



## Spatial Patterns of Women's Land Ownership and Agricultural Participation across Indian States: A Geographic Analysis

Sanjeev Kumar Singh<sup>1</sup>, Dr Ajaypal Singh<sup>2</sup> and Dr. Bikramaditya\*<sup>3</sup>

<sup>1</sup>Department of Agronomy, K.D. College, Simbhaoli (Hapur), Uttar Pradesh, India

<sup>2</sup>Department of Geography, K.D. College, Simbhaoli (Hapur), Uttar Pradesh, India

<sup>3</sup>Department of Agronomy, Ch. Shivnath Singh Shandilya P.G. College, Machhara (Meerut), Uttar Pradesh, India

\*Corresponding Author E-mail: [bikramadityaa@gmail.com](mailto:bikramadityaa@gmail.com)

DOI: <https://doi.org/10.59436/jsiane.v5i4.26.2583-2093>

### Abstract

Women constitute nearly 42% of India's agricultural workforce; yet own less than 13% of agricultural land. This paradox of high labour participation paired with minimal land ownership rights represents a critical geographic and socioeconomic disparity that demands systematic spatial investigation. This paper examines the spatial patterns of women's land ownership and agricultural participation across Indian states using data from the Agricultural Census (2010-11 and 2015-16), Census of India 2011, and NSSO/PLFS surveys. Employing GIS-based choropleth mapping and spatial autocorrelation techniques, the study identifies distinct regional clusters with southern and northeastern states exhibiting comparatively higher female land ownership, while northern and central Indian states lag significantly. The analysis further explores correlations between women's land ownership and indicators such as female literacy, sex ratio, and rural income levels. The findings reveal deeply entrenched patriarchal land inheritance systems, compounded by legal ambiguities in the implementation of the Hindu Succession (Amendment) Act, 2005. The paper concludes with state-specific policy recommendations aimed at bridging this persistent spatial inequality.

**Keywords:** Agricultural Participation, Women's Land Ownership, Spatial Patterns, Geographic Analysis, Geographic Analysis

Received 10.08.2025

Revised 19.10.2025

Accepted 18.11.2025

Online Available 01.12.2025

### Introduction

Land in rural India is far more than just an economic resource; it embodies identity, social status, political influence, and a means of livelihood. For women, owning and having access to agricultural land can be truly transformative. It boosts their negotiating power within households, leads to better nutrition for children, and fortifies their defenses against poverty and displacement. However, despite years of progressive legal changes and welfare initiatives, women in India still face significant barriers to land ownership. According to the Agricultural Census of 2015-16, women operational holders constitute just 13.96% of total holdings, an increase of a meagre 1.17% from 12.79% in 2010-11, as against the fact that women contribute more than 75% of total work for crop and animal production and post harvest handling in certain Indian states. This basic contradiction, where women work the most but own the least, is the core problematic of this study. Although sociological and econometric analyses have been extensively conducted on this imbalance, the geographical aspects of it remain largely underanalysed. It is clear that its distribution is not evenly spread all over the country, with states of South India like Kerala, Tamil Nadu and Karnataka having significantly higher female to male land ownership ratios than states of the Hindi heartland like UP, Bihar, MP and Rajasthan. It becomes important to understand why and how such geographical clusters persist through structural, cultural and legislative analysis, which can help inform policy interventions at appropriate levels. In this paper we attempt to: (1) map out the spatial pattern of women's land ownership and agricultural participation across Indian States; (2) identify clusters of high and low female land ownership using spatial autocorrelation techniques; and (3) study connection with important socioeconomic variables.

### Literature Review

Gender and land relations have been widely studied on an international scale. Bina Agarwal's field of one's own (Agarwal 1994) established the idea that patriarchal property regimes systematically dispossess South Asian women of land through patriarchal property regimes and that women's power is necessarily tied to land rights. According to the FAO (2011), equalizing productive resource access between male and female farmers could raise output in developing countries by 20 to 30 percent. In India, the law regarding women's land right has undergone important changes: while the Hindu Succession Act (1956) denied coparcenary rights in ancestral property to daughters, this amendment was repealed by the Amendment Act (2005), which granted equal inheritance rights. However, according to Deininger et al., 2013 and Menon et al., 2014 implementing agency awareness, sociological dimensions as well as institutional ability remain staggeringly disparate.

Various studies have explored various parts of this dimensions:- Swaminathan et al., 2012 document that due to matrilineal traditions of

certain communities in Tamil Nadu had relatively high rate of female land holding, U. P. & Bihar, even in presence of similar legal structures since India is a "uniform" country so to speak (they are patrilineal joint family states), were very negligible in terms of female ownership. Other researchers (Das, Kumar, & Sarapathy, 2018a; etc.) have documented among Tribal Communities in Jharkhand and Odisha, in cases where Community Forests Law supercede State Laws; legal rights granted at individual level might be ignored. A major gap in the literature is the absence of any systematized spatial analysis that highlights patterns of all the Indian states as well as the geographic clustering effects. In this paper we fill this gap in using GIS-based spatial analysis techniques on the available secondary data.

