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The Correlation between Female Literacy and Juvenile Sex Ratio in Nashik District: A Geographical Perspective

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The present investigation aims to examine the geographical analysis of the correlation between female literacy and the juvenile sex ratio in Nashik district. The study is primarily based on secondary data collected from Nashik district's 2011 population census handbooks. The present paper is a major analysis of the female literacy rate, the juvenile sex ratio pattern, and its correlation with the study region. This research paper applies the literacy rate method, the juvenile sex ratio method, and the Pearson correlation coefficient technique. Nashik, Malegaon, Niphad, Yeola, and Deola tehsils showed high female literacy. In Dindori, Igatpuri, Baglan, Chandwad, Nandgoan, and Sinnar tehsils, there is moderate female literacy, while in highly concentrated tribal populations such as Surgana, Peint, Triembek, and Kalwan tehsils, there is low female literacy. Generally, developed

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regions exhibit high female literacy rates, while less developed regions, particularly tribal regions, display low female literacy rates. Only three tahsils, namely Peint, Trimbakshwar, and Surgana, exhibited a high juvenile sex ratio. Kalwan, Malegaon, Chandwad, Yeola, Baglan, Sinner, and Nandgaon had a moderate juvenile sex ratio, while Baglan, Chnadwad, Deola, Nandgaon, Niphad, Nashik, and Sinnar tehsil had the lowest. Tribal regions generally have the highest juvenile sex ratio, while urban areas have the lowest. The correlation analysis reveals a strong negative relationship between the female literacy rate and the juvenile sex ratio. Therefore, we can conclude that there is no significant relationship between the female literacy rate and the juvenile sex ratio level, and variations in the female literacy rate do not influence the juvenile sex ratio in the study region. The present paper gives a geographical analysis of the correlation between female literacy and the juvenile sex ratio in Nashik district.

Keywords: Population; female literacy; juvenile sex ratio; correlation; tribal region.

1. INTRODUCTION

Scholars have published numerous research papers and articles exploring the correlation between female literacy and the juvenile sex ratio. Shetty [1] has studied the influence of female literacy on the sex ratio in Indian states. He asserted that female literacy positively impacts the sex ratio, noting that states with higher literacy rates exhibit faster progress toward gender parity. Consequently, a higher female literacy rate in a state lead to a greater improvement in the sex ratio for every percentage increase in female literacy [2]. Pakhare [3] has analysed the inequality and correlation between literacy and sex ratio in India: a geographical analysis. Using Spearman's rank correlation method, he studied the variation in literacy and sex ratio in India and found a correlation between them. He found that there is a positive correlation between literacy and the sex ratio in India [4]. Jhala [5] has analysed the impact of female literacy on the child-sex ratio in Rajasthan. We observe a negative correlation between rural female literacy and the child-sex ratio [6]. Kumar and Singh [7] have studied the correlation between female literacy rate and sex ratio in Haryana. This study reveals that Spearman's rank correlation between sex ratio and female literacy. This value shows a moderately negative correlation between female literacy and the sex ratio [8]. Imam [9] wrote a research article on Female Literacy and Changes in Child Sex Ratio in Bihar: A District Level Analysis. He concludes that despite the increasing female literacy rate, the issue of female foeticide persists, potentially due to societal preferences. The government and our society should consider the declining child sex ratio [10]. Sarkar and Mondal [11] have analysed the correlation between caste-based female literacy and child sex ratio in the Alipurduar District of West Bengal. The study shows that the correlation between the caste-based female literacy rate and the child-sex ratio is not equal. In Alipurduar District, the correlation is positive for the general caste but negative for both the scheduled caste and the scheduled tribe. The study also highlights that the correlation between the Scheduled Caste female literacy rate and child sex ratio is significant at 95 percent [12]. Yadav [13] has written a research article on the correlation between female literacy and sex ratio in Rajasthan: a geographical analysis. The study reveals that the correlation between female literacy and sex ratio is r = -295. It is a moderately negative correlation. In Rajasthan, the female literacy and sex ratio have moved in opposite directions. Districts with low female literacy have a higher sex ratio. Each study contributes to understanding how regional factors, literacy levels, and socio-cultural dynamics interplay with juvenile sex ratios, highlighting positive and negative correlations and suggesting implications for policy and societal interventions [14,15].

