# Mapping gender inequality in child deaths at the local level in India, 1991-2011

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**Introduction**

In most populations, female mortality rates are lower than male mortality rates and females are more than males. This remain consistent across all the ages. Newborn girls have higher survival chances than males because of less vulnerability to infections and other complications. Ratio of male-female infant mortality is greater than one, provided both sexes have equal access to food and medical care. Further, the sex ratio of childhood mortality is expected be greater than one, in the absence of sex-specific differences in the treatment of children. However, South Asia is known for its skewed sex ratio and sex differentials in child mortality (Alkema et al. 2014). Researchers have attributed sex differentials in child mortality as one of the keys factor contributing to its skewed sex ratios in 0–6 year population (Guilmoto, 2008).

The presence of sex differentials in child mortality is well observed in India since 1970s. However, these differences has reduced over the period. Excess female CMR has decreased by almost two-thirds from 13·6 per 1000 livebirths in 1990 to 5·0 per 1000 livebirths in 2012, although it is still has the highest level of excess female CMR in the world. India is the only country to see an increase in the ratio of estimated over expected female CMR (Alkema et al. 2014). Recent Sample Registration System (SRS) 2016 report has also indicated a gap (4 deaths per 1000 live births) in under-five mortality rate among males and females in India. Large inter-state, rural-urban and district differentials are further observed in the level of male-female gap in under-five mortality in India. The male-female gap in under-five mortality was higher in rural than urban areas. While most of the large Indian states show excess female under-five mortality, the discrimination is huge in the states from northern and central part of India. The southern states clearly have much lower child mortality rates and smaller gap in under-five mortality than the rest of the country, while North and West India lag behind (RGI, 2016).

The data clearly indicates an unusual pattern of change in male and female CMR, which can be strongly related to the strong gender bias and discrimination against girl child. The data encourage investigating these findings and examining this phenomenon more closely. Previous studies has highlighted the key factors associated with female disadvantage in child mortality in India for the most recent census (Guilmoto et al. 2011) or older census (Murthi et al. 1995). However, there is huge variation in the way the female disadvantage in child mortality is measured in several studies India. Further previous studies has looked into the female disadvantage in child mortality at one point of time, did not investigate the change in the role of factors associated with female disadvantage in child mortality. The objective of the present study is to study the changing dynamics of female disadvantage in child mortality in India at the district level over the last 20 years. Further, this study also focused to examine the spatial heterogeneity in the effect of demographic, socioeconomic, health environment and gender related factors to the index of female disadvantage in India, which was not at all studied in the previous studies related to male-female differences in child mortality.

**Data and methods**

Registrar General of India conduct Census in India every ten year. Census of India data information at the district-level for the year 1991 and 2011 is used in this study. The districts in 1991 are considered as the reference for the whole study. The last three censuses of India asked all women of childbearing age to report on the total number of children ever born and children surviving. This information for males and female children was used for indirect estimation of under five mortality (Hill, 2013) for males and females at the district level. This indirect method converts the proportion dead of children born to women in each 5-year age group into estimates of the probability of dying by exact ages of childhood, and calculates the number of years before the census or survey date to which the estimates refer. We took the average of the estimates derived from two age groups of women (25-29 and 30-34 years-old) to get final estimates of male and female U5MR. We discard reports from younger women aged 15-24 because of biases related to higher mortality of first-born children. We also discard reports from women older than 35 to limit biases due to underreporting of deaths from the more distant past. The reference dates for $_5q_0$ estimates for males and females in 2011 and 1991 census were respectively 2006-2007 and 1986-1987.

For estimating female disadvantage in child mortality, the difference between the observed ratios of female to male child mortality estimated using census data, and the standard level, obtained from the life tables covering the period 1820 to 1964 for England and Wales, France, the Netherlands, New Zealand, and Sweden have been used as the basis for examining sex differences in child mortality at different levels of overall mortality. Hill and Upchurch (1995) developed this approach to measure female disadvantage in child mortality.

$$I_{i(x,x+n)} = ({}_nq_x^{\,f} / {}_nq_x^{\,m}) - (({}_nq_x^{\,f} / {}_nq_x^{\,m})^S \mid {}_5q_0^{\,m})$$

A positive value of I indicates a female disadvantage (higher female to male mortality than expected given the overall level of male under-5 mortality) whereas a negative value indicates a female advantage (relative to that expected).

The set of explanatory variables considered in this study are captured at district level and constructed from census data (Appendix 1). The proportion of third or higher order births in the districts and population density per square kilometer is included to control for the demographic characteristics of the population. Social variations are reflected in the percentage of population reported as Muslim, the percentage of population belonging to scheduled castes, and the percentage of population belonging to scheduled tribes. Scheduled tribes and castes are officially designated groups of disadvantaged people, comprising respectively 8.6 and 16.6% in the 2011 censuses. The economic condition of the district is measured from percentage of non-agricultural workers, urbanization and percentage of households with access to electricity. The percentage of households with sanitation facilities and the village with access to medical facility are used to reflect the health environment of the district. The gender inequality, a key determinant of female disadvantage in under-five mortality, is captured through ratio of male/female literacy rate and ratio of male/female workers.

**Analysis**

Some district boundaries have changed between 1991 and 2011. For this study, however, the districts in 1991 were considered as the reference, and districts that had been separated in recent years were merged into the original district. In total, we retained 449 districts. We excluded districts from Jammu and Kashmir, Lakshadweep, and Andaman and Nicobar Islands for two reason. First, census was not conducted in Jammu and Kashmir in 1991. Second, due to difficultly in defining spatial neighbors for islands such as Lakshadweep, Andaman, and Nicobar and calculate the bandwidth in GWR.

