Literacy and Child Sex Ratio in Punjab: A Spatio-Temporal Observations

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ABSTRACT: *This paper is an attempt to understand the correlation between literacy and child sex ratio in the state during the last decade of twentieth and first decade of 21st century (1991-2011). It is based on secondary data borrowed from the Census of India. Districts have been selected as study units. It has been observed that literacy and child sex ratio are positively correlated in the selected study area. Variations have been observed in this regard at district as well as at regional level. Out of all three traditional geographical regions, Doaba and Majha are relatively ahead than that of Malwa.*
KEYWORDS: *Literacy, child sex ratio, geographical variations, traditional geographical regions.*

I. INTRODUCTION

Literacy and education are known to be important factors for examining socio-economic development. Both are considered as the engines of social change. With the help of literacy and education, society can be liberated from various social evils. It transforms individuals, societies and the entire social structure. Literacy and high levels of educational attainment are most significant indicators of development in an area and community as well (Kaur, 2007). In simple words, "literacy/education is considered as a means to enlightenment as much as a means to a job" (Caldwell et al., 1985). Levels of education and socio-economic status of an individual are positively correlated (Gosal, 1967). Thus, a close relationship has emerged between education and demographic change, over the last few decades (Murthi et al., 1995). Similarly, female literacy is a key instrument to empower women. "When you educate a man; you educate an individual but when you educate a woman; you educate a family as well as a nation" (Suen, 2013). With the increase in female literacy, the socio-economic status of females improves automatically. High female literacy raises employment opportunities for females, enforcing their decision-making power in the household, which decreases gender discrimination in society. Since it is assumed that as female literacy goes up, gender discrimination against females in society diminishes. Thus, there is a close relationship between the male-female literacy rate and child sex ratio of an area and the state of Punjab was not exception in this regard.

Many studies have been conducted to find out the relationship between female literacy rate and child sex ratio at national level. For example, no doubt child mortality rate decreased with the education of women but discrimination against birth of girls also increased (Gupta, 1987); educated women give preference to fewer children as compared to illiterate women (Siddiqui and Siddiqui, 1999); with the increase of maternal education levels among females, the sex-selective abortion also increases (Miller, 2001); women with higher education, who have at least one son have relatively lower preference for son than illiterate women. Whereas women with high education who have no son have relatively higher preference for son than illiterate women (Zuanna and Leone, 2001); mothers who completed matriculation or higher education have a lower sex ratio than illiterate mothers (Jha et al., 2006); the education levels of the mothers also effect the child sex ratio of an area, especially among the rural areas (Inchani and Lai, 2008). The relationship between sex ratio at birth and literacy or education is an inverted U-shaped; and sex ratio and education are positively correlated (Echavarri and Ezcurra, 2010). There is a strong preference for son among Indian women who are illiterate and relatively less educated (Bharti et al., 2011). There is a positive correlation between sex ratio at birth (SRB) in favour of males and mother's level of education (Guilmoto, 2012). When the level of women's education increases, discrimination against girls also increases through prenatal sex-selection, especially in urban areas (Mukherjee, 2013). However, in case of Punjab, quite a few studies have been conducted to understand the impact of male-female literacy on child sex ratio at the micro-level. The number of girls has continuously decreased in the state. No doubt, some improvement in state's child sex ratio has been recorded during 2001-2011. But it is still below the desired levels. It is believed that the education and literacy contribute to all round development of the society.

Given this, there is need to explore that will child sex ratio in the state increase when the literacy rate increases or not? Keeping this research question in mind, the present study is an attempt to find out the relationship between literacy rate and child sex ratio in Punjab from 1991 to 2011.

II.   OBJECTIVES
i.   To examine the correlation of literacy and child sex ratio during 1991-2011.
ii.   To analyze the spatial and regional variations in this regard.
iii.   To identify the factors responsible for disparities in the impact of literacy on child sex ratio.

