

Spatial Dimensions of Employment-Driven Seasonal Migration of Sugarcane Cutters: Analysis of Employment Opportunities between Marathwada and Kolhapur

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Abstract:

Seasonal migration of sugarcane cutters is a major socio-economic phenomenon in the state of Maharashtra, particularly involving the migration of workers from drought-prone Marathwada like regions to the sugarcane-rich Kolhapur District. The present research work examines the influence of employment opportunities on the migration patterns of sugarcane-cutters, focusing on income, age structures, dependency ratio, gender disparity and educational status. The survey based primary data is collected from Chh. Shahu Cooperative Sugar Factory, Kagal in 2013-14 and compared with the data of 2018-19 and also supported by secondary sources like sugar industry records and census reports, the research finds migration as predominantly a survival strategy rather than a pathway to economic mobility. The findings shows that although migrants earn comparatively higher incomes at the place of destination, saving remain minimal due to indebtedness and subsistence expenditures. The population analysis reveals a predominance of working-age migrants, a declining dependency ratio over time, and noticeable gender disparities. A Chi-square test confirms a statistically significant relationship between education and age structure in sugarcane-cutters. Finally, the research concludes that although employment opportunities attract sugarcane-cutters to Kolhapur as a seasonal migrant, structural vulnerabilities, poor standard of living, exploitative labour arrangements continue to restrict long-term socio-economic advancement.

Keywords: Seasonal Migration, Sugarcane-cutters, Employment Opportunities, Kolhapur, Marathwada, Dependency Ratio etc.

Introduction:

In the arid landscapes of Marathwada region of Maharashtra, where the work of sugarcane cultivation has long been a way of life for many, the prospect of employment opportunities in Kolhapur district acts as a beacon of hope and change. The migration of sugarcane-cutters from Marathwada to Kolhapur is a distinctive phenomenon with multifaceted impacts on both regions. As economic forces drive these individuals towards new prospects, the consequences are profound, influencing not only the lives of the migrants but also the socio-economic fabric of both areas.

The sugarcane fields of Marathwada have sustained communities for generations, but the scarcity of employment opportunities has prompted a significant exodus to Kolhapur district. The allure of employment in the burgeoning sugar industry of Kolhapur, renowned for its sugar mills and agro-based enterprises, is undeniable. The migration is driven by the promise of steady work, improved wages, and the hope for a better life. For many sugarcane-cutters, this journey is a leap of faith towards a future unburdened by the economic hardships of their homeland.

However, the migration also poses challenges. The sudden increase in population strains local resources and infrastructure, testing the resilience of Kolhapur's social services. Housing, healthcare, and education facilities may face unprecedented pressure, necessitating strategic planning to accommodate the needs of the growing population. Moreover, cultural differences between the migrants and the host community can sometimes lead to social tensions, highlighting the importance of community integration initiatives. For the sugarcane-cutters themselves, the transition is a transformative journey fraught with both opportunities and hurdles. The improved employment prospects offer financial stability, enabling them to provide better for their families. Yet, the adjustment to a new environment, away from the familiarity of Marathwada, can be emotionally challenging. The migrants often grapple with the dichotomy of economic advancement and the nostalgia for the life they left behind. As they navigate this delicate balance, the resilience and adaptability of these individuals become evident, portraying a narrative of human strength in the face of change. The migration of sugarcane-cutters from Marathwada to Kolhapur district in Maharashtra is a dynamic process with far-reaching implications. It shapes the economic landscape of both regions, fostering growth and collaboration while presenting challenges that demand strategic solutions. The stories of these

migrants, woven into the fabric of Kolhapur's agricultural tapestry, reflect the intricate interplay between economic forces, cultural dynamics, and the indomitable spirit of those seeking a better life. Seasonal migrants working in sugarcane fields face severe living conditions in the outer limits of sugarcane factories, which are occasionally adjacent to sugarcane farms. Everyone lives in a little hut known as *zopadi*.