Local indicators of spatial association (LISA) statistics was used to capture the pattern and magnitude of significant local spatial clusters/outliers of index of female disadvantage (Anselin and Bera, 1998). Spatial dependence in the district-level estimates of each indicator was assessed using Moran's I Index (Global) value. We then applied OLS models to obtain coefficient estimates at the global level. OLS models also helped identify the covariates before moving on to the GWR. Further multicollinearity tests were performed on the list of variables. The multicollinearity was assessed through variance inflation factor (VIF) values. This final list of selected variables was retained for both the OLS and GWR analyses. To explore the varying relationships between index of female disadvantage and socioeconomic predictors, we used geographically weighted regression models. The bandwidth size is determined based on minimum Akaike Information Criterion (AIC). Model comparison between the OLS and GWR regression models were conducted using the Akaike Information Criterion with a correction for finite sample sizes (AICc). The main advantage of using GWR modeling is that researchers can map the local coefficients as well as $R^2$ and better identify spatial heterogeneities (Wang and Chi, 2017).

Following Fotheringham, Brunsdon, and Charlton (2003), the basic equation of the GWR model is expressed as:

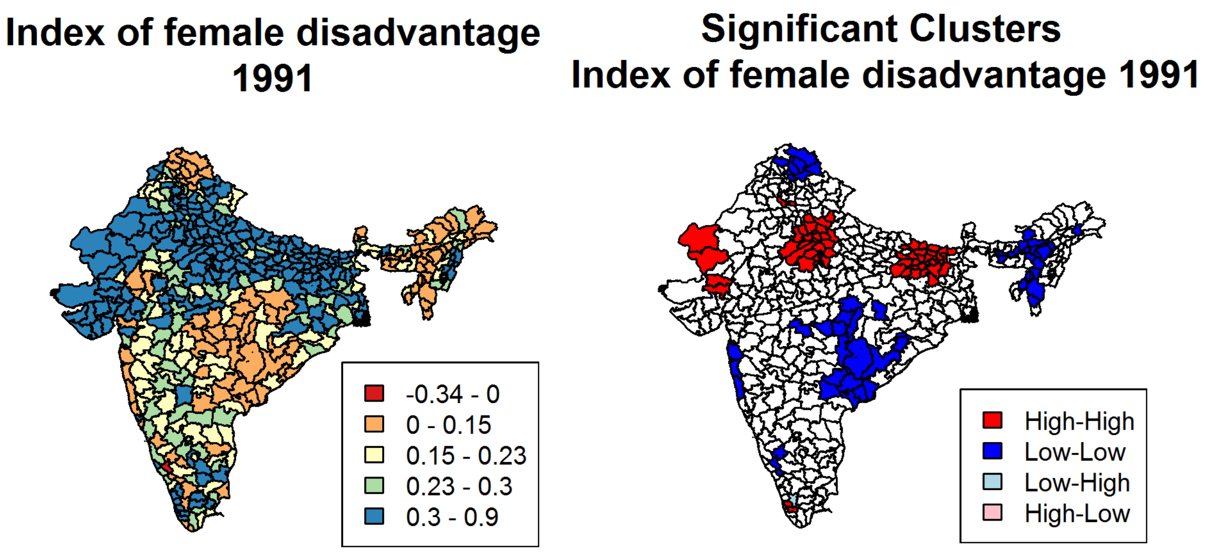
$$y_i = \beta_{0i}(u_i, v_i) + \sum_{n=1}^{k} \beta_{ni}(u_i, v_i) x_{ni} + \varepsilon_i \quad (1)$$

where $y_i$ refers to the index of female disadvantage in the district $i$, $(u_i, v_i)$ denotes the coordinates of the centroid of district $i$, $\beta_{0i}$ is the local intercept for the district i, and $\beta_{ni}$ is the local coefficient for predictor $n$ for district $i$. In GWR models, the regression coefficients were estimated for each district independently by applying district-specific weighting schemes. There are as many 'local' regression models as there are observations (Wheeler and Tiefelsdorf, 2005). The vector of local coefficients is estimated as: $\beta_i = (X'W_iX)^{-1}X'W_iY$ (2) where $X$ is the matrix of independent variables, and $Y$ is the vector of dependent variables. The estimator in equation (2) is a weighted least squares estimator where the weights vary according to the location point of $i$. There are a variety of weighting schemes available for researchers (Fotheringham et al., 2003). We chose the Gaussian weights and their bi-square variations, which are the most commonly used options. Thus in equation (2), $W_i$ is an n×n diagonal matrix with the j-th diagonal element equal to $[1-(d_{ij}/b)^2]^2$ if $d_{ij} < b$ and zero otherwise. $d_{ij}$ refers to the Euclidean distance between location $i$, where the parameters are estimated, and a specific point in space $j$ at which data is observed (Fotheringham et al., 2003). The parameter $b$ is the bandwidth size (i.e., the distance between each observation and its neighboring locations specified by the spatial weights). Finally, we tested for non-stationarity of the local parameter estimates by conducting a non-stationarity test developed by Leung, Mei, and Zhang (2000).

## Results

Index of female disadvantage have reduced from 1991 to 2011 almost everywhere, but there are large variations in the pace of decline (Figure 1). Most female disadvantage estimates based on 1991 census were in the range 0.3-0.9 for the districts in the North and Central part of India and no district with negative values. This signifies that the female were at disadvantage in all the districts of India. Value of index of female disadvantage declined in each district between the two censuses from 1991 and 2001, with a clear cluster of districts in the highest range of 0.3-0.9 reducing. In the last period, 22 districts had a negative value of female disadvantage, which implies that the female have lower mortality than males in these districts. The LISA cluster maps presented alongside the map of Index of female disadvantage display four types of significant geographical clustering. These maps show high-high clusters of female disadvantage in the three pockets of districts located in the northern part of India. On the other hand, the maps show a few cold spots with substantially lower values of female disadvantage in southern India, and a few districts from northeastern and northern India. The most striking findings from this figure is that there has been no considerable change in the number of districts falling in significant "high-high" clusters of female disadvantage in India over the last 20 years.

