SRI VENKATESWARA INTERNSHIP PROGRAM
FOR RESEARCH IN ACADEMICS
(SRI-VIPRA)

SRI-VIPRA

Project of 2023: **Report**

SVP-2306

"An Analysis of different Approaches and Structural Model of Female Empowerment: Study of Emerging India"

IQAC
Sri Venkateswara College
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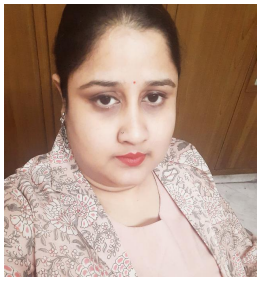
SRIVIPRA PROJECT 2023

Title : An Analysis of Different Approaches and Structural Model of Female Empowerment: Study of Emerging India

Name of Mentor: Dr. Tanuja Sriwastava **Name of Department: Statistics** **Designation: Assistant Professor**	

List of students under the SRIVIPRA Project

S.No	Photo	Name of the student	Roll number	Course	Signature
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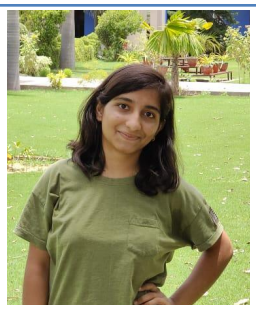
7		Sunita	1921024	B.Sc. Statistics (H)	Sunita

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Certificate of Originality

This is to certify that the aforementioned students from Sri Venkateswara College have participated in the summer project SVP-2306 titled "An analysis of different approaches and structural model of Female Empowerment: Study of emerging India". The participants have carried out the research project work under my guidance and supervision from 15 June, 2023 to 15th September 2023. The work carried out is original and carried out in an online/offline/hybrid mode.

Tanuja Sriwastava

Signature of Mentor
Dr. Tanuja Sriwastava
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Acknowledgements

We would like to express our deepest gratitude to our mentor Dr. Tanuja Sriwastava, Assistant Professor, Department of Statistics, Sri Venkateswara College, University of Delhi, New Delhi for her invaluable guidance, mentorship, and unwavering support throughout the entire research process. Her expertise, encouragement, and constructive feedback were instrumental in shaping this project and enhancing its quality.

We are thankful to our Principal, Professor K. C. Singh (Officiating Principal) for creating this research opportunity, and to the Convener of SRI VIPRA-2023 for providing us with a platform to work, learn and progress.

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INTRODUCTION:

Empowerment is the process through which those who lack authority acquire more control over their circumstances or the capacity to make decisions. Women's emancipation has been a major talking point in discussions of India's socioeconomic and political climate. India is a deeply diverse country that stands out for its many languages, cultures, and traditions as well as the unique and changing status of women across its 28 states and 8 union territories. The journey towards women's empowerment is characterised by a variety of difficulties, victories, and discrepancies that call for an extensive investigation.

In India, several communities have made significant efforts to support the cause of women's empowerment. To examine the situation and pave the path for the empowerment of women across all dimensions of human existence, a number of worldwide conferences have been called. In a growing country like India, the empowerment of women is a complex enterprise that requires the active participation of numerous stakeholders. In order to further the objective of women's empowerment, a number of constitutional measures with a protection and promotion focus have been developed and put into effect in India. In India, the study of women's concerns has recently grown in importance, and creative strategies have been adopted to guarantee women's empowerment and equal opportunity in all spheres of life.

In the middle of the 1980s, the idea of women's empowerment rose to prominence. The safeguarding of human rights had long been an issue for the international community. The adoption of the World Population Plan of Action in 1974, the United Nations Charter in 1945, the Universal Declaration of Human Rights in 1948, the International Conferences on Women in 1975, 1980, and 1985, and the declaration of International Women's Year in 1975 all marked significant steps towards bringing attention to the plight of women around the world. The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and the Decade for Women were established to bring attention to the plight of women who, despite doing a significant amount of the world's work, receive a disproportionately small share of its income and own little property. UNESCO, UNICEF, CIDA, OECD, SIDA, and the Population Council are just a few of the international, national, and organisations that have taken an active interest in the issue of women's empowerment. In addition, research institutes have been set up in renowned institutions all over the world to investigate the best course of action for fully integrating women into development initiatives.

The advancement of gender equality and women's empowerment has become a higher priority in the development agenda over the past 20 years. This focus has been greatly influenced by international conferences including the Beijing Platform for Action, Cairo Programme for Action, and Millennium Declaration. These initiatives recognise the fundamental implications of female empowerment for public policy, as well as its intrinsic and instrumental value. Empowerment is a dynamic process that involves

the redistribution of power among nations, social classes, and genders; it is not merely an outcome. Men are also liberated and empowered by the advancement of women, both materially and psychologically.

The level of women's empowerment in India needs to be evaluated, promoted, and monitored for a number of compelling and urgent reasons, not the least of which is the fact that women typically manage household health and nutrition, making women's empowerment essential for ensuring not only their own welfare but also the welfare of the entire household. The fruits of development must also reach men, women, boys, and girls for such efforts to be successful. Exactly how much of this occurs. The value of one sex in comparison to the other, however, critically depends on gender dynamics within the culture. A final, but one of the most fundamental reasons for promoting the empowerment of women is that failing to empower women as well as men to reach their full potential is a violation of their basic human rights.

Women's experiences are diverse within the boundaries of India. The situations in which women find themselves are extremely diverse, ranging from the busy metropolises of Delhi in Northern India to the isolated villages of the Seven Sisters in the Northeast to the balmy oceans in Southern India. States differ from one another in terms of their educational options, healthcare access, economic prospects, and even the ingrained cultural norms that influence their lives. Therefore, it is fundamentally incorrect to approach women's empowerment in a one-size-fits-all manner. It's essential to comprehend these geographical differences and nuances in order to create methods that are both effective and appropriate for the situation.

An important and ongoing project in India that provides a thorough picture of population, health, and nutrition dynamics is the National Family Health Survey (NFHS), carried out by the International Institute for Population Sciences in Mumbai. NFHS-5, which covers 28 states, 8 union territories, and 707 districts nationwide from 2019 to 2021, is the fifth edition of this extensive study. The massive data collection involved more than 636,000 homes, 724,000 women (aged 15–49), and 101,000 men (aged 15–54), and was carried out in two periods. It is a thorough investigation that covers all aspects of women's lives, employing econometric techniques and statistical tools to cover crucial areas including education, work, health, decision-making participation, and freedom of mobility. We seek to provide not just a cursory glance but a profoundly nuanced understanding of the state of women's empowerment in different Indian states.