Sugar Production in India:

India is one of the world's largest producers of sugar, and sugarcane cultivation plays a crucial role in the rural economy. Table 1 presents sugar production trends in India from 2004 to 2011, showing significant inter-annual variations influenced by climatic conditions, irrigation availability, and policy interventions.

Table 1: Sugar Production in India: 2012

Sr. No.	Year	Production
1	2004	14,432,386
2	2005	15,215,826
3	2006	22,346,546
4	2007	29,090,294
5	2008	25,936,000
6	2009	15,654,974
7	2010	21,150,846
8	2011	27,960,000

Source: Sugar Year Book 2012

**Table 2: Distribution of Sugarcane Area, Production and Yield in Different:
Class Interval of Sugarcane Spread in India**

Percentage of sugarcane area to net sown area in a district – Spread Index	No. of districts	Area ('000 ha)	Production ('000 t)	Yield (t/ha)	State	Districts
> 40 (Very high)	9	1130 (28.57)	71360 (25.79)	63.15	Uttar Pradesh	Bagpat, Bijnor, J.B. Phule Nagar, Kheri, Meerut, Muzaffarnagar, Saharanpur
					Uttarakhand	Haridwar, Udham Singh Nagar
20– 40 (High)	12	823 (20.81)	50513 (18.26)	61.38	Bihar	West Champaran
					Gujarat	Surat
					Haryana	Yamuna Nagar
					Maharashtra	Kolhapur
					Uttar Pradesh	Balrampur, Bareilly, Ghaziabad, Kushi Nagar, Gonda, Moradabad, Pilibhit, Sitapur
10 – 20 (Medium)	22	991 (25.06)	83734 (30.27)	84.47	Andhra Pradesh	Visakhapatnam
					Bihar	Gopalganj
					Gujarat	Navsari
					Uttarakhand	Dehradun
					Karnataka	Bagalkote, Belgaum, Mandya
					Maharashtra	Pune, Sangli, Satara, Solapur
					Tamil Nadu	Cuddalore, Dharmapuri, Erode, Namakkal, Tiruvannmalai, Villupuram
					Uttar Pradesh	Basti, Bullandshahr, Faizabad, Rampur, Shahjahanpur
5 – 10 (Low)	29	525 (13.27)	37460 (13.54)	71.35		
1 – 5 (Very low)	80	486 (12.28)	33582 (12.14)	69.13		
Total	152	3955 (100)	276649 (100)	69.95		

Source: Annual Report 2012-13

Above table 2 depicts the distribution of sugarcane land, output, and yield at different sugarcane class intervals in India. The Kolhapur district has a large percentage of sugarcane area, as well as a high production and yielding group.

Causes Of Seasonal Migration of Sugarcane-Cutters:

Seasonal migration of sugarcane-cutters is a multi-causal process shaped by push and pull factors. There is no single reason for migration, as the study too illustrates various reasons for migration. The push factors like indebtedness, economic hardship, unemployment and backwardness at origin place forces movement. At origin these people's income-expenditure constancy reflects a great leaning to indebtedness that unsurprisingly represents a cause to migration. The chief reasons for migration as declared by the migrants are: unemployment, lack of water for agriculture or landlessness, not enough land and incapability to pay back loans, advance while the remaining migrants have given mixture of these causes for seasonal migration.