**Figure 1: Index of female disadvantage in India and significant LISA clusters, 1991-2011.**



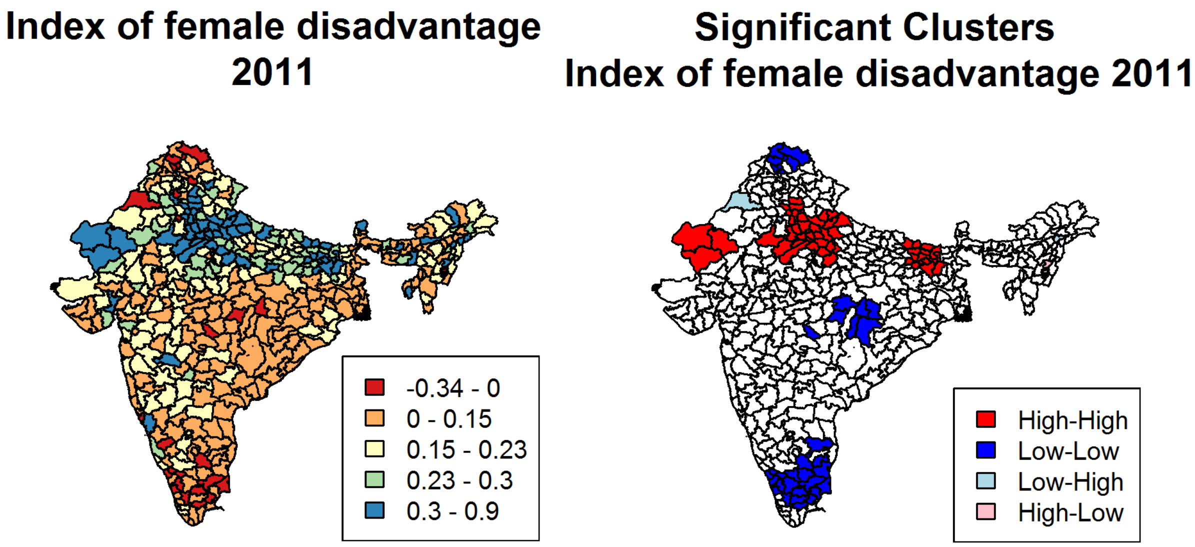



Table 1 shows that Moran's I index value was significant for each of the indicator used in this study. This indicates strongly a significant spatial autocorrelation. Coefficients from the OLS model show the expected relationships between district-level index of female disadvantage and demographic, socioeconomic and health related factors (Table 2). They are also consistent over time. According to estimates from the both censuses, districts with high fertility (here a high proportion of births of third order or more) face significantly higher female disadvantage. Belonging to specific scheduled caste or tribe or Muslim religion leads to lesser female disadvantage. Even the access to medical facility (1991: $\beta=0.0013$, $p<0.001$; 2011: $\beta=0.0006$, $p<0.05$) or sanitation (2011: $\beta=0.0012$, $p<0.001$) was significantly and positively related with index of female disadvantage in child mortality. Higher the level of facility, higher was the index of female disadvantage. However, increased access to electricity, which is a strong indicator of economic condition of the district, is negatively associated with index of female disadvantage in both the periods. Increase in one percent of households with electricity leads to reduction of female disadvantage by 0.0015 points in 1991 and 0.0008 points in 2011. Gender inequality in literacy and workers also contributes significantly to explain variation in female disadvantage in child mortality in India during both census. Proportion of non-agricultural workers was significantly negatively associated with index of female disadvantage only in the year 2011 while population density was significantly related in the year 1991.

Table 1. Moran's I global index for variables in this study, 1991-2011.

| Censuses | 1991 | 2011 |
|---|---|---|
| Index of female disadvantage | 0.6356*** | 0.4101*** |
| Birth order 3+ | 0.7270*** | 0.7216*** |
| Population density | 0.0494* | 0.0667** |
| Scheduled caste | 0.6511*** | 0.6743*** |
| Scheduled tribe | 0.6302*** | 0.6313*** |
| Muslims | 0.5375*** | 0.5475*** |
| Non-agricultural workers | 0.3746*** | 0.4330*** |
| Urbanization | 0.1264*** | 0.3253*** |
| Access to electricity | 0.6397*** | 0.7683*** |
| Access to sanitation | 0.3838*** | 0.6975*** |
| Access to medical facility | 0.5994*** | 0.4474*** |
| Male-female literacy ratio | 0.6499*** | 0.6919*** |
| Male-female workers 15-59 ratio | 0.7286*** | 0.6583*** |

Note : *p<0.05, **p<0.01, ***p<0.001

Table 2: OLS regression estimates of index of female disadvantage, 1991-2011

| Censuses | 1991 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | β | | vif | β | | vif |
| (Intercept) | 0.2089 | *** | | -0.1756 | * | |
| Birth order 3+ | 0.0021 | * | 2.1084 | 0.0060 | *** | 3.26842 |
| Population density | 0.0000 | * | 1.4905 | 0.0000 | | 1.515456 |
| Scheduled caste | -0.0028 | * | 1.9309 | -0.0007 | | 2.040979 |
| Scheduled tribe | -0.0024 | *** | 2.5882 | -0.0007 | * | 3.084556 |
| Muslim | -0.0029 | *** | 1.6345 | -0.0020 | *** | 1.849701 |
| Non-agricultural workers | -0.0012 | | 3.3993 | -0.0011 | * | 3.681546 |
| Urbanization | 0.0008 | | 2.2823 | 0.0006 | | 3.324886 |
| Access to electricity | -0.0015 | *** | 2.1316 | -0.0008 | ** | 3.152941 |
| Access to sanitation | 0.0003 | | 1.8651 | 0.0012 | *** | 3.317461 |
| Access to medical facility | 0.0013 | *** | 1.2989 | 0.0006 | * | 1.437755 |
| Male-female literacy ratio | 0.0458 | ** | 2.0700 | 0.1183 | * | 2.882306 |
| Male-female workers 15-59 ratio | 0.0052 | *** | 1.5010 | 0.0130 | *** | 1.904154 |
| AICc | -481.0695 | | | -727.6631 | | |
| Adjusted $R^2$ | 0.33 | | | 0.31 | | |

Note :*p<0.05, **p<0.01, ***p<0.001

Figure 2 and 3 provides the estimated GWR Local $R^2$ and t-values maps. These maps demonstrate how the identified relationships vary from one district to another and to what extent these local relationships remain hidden in the global model presented in the OLS models. The non-stationarity test results was significant for each of the explanatory variable. This signifies that all the covariates should be treated as local covariates. This observation holds for both the census years. In terms of overall goodness-of-fit, compared to the OLS model, the Quasi-Global $R^2$ is more than 0.6 for both the GWR models (Table 3). The AICc values of the GWR model indicates that the GWR model has a better fit than the global OLS model for both census data (Table 3). Local $R^2$ maps show that the GWR model fits well in most places in India with $R^2$ above 0.5 for majority of the districts in northern part of India. The local model R-square was lower than 0.5 for mainly the districts from the south region, where the value of female disadvantage was more close to 0 and negative in the recent census 2011.