In conclusion, women's empowerment is a complicated and diverse idea that has drawn more and more attention on the global arena. It is acknowledged as both a process and a result, and it includes a number of characteristics such as agency, resources, and accomplishments. It is impossible to overestimate the significance of initiatives to empower women, which have been supported by international organisations, national governments, and research institutes. In addition to improving their personal lives, empowered women also help their communities and countries grow and prosper.

OBJECTIVE:

The primary objective of this research project is to analyze and assess the spatial patterns and understanding the correlation between the various factors of women's empowerment in India and its regions through the application of a Spatial Autoregressive Model (SAR) on multidimensional datasets related to empowerment including education, attitudes towards violence, employment, and more. This study aims to uncover the nuanced regional variations in women's empowerment within India by employing spatial analysis techniques and generating informative heat maps at the state level in a Geo informative system. Further various Statistical approaches like Econometrics and Regression analysis have been used to be show a broader perspective.

Specifically, the objectives of this research are as follows:

1. **Division of India states and regions**: For the ease of working and applying econometric tools the paper has been divided into 3 regions specifically- North central, North eastern and Southern India.

2. **Data Compilation**: Gather comprehensive and up-to-date datasets from NFHS-5 section 14 of women empowerment. The various factors considered are as follows-

Participation in decision making -- Table 14.8

Attitude towards violence-- Table 14.15

Ownership of assets – Table 14.23

Employment and Cash earnings -- Table 14.2

Access to money and credit – Table 14.12

All of these tables have been divided according to states and territories and can be accessed by the union ministry of India.

3. **Data Pre-processing**: Clean, harmonize, and pre-process the collected data to ensure consistency and compatibility for spatial analysis and regression.

4. **Regression**: Apply multiple linear regression analysis on the variables and factors chosen from the data and get useful result to be used further.

5. **Spatial Auto Regressive Modeling**: Apply advanced Spatial Autoregressive Models to assess the spatial dependencies and relationships among various empowerment indicators across different states in India. This includes making weight matrix for the neighbouring states and finding out the Spatial lag variable.

6. **Identify Spatial Patterns**: Uncover and interpret spatial patterns and trends in women's empowerment indicators to understand how they vary geographically within India.

7. **Heat Map Generation**: Utilize the results of the spatial analysis to create visually informative heat maps that illustrate the regional disparities and concentrations of women's empowerment, allowing for easy interpretation and comparison among states.

8. **Policy Implications**: Provide insights and recommendations based on the spatial analysis results to inform policymakers, NGOs, and other stakeholders about areas in need of targeted interventions and policies to promote women's empowerment.

9. **Contribute to the Empowerment Discourse**: Contribute to the existing body of knowledge on women's empowerment in India by offering a spatial perspective, which can provide a more nuanced understanding of the dynamics at play and facilitate evidence-based decision-making.

By achieving these objectives, this research endeavours to shed light on the geospatial dimensions of women's empowerment in India, ultimately aiming to drive positive changes that enhance the status and opportunities of women across different states in the country.

STATISTICAL APPROACHES USED IN THE ANALYSIS:

TIME SERIES

A time series is a collection of data points or observations that were gathered or noted across a series of equally spaced time periods. Numerous disciplines, including finance, economics, climate science, engineering, and more, use time series data for a variety of purposes. For creating predictions, spotting patterns, and making wise decisions based on previous trends, it is crucial to comprehend time series data. Whether it's for financial forecasting, demand forecasting, climate prediction, or interpreting historical trends in data, time series analysis is essential to decision-making. It enables us to make defensible decisions based on prior observations and derive useful insights from temporal data patterns.

In time series analysis, a regression equation is used to model the relationship between a dependent time series variable and one or more independent (explanatory) variables. The general form of a linear regression equation in the context of time series analysis can be expressed as follows:

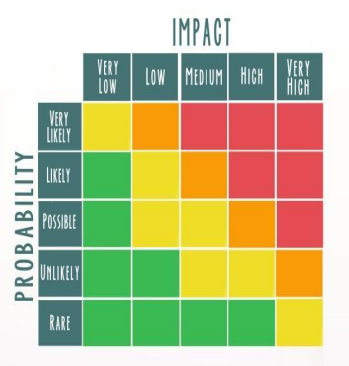
$$Y = a + bX,$$

where X is the explanatory variable and Y is the dependent variable. The slope of the line is b, and a is the intercept (the value of y when x = 0).

ECONOMETRICS

In order to examine and comprehend economic phenomena, test economic hypotheses, and produce forecasts or policy recommendations, the field of economics known as econometrics integrates statistical methods, mathematics, and economic theory. It entails using statistical methods to examine and quantify economic relationships in order to make defensible conclusions using data from the real world.

HEAT MAPS



Heat maps are a data visualization technique used to represent data values in a two-dimensional (2D) space, typically on a color scale. They are particularly useful for visualizing the distribution and patterns within large datasets, especially when dealing with numerical or categorical data. Heat maps use colors to represent the intensity or magnitude of a variable at different points or regions in the data. Heat Maps work in the particular way:

1. **Data Representation**: Heat maps are often applied to a grid or matrix of data values. Each cell in the grid represents a specific data point or location.

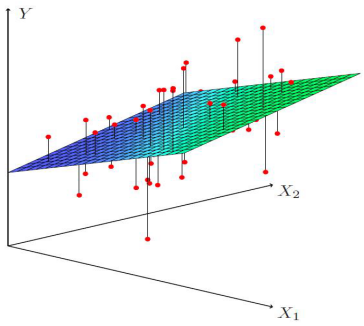
2. **Color Scale**: A color scale is defined to map the data values to colors. Typically, a gradient of colors is used, with one color representing low values and another representing high values. For example, a common color scale for heat maps uses cool colors (e.g., blue) for low values and warm colors (e.g., red) for high values.

3. **Color Encoding**: The data values are then encoded using the color scale. High data values in a cell will be represented by a color from the warm end of the scale, while low values will be represented by colors from the cool end. The color intensity in each cell corresponds to the magnitude of the data value.

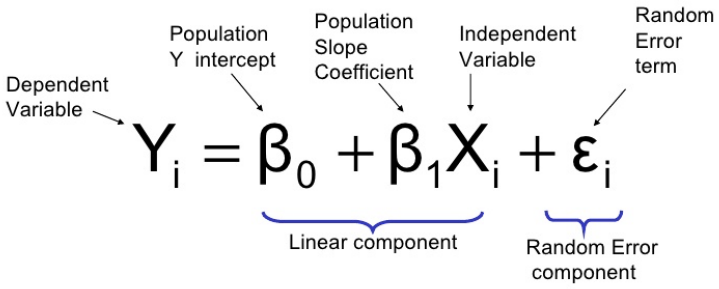
4. **Interpolation**: Often, heat maps use interpolation techniques to smoothly transition between colors in adjacent cells, creating a visually smooth gradient that makes it easier to spot trends and patterns.

