



## RESEARCH ARTICLE

### Infrastructure, Care Burden, and Gendered Citizenship in Tripura

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#### ABSTRACT

Social norms and cultural practices are the common explanatory frameworks in most existing research on gender inequality. The material inequality gap linked to infrastructure and public service delivery has been mostly overlooked. This research gap is the central argument of the present study. Drawing on gendered citizenship as a framework, the study focuses on India's Tripura state, integrating three theories: feminist political economy, political geography, and the capability approach. Gendered citizenship is defined as the unequal capacity of women to access public services and convert legal rights into practical freedoms. The study draws primarily on three secondary data sources: the National Family Health Survey (NFHS-5), the Tripura State Economic Review, and the National Forest Report. It constructs a self-developed Household Infrastructure Index (HII) covering three indicators: access to drinking water, sanitation facilities, and clean cooking fuel. The study employs descriptive statistics, exploratory correlation analysis, and GIS spatial mapping to conduct quantitative and spatial analysis. The study finds that a prominent regional development gap exists within Tripura State. The level of household infrastructure correlates far more strongly with women's reproductive health outcomes, including the secondary education enrolment rate, early marriage rate, and adolescent fertility rate, than public health infrastructure does when considered in isolation. Even some areas with a higher density of grassroots primary health centres still face greater reproductive health vulnerability due to weak household-level infrastructure. This study divides the entire state into distinct gendered citizenship zones and argues that the state's gender inequality is an outcome of spatial production, shaped jointly by unequal infrastructure, governance levels, and capacity building. It calls on the government to implement spatially differentiated intervention policies to simultaneously resolve the three core problems that hinder the conversion of statutory rights into tangible welfare.

#### KEYWORDS

Gendered Citizenship;

Infrastructure;

Care Burden;

Spatial Governance;

Reproductive Health;

Tripura

## **1. INTRODUCTION**

Gender inequality is a long-standing core challenge in the process of contemporary global development, and this issue presents particularly prominent complexity in India, a country with the world's second-largest population. India has recently made significant progress in social and health indicators, viz. female literacy rates, maternal health care, women's political participation, and statutory laws to improve gender equality. However, significant structural gaps still prevail across the geography of the country (United Nations Population Fund [UNFPA], n.d.). India's gender inequality has been mostly explained through immaterial social and cultural norm dimensions. The material dimension has been generally overlooked in terms of accessibility to public infrastructure and services. Access to public infrastructure and services like drinking water, sanitation, clean cooking fuel, education, transportation, and health care, which directly influences women's unpaid care burden, educational attainment, and reproductive health, has been undervalued and overlooked. Sen (1999) and Kabeer (1999), through their capability approach, provided argumentative support and validity to these variables. Dyson (2018) highlighted that India's aggregate national development indicators hide significant development gaps between geographies. The study builds on these gaps and focuses on India's northeastern region, taking references from Barua (2005) and Carlson (2011). The region has been experiencing development imbalances due to unique geographical and ecological settings. The impacts of its development deficit carry distinct gendered characteristics, forcing local women to take on excess unpaid care work. The study ultimately anchors its research site in Tripura State. This study draws on local NFHS-5 data released in 2021 by IIPS and ICF to verify the regional development gap in this state and puts forward its core argument: gender inequality in Tripura State is highly correlated with infrastructure gaps, insufficient state presence, and women's limited capacity to convert resources. This study integrates feminist political economy, political geography, and the capability approach to construct an analytical framework centered on gendered citizenship. It anchors the framework by drawing on the redefined connotation of citizenship proposed by Holston

(2008) and the core explanation of capability inequality put forward by Sen (1999). It plans to investigate regional variations in women's citizenship in this state and adopts three core data sources—district-level NFHS-5 data, official economic assessment reports from the Tripura State government (Directorate of Economics and Statistics, Government of Tripura [DES], 2023), and India's National Forest Report (FSI, 2023)—to examine the spatial distribution differences of three core variables within the state. This study organizes and links three core indicators affecting women's development and verifies that significant differences exist in women's experiences of citizenship across different regions.

## **2. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

### **2.1 Gender Inequality, Reproductive Risk, and Educational Capability**

A review of existing research in the field finds that from the causal logic linking gender inequality and reproductive risk proposed by UNFPA (UNFPA, n.d.) for the South Asia region, to the regional population studies of Dyson (2018), most prior works only explain variations in reproductive outcomes using cultural and individual demographic characteristics. This study breaks through this limitation and argues that region-specific variations related to reproductive issues in Tripura must be explained by structural conditions rather than individual-level factors.

