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Statistics

CORRELATION BETWEEN LITERACY RATES AND SEX RATIOS IN NORTHEAST STATES OF INDIA

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ABSTRACT The sex composition of a population has a considerable impact on health, social, economic condition of a country. According to census of India "a person aged more than 6 years and who can both read and write with understanding in any language has taken as a literate" and the sex ratio is defined as the number of females per 1000 males. The objective of the present study is to analyse the correlation between the literacy rates and sex ratios in northeast states of India. The study was based on census 2011 published by the Registrar General, Government of India. The literacy was considered as an independent variable, while sex ratio is considered as a dependent variable. Using Spearman's rank correlation method, it was observed that literacy rate and sex ratio was positively correlated which was insignificant (r = 0.02, P=0.95).

KEYWORDS : Spearman's rank correlation; Dependent variable; Population; Gender equity

INTRODUCTION:

One of the important indicators of social development is the level of literacy and a high level of which is considered to be an important factor in the process of modernization. Education is an important variable affecting demographic behaviour concerning marriage, fertility, mortality, migration as well as participation in labour force (Bhende & Kanitkar, 2010, chap.6). Literacy is one of the most important indicators of Human Development and decides the quality of life. It also affects the birth rate and indicates the level of economic development, living standards, status of women and also the technological development, etc.(Salunke, 2016). The United Nations has define literacy as the ability of a person to read and write with understanding a short simple statement on his everyday life. From 1971 Indian census, literacy was define as: a person, who can both read and write with understanding in any language, is to be taken as a literate (Bhende & Kanitkar, 2010, chap.6). But from 1991 census onward, it is defined as: a person aged seven and above who can both read and write with understanding in any language, is treated as literate. Literacy rate also called the "effective literacy rate" is the total percentage of the population of an area at a particular time aged seven years or above who can read and write with understanding. Here the denominator is the population aged seven years or more (Park, 2013).

$$\text{Effective literacy rate} = \frac{\text{number of literate persons aged 7 or above}}{\text{Population aged 7 and above}} \times 100$$

According to census 2011, India has 51.47% male population. The literacy rate of overall Indian population is 74.04% with 82.14% males and 65.46% female literates. This was a 9.81% increase since the last census 2001(GOS, 2014). Sex is the basic characteristic or the biological attributes, of any demographic group and affect not only its demographic but also its social, economic and political structure of a population. In India, sex ratio defined here as the number of females per 1000 males in the population, is an important social indicator to measure the extent of prevailing equity between males and females in a society at a given point of time. The sex ratio in the country had always remained unfavourable to female and it has been a matter of concern for the Indian demographers, social scientist, women's groups, research scholars and planners and policy makers (Bhende & Kanitkar, 2010, chap.6). According to the census of India 2011, the sex ratio stands at 943 for the country. It was 933 females per 1000 males in census 2001 (Government of Sikkim, 2014).

Justification of the study:

It was observed in many studies conducted in India that in a patriarchal society, sex ratio is always unfavourable for females and in matrilineal society, the sex ratio is favourable to females. The north-eastern states of India are far behind in term of development as compared others states of India. All the states are hilly areas and their geographical location also make them to be isolated from others states of India. These states are also politically neglected for so many decades. However, these states are socially advanced in term of literacy, women empowerment, and women autonomy as compared with the status of women of other states of India. Though many studies are available in others states of India related to association between literacy and sex ratio. However, there is no research study conducted to generate scientific evidence on the correlation between literacy rate and sex ratio in the northeast states of India. Therefore, the finding of the study will be helpful to frame programs and policies related to education and health policies of the women by the policy makers in the states as well as to the future researchers.

Objective:

The objective of the present study is to analyse the correlation between the literacy rates and sex ratios in the northeast states of India.

Study area:

The northeast India consisted of 8 states namely Sikkim, Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. Sikkim is the second smallest state in term of areas with 7096 sq. Km. The state constitutes 0.22% of India's geographical area. According to 2011 provisional population census, Sikkim is the least populated state in India with a population of 6,10,577 (52.91% males and 47.9% females) and the percentage share of the state population to northeast population is 0.05%. Mizoram 10,97,206 and Arunachal Pradesh 13,83,727 are the second and third least populated states in Northeast states. The percentage contributions of male's population to the total population in these two states are 50.61 and 59.56 respectively. The most populated state is Assam 31,205,576 followed by Tripura 36,73,917. Assam contributes 2.58% to the total population of India. In Assam and Tripura, the male population constitutes 51.08% and 51.02% respectively to the total population. The states having percentage of males' population lower than the national figures (51.47%) are: Assam (51.08%), Tripura (51.02%), Meghalaya (50.28%), Mizoram (50.61%) and Manipur (50.19%). There is no state having more female's percentage population than male's percentage population in these 8 states. Only three states namely Mizoram (49.39% females), Meghalaya (49.42% females) and Manipur (49.81%) have nearly an equal percentage of males and females populations. The parentage share to nation's population by these 8 northeast states is 3.76% (Government of Sikkim, 2014). Fig. 1 shows the geographical location of 8 states of northeast India.

Arunachal Pradesh	66.95	938	8	6	2	4
Manipur	79.85	992	5	1	4	16
Meghalaya	75.48	989	6	2	4	16
Mizoram	91.58	976	1	3	-2	4
Nagaland	80.11	931	4	7	-3	9
Sikkim	82.20	890	3	8	-5	25
Tripura	87.75	960	2	4	-2	4
Total						82

Source: Census of India, Sikkim, 2011

Spearman's rank correlation method is given as

$$r = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}$$

$$= 1 - \frac{6*82}{8(8^2-1)}$$

$$= 1 - \frac{492}{8(64-1)}$$

$$= 1 - \frac{492}{8*63}$$

$$= 1 - \frac{492}{504}$$

$$= 1 - 0.976$$
$$= +0.02$$

Figure 1. Map of Eight Northeast states of India

METHODOLOGY:
The type of study was a descriptive. The present study was based on secondary data collected from the report of Census of India, 2011 published by the Registrar General, Government of India.