Heat maps are a valuable tool for visually representing data by assigning colors to data values, making it easier to identify patterns, trends, and variations within datasets. They are versatile and widely used in various fields for data analysis and decision-making.

MULTIPLE REGRESSION EQUATION



A multiple regression equation is a statistical model used to explain the relationship between two or more independent variables (predictors or factors) and a dependent variable (the outcome you want to predict or explain). While accounting for the effects of the other independent variables, the equation is used to calculate the influence of each independent variable on the dependent variable. The general form of a multiple regression equation is as follows:



Using statistical techniques, we can make predictions or draw conclusions about the relationships between the variables. These coefficients tell us how much each independent variable contributes to the variation in the dependent variable while controlling for the other variables.

Multiple regression analysis assumes that the relationship between the dependent variable and the independent variables is linear, and it uses various statistical methods to find the best-fitting equation that minimizes the error term E

To perform a multiple regression analysis and estimate the coefficients, we use statistical software like R and Python. These tools help us analyse the data and generate the regression equation, as well as provide statistics to assess the model's goodness of fit and the significance of each predictor.

SAR MODEL

In statistics, "SAR" stand for Spatial Autoregressive Model. A Spatial Autoregressive Model is a type of statistical model used to analyse data that exhibits spatial dependencies or spatial autocorrelation. A brief overview of the key concepts and components of a Spatial Autoregressive Model (SAR):

1. **Spatial Dependence**: SAR models assume that the values of a variable in a given location are dependent on the values of the same variable in neighbouring locations. In other words, there is a spatial relationship between the observations.

2. **Weights Matrix**: SAR models typically require the specification of a weights matrix that quantifies the strength of the spatial relationships between locations. This matrix defines which locations are considered neighbours and assigns weights to these neighbours based on their proximity.

A significant operational challenge in spatial econometrics is quantifying the spatial matrix. The spatial autoregressive models in this study use a spatial contiguity matrix. Before introducing the matrix, the first thing we must do is explain what the term "contiguity" means. Contiguity, as the name suggests, reflects the spatial proximity of one regional unit of the sample observation to other regional units. A map's information on the boundaries of spatial units is used to measure boundaries. It is intuitively clear from the map which units are contiguous and which are not. In other words, units are regarded as contiguous or neighbouring if their borders are the same.

3. **Autoregressive Term**: SAR models include an autoregressive term, which represents the impact of neighbouring observations on the value of the variable at a particular location. This term is often expressed as a linear combination of the values of the variable at neighbouring locations, weighted by the corresponding entries in the weights matrix.

4. **Error Term**: Like many statistical models, SAR models include an error term that represents random variability or unexplained variation in the data.

This model says that levels of the dependent variable y depend on the levels of y in the neighbouring regions. It is thus a formulation of the idea of spatial spill overs. A general spatial autoregressive model which is well known as spatial lag model is labelled as SAR in this paper and has been introduced to model cross-sectional data, is described in Anselin (1988) and is given by

$$Y = \rho WY + X\beta + \mu$$

where, Y is (n*1) vector of dependent variable

X is (n*p) vector of independent variable(s)

W is (n*n) vector of spatial weighted matrix

μ is the error term

β is (p*1) vector of parameters associated with X which reflects influence on Y

ρ is coefficient on spatially lagged dependent variable WY.

STATES TAKEN INTO CONSIDERATION:

NORTHERN AND CENRAL STATES OF INDIA:
GUJARAT, RAJASTHAN, MADHYA PRADESH,
UTTAR PRADESH, PUNJAB, HARAYANA,
UTTARAKHAND

SOUTHERN STATES OF INDIA:
KARNATAKE, KERELA, ANDHRA PRADESH,
TELANGANA, TAMIL NADU,
MAHARASHTRA, GOA

SEVEN NORTHEAST STATES:
ARUNACHAL PRADESH, ASSAM, MANIPUR,
MEGHALAYA, MIZORAM, NAGALAND and TRIPURA

VARIABLES TAKEN INTO CONSIDERATION:

1. Employment

Women's empowerment is fundamentally influenced by women's employment and financial gains. They provide the ability to make independent life decisions, access to healthcare and education, and financial independence. Additionally, it is common for women in the job to question gender stereotypes and push for social changes that improve women's empowerment and gender equality.

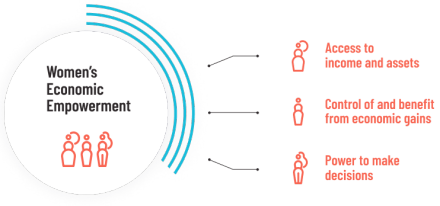
2. Decision Making

Women's empowerment, diverse viewpoints, egalitarian policies, and inclusive government all depend on their participation in decision-making. Increasing the number of women in leadership positions encourages more thorough and representative decision-making, which is advantageous to society as a whole.

3. Access to money

Access to finance is a key driver of women's empowerment. It gives them the freedom to live their lives as they see fit, to spend money on their health and education, to start their own enterprises, and to end cycles of poverty. Financial independence gives women the power to take charge of their lives and fight for their rights in both private and public spheres.

4.Ownership of Assets



Women's empowerment is based on women owning their possessions. It increases their level of economic independence while also giving them more influence over decisions that affect their families and communities. This sense of ownership promotes self-assurance, financial security, and a stronger role in determining their destiny, all of which are crucial components of their overall empowerment.