1.1 Study Area

Nashik district is an important district in Maharashtra state. The latitudinal extent of Nashik district is 190 35' to 200 53" north, and the longitudinal extent is 73016' to 740 56' east. According to the 2011 census, the total geographical area of Nashik district is 15,530 sq km, and the population is 6,107,187. There are 15 tahsils included in the Nashik district. Godavari and Girna are major river basins in Nashik district. The main system of Sahyadri's Mountains runs north-south in the western portion of the district. Jalgaon district borders the Nashik district to the east and north-east, Dhule district to the north, and Dang and Surat districts of Gujarat State to the north-west. Thane district

is to the west and southwest; Ahmednagar district is to the south; and Aurangabad district is to the south-east. The district's climate is generally dry, except during the monsoon season, when the average annual rainfall of the district as a whole is 915.9 mm. Studying these factors about female literacy and sex ratios can provide insights into how geographical and environmental conditions influence the district's social outcomes and educational disparities [16,17].

Objective:

1) To analyze the female literacy rate in Nashik district.
2) To analyze the Juvenile Sex Ratio in Nashik district.
3) To study the correlation between female literacy rate and juvenile sex ratio

1.2 Data Source and Methodology

This present study is based on secondary data. The present paper requires statistical information collected from the Nashik district population census 2011 handbook, the records of the local bodies' statistical departments, and the Government of Maharashtra. The collected data was processed, edited, and analyzed by applying different statistical methods and presented through tables and figure.