The migration of sugarcane-cutters is often driven by a combination of economic, social, and environmental factors. Here are some key causes that contribute to the migration of sugarcane-cutters:

- **Limited Employment Opportunities:** Sugarcane-cutters often face unemployment during the off-season, prompting them to seek work in other areas where opportunities are more consistent.
- **Low Agricultural Income and Indebtedness:** The wages for sugarcane-cutting are low, and the income earned during the harvesting season is not sufficient to sustain families throughout the year. Small landholdings, crop failures, and rising input costs lead to chronic indebtedness.
- **Seasonal Nature of Sugar industry:** Sugarcane harvesting is a seasonal activity, and the demand for labour is concentrated during specific periods. Sugar factories operate for less than half the year, making employment temporary and insecure. Many sugarcane-cutters operate in a cycle of debt, often borrowing money for various expenses.
- **Lack of Social and Educational Opportunities:** Some regions with a high concentration of sugarcane cultivation may lack adequate social and educational infrastructure. Migrants may seek opportunities in areas with better access to schools, healthcare, and other social amenities, aspiring to improve the overall well-being of their families.
- **Environmental Challenges:** Recurrent droughts and water scarcity reduce agricultural productivity, leading to decreased employment opportunities for sugarcane-cutters and prompting migration to more stable agricultural regions.
- **Mechanization of Agriculture:** The adoption of mechanized harvesting techniques in some areas reduces the demand for manual labour in sugarcane cultivation. This can lead to unemployment among sugarcane-cutters, compelling them to migrate to areas where traditional manual labour is still in demand or where alternative employment options exist.
- **Social Injustice:** In some cases, sugarcane-cutters may face social injustice and exploitative labour practices, including low wages, poor working conditions, and lack of social protection. Migration becomes a way for individuals to escape such conditions and seek better opportunities elsewhere.

Migration thus functions largely as a coping and survival strategy rather than a choice driven by upward mobility.

The income from sugarcane cutting involves multiple components, including the payment for the actual cutting of sugarcane and, in some cases, additional compensation for transportation to the sugar factory. However, it's important to note that the income can vary significantly based on factors such as the region, prevailing labour practices, and agreements between farmers and sugarcane-cutters.

Age Structure, Dependency Ratio and Male-Female Disparity:

Age decides the physical strength and mental ability of a particular person. Age structures determine the number of persons made accessible for various categories. At the place of destination, (Kagal) the age structures calculated by surveying, it is the main factor which differ the working and non-working population. It is analyzed by various ways.

The most commonly used method is percentile method. Once the percentage distribution in different age groups is available, one can compare the age structure of two populations. Examine the temporal changes in age structure of a single population. Another measure to study the age structure of population is dependency ratio. Dependency ratio of a population provides the

number of dependents in the population for every 100 working persons. Children below 15 years and persons above 60 years are considered as dependent age group on the working age group, i.e. between 15 and 59 years (Kanase, S. 2007).

The dependency ration is computed in the following way.

$$\text{Dependency ratio} = \{(P_{0-14} + P_{60+}) / (P_{15-59})\} \times 100$$

The age group and dependency ratio has been calculated below, the selected cooperative sugar factory for the research work is:

Comparative Analysis of Age Structure and Dependency Ratio (2013–14 and 2018–19):

A comparative analysis of the age structure of seasonal migrants working in Chh. Shahu Coop. Sugar Factory, Kagal- Kolhapur reveals major demographic changes between 2013-14 and 2018-19. In 2013–14, children in the age group of 0–14 years constituted 28.16 per cent of the migrant population, while the working-age group (15–59 years) accounted for 68.31 per cent and the elderly population (60+ years) formed only 3.52 per cent. By 2018–19, the proportion of children declined markedly to 19.37 per cent, whereas the working-age population increased substantially to 73.94 per cent, indicating a stronger migration of economically active individuals.

