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Impact of female literacy on infant mortality and maternal mortality in Kashmir valley: a district level analysis

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Abstract Female literacy plays a critical role on the overall growth and development of society. It has been proved from research that children who are taken care of by literate mothers get all round development in every aspect of their life. This paper analysed the impact of female literacy rate on the infant mortality and maternal mortality rate in different districts of Kashmir valley. For this linear regression method was used which shows the impact of female literacy rate on infant mortality rate and maternal mortality rate. From the result it has been observed that there is inverse relationship between female literacy rate and infant mortality and maternal mortality rate in districts of Kashmir valley. This study analysed that female literacy has immense contribution in declining the infant mortality rate and maternal mortality rate and thus help in improving the health status of both women and child.

Keywords Female literacy · Infant mortality rate · Maternal mortality rate · Districts · Linear regression

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Introduction

Female literacy is considered as one of the important parameter for determining the socio-economic progress of a country and has played a great role in enlarging the opportunities and freedom in every aspect of female's life. Female literacy rate has been defined as the ratio of total literate females population aged 6 years and above to the total female population in the same age group and is expressed in percentage. The female literacy of the country has increased from 53.67 to 65.46% from the last decade where as In Jammu and Kashmir the female literacy rate was 43% while as it has increased to 58.1% as per census 2001 and 2011. This female literacy rate is considered the key variable in determining the infant and maternal mortality rate of the country. It also determines the wellbeing and the standard 0f living of a nation. Shetty and Shraddha (2014) analysed that States which have progressed more on the female literacy front reduce infant mortality at a faster pace and this should motivated and encouraged lesser literate states to enhance and reinforce their efforts to boost female

literacy States which have progressed more. Sandiford et al. (1995) show that among the children of women who became literate exclusively by adult education, mortality and risk of malnutrition are significantly lower than among those women who remained illiterate. Pillai et al. (2013) found that rates of change in female literacy and maternal mortality ratios are negatively related. Adhikari and Sawangdee (2011), Shawky (2001), Rao et al. (1996) and Gakidou et al. (2010) analysed that there is an inverse relationship between female literacy and infant mortality rate.

Kateja (2007) establishes an inverse relationship between female literacy rate and mortality rates (IMR and MMR). Caldwell (1979, 1986), Cochrane (1980), Hobecraft et al. (1984), United Nations (1985), Ware (1984), Gokhale et al. (2002) and Govindasamy and Ramesh (1997) have discussed the mechanism of literacy influence on infant survival. Shiffman (2000) found that the wealth indicators explained only a small proportion of maternal mortality rate than per capital income and Other variables such as women's literacy rates and proportion of deliveries attended by trained birth attendants were found to be far more effective predictors of maternal mortality than per capital income. Grosse and Auffrey (1989) and Sandiford et al. (1995) observed that literate women are less likely to experience poverty. Thaddeus and Maine (1994) and McTavish et al. (2010) analysed that literate women's make decisions with respect to health and wellbeing. Thus from the above evidence it can be said that there is a strong negative correlation between female literacy rate and infant mortality rate. As maternal education increases the standard of living thus results in better health Status for both women and child.

Impact of female literacy on maternal and infant mortality

As per UN report 2015, the lives of women have improved in a number of areas over the last two decades—but the pace has been slow and uneven across regions as well as within and among countries. It has also confirmed that education for women is the single most effective way to improve lives and health of family and a society at large. Mehta et al. (2014), Investigated that higher number of years of education is linked with lower incidence of disease and better immunization status of children. Ravallion and Wodon (2000) and Gibson (2001) also observed that nutritional status and educational status are improved by having better educated parents, particularly the mother's education. Levine and Rowe (2009) analysed that 30 years of research data taken from Asia, Africa, and Latin America has shown that maternal schooling is associated with reduction in child mortality in less developed countries. Sufiyan et al. (2012) observed that maternal literacy has a significant relationship with the nutritional status of the children. Vikram et al. (2012) Investigated that there is a positive relationship between maternal education and childhood immunization even after the extensive control for socio demographic characteristics, village and neighbourhood fixed effects. Basu and Stephenson (2005) found particularly strong evidence for the protective role of maternal education for many mortality and mortality determinant outcomes. Borooah (2004), observed that the literacy status of the father was far less important when compared to the mother literacy rate in influencing infant and child mortality rate. While as, Macassa et al. (2003) have observed that educational level of father is a significant determinant in infant mortality rate. Ijaz (2012) analysed that female literacy had not been successful in reducing in infant mortality. Shawky (2001) and Davidson et al. (2011) concluded that improving female literacy is among a number of core programs that yield sustainable reduction of maternal deaths. Karsh et al. (2006), Yin et al. (2007) and Weiss (2003) Have analysed that low parental literacy level to be associated with adverse paediatric health outcome generally, include infant mortality, breastfeeding and asthma outcomes. Levine and Rowe (2009), Ibeh (2008) and Goldman (2010) observed that Female literacy rate increases are positively correlated with health care utilization and reduction in maternal mortality ratio. Weiss et al. (1991) analysed that literacy helps in shaping choices and decisions; impaired literacy limits access to health information.