III.   METHODOLOGY
To achieve the mentioned objectives, the Census data of 1991, 2001 and 2011 has been used in the present study. District is the unit for the spatial analysis. Choropleth maps have been prepared to show the spatial variations on the impact of literacy on child sex ratio. Correlation has been calculated to understand the impact of male-female literacy on child sex ratio in Punjab. For this purpose, Karl Pearson's coefficient of correlation formula has been used:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

IV.   DISCUSSION
Correlation between Literacy and Child Sex Ratio
It is significant to mention here that literacy differentials affect the child sex ratio of the study area. To understand the impact of male-female literacy on child sex ratio and the relationship between male-female literacy rate and child sex ratio; the state has been spatially divided into the following correlation categories:

Degree	Positive	Negative
Perfect	1	-1
Strong	0.75 to 0.99	-0.75 to -0.99
Moderate	0.25 to 0.74	-0.25 to -0.74
Weak	0.01 to 0.24	-0.01 to -0.24
No	0	0

As far as the correlation between male literacy and child sex ratio in the state was concerned, the degree of the relationship varied during the entire study period (1991-2011) (Table 1). In 1991, the state recorded a moderate positive correlation i.e., 0.56. After one decade in 2001, a weak positive correlation (0.14) between male literacy and child sex ratio has been observed in Punjab. Whereas in 2011, a moderate positive correlation (0.45) between male literacy and child sex ratio in Punjab had emerged. The state has reflected moderate positive correlation (0.44) in this regard. It emerges from the analysis that with the increase in male literacy the child sex ratio has increased in Punjab during the study period. At the micro-level, the different areas of Punjab have emerged with different degrees of correlation.

Apart from male literacy, female literacy is also a key indicator that leads to socio-economic change in the society of a given area. As already discussed, high female literacy raises the employment opportunities for females which enriches their decision-making power in the household. It further contributes towards reducing gender discrimination in society. Because it is assumed that as female literacy goes up, gender discrimination against females in society diminishes, which mostly affects the child sex ratio of a particular area. Thus, female literacy has a very close relationship with child sex ratio. The degree of relationship has spatially varied from one area to another in the state. The state recorded moderate positive correlation (0.56) between these two variables in 1991. In 2001 and 2011, the correlation between female literacy and child sex ratio in Punjab was positive i.e., 0.15 and 0.44 respectively.
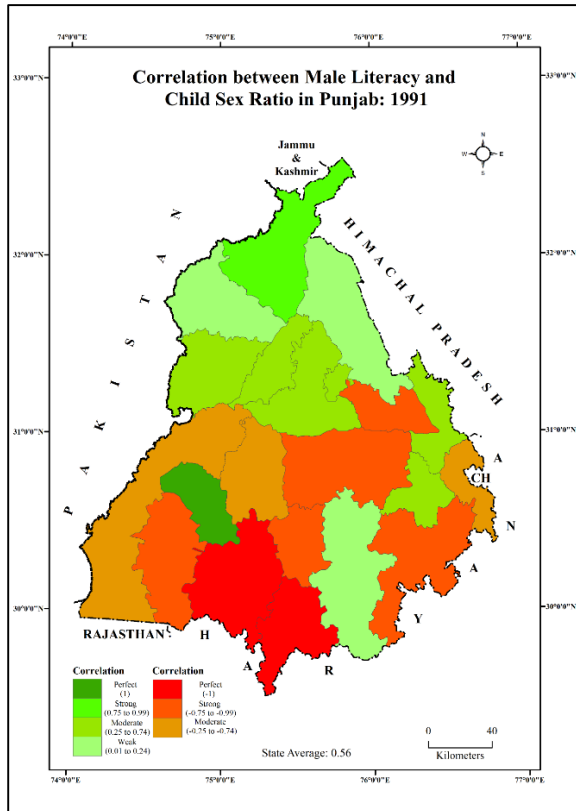
Areas with Positive Correlation
Out of all the districts of the state, only one namely, Faridkot recorded perfect positive correlation (1) between male literacy and child sex ratio in 1991. It belongs to *Malwa* region. Whereas in 2001, not even a single district of the state emerged with perfect positive correlation in this regard (Table 1). After twenty years in 2011, two districts (Bathinda and Moga) showed perfect positive correlation (1) between male literacy and child sex ratio (Map 3). Interestingly, not even a single district of the state reported perfect positive correlation (1) between female literacy and child sex ratio in 1991. In 2001 and 2011, the same situation has sustained in this regard (Map 4, 5 and 6).