5.Attitude towards violence

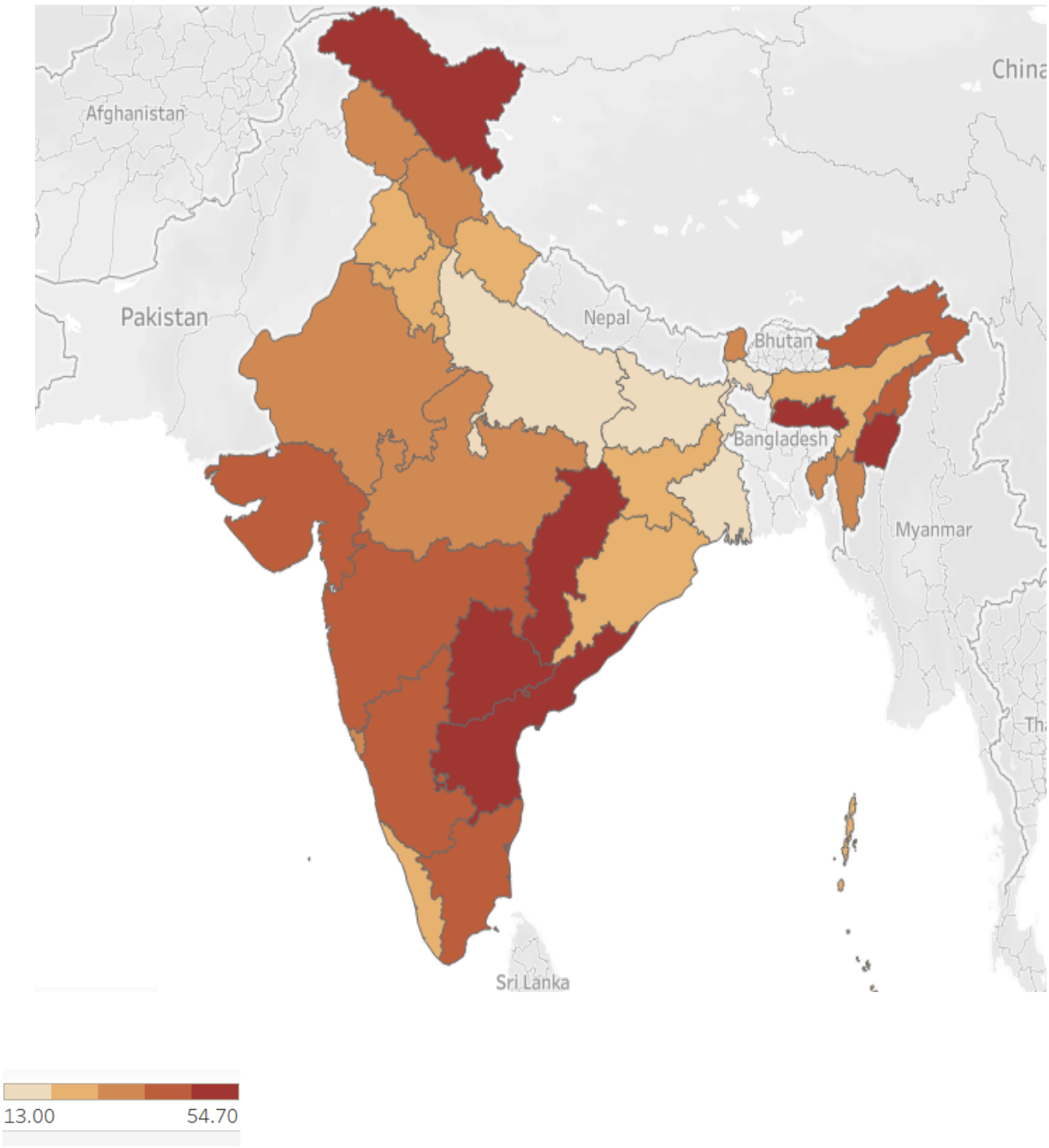
Women's empowerment is greatly influenced by how they feel about violence against them. When women demand their rights to safety and dignity and refuse to accept violence as the norm, it sparks societal change, increases their empowerment, and promotes the fall of oppressive structures that uphold inequality and violence.

6.Education

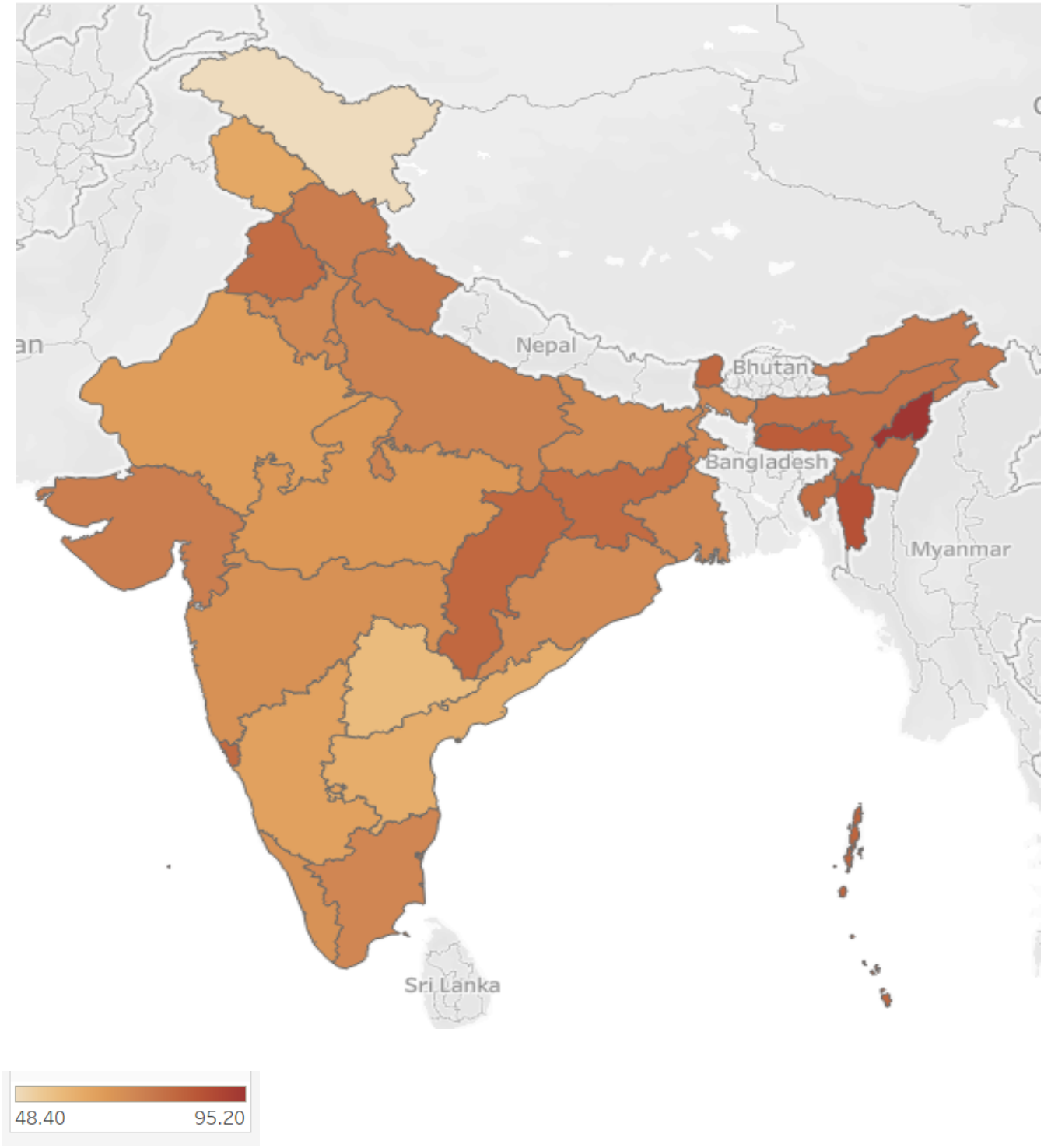
One of the pillars of women's empowerment is education for women. It gives women the information, abilities, and self-assurance they need to achieve their goals, take part in decision-making, and make a meaningful contribution to society. Furthermore, women with higher levels of education frequently have better economic opportunities and are more likely to question gender conventions, which promotes greater gender equality.