In this study, we sought to determine the degree to which the female literacy has association with maternal mortality and infant mortality rate. We analysed that female literacy have positive bearing in declining the maternal mortality rate and infant mortality rate as female literacy helps in improving the health status of the women and child.

Study area

The state of Jammu and Kashmir is one of the largest states of the Indian union and is situated in the Western Himalayas. The Indian state of Jammu and Kashmir comprises of three natural as well as administrative regions: Jammu, Kashmir valley and Ladakh with 22 districts. According to the census 2011 the total population of Jammu and Kashmir was 1, 25, 48,926 persons in which 66, 65, 561 are male and 58, 83,365 are females. The distribution of populations reveals striking variation at both the regional as well as district level. So far as the Kashmir valley is concerned it is situated between Pir Panjal range and Zanskar range and has an area of 15,220 Sq kms. Average elevation of valley is 1850 meters above sea level. There are 10 district falling the jurisdiction of Kashmir valley. The major ethnic group of Kashmir valley are Kashmiris and they speak the Kashmiri language. The valley has a Muslim majority population and Islam is practiced by 97.16% of the population with the remaining being Hindus (1.84%), Sikhs (0.88%), Buddhist (0.11%) and others. The principle spoken language in the valley is Kashmiri and Urdu, with Urdu being the official language.

Education occupies a pivotal position in the development of every society. Studies revealed that education is the most important instrument for the empowerment of women, thus educating women helps in improving the status and position of women in the society. Education has helped Kashmiri women in acquiring skill and self Confidence. Kashmiri women in urban and rural areas work in and outside their homes for education and employment but still the gender gap in literacy is in favour of males. As per Census 2011, Districts such as Bandipora, Ganderbal, Budgam and Kulgam have reported the low literacy rates of less than 60%. On Whole there is improvement in education of women in cities and towns while as in rural and far flung areas the situation is still unsatisfactory.

The economy of Kashmir valley is predominantly agricultural about 75% of the workforce is directly or indirectly depend on primary activity. In primary sector, women's plays a vital role because it is largely a house hold enterprise. There is an urgent need to develop industries so that the pressure of population from the primary sector may be shifted to the secondary and tertiary sector. The location map of Kashmir valley is shown in Fig. 1.

Materials and methods

The analysis of the impact of female literacy rate on infant mortality rate needs data for this The Data of the female literacy rate of the districts of the Kashmir valley has been obtained from census 2011 and the data of the infant mortality rate, Still births and maternal mortality rate was obtained from Vital Statistic of j and k 2011 data. The data set used is given as under (Table 1).

For identifying the impact of female literacy rate over infant mortality rate and maternal mortality rate linear regression was used. The equation of linear regression is given by $y = a + bX$ Where X is independent variable and Y is dependent variable. Micro soft excel was used to calculate the lines and statistical values of linear regression analysis. The value of R^2 or the square of correlation from the regression analysis was used to show how strong the correlation and relationship between variables X and Y.

Result and discussion

In this study we analysed the impact of female literacy rate over the infant mortality rate, maternal mortality rate, for different districts of the Kashmir valley.

Impact of female literacy rate on infant mortality rate

On linear regression an inverse relationship was found between female literacy rate and infant mortality rate and has observed that infant mortality rate decrease at a rate of -0.057 which indicates that for every 1% rise of female literacy rate there is an decrease of infant mortality rate by 0.057/1000 live births (Fig. 2).