Only one district (Gurdaspur) found strong positive correlation (0.75) between male literacy and child sex ratio in 1991. Whereas in 2001, two districts recorded strong positive correlation in this respect. The strongest positive correlation (0.90) was reported by S.A.S Nagar district followed by Rupnagar (0.75). But in 2011, only one district namely, S.A.S. Nagar (0.84) lie in this category. Geographically, some pockets of foothills of the Himalayas showed strong positive correlation between male literacy and child sex ratio during the study period (Map 1, 2, 3). As far as the strong positive correlation between female literacy and child sex ratio in the state was concerned, not even a single district comes under this category in 1991 (Table 1). But in 2001, one district namely, S.A.S Nagar had the strongest positive correlation (0.80) between female literacy and child sex ratio. Ten years later in 2011, the number of districts that recorded strong positive correlation between these two variables had increased to four. Out of these, the strongest positive correlation (0.93) was reported in Moga district followed by Bathinda (0.87), S.A.S Nagar (0.80) and Fatehgarh Sahib (0.75). Spatially, most of these districts were located in the southern, south-eastern and south-western parts of the state (Map 6).

| Sr.	District/State	1991		2001		2011	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
1	Amritsar	0.20	0.30	-0.94	-0.80	-0.71	-0.63
2	Barnala	-0.87	0	0	0	-0.34	-0.21
3	Bathinda	-1	-1	-0.72	-0.46	1	0.87
4	Faridkot	1	-0.30	-0.40	-0.54	-0.70	-0.67
5	Fatehgarh Sahib	0.42	-0.50	-0.80	-0.62	0.64	0.75
6	Firozpur	-0.35	0	-0.75	-0.55	-0.14	-0.43
7	Gurdaspur	0.75	0.60	0.34	0.07	0.62	0.61
8	Hoshiarpur	0.12	0.33	-0.14	0.46	-0.44	0.44
9	Jalandhar	0.35	0.21	-0.54	-0.42	-0.18	-0.06
10	Kapurthala	0.46	0.43	0.28	0.22	0.44	0.49
11	Ludhiana	-0.88	-0.53	-0.12	0.05	0.63	-0.11
12	Mansa	-1	-0.75	-1	-0.93	-0.65	-1
13	Moga	-0.62	-0.63	-0.74	-0.74	1	0.93
14	Patiala	-0.82	-0.93	-0.80	-0.61	0	-0.23
15	Rupnagar	0.29	0.21	0.75	-0.07	0.42	-0.04
16	S.A.S Nagar	-0.33	-0.43	0.90	0.82	0.84	0.80
17	Sangrur	0.12	-0.13	0.24	0.11	0.20	0.25
18	S.B.S Nagar	-0.80	0.50	0	0	-0.34	0.23
19	Muktsar	-0.75	-0.33	-0.54	0.21	0.16	-0.60
20	Tarn Taran	0.54	0.64	0.50	0.53	0.25	0.30
	PUNJAB	**0.56**	**0.56**	**0.14**	**0.15**	**0.45**	**0.44**