**Figure 2. Local $R^2$ for GWR regression.**

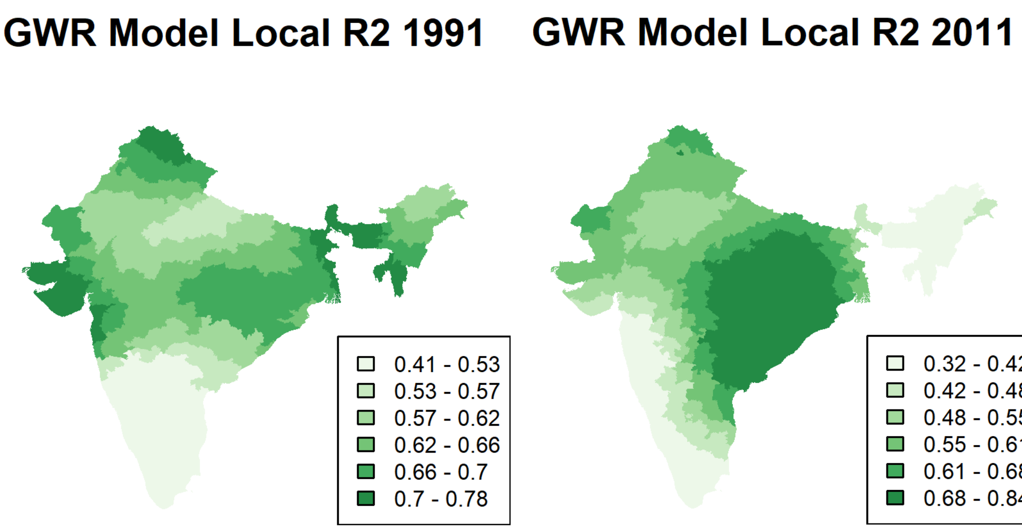


Table 3 . GWR regression estimates, 1991-2011

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1991 | | | |
| Intercept | -0.3461 | -0.1388 | 0.1379 | 0.3054 | 0.8143 | 0.2089 |
| Birth order 3+ | -0.0126 | 0.0007 | 0.0031 | 0.0062 | 0.0104 | 0.0021 |
| Population density | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0000 |
| Scheduled caste | -0.0104 | -0.0048 | -0.0020 | 0.0004 | 0.0045 | -0.0028 |
| Scheduled tribe | -0.0102 | -0.0053 | -0.0040 | -0.0020 | 0.0004 | -0.0024 |
| Muslim | -0.0061 | -0.0045 | -0.0035 | -0.0021 | 0.0028 | -0.0029 |
| Non-agricultural workers | -0.0044 | -0.0029 | -0.0013 | 0.0002 | 0.0033 | -0.0012 |
| Urbanization | -0.0043 | -0.0010 | -0.0001 | 0.0015 | 0.0052 | 0.0008 |
| Access to electricity | -0.0068 | -0.0020 | -0.0003 | 0.0007 | 0.0053 | -0.0015 |
| Access to sanitation | -0.0035 | 0.0001 | 0.0008 | 0.0018 | 0.0046 | 0.0003 |
| Access to medical facility | -0.0007 | 0.0003 | 0.0007 | 0.0016 | 0.0034 | 0.0013 |
| Male-female literacy ratio | -0.1129 | 0.0156 | 0.0432 | 0.0757 | 0.3248 | 0.0458 |
| Male-female workers 15-59 ratio | -0.0112 | 0.0042 | 0.0064 | 0.0120 | 0.0459 | 0.0052 |
| AICc | -617.5696 | | | | | |
| Quasi Global $R^2$ | 0.6993 | | | | | |
| | | 2011 | | | | |
| Intercept | -1.3760 | -0.2168 | -0.0525 | 0.1230 | 0.7330 | -0.1756 |
| Birth order 3+ | -0.0078 | 0.0010 | 0.0026 | 0.0035 | 0.0052 | 0.0060 |
| Population density | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Scheduled caste | -0.0053 | -0.0023 | -0.0015 | -0.0011 | 0.0003 | -0.0007 |
| Scheduled tribe | -0.0027 | -0.0020 | -0.0013 | 0.0000 | 0.0102 | -0.0007 |
| Muslim | -0.0039 | -0.0025 | -0.0005 | 0.0017 | 0.0075 | -0.0020 |
| Non-agricultural workers | -0.0044 | -0.0017 | -0.0007 | -0.0001 | 0.0027 | -0.0011 |
| Urbanization | -0.0030 | -0.0008 | -0.0002 | 0.0008 | 0.0026 | 0.0012 |
| Access to electricity | -0.0026 | -0.0001 | 0.0003 | 0.0009 | 0.0022 | 0.0006 |
| Access to sanitation | -0.0051 | -0.0009 | 0.0006 | 0.0025 | 0.0085 | 0.0006 |
| Access to medical facility | -0.0035 | -0.0015 | -0.0008 | 0.0002 | 0.0150 | -0.0008 |
| Male-female literacy ratio | -0.4126 | 0.0003 | 0.1484 | 0.2735 | 0.6851 | 0.1183 |
| Male-female workers 15-59 ratio | -0.0672 | 0.0039 | 0.0121 | 0.0184 | 0.0295 | 0.0130 |
| AICc | -830.9407 | | | | | |
| Quasi Global $R^2$ | 0.6406 | | | | | |