DEFINITION OF CORRELATION: Whenever two variables are so related that an increase in the one is accompanied by an increase or decrease in the other, then the two variables are said to be correlated. The number showing the degree of extent to which the two variables are related to each other is called the correlation coefficient. It is denoted by the symbol r or greek letter ρ. The value of correlation coefficient has a range of -1.0 to +1. Spearman's rank correlation is a measure of the relationship between two variables using the ranked data. Spearman's rank correlation is the number r, given by the formula

$$r = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}$$

Where d is the difference of the corresponding ranks and n is the number of pair's observation. In the present study, literacy is considered as an independent variable, while sex ratio is considered as a dependent variable.

RESULTS:
Table 1 showed the literacy rates and sex ratios of India and 8 northeast states as per census 2011. It was observed that all the states had higher literacy rates than the national literacy rate (74.04%) except Arunachal Pradesh (66.95%). The highest literacy rate was observed in Mizoram (91.58%) followed by Tripura (87.75%). The third highest literacy rate was in Sikkim (82.18%) followed by Meghalaya (75.48%). From Table 2, it was observed that three states namely Arunachal Pradesh (938), Nagaland (931) and Sikkim (890) showed the sex ratios lower than the national's sex ratio (940). Sex ratio was lowest in Sikkim (890) followed by Nagaland (931) and Arunachal Pradesh (938). Even though these state' sex ratios lower than the national' sex ratio, their literacy rates were 3rd, 4th and 8th ranked respectively. Manipur has the highest sex ratio (992) among the others northeast states of India followed by Meghalaya (989) and Mizoram (976). It is clear also from Table 2 that those states having lower literacy rates increased in ranked in sex ratios.

Table 1: Distribution of literacy rates and sex ratios in northeast states of India, 2011

	Literacy rate (%)	Sex ratio (no. of females per 1000 males)
India	74.04	940
States		
Assam	73.18	958
Arunachal Pradesh	66.95	938
Manipur	79.85	992
Meghalaya	75.48	989
Mizoram	91.58	976
Nagaland	80.11	931
Sikkim	82.20	890
Tripura	87.75	960

Source: Census of India, 2011

Table 2: Correlation between literacy rates and sex ratios in 8 northeast states of India

Name of the states	Literacy rate (%)	Sex ratio (per 1000 males)	R1 ranking of literacy	R2 (ranking of sex ratio)	d = (R1 – R2)	d 2
Assam	73.18	958	7	5	2	4

From the above calculation, the value of Spearman's rank correlation coefficient was found to be +0.02. The plus sign indicate the positive direction of the relationship between literacy rates and sex ratios and the value 0.02 showed the strength of the relationship. We can interpret in another way that with the increase in literacy, the sex ratio also increases and vice versa or both literacy rate and sex ratio had a direct correlation. Hence, it was clear from the result that there was a very low and insignificant positive correlation between the two variables (r = 0.02, P = 0.95).

DISCUSSION:
We know that correlation measure the linear relationship between two or more quantitative variables. Here, Spearman's rank correlation method was applied by assigning ranks to the two variables: literacy rate and sex ratio. Clearly, the coefficient of correlations (r) was found to be + 0.02 which was insignificant (P=0.95). It indicates a very low degree of insignificant positive correlation between these two variables. This shows that with the increase in literacy, the sex ratio increase and vice versa. In a study conducted in Kerala, a state in the southern part of India, having the highest literacy rate in India found that there was a strong and positive correlation (r=.66) between literacy rate and sex ratio (Jasim, 2017) **.** The reasons may be due to being the highest literates' state in India and the state follows a matriarchal pattern of society. However, a study conducted in Meghalaya, which is one of the 8 states of northeast India found that literacy rate and sex ratio was independent of each other (r = 0.0). This meant that literacy and sex ratio were not correlated in their study. The change in one variable that is literacy was not followed by changes in another variable that is in sex ratio. It was also stated that the reasons may be due to no caste system exists in the state and the state followed a matriarchal pattern in their society (Salunke, 2016). In another study of Maharashtra, the most industrialized state in the country revealed that the literacy and sex ratio had a positive but insignificant correlation (r = 0.07) (Chaudhari & Ahire, 2015) which is similar to the finding of present study. In a study conducted in Gujarat, a state in the western part of India concluded that there was a negative correlation (- 0.52) between literacy and sex ratio (Desai, & Oza, 2016). A study conducted in Rajasthan also revealed that there was a low negative correlation (-0.37) between literacy and sex ratio (Yadav, 2015).

CONCLUSION:
Literacy rate is one of the components used in human development index. The level of literacy indicates the level of economic development, living standards, status of women in a society of a country. Literacy plays a vital role in the improvement of the sex ratio of a population. It was observed that when the literacy was highest, the sex ratio was declined and the sex ratio was highest, the literacy rate was declined among the northeast states of India. Applying the

Spearman's rank correlation method, it was observed that literacy rate and sex ratio were positively correlated. In other words, a very low and insignificant positive relationship was observed between these two variables in the present study. This meant that increasing the literacy rate would make an increase in sex ratio and vice versa in the population.

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