7.40	-5.64	0.97	-0.66	0.31
25	Valsad	3.53	-1.16	2.34	0.99	-7.45	-6.54	3.35	-1.46	1.84
	Mean	**2.27**	**0.38**	**2.65**	**4.24**	**-4.82**	**-0.81**	**2.45**	**0.06**	**2.50**

Note: I = 1981-1991; II= 1991-2001; III= 1981-2001

Growth rates for the Period- I and III with base year 1981 and for the Period-II with base year 1991

Similarly, the number of female agricultural labourers (Table 5) in rural areas and whole of Gujarat increased during 1981 to 2001 in almost all the districts, with the exception of the districts - Ahmedabad, Bharuch, Bhavnagar, Kutchh, and Sabarkantha. In case of the urban areas, the female agricultural labourers registered negative growth rates during the overall period in most of the districts excluding the districts - Anand, Banaskantha, Dahod, Gandhinagar, Kheda, Kutchh, Narmada, Navsari, Porbandar, and Sabarkantha. It was further revealed that growth rates of female agricultural labourers in rural, urban, and whole of Gujarat were found to be positive during the 1980s across the districts, with notable exceptions -Bhavnagar and Valsad districts - for the urban areas. However, a reverse trend was observed during the 1990s in 18 districts in case of rural areas, 20 districts in urban areas, and in whole of Gujarat. Furthermore, the rates of increased female agricultural labourers were lower during the 1990s in Gandhinagar, Narmada, Navsari, Patan, and Surendranagar districts in case of rural areas; Anand, Dahod, Gandhinagar, Kheda, and Narmada districts in case of urban areas; and Gandhinagar, Kheda, Narmada, Navsari, and Surat districts in whole of Gujarat as compared to the 1980s. The female agricultural labourers in the rural areas increased at marginally higher rates during the 1990s as compared to the 1980s in Mehsana and Surat districts. The positive growth rates of agricultural labourers (both male and female) during the 1980s are in conformity with the

Table 5. District-wise Growth Rates of Female Agricultural Labourers in Gujarat During 1981 to 2001 (per cent /annum)

Sr. No.	Districts	Rural			Urban			Total		
		I	II	III	I	II	III	I	II	III
1	Ahmedabad	4.29	-6.01	-1.98	3.01	-4.18	-1.30	4.20	-5.87	-1.92
2	Amreli	3.90	-0.14	3.75	4.00	-8.75	-5.09	3.90	-0.61	3.27
3	Anand	5.04	-2.34	2.58	5.77	3.52	9.49	5.08	-1.90	3.08
4	Banaskantha	8.52	-0.50	7.98	6.95	-1.50	5.35	8.50	-0.51	7.95
5	Bharuch	1.09	-2.08	-1.02	-2.01	-8.89	-10.72	0.99	-2.22	-1.26
6	Bhavnagar	4.94	-6.54	-1.92	3.74	-10.20	-6.84	4.88	-6.69	-2.13
7	Dahod	7.54	-1.91	5.48	2.37	2.71	5.14	7.45	-1.84	5.47
8	Dang	4.74	-0.94	3.76	0.00	0.00	0.00	5.31	-1.48	3.76
9	Gandhinagar	5.68	1.75	7.54	4.70	1.53	6.31	3.38	1.74	5.19
10	Jamnagar	4.63	-2.04	2.49	0.07	-5.36	-5.29	4.28	-2.22	1.96
11	Junagadh	4.26	-0.56	3.68	3.71	-6.51	-3.05	4.21	-1.04	3.13
12	Kheda	4.38	-0.06	4.31	3.70	2.73	6.53	4.35	0.06	4.41
13	Kutchh	2.82	-2.98	-0.24	6.38	-5.69	0.32	2.98	-3.11	-0.22
14	Mehsana	4.56	6.81	11.68	4.42	-4.97	-0.77	5.45	-2.09	3.25
15	Narmada	3.34	0.99	4.36	0.28	0.44	0.72	3.31	0.98	4.33
16	Navsari	2.03	0.56	2.60	9.58	-7.15	1.74	2.33	0.25	2.58
17	Panchmahal	7.24	-5.47	1.38	0.89	-12.17	-11.39	7.12	-5.54	1.18
18	Patan	3.34	0.08	3.42	1.88	-3.29	-1.47	3.28	-0.03	3.25
19	Porbandar	5.13	-1.33	3.74	11.02	-3.17	7.51	5.76	-1.56	4.11
20	Rajkot	2.84	-0.93	1.88	1.14	-2.69	-1.58	2.72	-1.04	1.66
21	Sabarkantha	5.83	-5.66	-0.16	9.14	-8.23	0.16	5.89	-5.70	-0.15
22	Surat	0.93	1.35	2.30	1.84	-2.84	-1.05	0.97	1.18	2.17
23	Surendranagar	3.78	0.06	3.84	0.56	-7.88	-7.36	3.57	-0.25	3.32
24	Vadodara	1.84	-1.54	0.27	1.10	-3.49	-2.43	1.82	-1.61	0.18
25	Valsad	2.63	-1.47	1.13	-0.66	-6.80	-7.41	2.50	-1.62	0.84
	Mean	4.21	-1.24	2.91	3.34	-4.11	-0.90	4.17	-1.71	2.38

Note: I = 1981-1991; II= 1991-2001; III= 1981-2001 Source : Compiled by the Authors

Growth rates for the Period- I and III with base year as 1981 and for the Period-II with base year as 1991

findings of Mecharla (2002) in Andra Pradesh; Rangi, Sidhu, and Kaur (2000) in Punjab; and Sharma (2009) in Himachal Pradesh.