Table 1: Correlation between Literacy and Child Sex Ratio in Punjab
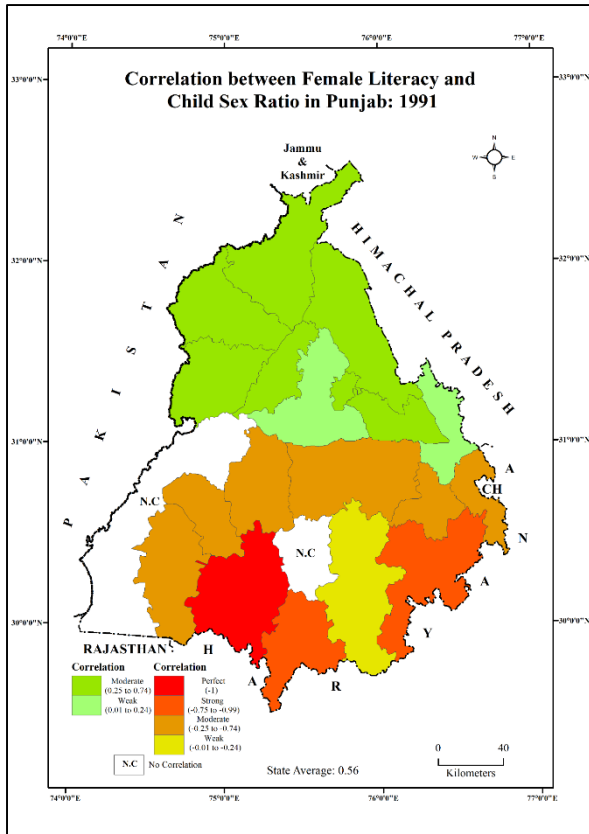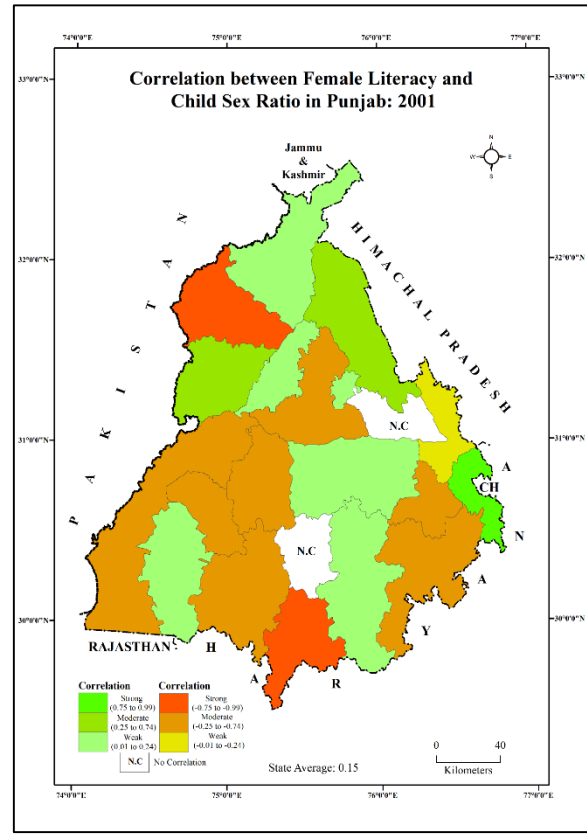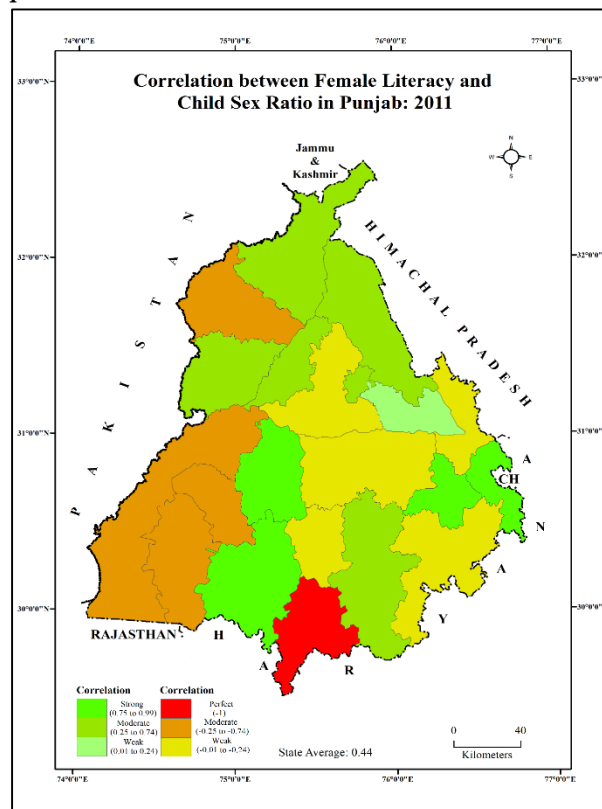***Source:** District Census Handbooks of Punjab, 1991, 2001 and 2011.*