Table 3: Age Structure of Sugarcane Cutters of C. S. Co-op. S. F., Kagal

Age Structure of Sugarcane Cutters of C. S. Co-op. S. F., Kagal 2013-14			Age Structure of Sugarcane Cutters in C. S. Co-op. S. F., Kagal 2018-19		
Age Group	Percentage	Total	Age Group	Percentage	Total
0 to 14 yrs.	28.16	40	0 to 14 yrs.	19.37	55
15 to 59 yrs.	68.31	97	15 to 59 yrs.	73.94	210
60+ yrs.	3.52	5	60+ yrs.	6.69	19
All Ages	100	142	All Ages	100	284

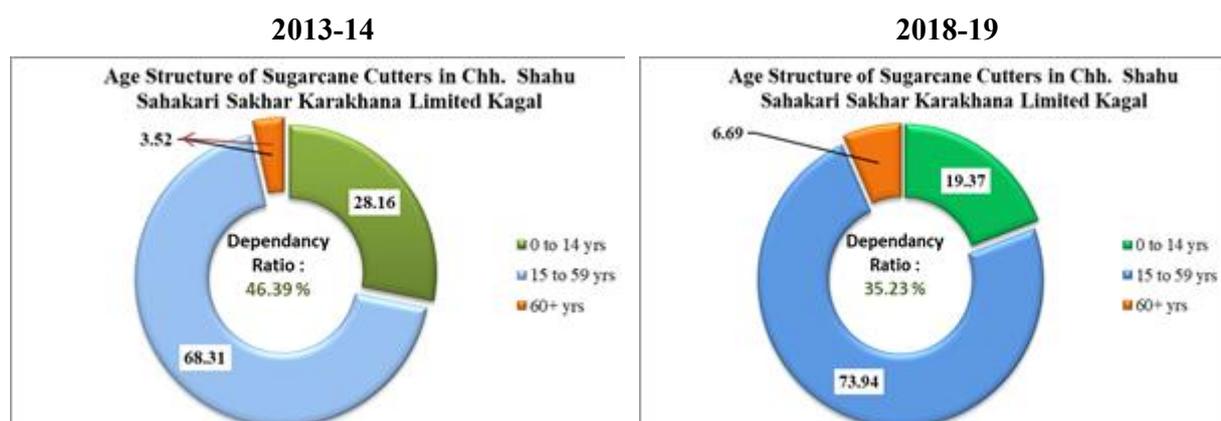


Fig. 1

The elderly population showed a marginal rise to 6.69 per cent, though it remained comparatively low, reflecting the physically demanding nature of sugarcane cutting. Correspondingly, the dependency ratio declined from 46.39 per cent in 2013–14 to 35.23 per cent in 2018–19, signifying reduced dependency burden and an increased dominance of productive age groups in the migrant workforce. Overall, the comparison highlights a shift towards more labor-oriented migration, with seasonal migration increasingly characterized by young and mature workers, while dependents and elderly populations largely remain at the place of origin.

Comparative Analysis of Male–Female Age Disparity (2013–14 and 2018–19):

A comparative examination of male–female age structure among seasonally migrated sugarcane cutters at **Chhatrapati Shahu Cooperative Sugar Factory, Kagal** reveals persistent gender disparities in both 2013–14 and 2018–19, with notable shifts over time. In 2013–14, males constituted 55.63 per

cent of the migrant population, while females accounted for 44.37 per cent, indicating male dominance across most age groups, particularly in the working-age category (15–59 years), where males (37.32 per cent) outnumbered females (30.99 per cent). Children in the 0–9 age group also showed a higher proportion of males than females, whereas the 10–14 and 60+ age groups exhibited relatively balanced gender participation. By 2018–19, the overall male share increased slightly to 56.69 per cent, while the female share declined to 43.31 per cent, reinforcing the male-dominated nature of migration. The working-age group continued to show a pronounced gender gap, with males rising to 43.66 per cent compared to 30.28 per cent females, reflecting increased male participation in economically active migration. However, in the younger age groups (0–9 and 10–14 years), females marginally outnumbered males, suggesting greater accompaniment of female children with migrant families. The elderly population (60+) remained small in both periods, though male participation was consistently higher.