HEAT MAPS:

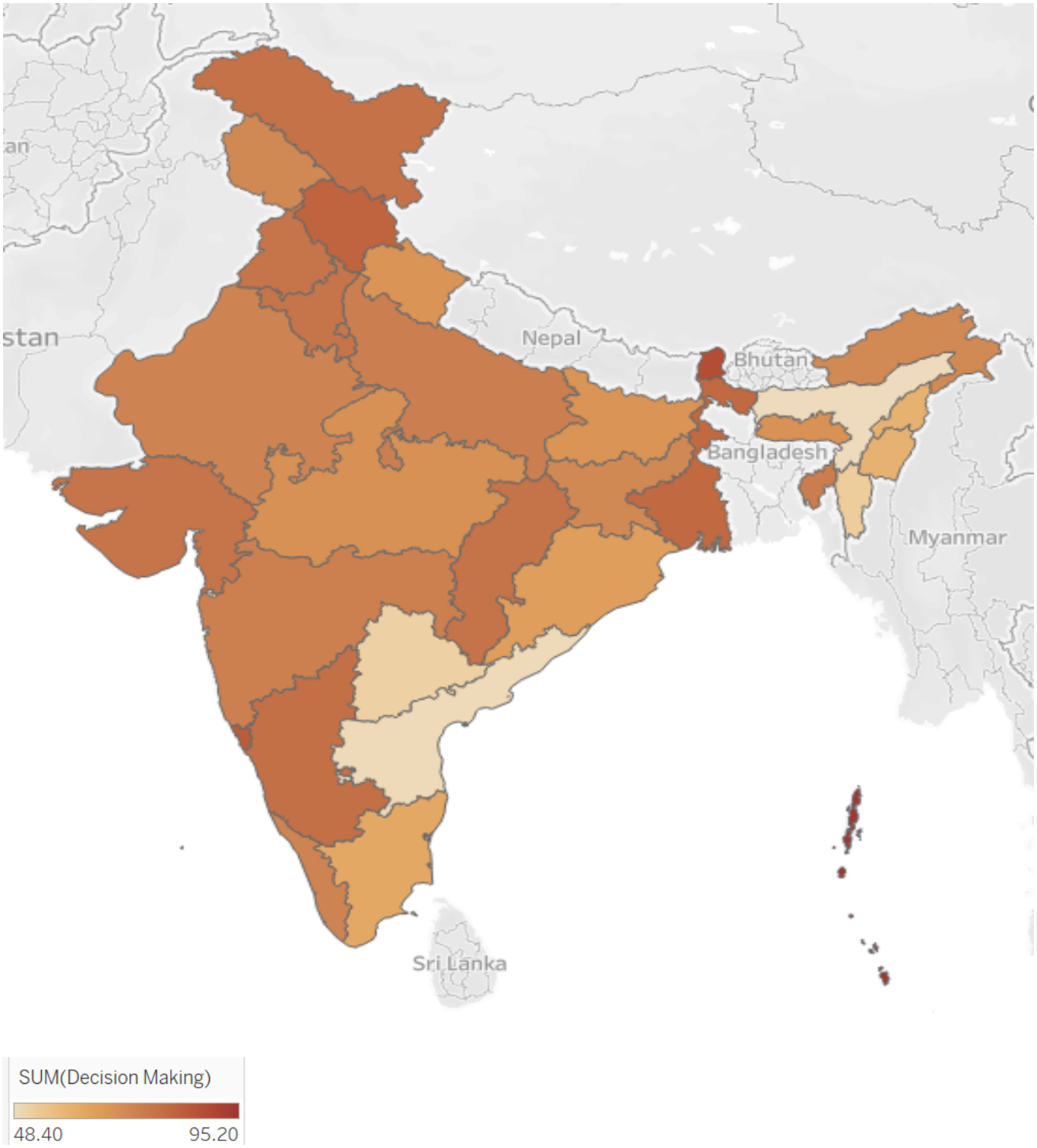
EMPLOYMENT



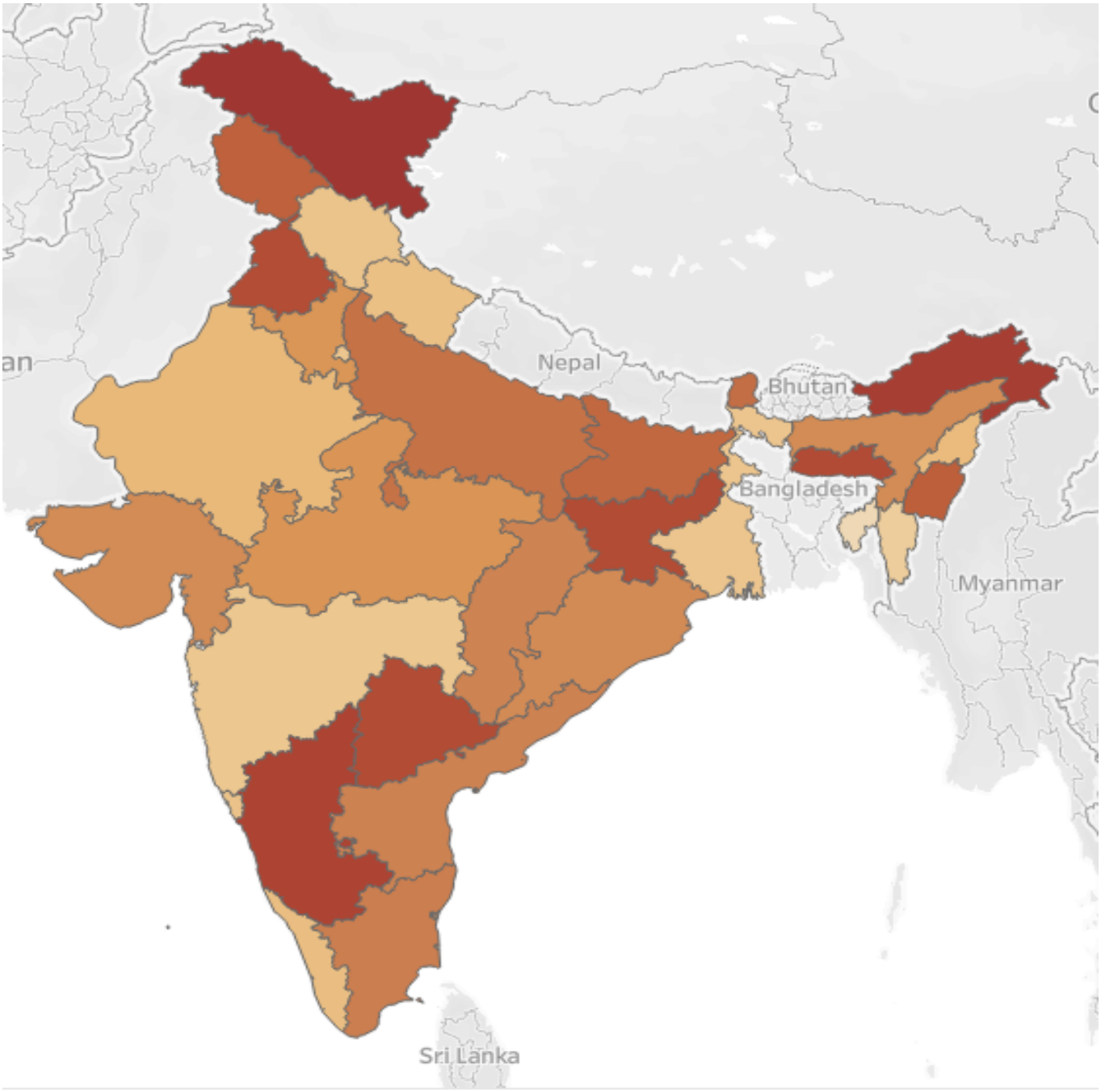
DECISION MAKING



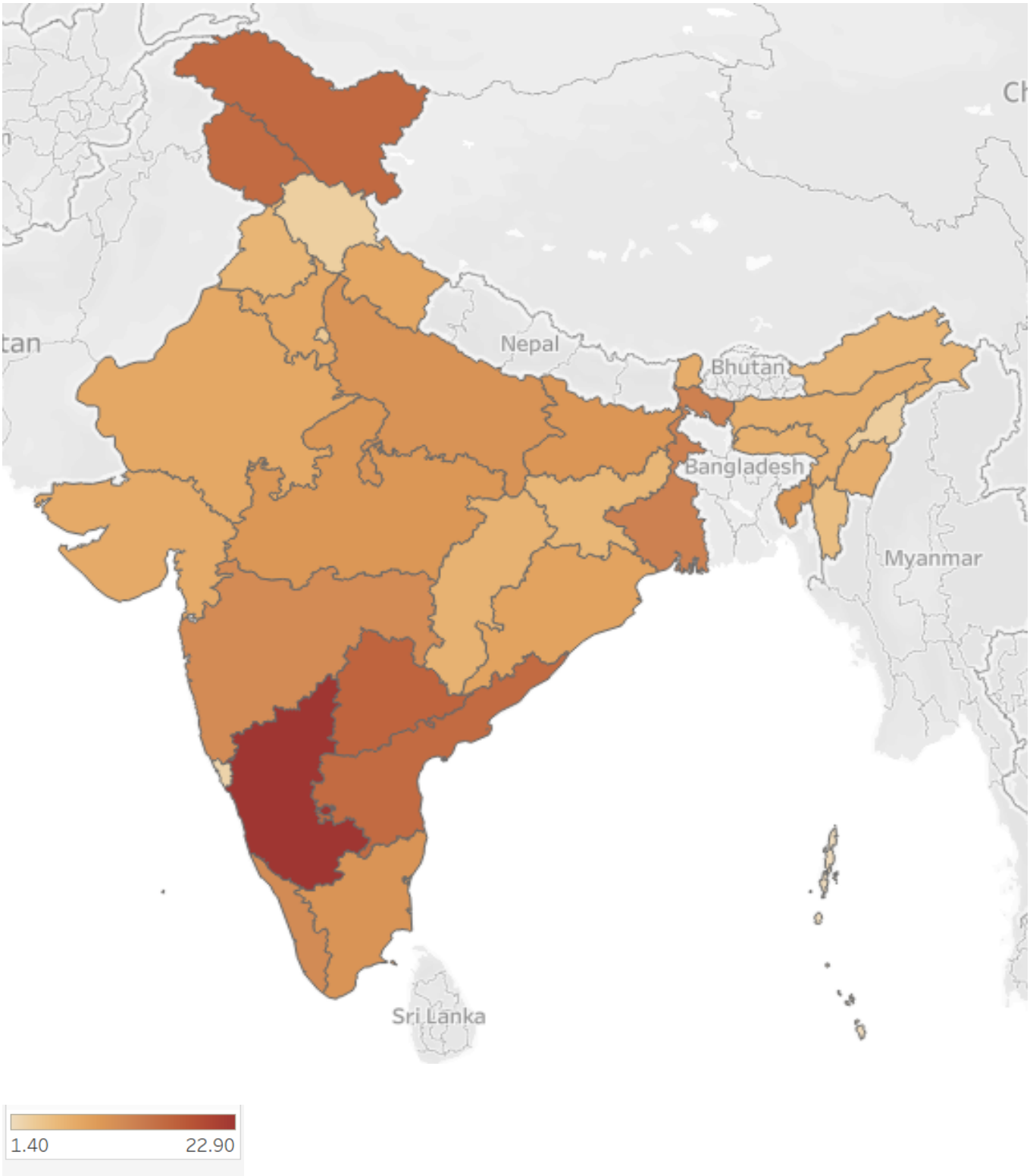
ACCESS TO MONEY



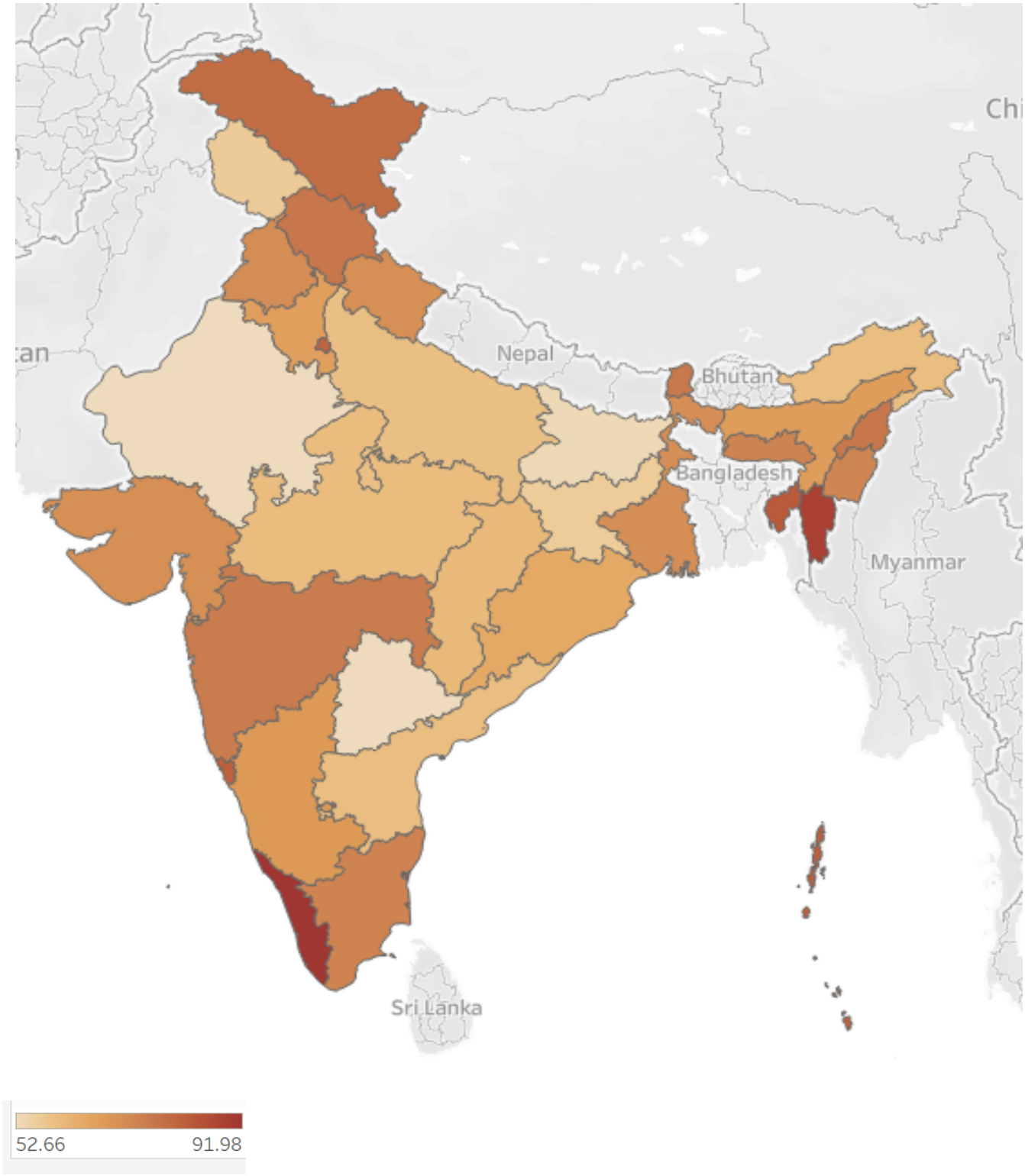
OWNERSHIP OF ASSETS



ATTITUDE TOWARS VIOLENCE


Nepal
Bhutan
Bangladesh
Myanmar
Sri Lanka
1.40
22.90

EDUCATION



MULTIPLE REGRESSION EQUATION:

NORTHERN AND CENTRAL STATES

Data-

States	Employ-ement (X1)	Decision making (X2)	Attitude towards Violence (X3)	Ownership of assets (X4)	Access to money (X5)	Education (Y)
Gujarat	38.2	75	7.6	42.2	57.6	70.73