Impact of female literacy rate on maternal mortality rate

From the result it has been observed that there is decrease in maternal mortality rate and has decreased at a rate of -1.324 which indicates that with 1%

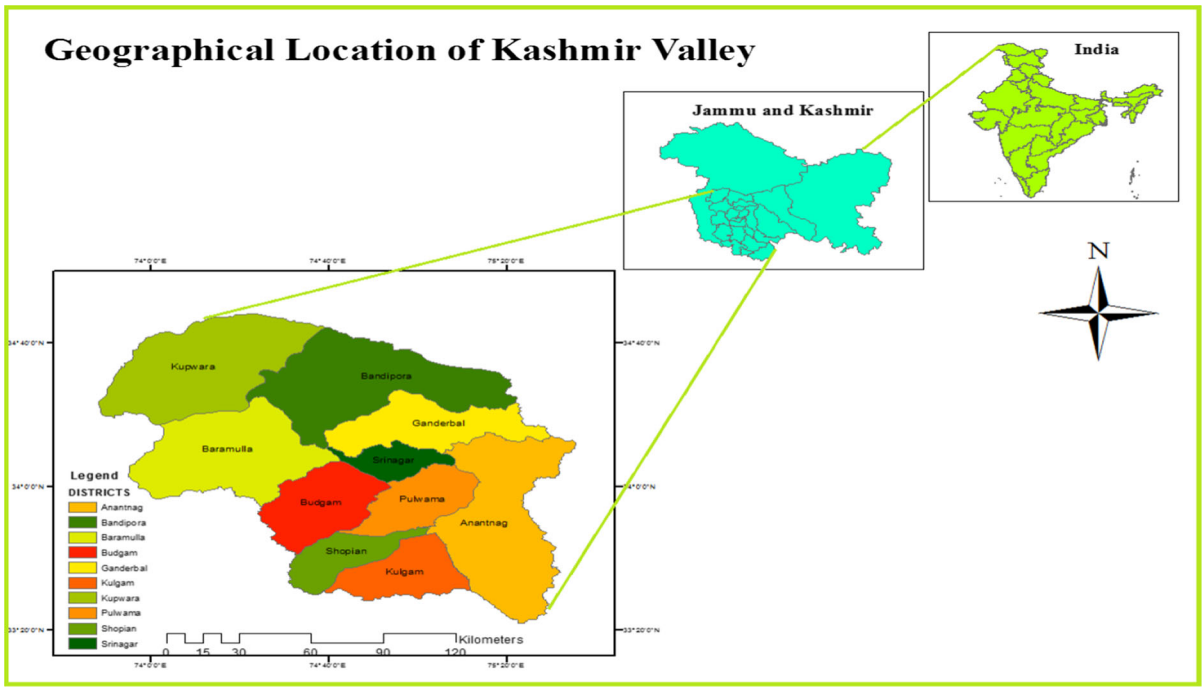

Fig. 1 Location map of Kashmir valley. *Source*: Survey of India toposheet

Table 1 Female literacy rate and infant mortality rate of districts of Kashmir valley

Serial no.	Districts	Female literacy rate %	Male literacy rate %	Infant mortality rate/1000	Maternal mortality rate
1	Anantnag	52.19	72.66	9.61	114.28
2	Srinagar	61.85	76.25	11.25	21.96
3	Shupiyan	50.90	70.27	13.15	47.47
4	Kulgam	84.49	69.59	18.60	94.10
5	Pulwama	51.80	74.39	15.48	120.3
6	Kuphwara	50.95	75.68	25.49	293.58
7	Ganderbal	45.71	68.85	42.5	94.38
8	Budgam	44.85	66.30	9.00	87.22
9	Bandipora	44.34	66.88	11.7	154.0
10	Baramulla	52.38	75.53	12.14	137.6

Source: Census of India 2011 and Directorate of economic and statistic, J&K

increase in the female literacy rate there is decrease of 1.324 maternal death/100,000 female (Fig. 3).