Note : Test for non-stationarity is significant for all independent variables

Compared with 1991, the positive significant effect of higher fertility on index of female disadvantage was more concentrated in the central and eastern region districts in 2011 (Figure 3.). The significant effect of population density on index of female disadvantage was reduced from districts in the east and northeast region in 1991 to fewer districts in northeast and south in the year 2011. Belonging to scheduled tribe was strongly related to lower female disadvantage in more than 90 percent of the districts in the year 1991. However, this relationship was not significant in few northeastern and southern region districts of India in 2011. The point to note in this finding is that the level of female disadvantage is much lower than the country average for these selected regions in 2011. The significant effect of proportion of scheduled caste showed a tendency of decline from districts in the northwestern region and northern eastern part of India to one cluster of districts in the south India. The effect of increase in muslim proportion was significantly negative with female disadvantage in the districts from the north, central and eastern region of India in the year 1991. However, over the period of time this enhancing effect has reduced to mainly the districts from central and east region of India. The strength of the relationship does vary and even changes direction in some areas for the percentage Muslim measure in 2011. This finding adds to our knowledge base and implies that the relationship between female disadvantage index and proportion of muslim population is place-specific in the recent time.

Significant negative association of proportion of non-agricultural workers with female disadvantage was observed in the northeastern districts in India for both time. This relationship was significant for the east region districts in 1991 and a group of districts in the north of India in 2011. Role of urbanization was positive as observed in OLS model. However, GWR models shows that urbanization effect is positive mainly in the North (2011) and east (1991) and negative in the districts lies in the south part of India. Access to electricity clearly emerged as one of the most significant factor reducing index of female disadvantage at the district level in 2011. The negatively association was observed in the east region (Bihar, Jharkhand, West Bengal, Orissa) in 1991 and expanded even to the central part (Madhya Pradesh, Rajasthan and Gujarat) of India in 2011.
As observed in the global model, access to sanitation facility or medical facilities was positively related with index of female disadvantage at the district level. While the majority of the significant districts experience an increase in index of female disadvantage with increase in medical facility in both the census. However, the significant effect of sanitation facilities at the local level was mainly constrained to the few districts in the central region in 1991 and districts in the east region in 2011. Districts in the northeast region even experience reduction in the index in 1991 with increase in sanitation facilities. This clearly signifies that this relationship is nonstationary and not steady. Gender inequality in literacy ratio was associated significantly positively associated to index of female disadvantage in the North (Punjab, Haryana and Uttarakhand) and in the central region (Madhya Pradesh) in 1991. More recently, this effect is spreading to the neighboring states in the north (Uttar Pradesh) and central part (Rajasthan) in 2011. Similarly, gender inequality in workers ratio was associated significantly and positively to the index of female disadvantage in approximately half of the districts in India in 1991, which lies in the North and Central part of India. However, this was reduced to the one-fourth of districts and more constrained to the northern region of India in 2011. Quite surprisingly, we observed few districts in the south where this association was significant and negative in 2011. This can be related to the workers ratio in this region, which has become more balanced in the recent years.

## Discussion and Conclusions

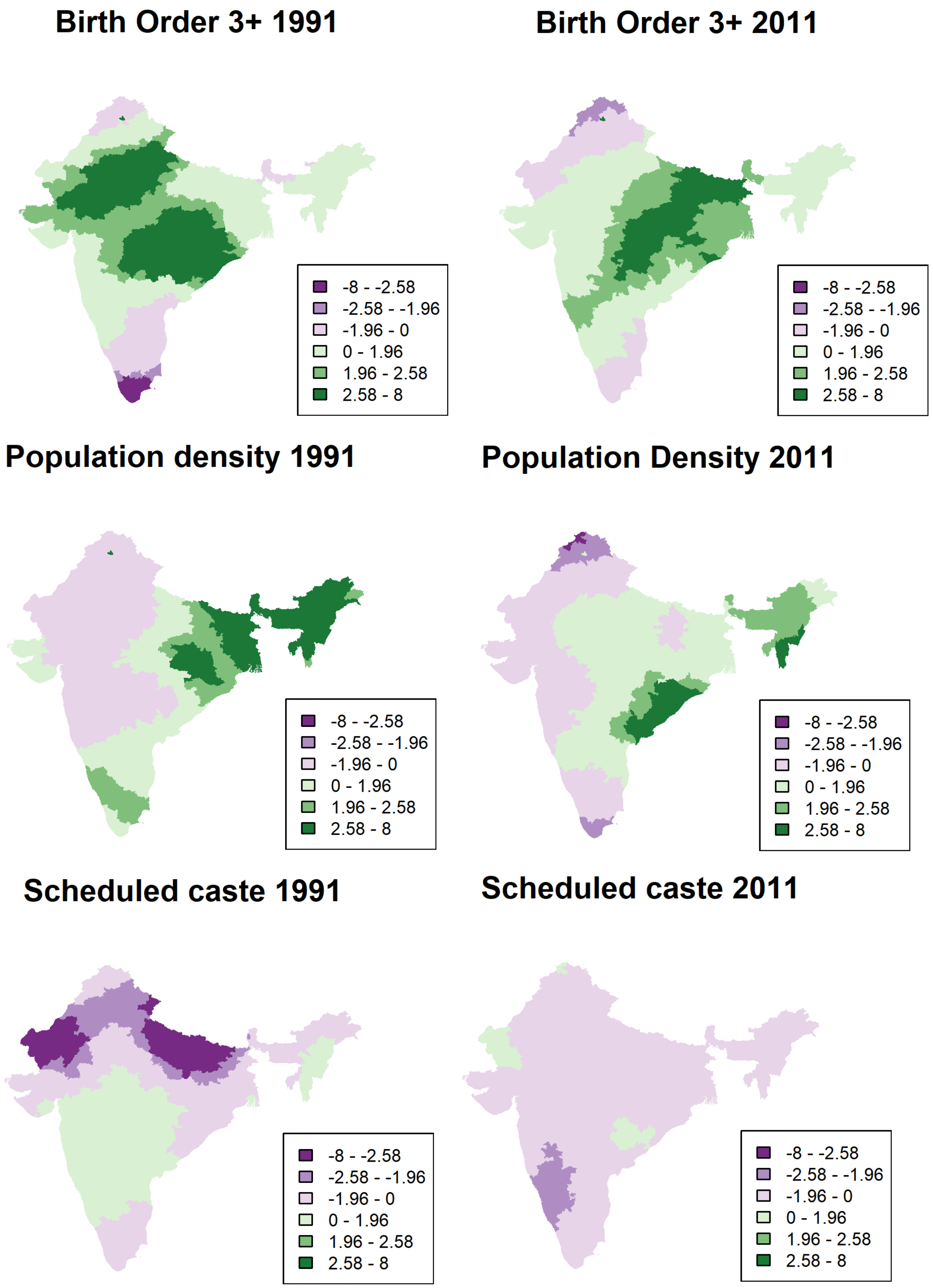
From this study, it is evident that each covariate of index of female disadvantage shows specific spatial variations, which cannot be readily summarized in a simple pattern. The proportion of births of third order (or higher) has been a significant local correlate of index of female disadvantage mainly in the high fertility regions of India. Previous studies in the low- and middle-income countries show that the births from higher order are often not covered by critical maternal and child health interventions, resulting in higher under-five mortality (Sonneveldt, Plosky, and Stover, 2013). However, this study adds to the literature suggesting that female in the higher birth order are worse effected than higher order male births in the high fertility regions. As evident from previous studies, preference of a son tends to be more pronounced among specific religious groups, such as Hindu. This was even observed at the average global level. However, local models indicate that few districts in the south region of India is showing a positive relationship between proportion of Muslim population in a district with index of female disadvantage. Socially deprived groups have lesser preference for sons, which is evident from its negative relationship with index of female disadvantage. This holds well at the global and local levels in India. Increase in gender inequality in literacy and workers and poor economic condition of the districts as measured using proportion of the households with electricity leads to the excess female mortality in India at the local levels, with much stringent effect in the northern and central part of India, where the excess female mortality is the higher than the national average. Role of gender inequality in social development indicators and economic condition is increasing at the local level over the period of last 20 years.