Map 1
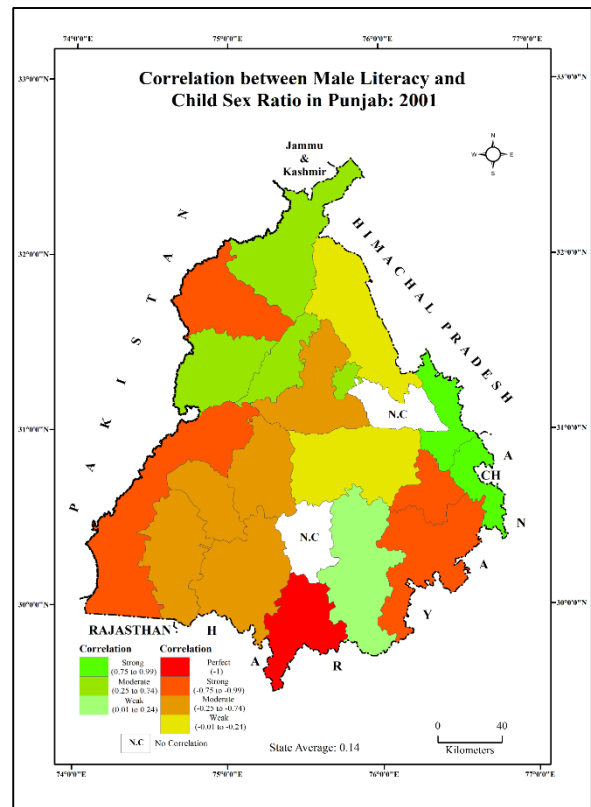
Map 2
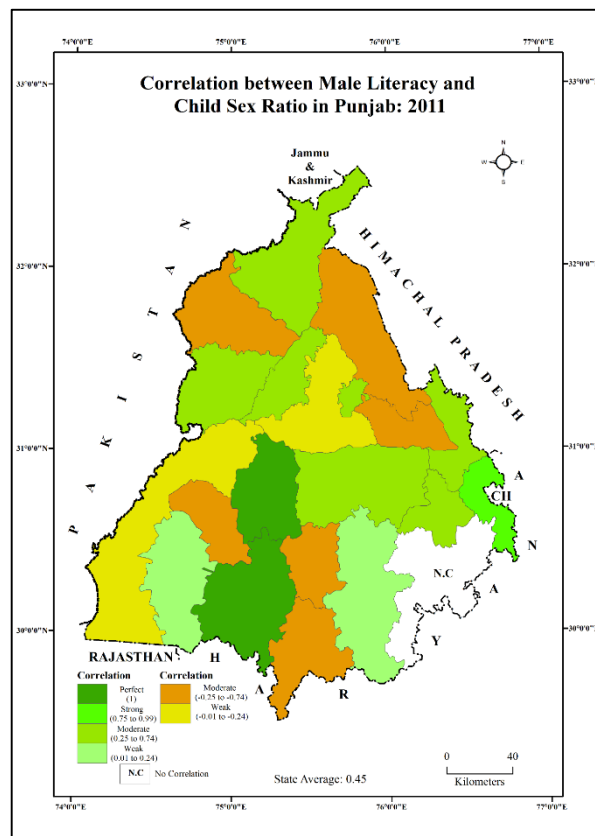
Map 3

Source: *District Census Handbooks of Punjab, 1991, 2001 and 2011.*

Map 4

Map 5

Map 6

Source: *District Census Handbooks of Punjab, 1991, 2001 and 2011.*

Moderate positive correlation between male literacy and child sex ratio was found in five districts in 1991. Ten years later in 2001, the number of districts which showing moderate positive correlation between male literacy and child sex ratio had reduced to three. All these districts belonged to *Majha* region (Map 2). In 2011, moderate positive correlation was recorded about thirty percent districts of Punjab. Among these, three districts belonged to *Malwa*, two to *Majha* and one to *Doaba*. Mostly, the northern, north-western and eastern parts of the state were covered by this category (Map 1, 2 and 3). About thirty percent districts of the state exhibited moderate positive correlation between female literacy and child sex ratio in 1991. Notably, all the districts of *Majha* and three-fourth districts of *Doaba* come under this category. Almost all the northern, north-western and north-eastern areas of Punjab recorded moderate positive correlation between female literacy and child sex ratio in 1991 (Map 4). One decade later in 2001, two districts (Tarn Taran and Hoshiarpur) recorded moderate positive correlation between these two variables i.e., 0.53 and 0.46 respectively i.e., one district each in *Majha* and *Doaba* respectively. In 2011, one-fourth districts of the state lie in this category. Among these, two districts are located in *Majha* and *Doaba* each and the rest in *Malwa* (Map 6).

In 1991, three districts of the state showed weak positive correlation between male literacy and child sex ratio. Out of these, the weakest positive correlation (0.12) between these two variables were reported in Hoshiarpur and Sangrur districts. Among these, all the districts in this category were equally distributed in all the traditional geographical regions i.e., *Majha, Malwa* and *Doaba* (Map 1). Whereas in 2001 and 2011, only Sangrur district of *Malwa* emerged with weak positive correlation in this regard i.e., 0.24 and 0.20 respectively. Only two districts (Rupnagar and Jalandhar) registered the same value (0.21) of weak positive correlation between female literacy and child sex ratio in 1991. After a decade in 2001, the number of districts that recorded weak positive correlation between these two variables had increased to five. The weakest positive correlation (0.05) in this regard was reported in Ludhiana district. Three districts belonged to *Malwa* and one each to *Majha* and *Doaba* (Map 5). In 2011, one district namely, S.B.S Nagar found the weakest positive correlation (0.23) between female literacy and child sex ratio.

An interesting finding has emerged from the analysis that in the initial phase (1991) of the study period a positive correlation between male literacy and child sex ratio was found in almost all the areas of *Majha* and *Doaba* region. No doubt, these areas of *Majha* and *Doaba* region were found negatively correlated in this context in 2001, but in 2011, the situation has been reversed. Because in 2011, positive correlation between male literacy and child sex ratio was found in almost half of the districts of the state. Geographically, a positive relationship between male literacy and child sex ratio had always been observed in the northern, north-western and north-eastern areas of Punjab during the entire study period. By 2011, this positive correlation between these two variables was also observed in rest of the state, such as the south-eastern and eastern parts (Map 1, 2 and 3).