Location Map- Nashik District

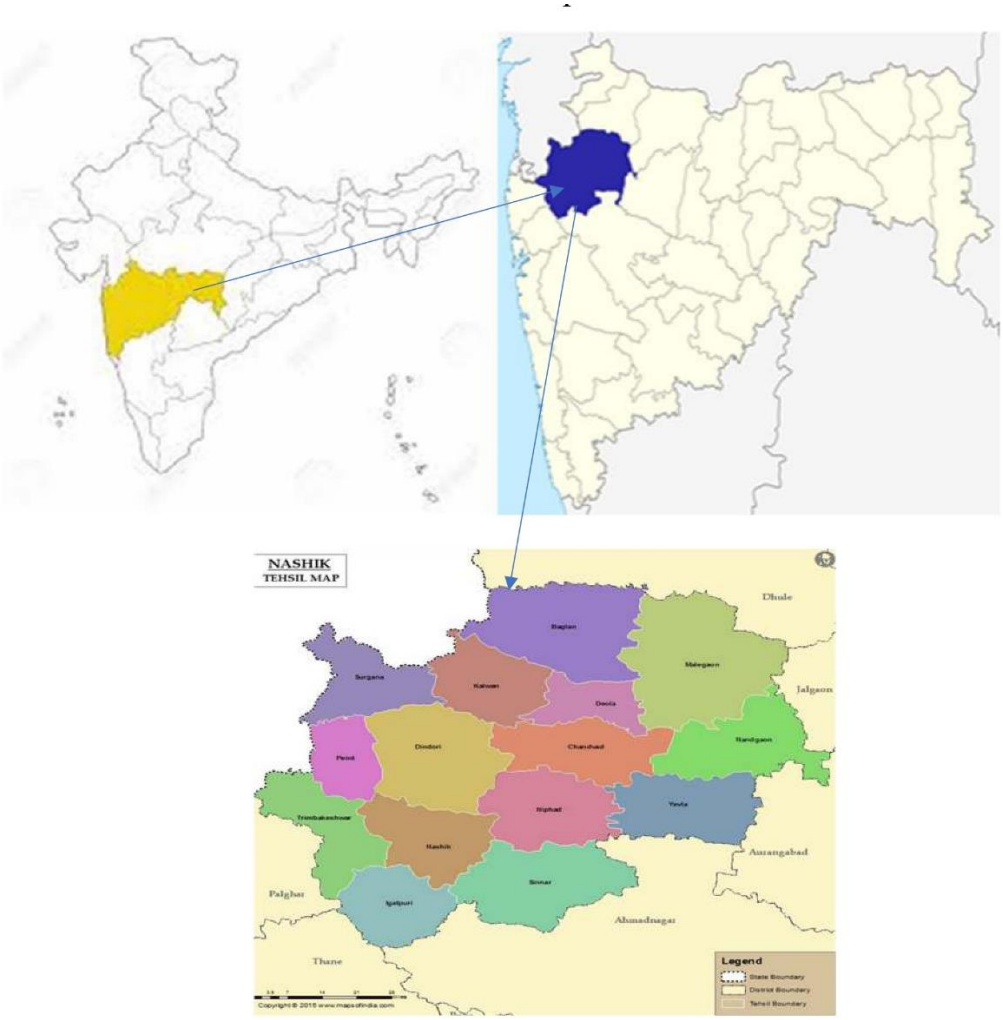

Fig. 1. Study area

For calculating the female literacy rate use the following formula

$$\text{Female Literacy Rate} = \frac{\text{Number of Literate Females Aged 15 and Above}}{\text{Total Number of Females Aged 15 and Above}} \times 100$$

For calculating the Juvenile Sex Ratio use the following formula

$$\text{Juvenile Sex Rtaio} = \frac{\text{Female Population (age group 0– 6 years)}}{\text{Male Population (age group 0– 6 years)}} \times 1000$$

For calculating the Pearson correlation coefficient use the following formula

$$r = \frac{\varepsilon xy}{\sqrt{\in x2. \in y2}}$$

2. RESULTS AND DISCUSSION

Female literacy rate: According to the census of India, an individual who can read and write in any language with understanding is considered literate [18]. The 2011 population census revealed an average female literacy rate of 76.08% in the Nashik district. The data tabulation revealed two tehsils with the highest and lowest female literacy rates, 84.59% and 60.37%, respectively. Based on these observations, we categorized the total female literacy into three categories: high, high, moderate, and low. For convenience, the range of female literacy rates has been categorized as below:

- High Female Literacy – More Than 75%
- Moderate Female Literacy- 65.00% To 74.99%) ¸
- Low Female Literacy- Less Than 64.99%

High female literacy rate: The high female literacy category falls within the range of more than 75%. It observed high female literacy in agricultural and industrially developed tehsils like Nashik, Malegaon, Niphad, Yeola, and Deola. High agriculture, industrial development, and urban atmosphere are the major causes of high female literacy in these districts.

Moderate Female Literacy Rate: The study region is classified as having moderate female literacy, ranging from 60.00% to 74.99%. In Nashik district, six tehsils fall under the moderate female literacy rate category. Dindori, Igatpuri, Baglan, Chandwad, Nandgoan, and Sinnar tehsils are observed for this category. These tehsils are situated in the district's northern and eastern parts. These tehsils are mostly in the drought-prone region of Nashik district. Insufficient water resources significantly impact the moderate literacy rate in these tehsils.

Low Female Literacy: Female literacy is low, ranging from less than 64.99%. Tehsils with a highly concentrated tribal population, such as Surgana, Peint, Triembek, and Kalwan, have reported a low female literacy rate. Lack of education facilities, uneven topography, high rainfall, and low development of agriculture and infrastructure facilities affected to lowest female literacy of these tehsils.

Table 1. Female literacy in Nashik District 2011

Sr. No	Tehsil	Female literacy
1	Surgana	61.01
2	Peint	62.94
3	Triembek	60.37
4	Kalwan	61.41
5	Dindori	69.68
6	Igtpuri	68.08
7	Baglan	71.07
8	Deola	75.25
9	Chandwad	74.86
10	Niphad	77.08
11	Nandgaon	73.34
12	Sinnar	74.9
13	Yeola	75.44
14	Malegaon	78.48
15	Nashik	84.59
	Nashik District	76.08

Source- Population census handbook, Nashik district 2011

Table 2. Juvenile Sex Ratio in Nashik District 2011

Sr. No	Tehsil	Juvenile Sex Ratio
1	Surgana	960
2	Peint	988
3	Triembek	972
4	Kalwan	918
5	Dindori	905
6	Igtpuri	922
7	Baglan	870
8	Deola	858
9	Chandwad	850
10	Niphad	853
11	Nandgaon	892
12	Sinnar	863
13	Yeola	878
14	Malegaon	912
15	Nashik	868
	Nashik District	890

Source- Population census handbook, Nashik district 2011

Juvenile sex ratio: The juvenile sex ratio is defined as the number of female children per 1000 male children in the age group of 0–6 years [19]. The child-sex ratio is a particularly interesting study for demographers, anthropologists, economists, and geographers around the world [20]. In Nashik district, the 2011 population census recorded an overall juvenile-sex ratio of 890. Though the juvenile sex ratio in rural and urban areas is the same as the overall juvenile sex ratio in Nashik District, there is considerable variation among the Tahsils.