Mortality reduction is a key element of the Sustainable Development Goals (SDGs) with a specific goal addressing the mortality of children under 5 years of age. Simultaneously, gender perspective is also an essential aspect of monitoring global health indicators. Disaggregation of child mortality by sex allows the detection of inequalities, which could be due to the unfair distribution of resources, discrimination, unequal opportunities or differential treatment for girls and boys and tracking gender inequality among children. This study shows that the contribution of each demographic, socioeconomic or health factor vary locally, in a vast country like India. Even accessing the role of predictors at the local level indicates that the important predictors associated with female disadvantage in child mortality in India are not the same across regions. This indicates that tackling gender inequality in child mortality in a regionally diverse country like India is perplexing.

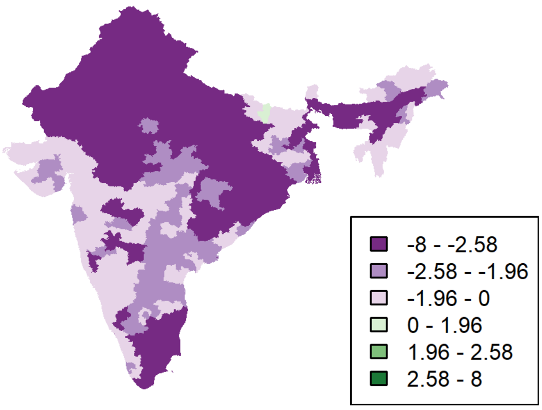
### Limitations

There are also few limitations in this study. To generate district-level estimates, we used indirect methods, but these methods do not allow estimating age-specific mortality rates, impeding the monitoring of neonatal mortality. Second, we constructed our covariates based on censuses only, because we needed them to be available for the whole period of observation. There is a need to further strengthen our database by including other covariates such as those constructed from the different Annual Health Surveys, if they can cover the period 1986 to 2006. Last, since the 2011 census is the last operation considered here, our results refer to the past and may not reflect recent mortality changes.

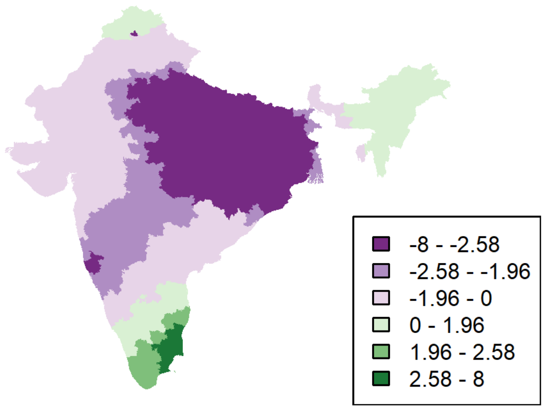
Fig 3. t values map for each independent variable estimated from GWR regression, 1991-2011.