The results show that female literacy was positively correlated with child sex ratio in all the areas of *Majha* and *Doaba* in 1991. In 2001, some areas of these regions were found negatively correlated in this context, but in 2011, positive correlation was found between female literacy and child sex ratio in most of the areas of *Majha* and *Doaba*. It has been observed that these regions of Punjab, especially *Doaba*, have always been at the forefront in terms of male-female literacy (Census of India, 2011). Secondly, people of this region received exposure to other countries of the world relatively earlier than the people of other regions of Punjab (Kaur, 2003; Taylor and Singh, 2013). One or two members of most of the families of this region are settled in foreign countries. Due to the exposure of these people to the advanced world, they made aware the families residing in this area of the socio-economic importance of the girl child in society. That is why the people of these areas are well aware of the value of girls' education which further effects the child sex ratio in this region.

It is believed that a high female literacy reduces discrimination against women and girls in society. In simple words, the spread of literacy and education among females in the long run tends to reduce gender bias in society (Murthi et al., 1995). An educated female is more health conscious and therefore, she not only reduces the Infant Mortality Rate (IMR) but also takes good care of children after their birth (Kateja, 2007). With the decrease in Infant Mortality Rate (IMR), not only does the survival rate of girls at the time of birth increase but it also has a positive impact on the child sex ratio. So, a literate and educated female renders full contribution in this regard.

It has been observed that the status of working women is higher than that of a housewife in society because working women economically contribute equally as men in the household. Unfortunately, contrary to this, the work done by a female in the household is not considered worthy from an economic point of view in society. Due to the economic value of an educated female in society, there is a change in the mentality of people to prevent the birth of girls, which has a positive effect on child sex ratio.

It is assumed that with the spread of education among females, there is a change in their thinking toward the structure of society. An educated female can cross the lines of patriarchy. She desires to see the rest of the females in society be also out of the walls of patriarchy, especially the new-born ones, whom the patriarchy clutches the most in its grip. Thus, an educated female makes a valuable contribution towards

creating an environment of gender equality in society which has a positive impact on child sex ratio of a particular area.

Areas with Negative Correlation

Two districts of the state (Mansa and Bathinda) showed perfect negative correlation (-1) between male literacy and child sex ratio in 1991. Both districts lie in *Malwa*. In 2001, Mansa recorded perfect negative correlation (-1) in this regard. But in 2011, not even a single district of the state showed perfect negative correlation between these two variables (Map 3). Out of all the districts, one namely, Bathinda showed perfect negative correlation (-1) between female literacy and child sex ratio in 1991. It lies in *Malwa* region (Map 5.4). Whereas in 2001 and 2011, not even a single district belonged to this category (Table 1).

About one-fourth districts of the study area emerged with strong negative correlation between male literacy and child sex ratio in 1991. Out of these, the strongest negative correlation (-0.88) in this context was reported in Ludhiana followed by Barnala (-0.87), Patiala (-0.82), S.A.S Nagar (-0.80) and Muktsar (-0.75). Ten years later in 2001, four districts (Amritsar, Fatehgarh Sahib, Patiala and Firozpur) recorded strong negative correlation between male literacy and child sex ratio. Top position in this regard was occupied by Amritsar district which showed a strong negative correlation (-0.94). Interestingly, in 2011, not even a single district of Punjab came under this category. Two districts namely, Patiala and Mansa recorded strong negative correlation between female literacy and child sex ratio in 1991 i.e., -0.93 and -0.75 respectively. Even a decade later in 2001, two districts namely, Mansa (-0.93) and Amritsar (-0.80) found strong negative correlation between female literacy and child sex ratio. But in 2011, not even a single district of the state emerged with strong negative correlation in this regard (Map 6).

Three districts of Punjab namely, Moga, Firozpur and S.A.S Nagar had observed moderate negative correlation between male literacy and child sex ratio in 1991. After one decade in 2001, one-fourth tehsils came under this category. Some central and south-western parts of the state were covered under this category (Map 2). Two decades later in 2011, about thirty percent districts reported moderate negative correlation between these two variables. Mostly, the southern and north-eastern parts of the area under study found moderate negative correlation between male literacy and child sex ratio in 2011 (Map 3). About thirty percent districts reported moderate negative correlation between female literacy and child sex ratio in 1991. Whereas in 2001, about thirty-five percent districts come under this category. One decade later in 2011, about twenty percent districts recorded moderate negative correlation in this context. Majority of the areas of south-western, western and central Punjab showed moderate negative correlation between female literacy and child sex ratio during the entire study period (Map 4, 5 and 6).