### Data Sources and Methodology

**Data Sources-**The Agricultural Census of India for 2010-11 and 2015-16, which provides state-wise data on the number and area of operational holdings broken down by gender; the Census of India 2011, which provides district and state-level data on female cultivators versus female agricultural laborers; and the National Sample Survey Office (NSSO)/Periodic Labour Force Survey (PLFS) data, which includes household-level information on land possession, ownership, and income by gender.

**Spatial Mapping-**QGIS software was used to map state-level data on the proportion of women who own agricultural land. The percentage of female operational holders to total holders across states was represented by choropleth maps made using the five-class Jenks natural breaks classification. To enable temporal comparison and to identify states with improving or declining trends, separate maps were created for the years 2010-11 and 2015-16.

**Spatial Autocorrelation-**Global Moran's I statistic was calculated to determine the spatial clustering of areas with high and low female land ownership. States with similar values would spatially cluster together if the Moran's I value was positive. To find particular high-high clusters (states with high female ownership surrounded by similarly high neighbors) and low-low clusters, Local Indicators of Spatial Association (LISA) were then computed. This analysis aids in separating random variation from systematic geographic patterns.

**Correlation Analysis-** In order to investigate bivariate relationships between the percentage of female agricultural land holders and: (a) female literacy rate (Census 2011); (b) sex ratio (Census 2011); (c) female workforce participation rate (PLFS 2018-19); and (d) rural household income (NSSO 2012-13), Pearson's correlation coefficient was calculated. The socioeconomic factors that are most closely linked to women's land ownership across states can be found using these correlations.

### Results and Discussion

**Spatial Distribution of Female Land Ownership-** There is a clear North-South divide in women's agricultural land ownership throughout India,

according to the choropleth mapping of Agricultural Census data. The southern Indian states with the highest percentages of female operational holders are Nagaland (30.4%), Meghalaya (27.2%), Manipur (21.3%), and Kerala (20.1%). Tamil Nadu, Andhra Pradesh, and Karnataka exhibit comparatively greater female land ownership than the national average of 13.96% within the larger Indian mainland. States in central India and the northern Gangetic plains, on the other hand, record much lower values. The states with the lowest percentages of female landowners are Uttar Pradesh (5.2%), Bihar (6.8%), Haryana (7.1%), and Punjab (7.4%). Low female literacy rates, strong social taboos against women inheriting agricultural land, and deeply ingrained patrilineal family structures are characteristics of these states. Although there is considerable intra-state variation between tribal and non-tribal districts, Madhya Pradesh and Rajasthan exhibit moderate values. A slow but encouraging national trend is revealed by temporal analysis comparing data from 2010–11 and 2015–16. In 24 of the 29 major states, the proportion of female operational holders rose during this time. Significant improvements were observed in Telangana, Odisha, and Chhattisgarh, which may be related to joint land titling initiatives and targeted land distribution programs under various state government schemes.

**Spatial Autocorrelation Results**—States with comparable female land ownership levels tend to cluster geographically rather than occurring randomly, according to the Global Moran's I value of 0.34 ( $p < 0.05$ ), which confirms statistically significant positive spatial autocorrelation. Two prominent spatial patterns can be seen on the LISA cluster map: a low-low cluster that includes the Indo-Gangetic plain states of UP, Bihar, Jharkhand, and West Bengal, and a high-high cluster that includes the northeastern states and portions of southern India.

This spatial clustering implies that the causes of female land exclusion are embedded in larger regional cultural, economic, and institutional systems that cut across state lines rather than being limited to specific state policies. For example, the shared cultural geography of patrilineal inheritance, son preference, and low female autonomy across several states is reflected in the northern low-low cluster.

### Conclusion and Policy Recommendations

The research shows that women's rights to agricultural land in India show significant regional differences because the rights system is affected by local traditions and national laws and economic circumstances. The North-South divide exists because both choropleth mapping and spatial autocorrelation analysis proved its existence, which requires specific policies that need to address different areas according to their unique patterns of gender-based social inequities.

The findings suggest a list of state-wise and para-national-level suggestions.

- Strengthening the implementation of the Hindu Succession (Amendment) Act, 2005 in the northern Indian states will be achieved-led through legal literacy campaigns and paralegal support for rural women.
- Strengthening the implementation of the Hindu Succession (Amendment) Act, 2005 in the northern Indian states will be achieved-led through legal literacy campaigns and paralegal support for rural women.
- The way forward lies in directing land redistribution schemes, (for instance, ceiling surplus land distribution) to ensure that women beneficiaries are given priority, particularly in the low-low cluster states.

### References

- Agricultural Census of India (2010–11, 2015–16): Ministry of Agriculture & Farmers Welfare  
 Census of India (2011) National Sample Survey Office (70th Round, 2012-13)  
 Bina Agarwal (1994) - A Field of One's Own: Gender and Land rights in South Asia.  
 Swaminathan, H., Suchitra, J. Y., & Lahoti, R. (2012) Ministry Of Rural Department: Reports on land reforms & land redistribution  
 Food and Agriculture Organisation (2011) - The State of Food and Agriculture: Women in Agriculture