Generally, the Juvenile Sex Ratio of Nashik district is divided into the following three groups.

1. High Sex Ratio (More than 951)
2. Moderate Sex Ratio (901-950)
3. Low Sex Ratio (Less than 900)

I) **High Juvenile Sex Ratio**: Only three tahsils, Peint, Trimbakshwar, and Surgana, have a high juvenile sex ratio, exceeding 951. Most of these tehsils are located in tribal regions. Due to a lack of education facilities, lesser accessibility, less availability of medical facilities, and awareness about scanning centers, may be the main reasons for the high juvenile sex ratio in these tehsils.

II) **Moderate Juvenile Sex Ratio**: A moderate juvenile sex ratio ranging from 901 to 950. The 2001 population census recorded a moderate juvenile sex ratio in seven tahsils, including Kalwan, Malegaon, Chandwad, Yeola, Baglan, Sinner, and Nandgaon. Within these tehsils, there exists a balance between agricultural development and other economic development, contributing to a juvenile-sex ratio.

III) **Low Juvenile Sex Ratio**: According to the 2011 population census, Baglan, Chnadwad, Deola, Nandgaon, Niphad, Nashik, and Sinnar Tahsil have observed less than 900 juvenile sex ratios.

Correlation Between Female Literacy Rate and Juvenile Sex Ratio

- **Null Hypothesis (H0): "**The Female Literacy Rate has no significant effect on the Juvenile Sex Ratio."
- **Alternative Hypothesis (H3):** "Changes in the Female Literacy Rate significantly impact the Juvenile Sex Ratio, indicating a direct relationship between increases or decreases in female literacy and corresponding variations in the juvenile sex ratio."

The correlation analysis reveals a strong negative relationship ($r = -0.79$) between the female literacy rate and the juvenile sex ratio. This indicates that higher female literacy rates are associated with lower juvenile sex ratios in the study region. Additionally, the obtained p-value (0.000011) is well below the 0.01 significance level, suggesting that the relationship is statistically significant. Therefore, we can conclude that changes in the female literacy rate have a significant impact on variations in the juvenile sex ratio in the study area.

Table 3. Correlation between female literacy rate and juvenile sex ratio

Variables	N	Correlation (r)	P-value (0.01 Level)
Female literacy rate	15	-0.79	0.000011
Juvenile sex ratio	15		

(Source: Compiled by the Researcher)

The research findings strongly accepted the null hypothesis (H0), positing that the female literacy rate level has no significant effect on the juvenile sex ratio in the study region. Conversely, Hypothesis (H3) states that there exists a significant relationship between the female literacy rate and the level of the juvenile sex ratio, with changes in the female literacy rate directly influencing variations in the juvenile sex ratio in the study region. Therefore, we can assert with 99 percent confidence that there is no direct correlation between an increased female literacy rate and the juvenile sex ratio in the study region.

3. CONCLUSION

The present study found that there are regional disparities in the distribution of the female literacy rate and the juvenile sex ratio. Generally, developed regions exhibit high female literacy rates, while less developed regions, particularly tribal regions, display low female literacy rates. Poverty, the availability of educational facilities, and infrastructure development influence the female literacy rate in Nashik district. Tribal regions generally have the highest juvenile sex ratio, while urban areas have the lowest. The social, economic, and agricultural developments hurt the juvenile sex ratio in Nashik district. The juvenile sex ratio in Nashik district does not align with the general assumption that educated people defer to males and females. The highest-developing tahsil has found a low juvenile sex ratio, and the lowest-developing tahsil has found a high juvenile sex ratio. The correlation analysis reveals a strong negative relationship between the female literacy rate and the juvenile sex ratio. Therefore, we can express that there is no significant relationship between the female literacy rate and the juvenile sex ratio level, and changes in the female literacy rate do not influence variations in the juvenile sex ratio in the study region.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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