Not even a single district of the state recorded weak negative correlation between male literacy and child sex ratio in 1991. Whereas in 2001, two districts (Ludhiana and Hoshiarpur) found weak negative correlation in this regard. Even in 2011, the same number of districts lie in this category. Only one district Sangrur emerged with weak negative correlation (-0.13) between female literacy and child sex ratio in 1991. Even ten years later in 2001, one district of the state lies in this category. But in 2011, about one-fourth districts recorded weak negative correlation between female literacy and child sex ratio. The weakest negative correlation (-0.04) in this regard was reported in Rupnagar district (Table 1). Mostly, the central parts of the state fall in this category (Map 6).

It is significant to note here that majority of the areas of *Malwa* region showed negative correlation between male literacy and child sex ratio as compared to the other traditional geographical regions throughout the study period. In 2001, male literacy was negatively correlated with child sex ratio in most of the areas of the state. But it is also worthwhile to mention here that many areas of *Malwa* established a positive correlation between these two variables in 2011.

A very interesting finding has come out from the analysis that *Malwa* region of the state, especially its areas located along the international border with Pakistan and inter-state borders with Haryana and Rajasthan showed a negative correlation between male-female literacy and child sex ratio throughout the study period (Map 1, 2, 3, 4, 5 and 6). The results of correlation reveal that the child sex ratio has declined with the increase in male-female literacy in these areas. In this context, the whole observation shows that *Malwa* emerges as one of the regions of the state where negative correlation was found. Broadly speaking, child sex ratio was decreased with the increase in male-female literacy in *Malwa*, especially during 1991-2001. There is no doubt that in 2011, many areas of *Malwa* were recorded positive correlation in this context. It is a bitter truth that *Malwa* region was more negatively affected in this regard than rest of the regions. *Malwa* is one of such regions in Punjab where spread of education, especially among the females started quite late. Secondly, educated female's revolutionary mindset towards society was suppressed by the strong patriarchal structure existing in this region. Due to strong patriarchal roots, the male-dominated society has sustained itself in this region from the beginning. Due to which the females of this region could not contribute to the society even after becoming literate. Consequently, female literacy has a negative rather than a positive effect on child sex ratio in this region.

Literacy and education appeared as a double-edged sword for child sex ratio. On the one hand, due to high literacy levels, there was a positive effect on child sex ratio, whereas on the other hand, there was increase in awareness levels regarding the use of sex determination techniques. As a result, the negative role of sex-selection techniques is particularly noteworthy. It ultimately led to low child sex ratio.

There were few districts (Barnala and S.B.S Nagar in 2001 and Patiala in 2011) in the state where no correlation was established between male literacy and child sex ratio (Table 1). On the other hand, two districts (Firozpur and Barnala) showed no correlation between female literacy and child sex ratio in 1991. Both of these districts lie in *Malwa* (Map 4). Even after one decade in 2001, two districts namely, Barnala and S.B.S Nagar found no correlation in this regard. Each one district comes from *Malwa* and *Doaba* (Map 5). But in 2011, not even a single district of Punjab belonged to this category (Map 6).

It has been observed that there was positive impact of male-female literacy on child sex ratio in the state only with few exceptions. Besides, an interesting finding coming out of the analysis is that male literacy had positive impact on child sex ratio more than the female literacy. It is well established fact that education plays a key role in reducing the existing gender inequality in society (Clark, 2000 and Murthi et al., 1995). Because of the presence of literate males and females in the society and household, there is a change in the patriarchal thinking towards the society. Educated men and women create a more gender egalitarian environment in the household than illiterate ones. Consequently, the chances of discrimination against new-born girl child are reduced significantly.

Regional Variations in Impacts of Literacy on Child Sex Ratio

As far as the correlation between male-female literacy and child sex ratio among the three traditional geographical regions was concerned, the degree of correlation between male-female literacy and child sex ratio varies from one region to another during the entire study period.

In 1991, *Majha* region reported strong positive correlation (0.84) between male literacy and child sex ratio. But after one decade in 2001, this region had observed weak negative correlation (-0.12). Whereas in 2011, moderate positive correlation (0.27) in this regard was found. In terms of correlation between female literacy and child sex ratio, this region recorded moderate positive correlation (0.72) in 1991. A moderate positive correlation between these two variables remained intact for the next two decades which was found 0.34 in 2001 and 0.45 in 2011 (Table 2).