Multiple linear regressions between male and female literacy rate on infant mortality rate and maternal mortality rate

Multiple linear regression method was done between female literacy rate and male literacy rate on infant mortality rate and maternal mortality rate. Both female literacy rate and male literacy rate showed inverse

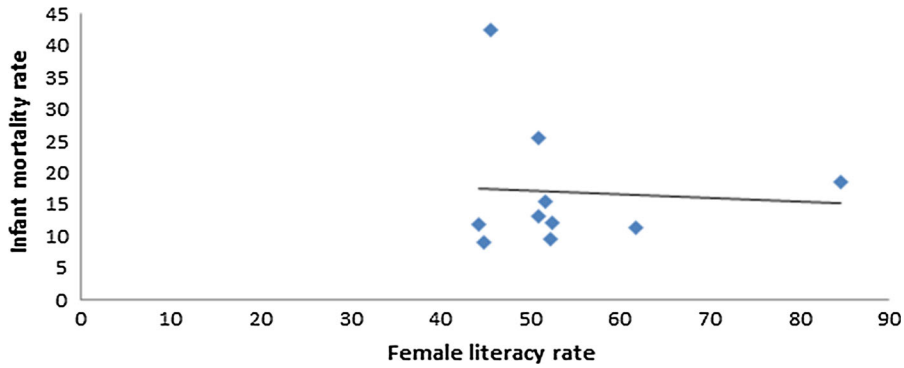

Fig. 2 Scattered plot and linear regression of female literacy rate versus infant mortality rate of different districts of Kashmir valley (slope = − 0.057 and $R^2 = 0.004$)

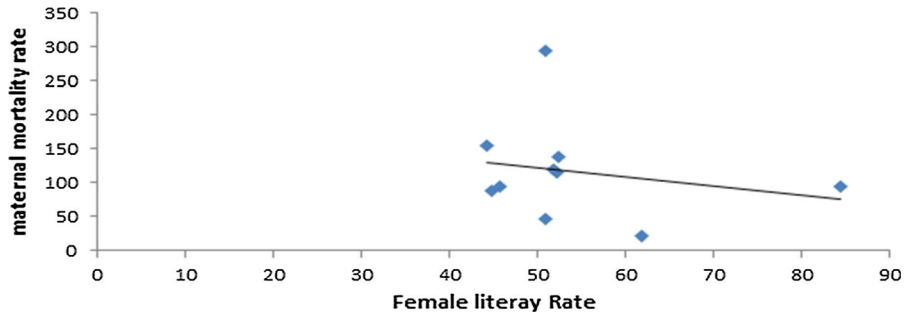

Fig. 3 Scattered plot and linear regression of female literacy rate versus maternal mortality rate of different districts of Kashmir valley (slope − 1.324, $R^2 = 0.046$)

relationship with infant mortality rate. But relationship between male literacy rate and maternal mortality rate was found not significant. While as inverse relationship was found between maternal mortality rate and female literacy rate (Table 2).

Conclusion

Female literacy plays an important role for empowering women in every aspect of her life. As female literacy brings independent income to women that helps in increases both standard of living for which helps them to avail appropriate health care services and increases children's health care facilities. Also, it helps in population stabilization and decreases maternal deaths. An educated woman have decision making ability that helps in improving the family condition over all whether it would be social, economic, cultural or health condition. It can also be used to save the infant lives by ensuring adequate nutrition and right knowledge for taking care of infant during illness.

The objective of this paper is to explore the impact of female literacy on infant mortality and maternal mortality ratios in Kashmir valley. We found that both female and male literacy rate was inversely related to infant mortality rate. This implies that both female and male literacy helps in improving the health condition

Table 2 Multiple linear regressions between female literacy rate and maternal mortality rate on infant mortality rate and maternal mortality rate

Dependent variable	Literacy rate	Slope of regression line	*P* value	R^2 value
Infant mortality rate	Female literacy rate	− 0.05745	0.8551	0.04
	Male literacy rate	− 0.19022	0.0848*	0.004
Maternal mortality rate	Female literacy rate	− 1.3426	0.548*	0.046
	Male literacy rate	4.352	0.5385*	0.049

Significant at 5% level

of infant as both are directly or indirectly related to family environmental conditions. Thus female literacy thus cannot be considered as a sole determinant in impacting the infant mortality rate. It act as a additive role in enhancing the status of child and in decreasing the infant deaths.

From the result we have also observed that female literacy was inversely related to maternal mortality rate and was found statistically significant at 5% level. We also observed that maternal mortality was independent of male literacy. Thus this study supported the view that there is positive relationship between female literacy rate and female health as female literacy has shown inverse relationship with maternal mortality rate. This highlights that literacy of women is more important for lowering infant mortality and maternal mortality. Thus gender equality in education must be considering an important parameter resulting in downtrend of both infant mortality rate and maternal mortality rate.

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