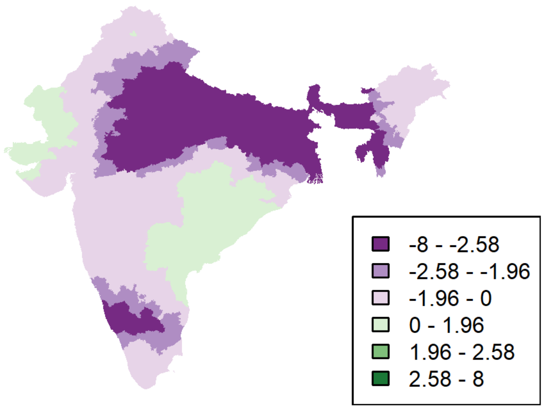
**Scheduled Tribe 1991**



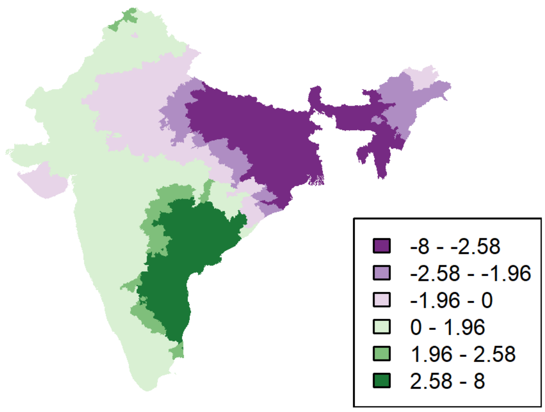

**Scheduled Tribe 2011**



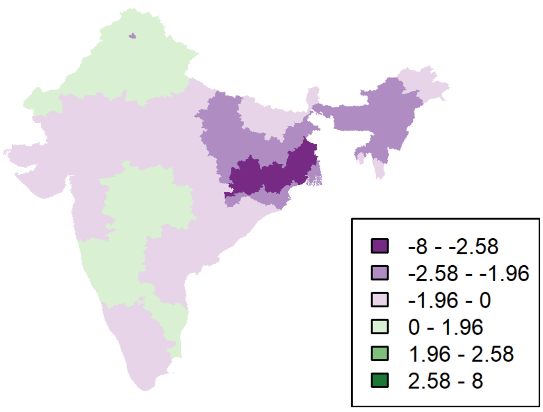

**Muslim 1991**



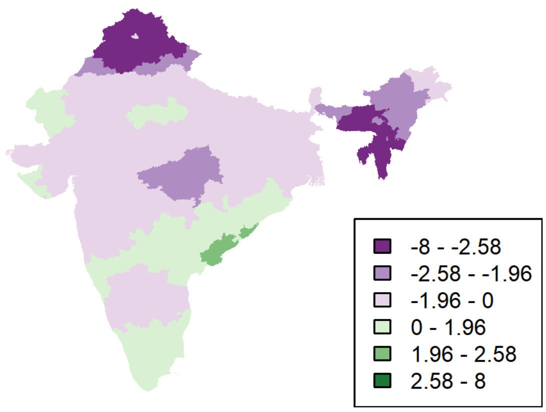

**Muslim 2011**



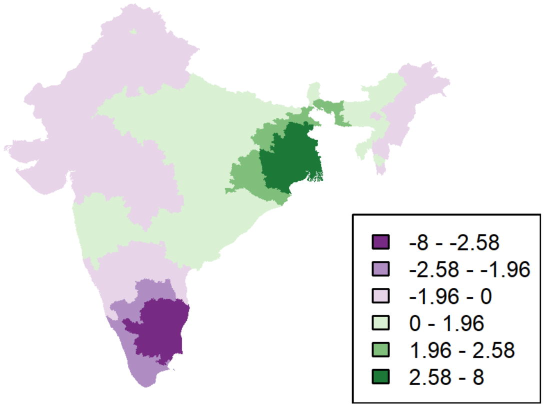

**Non-agricultural workers 1991**



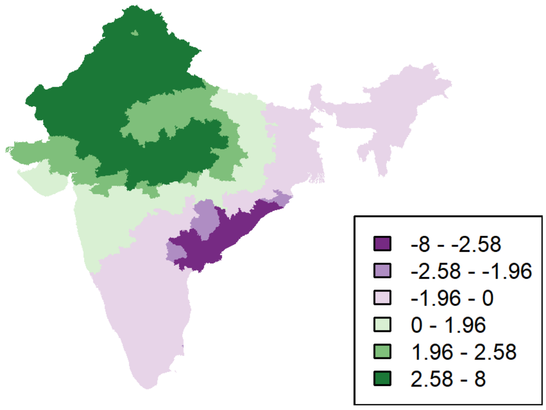

**Non-agricultural workers 2011**



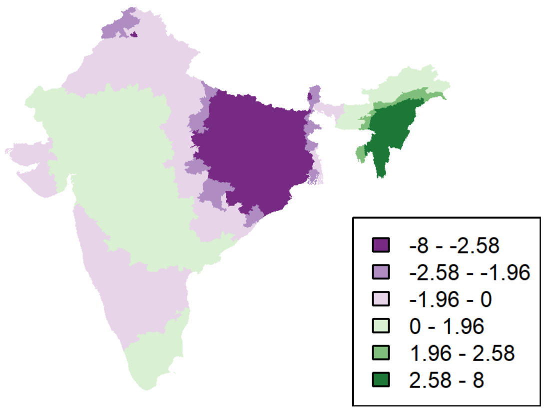
## Urbanization 1991



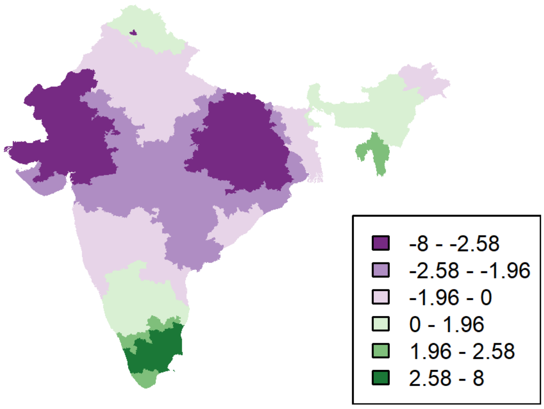

## Urbanization 2011



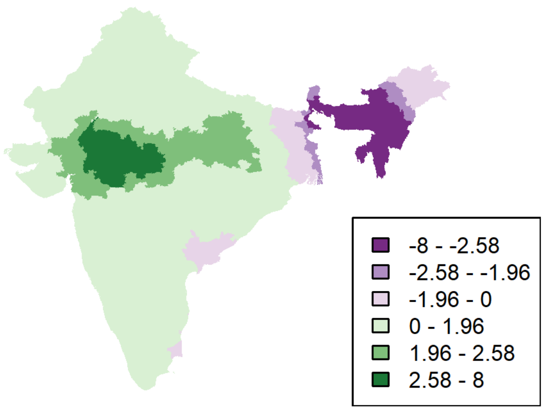

## Access to electricity 1991



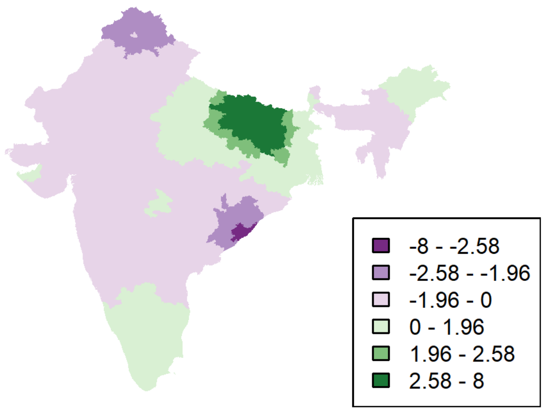

## Access to electricity 2011



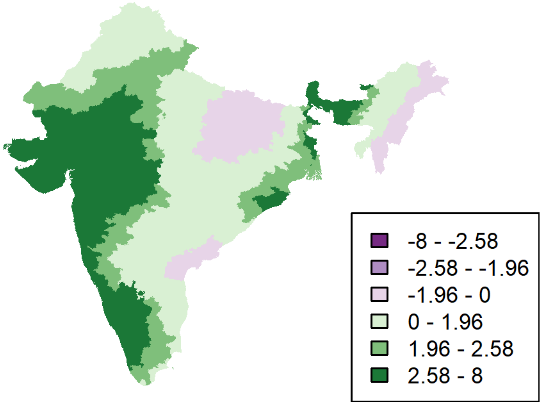

## Access to sanitation 1991




## Access to sanitation 2011



**Access to medical facility 1991**

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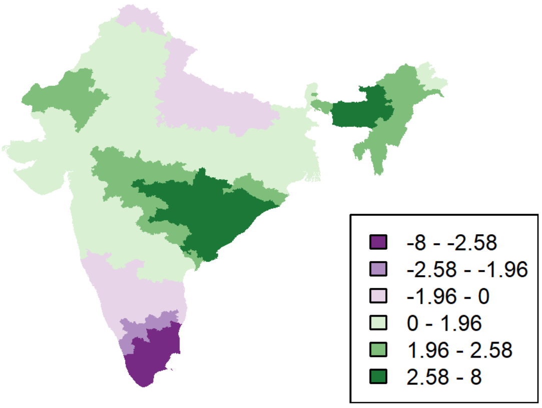
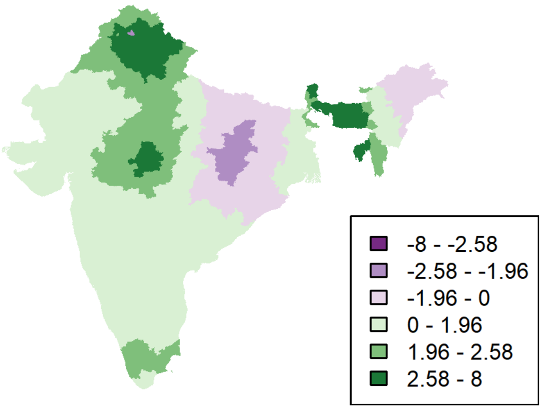



**Male-female literacy ratio 1991**

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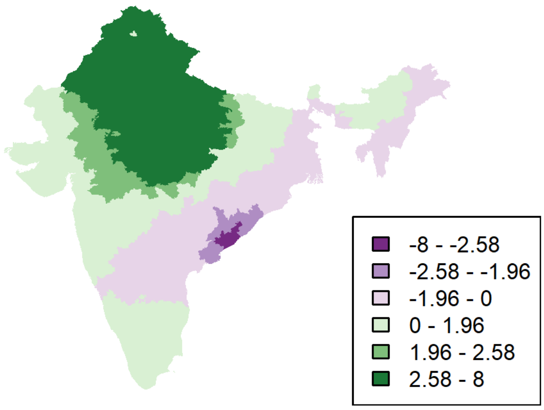
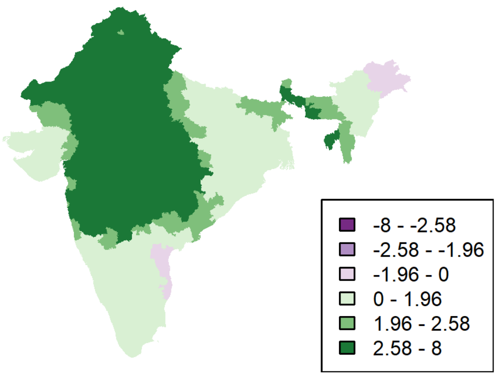
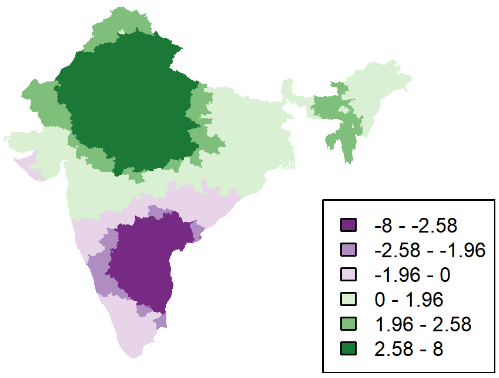



**Male-female workers 15-59 ratio 1991**




**Male-female workers 15-59 ratio 2011**



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Appendix 1

Table 1. Description of variables used in this study.

| | |
|---|---|
| Birth order (3+) | Percentage of third or higher order births in the district |
| Population Density | Number of persons per square kilometer in the district |
| Scheduled caste | Percentage of population belonging to a scheduled caste in the district |
| Scheduled tribe | Percentage of population belonging to a scheduled tribe in the district |
| Muslim | Percentage of population belonging to muslim religion |
| Non-agricultural workers | Percentage of non-agricultural workers in the district |
| Urbanization | Percentage of the population in each district living in urban areas |
| Access to electricity | Percentage of households in each district with access to electricity |
| Access to sanitation facilities | Percentage of households in the district with access to toilet facilities |
| Access to medical facilities | Percentage of villages in the district having medical facilities |
| Male-female literacy ratio | Percentage of male literates/Percentage of female literates |
| Male-female workers 15-59 ratio | Percentage of male workers aged 15-59 years/Percentage of female workers aged 15-59 years |