Moderate positive correlation (0.37) between male literacy and child sex ratio was found in *Malwa* in 1991. But in 2001, these two variables were inversely correlated in this region. Ten years later in 2011, again the male literacy and child sex ratio was moderate positively correlated (0.44) in this region. Whereas female literacy and child sex ratio was moderate negatively correlated (-0.40) in 1991. But in 2001, a weak negative correlation (-0.15) between these two variables was found. But interestingly, a moderate positive correlation (0.42) was registered in this regard in 2011.

Region/State	1991		2001		2011	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Majha	0.84	0.72	-0.12	0.34	0.27	0.45
Malwa	0.37	-0.40	-0.13	-0.15	0.44	0.42
Doaba	0.64	0.64	0.10	0.35	-0.41	-0.73
PUNJAB	**0.56**	**0.56**	**0.14**	**0.15**	**0.45**	**0.44**

Table 2: Region-wise Correlation between Literacy and Child Sex Ratio
Source: District Census Handbooks of Punjab, 1991, 2001 and 2011.

In case of *Doaba*, a moderate positive correlation (0.64) between male literacy and child sex ratio had been observed in 1991. One decade later in 2001, low positive correlation (0.10) in this regard emerged in this region. Surprisingly in 2011, this region reported moderate negative correlation (-0.41) between these two variables. As far as the correlation between female literacy and child sex ratio in *Doaba* was concerned, both the variables were moderate positively correlated i.e., 0.64 in 1991 and 0.35 in 2001. But a very surprising finding has come out that in 2011, a moderate negative correlation (-0.73) between these variables was found.

It is interesting to note that all the traditional geographical regions of the state recorded positive correlation in terms of male literacy and child sex ratio in 1991. But with the passage of one decade (2001), out of these three regions, two, *Majha* and *Malwa* recorded a negative shift in this respect. Although, *Doaba* was positively correlated in this regard. During the last decade (2011) of the study period, the male literacy and child sex ratio was positively correlated in *Majha* and *Malwa* but in *Doaba,* it was negatively correlated. (Table 2). It is worthwhile to mention here that between 1991 and 2001, two regions of the study area namely, *Majha* and *Doaba*, were found positively correlated in terms of female literacy and child sex ratio. While on contrary in

Malwa, the female literacy and child sex ratio were inversely correlated during this period. But in 2011, *Malwa* had reported positive relationship in this regard. It comes out of the analysis that *Majha* was the only region of Punjab where female literacy was always positively correlated with child sex ratio during the entire study period. It means that with the increase of female literacy, the child sex ratio also increased in *Majha* since 1991. Whereas in *Doaba*, the child sex ratio also increased with the increase of female literacy in the early decades (1991 and 2001) of the study period, but in the last decade (2011), this scenario was completely reversed.

Looking at the overall scenario, it has been observed that with the increase of male-female literacy, the child sex ratio has also increased, and this rate of increase was higher in *Doaba* and *Majha* than in *Malwa* region. *Doaba* and *Majha* are the leading regions in Punjab in terms of both male and female literacy. The early start of education and the early understanding of its importance in the society by the people of these areas helped in weaving a good social fabric in these regions. In such an environment, the literacy had a positive impact on child sex ratio of these areas. On the contrary, the rate of increase in child sex ratio with the increase of male-female literacy remained low in *Malwa* during the same period. The late start of education and low male-female literacy rates in this region testify to the negative effect of literacy rate on child sex ratio in the early part (1991-2001) of the study period. But, with the passage of time, its effects were found to be positive in this region till the last decade (2001-2011) of the study period.

V.   SUMMING UP

The present study reveals that there is a close relationship between literacy rate and child sex ratio, both male and female literacy rates affect the state's child sex ratio in different ways in Punjab. The degree of correlation varied spatially. Positive correlation between male literacy and child sex ratio has always been observed in the northern, north-western and north-eastern areas of Punjab during the entire study period. In both the cases (male and female), high literacy showed relatively high child sex ratio. It has been noted that with the increase of literacy, the child sex ratio has also increased in the state, and this rate of increase was higher in *Doaba* and *Majha* than in *Malwa* region. The study found that *Malwa* region of the state, especially its areas located along the international border with Pakistan and inter-state borders with Haryana and Rajasthan showed a negative correlation between male-female literacy and child sex ratio throughout the study period.

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