Table 4: Male-Female Disparity in Age Structure of Sugarcane-cutters at C. S. Co-op. S. F., Kagal 2013-14

Age Group	male	Female	total
0 to 9	9.15	4.93	14.08
10 to 14	6.34	7.75	14.08
15 to 59	37.32	30.99	68.31
60+	2.82	0.70	3.52
All Ages	55.63	44.37	100.00

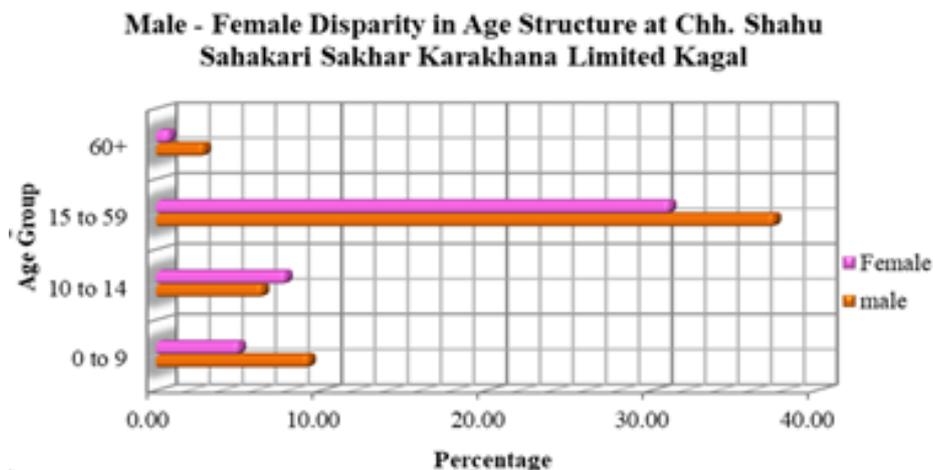


Fig. 2

Table 5: Male-Female Disparity in Age Structure of Sugarcane-cutters at C. S. Co-op. S. F., Kagal 2018-19

Age Group	male	Female	total
0 to 9	4.23	5.63	9.86
10 to 14	4.23	5.28	9.51
15 to 59	43.66	30.28	73.94
60+	4.58	2.11	6.69
All Ages	56.69	43.31	100.00

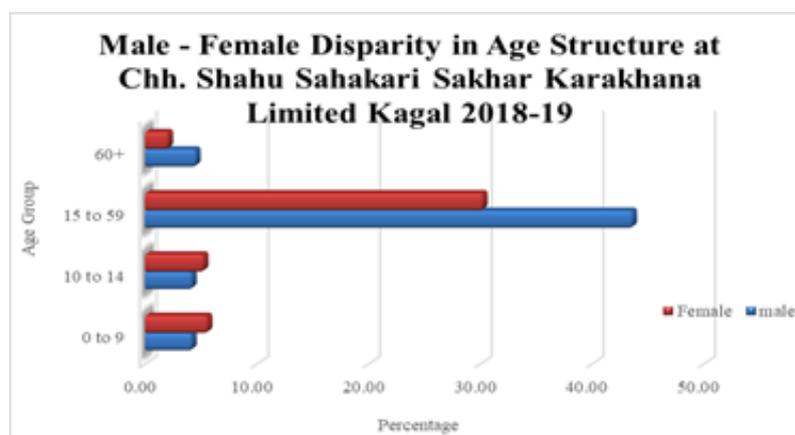


Fig. 3

Overall, the comparison indicates a strengthening of male dominance in working-age migration over time, while gender differences among dependent age groups have become relatively less pronounced.

The age groups have been categorized into male and female based on age criteria. Table 4 indicates that male migrants surpass females across all groups, with some displaying an equal distribution. In the 0 to 9 age group, there are 8.20%

male children and 3.28% female children, indicating that female children constitute less than half of the male children. The 10 to 14 age group exhibits an equal ratio of 1.64% for both male and female children. In the 15 to 59 age range, the male population is 42.62%, exceeding the female percentage of 36.07%. The above-60 age group has an equal distribution with 3.28% for both males and females. The data reveals an equal migration flow

of males and females in the 10 to 14 and 60+ age groups.