↳ **Growth Rates of Labour Absorption for Different Crops :** The compound growth rates of labour absorption for different crops are presented in the Table 6. It can be seen from the Table 6 that cotton (8.99 %/annum) registered the highest positive and significant growth rates of labour absorption, while the highest negative and significant growth rates were recorded in case of Kharif jowar (-10.09 %/annum) for labour absorption.

In the Kharif season, for most of the crops, negative growth rates of labour absorption were observed for most of the crops with the exception of crops like cotton and paddy, which registered positive and significant growth rates of 8.99% and 2.07% per annum, respectively. This may be due to the introduction of HYV seeds of paddy and Bt. cotton varieties, particularly during the last decade, which thereby increased the cropped area and cropping intensity. Raheem (2007) and Subrahmanyam (1999) reported that the labour absorption depends on both cropping intensity and cropping pattern. Moreover, jowar registered the highest negative and significant growth rates of labour

Table 6. Compound Growth Rates of Labour Absorption for Different Crops in Gujarat During 1990-91 to 2009-10

(per cent/annum)

Particular	Growth rates of labour absorption	Particular	Growth rates of labour absorption
KHARIF CROPS		**RABI CROPS**	
Bajra	**-3.27** ** (0.110)	Jowar	**-7.54** ** (0.333)
Groundnut	**-0.43** (0.096)	Wheat	**0.70** (0.334)
Paddy	**2.07** ** (0.172)	Onion	**7.13** ** (0.323)
Jowar	**-10.09** ** (0.284)	Garlic	**1.77** (0.503)
Maize	**-2.17** ** (0.195)	Potato	**2.25** ** (0.168)
Sesamum	**-6.58** ** (0.286)	Cumin	**5.73** ** (0.156)
Greengram	**-0.33** (0.160)	Fennel	**-2.28** * (0.298)
Blackgram	**-3.23** ** (0.194)	**Long Duration Crops**	
Long Duration Crops		Banana	**0.54** ** (0.196)
		Sugarcane	**-0.39** (0.175)
Cotton	**8.99** ** (0.144)	**SUMMER CROPS**	
Castor	**-4.50** ** (0.320)	Bajra	**-1.72** ** (0.125)
Pigeonpea	**-4.72** ** (0.102)	Groundnut	**-2.08** (0.507)

Note: Labours utilized per hectare for different crops multiplied by the total area under these crops in each district/state. Figures in parentheses are standard errors, * Significant at the 0.05 probability level, ** Significant at the 0.01 probability level

Source : Compiled by the Authors

absorption (-10.09 %/annum), followed by sesamum (-6.58 %/annum), pigeonpea (-4.72 %/annum), castor (-4.50 %/annum), bajara (-3.27 %/annum), blackgram (-3.23 %/annum), and maize (-2.17 %/annum). Besides these crops, groundnut (-0.43 %/annum) and greengram (-0.33 %/annum) recorded negative and non-significant growth rates of labour absorption. In the Rabi season, onion (7.13 %/annum) registered the highest positive and significant growth rates followed by cumin (5.73 %/annum) and potato (2.25 %/annum). Positive and non-significant growth rates of labour absorption were found in case of garlic (1.77 %/annum), wheat (0.70 %/annum), and banana (0.54 %/annum). Whereas, negative and significant growth rates were observed for jowar (-7.54 %/annum) followed by fennel (-2.28 %/annum) ; while sugarcane (-0.39 %/annum) recorded negative and non-significant growth rates of labour absorption. Similarly, in the summer season, bajra (-1.72 %/annum) showed a significantly declining trend of labour absorption, while groundnut (-2.08 %/annum) recorded a negative but non-significant growth rate of labour absorption.

The diversification from foodgrain crops to Bt. cotton and other high value crops and the introduction of labour substituting technology, including tractor and combined harvester could be the probable reasons for the declining trend of labour absorption in case of most of the foodgrain crops.

Suggestions and Policy Implications

The logical implications of the results obtained from this study are listed below:

1) Encouragement of micro-agricultural enterprises like mushroom cultivation, apiculture, home based processing units, and so forth at the farm level around each production centre can provide employment in farm-based off-farm jobs, which restrict the migration of workers who depend upon agriculture.

2) There is a need of integrating production with marketing through value addition and other post-harvest management practices which would help to enhance or provide sustained income to agricultural labourers throughout the year.

3) Declining farm labour supply is inevitable in a fast developing economy. Therefore, the agricultural extension system of the district/state/country has to be geared up to bring farmers out from the conventional methods of

cultivation and educate them for adoption of available labour-saving implements.

4) Owing to the increasing role of women folk in agriculture, due priority should be given to research and extension on farm equipments which are female labour friendly.

Conclusion

From the foregoing discussion, it can be concluded that the share of agricultural labourers (both male and female) decreased during the year 2001 as compared to the year 1981 in most of the districts in the state of Gujarat. The share of the female agricultural labourers was relatively higher in rural as well as in urban areas across districts as compared to the male agricultural labourers over the study period. The results of the growth rates of agricultural labourers (both male and female) indicated a mixed pattern for different periods. It was also found that the growth rates of agricultural labourers had slowed-down during the 1990s. Labour absorption declined in case of most of the foodgrain crops, while a reverse situation was noticed in case of the horticultural crops.

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