Rajasthan	30.4	65.8	7.9	26	53.1	52.6
M.P.	37.6	67.5	10.2	38.9	49.4	60.02
Uttar Pradesh	20.6	73.7	10.8	51.2	54.5	59.26
Punjab	24.9	79.6	6.3	63.2	57.2	71.34
Haryana	22	71.9	8.1	38.6	57.2	66.77
Uttarakhand	25.7	76.1	8.1	23.8	48.6	70.7
Himachal Pradesh	30.1	75.3	3	22.4	61.8	76.6
Ladakh	47.7	67.1	16.2	71.9	58	78.85
J & K	30.3	62.5	16	56.6	51.7	56.43
Delhi	22.2	72.1	3.7	21.9	56.6	80.93

The fitted multiple regression equation is:

Y= -87.94 +0.38 X1+1.13 X2+0.72 X3-0.19 X4+1.18 X5

Where X1 is employment

X2 is decision making

X3 is attitude towards violence

X4 is ownership of assets

X5 is access to money

Predicted Value

$\hat{Y} =$ (76. 75 61. 37 60. 87 65. 53 71. 50 67. 66 66. 48 779. 41 72. 45 55. 97 67. 26)

NORTH EASTERN STATES

Data-

States	Employ-ement (X1)	Decision making (X2)	Attitude towards Violence (X3)	Ownership of assets (X4)	Access to money (X5)	Education (Y)
Arunachal Pradesh	43.1	76.4	6.1	68.7	51.6	59.74
Assam	21.8	77.8	7.1	42.2	28.7	67.27
Manipur	53.6	77.7	7.1	57.3	40.0	73.17
Meghalaya	54.7	83.8	7.0	64.1	49.0	73.78
Mizoram	34.0	87.0	5.1	19.4	32.7	89.4
Nagaland	41.2	95.2	3.2	25.4	40.3	76.69
Tripura	32.5	79.5	10.0	15.8	55.2	83.15

The fitted multiple regression equation is:

Y*= 68.6617 + 0.5913 *X1*+ 0.09268 *X2*+ 1.52566 *X3*+(-0.49938*) X4*+(-0.33728*) X5

Where X1 is employment

X2 is decision making

X3 is attitude towards violence

X4 is ownership of assets

X5 is access to money

Predicted Value

$$\hat{Y} = (58.82\ 68.84\ 76.28\ 70.91\ 83.89\ 80.45\ 83.99)$$

SOUTHERN STATES

Data-

States	Employ-ement (X1)	Decision making (X2)	Attitude towards Violence (X3)	Ownership of assets (X4)	Access to money (X5)	Education (Y)
Karnataka	45.8	64.5	22.9	66.2	58.6	68.13
Kerala	29.0	69.3	12.0	24.5	53.4	91.98
Andhra Pradesh	49.8	61.3	16.0	45.6	29.4	59.74
Telangana	53.3	57.4	16.9	63.6	31.8	57.99
Tamil Nadu	46.0	72.7	10.7	47.0	42.6	73.86
Goa	30.4	80.5	2.5	22.8	63.9	84.66
Maharashtra	43.9	69.5	11.9	21.5	54.4	75.87

The fitted regression equation is:
Y= 120.899542+ (-0.216884) X1 +(-0.135347) X2+ (-0.938057) X3+ (-0.004155) X4+ 0.257088 X5
Where X1 is decision making
X2 is ownership of assets
X3 is employment
X4 is attitude towards violence
X5 is access to money

Predicted Value

$$\hat{Y} = (67.52\ 70.25\ 88.10\ 72.73\ 68.18\ 89.58\ 73.64)$$

SPATIAL AUTOREGRESSION MODEL FITTING:
NORTHERN AND CENTRAL STATES

Weighted Matrix (W) for Northern and Central States

	GUJ	RAJ	M.P.	U.P.	PUN	HAR	U.K.	H.P.	Ladakh	J & K	Delhi
Gujrat	0	1/2	1/2	0	0	0	0	0	0	0	0
Rajasthan	1/5	0	1/5	1/5	1/5	1/5	0	0	0	0	0
Madhya Pradesh	1/3	1/3	0	1/3	0	0	0	0	0	0	0
Uttar Pradesh	0	1/6	1/6	0	0	1/6	1/6	1/6	0	0	1/6
Punjab	0	1/4	0	0	0	1/4	0	1/4	0	1/4	0
Haryana	0	1/6	0	1/6	1/6	0	1/6	1/6	0	0	1/6
Uttarakhand	0	0	0	1/3	0	1/3	0	1/3	0	0	0
H. PP.	0	0	0	1/6	1/6	1/6	1/6	0	1/6	1/6	0
Ladakh	0	0	0	0	0	0	0	1/2	0	1/2	0
J & K	0	0	0	0	1/3	0	0	1/3	1/3	0	0
Delhi	0	0	0	1/2	0	1/2	0	0	0	0	0

So, $\rho = 1.0221,$

$\beta = (0.85\ 0.11\ -3.25\ 0.35\ -0.32);\ \mu = (0.82\ -13.98\ -6.22\ -1.17\ -6.41\ 1.2\ 5\ -4.28\ 8.99$

.

Predicted Value

$\hat{Y} = (70.73\ 52.6\ 60.02\ 59.26\ 71.34\ 66.77\ 70.7\ 76.6\ 78.85\ 56.43\ 80.93)$

NORTH EASTERN STATES

Weighted Matrix (W) for North Eastern States is

	A. P.	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
A. P.	0	1/2	0	0	0	1/2	0
Assam	1/6	0	1/6	1/6	1/6	1/6	1/6
Manipur	0	1/3	0	0	1/3	1/3	0
Meghalaya	0	1	0	0	0	0	0
Mizoram	0	1/3	1/3	1/3	0	0	0
Nagaland	1/3	1/3	1/3	0	0	0	0
Tripura	0	1/2	0	0	1/2	0	0

So, $\rho = 0.00122593$,

$\beta = (0.79 \ -0.35 \ 0.46 \ 3.22 \ -0.38)$; $\mu = (2.67 \ -2.31 \ -1.45 \ -0.05 \ 6.$

.

Predicted Value

$$\hat{Y} = (59.74 \ 67.27 \ 73.17 \ 73.78 \ 89.40 \ 76.69 \ 83.15)$$

SOUTHERN STATES

Weighted Matrix (W) for Southern States is

	Karnataka	Kerala	A.P.	Telangana	T.N.	Goa	Maharashtra
Karnataka	1/6	0	1/6	1/6	1/6	1/6	1/6
Kerala	0	1/2	0	0	1/2	0	0
A.P.	0	1/3	0	1/3	1/3	0	0
Telangana	1/3	1/3	0	0	0	0	1/3
Tamil Nadu	1/3	1/3	1/3	0	0	0	0
Goa	0	1/2	0	0	0	0	½
Maharashtra	0	1/3	0	1/3	0	1/3	0

So, $\rho = 0.0005531693$,

$\beta = (-0.756474 \ 1.5955735 \ 1.3231234 \ -0.1143647 \ -0.3104732)$; $\mu = (-$

.

Predicted Value

$$\hat{Y} = (59.74\ 68.13\ 91.98\ 66.54\ 73.86\ 84.66001\ 74.87001)$$

CONCLUSION:

In recent years, spatial econometric approaches have expanded quickly and have been used more and more in empirical studies. The topic of spatial econometrics, which deals with the interaction of spatial dependency and spatial heterogeneity in regression analysis, is generally related to spatial statistics. The term "spatial dependence" refers to the correlation that observations in the sample data set show with respect to their spatial position. The concept of spatial heterogeneity refers to the possibility of systematic spatial variation in the regression models we estimate.

In order to account for within-variable correlation, spatial autoregressive models differ from conventional regression models by having the response variable Y on both sides of the equal sign. The adjective spatial indicates that these other values are chosen based on the geographic proximity of their locations to that of a specific observation, and the right-hand term containing Y consists of values for other observations. To put it another way, spatial autocorrelation is taken into consideration. These regression equations provide descriptions of frequency distributions that, in the most common scenario, are deformed from their normal shapes by rising positive spatial autocorrelation.

In this work, we will concentrate on the theoretical study of spatial econometrics and investigate an empirical application of spatial autoregressive models on NFHS-5 data of Women's Empowerment. Data user here are Education which is takes as base for Women's Empowerment and other five variables that

influence it. Then data were analysed using Multiple Regression method and Spatial Autoregressive (SAR) method. Result shows that

- **i.** Education of women positively affected by Employment, Decision making and Attitude towards Violence in Northern and Central States and North Eastern States.
- **ii.** In multiple regression method and SAR method; SAR method shows the best fitted method to data taken here.
- **iii.** In SAR model fitting the value of $\rho > 0$ for Northern and Central States, this shows there is positive spatial dependence between states.
- **iv.** On the other hand, the value of ρ is positive but approximately zero in North Eastern States and Southern States, this shows there might be cold spots or the regions are not very strongly spatial dependence.

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