Application Of Chi-Square Test To Assess The Association Between Education And Age Structure:

The Chi-square statistic is commonly employed to test the independence between two categorical variables using a crosstabulation (bivariate table). In a crosstabulation, the categories of both variables intersect within the table cells, allowing the simultaneous observation of their distributions. The Test of Independence evaluates whether the observed frequencies in each cell differ significantly from the frequencies that would be expected if the variables were statistically independent. By calculating the Chi-square value

and comparing it with the corresponding critical value from the Chi-square distribution, the researcher can determine whether the deviations between observed and expected frequencies are due to chance or indicate a meaningful association between the variables.

The Chi-square test is used to test the null hypothesis (H_0) and alternative hypothesis (H_a). In the following details Chi-Square method is used to identify whether there is relationship between educational status and age structure of the migrated sugarcane-cutters or not.

- Null Hypothesis (H_0): Gender and Literacy are not dependent
- Alternate Hypothesis (H_a): Gender and Literacy are dependent

Table 6: Table of Observed Values 2018-19

Qualification / Marital Status	Primary (I to IV class)	Middle Education (V to VII class)	Secondary (VIII to X class)	Higher Secondary (XI to XII class)	Graduate	Post-Graduate/ Other	Total
Male	23	33	42	17	10	5	130
Female	18	30	11	13	01	4	77
Total	41	63	53	30	11	9	207

Table 7: Table of Expected Values 2018-19

Qualification / Marital Status	Primary (I to IV class)	Middle Education (V to VII class)	Secondary (VIII to X class)	Higher Secondary (XI to XII class)	Graduate	Post-Graduate/ Other
Male	25.75	39.57	33.29	18.84	6.91	5.65
Female	15.25	23.43	19.71	11.16	4.09	3.35

Table 6 and 7 contains the test results. We reject the null hypothesis at the 5% level of significance since the P-value of the Chi-square test is less than 0.05, implying that invasion season and animal are dependent.

Chi-square test formula

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Where O_i is observed value, E_i is expected value, χ^2 = Test Statistics.

Table 8: Calculation of X^2

Sr. No.	Observed Values (O _i)	Expected Values (E _i)	(O _i -E _i)	(O _i -E _i) ²	(O _i -E _i) ² / E _i
1	23	25.7	-2.7	7.29	0.2837
2	33	39.57	-6.57	43.16	1.0908
3	41	33.29	7.71	59.44	1.7856
4	17	18.84	-1.84	3.39	0.1797
5	10	6.91	3.09	9.55	1.3818
6	5	5.65	-0.65	0.42	0.0748
7	18	15.25	2.75	7.56	0.4959
8	30	23.43	6.57	43.16	1.8423
9	11	19.71	-8.71	75.86	3.8490
10	13	11.16	1.84	3.39	0.3034
11	1	4.09	-3.09	9.55	2.3345
12	4	3.35	0.65	0.42	0.1261
13	Total				13.7476

Table 9: Chi-square distribution table:

DF	P										
	0.995	0.975	0.2	0.1	0.05	0.025	0.02	0.01	0.005	0.002	0.001
1	.0004	.00016	1.642	2.706	3.841	5.024	5.412	6.635	7.879	9.55	10.828
2	0.01	0.0506	3.219	4.605	5.991	7.378	7.824	9.21	10.597	12.429	13.816
3	0.0717	0.216	4.642	6.251	7.815	9.348	9.837	11.345	12.838	14.796	16.266
4	0.207	0.484	5.989	7.779	9.488	11.143	11.668	13.277	14.86	16.924	18.467
5	0.412	0.831	7.289	9.236	11.07	12.833	13.388	15.086	16.75	18.907	20.515
6	0.676	1.237	8.558	10.645	12.592	14.449	15.033	16.812	18.548	20.791	22.458
7	0.989	1.69	9.803	12.017	14.067	16.013	16.622	18.475	20.278	22.601	24.322
8	1.344	2.18	11.03	13.362	15.507	17.535	18.168	20.09	21.955	24.352	26.124
9	1.735	2.7	12.242	14.684	16.919	19.023	19.679	21.666	23.589	26.056	27.877
10	2.156	3.247	13.442	15.987	18.307	20.483	21.161	23.209	25.188	27.722	29.588
11	2.603	3.816	14.631	17.275	19.675	21.92	22.618	24.725	26.757	29.354	31.264
12	3.074	4.404	15.812	18.549	21.026	23.337	24.054	26.217	28.3	30.957	32.909
13	3.565	5.009	16.985	19.812	22.362	24.736	25.472	27.688	29.819	32.535	34.528
14	4.075	5.629	18.151	21.064	23.685	26.119	26.873	29.141	31.319	34.091	36.123
15	4.601	6.262	19.311	22.307	24.996	27.488	28.259	30.578	32.801	35.628	37.697
16	5.142	6.908	20.465	23.542	26.296	28.845	29.633	32	34.267	37.146	39.252
17	5.697	7.564	21.615	24.769	27.587	30.191	30.995	33.409	35.718	38.648	40.79
18	6.265	8.231	22.76	25.989	28.869	31.526	32.346	34.805	37.156	40.136	42.312
19	6.844	8.907	23.9	27.204	30.144	32.852	33.687	36.191	38.582	41.61	43.82
20	7.434	9.591	25.038	28.412	31.41	34.17	35.02	37.566	39.997	43.072	45.315

Source: <https://testbook.com/maths/chi-square-test>

Results of the analysis are as follow:

- Significance level: 0.05
- Chi-square: 13.74
- X^2 Tabular Value: 11.07
- X^2 calculated Value: 13.74
- Degrees of Freedom: 5

According to the above calculations: We reject the null hypothesis and accept the alternative hypothesis:

Alternative Hypothesis: There is a significant relationship between Gender and Literacy of the sugarcane cutters because they are dependent on each other. For the present chi-square test, two classes, namely Education and age structure, were selected for which the degree of freedom is (N-5) is 5. On the basis of the calculated value and expected value obtained from two tail chi-square table, the null hypothesis was tested. This will tell us the probability that the deviation is due to chance alone and our hypothesis can be supportive. The result of the test is summarized in the table no. 3.7 and 3.8. As per computation, the 'P' value of the chi-square test is less than 0.05, which denotes the rejection of the null hypothesis. With this, it is concluded that the education of the sugarcane-cutters and age structure are dependent on each other.

The Chi-square test is a statistical method used to determine whether there is a significant association between two categorical variables. In this case, the variables under examination are the education and age structure of sugarcane cutters. The significance level, often denoted as alpha (α), is set at 0.05, indicating a 5% probability of making a Type I error (rejecting a true null hypothesis).

The Chi-square calculated value, which measures the discrepancy between observed and expected frequencies, is determined to be 13.74. Comparing this value with the critical Chi-square tabular value of 11.07 for a significance level of 0.05 and degrees of freedom (df) of 5, it exceeds the critical value. The degrees of freedom in this context are calculated as the product of the number of categories -1. Since the calculated Chi-square value exceeds the tabular value and falls in the critical region, we reject the null hypothesis. The null hypothesis typically assumes independence or no association between the variables, while the

alternative hypothesis posits a significant association.

Therefore, based on the results of the Chi-square test, we accept the alternative hypothesis, indicating a statistically significant relationship between the education and age structure of sugarcane cutters. This implies that there is evidence to suggest that the education levels of sugarcane cutters are not independent of their age structure. The findings from this statistical analysis contribute valuable insights for policymakers and researchers, informing targeted interventions or policies that may address specific age-related educational challenges within the sugarcane cutter population.

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