### **2.2 Infrastructure and the Political Economy of Care**

This study uses feminist political economy as its core analytical framework to unpack the deeply intertwined logic linking insufficient public infrastructure supply and gender inequality. First, it defines the scope of unpaid care work, the core concept of this framework, which specifically covers four types of necessary activities that sustain the daily operation of society: fetching water, collecting fuel, doing housework, and caring for family members. Classic studies by Folbre (2001) and Tronto (1993) confirm that this type of labour, which underpins social reproduction, has long been excluded from mainstream economic accounting systems, and its value has never been officially recognized or

quantified. This study further derives its core causal chain: the extra housework burden caused by insufficient supply of three core public infrastructure categories—drinking water facilities, sanitation facilities, and clean cooking fuel—has long been disproportionately borne by women, directly triggering issues including women's time poverty, impaired health, and continuously rising housework workloads. Empirical research by Duflo et al. (2008) supports the significant negative impact of traditional solid fuels on the health of women and children, while the study by Desai et al. (2015) verifies that infrastructure upgrades can deliver multiple positive benefits for gender equality. This study puts forward its core original argument, correcting the widespread cognitive bias that "infrastructure is only a technical engineering issue." It proposes that infrastructure is essentially a social resource that shapes the distribution of opportunities and responsibilities within households and communities, and all analyses of gender inequality must incorporate the core logic that insufficient public supply will shift the burden of care work onto women.

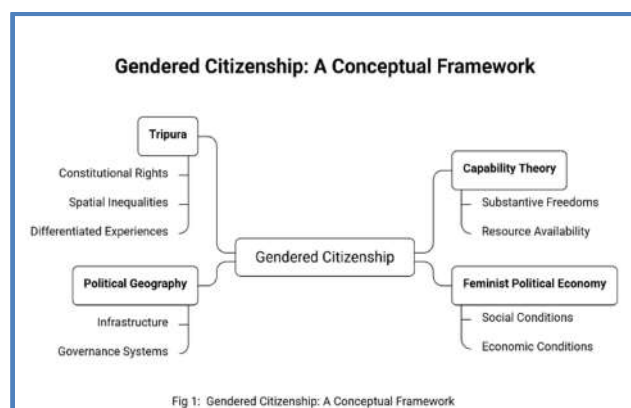
### 2.3 Infrastructure, Governance, and State Presence

Drawing on the complementary political geography research perspectives proposed by Painter (2006) and Jessop (2016), this study defines infrastructure as a material expression of state presence. It embodies the logic of daily governance and determines citizens' access entitlement to public goods and services. Uneven distribution of infrastructure often corresponds to gaps in governance capacity, a pattern that is particularly prominent in geographically peripheral regions constrained by ecological limits. Building on studies of India's Northeast by Baruah (2005) and Karlsson (2011), this work finds that the local infrastructure gaps shaped by overlapping historical marginalization, insufficient administrative capacity, and ecological restrictions continue to block all types of development opportunities. This study further argues that completing infrastructure alone cannot guarantee positive development outcomes, as various barriers will lower service utilization rates. Drawing a clear distinction between accessibility and

effectiveness is critical to understanding gender inequality in the health sector.

### 2.4 Gendered Citizenship: A Conceptual Framework

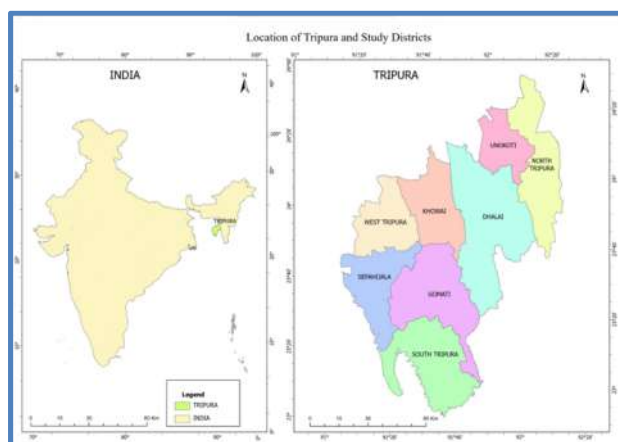
This study first cites Sen's (1999) capability approach theory, which argues that development evaluation should take people's substantive freedom, rather than merely disposable resources, as its core standard. It then draws on the citizenship research perspectives of Holston (2008) and, on this foundation, proposes its core concept, "gendered citizenship," which is defined as women's unequal capabilities in accessing public goods and converting formal rights into substantive opportunities. The study posits that citizenship is a lived experience shaped by routine interactions with infrastructure, institutions, and other related elements, rather than a mere legal status. The framework illustrated in Figure 1 is applied to study how spatial inequalities in terms of infrastructure shape the everyday experiences of women in Tripura, in spite of improved social and health indicators.



**Figure 1.** Gendered Citizenship: A Conceptual Framework

### 3. STUDY AREA

Tripura, a landlocked state in northeastern India with 8 administrative districts situated between latitudes 22°56'N and 24°32'N, and longitudes 91°09'E and 92°20'E, forms the study area (**Figure 2**). The state is surrounded by Bangladesh on three sides and is connected to mainland India only via a narrow corridor on its northeastern edge. The state has unique geographical and ecological conditions, as highlighted in **Table 1**.



**Figure 2.** Study area.

**Table 1:** District wise physical, Demographic, and Ecological Context in Tripura

| District      | Average Elevation (m)* | ST Population (% of district) | Urban Population (% of district) | Forest Cover (% of calculated area) |
|---------------|------------------------|-------------------------------|----------------------------------|-------------------------------------|
| Dhalai        | 132.56                 | 55.68                         | 10.71                            | 79.19                               |
| South Tripura | 52.64                  | 35.45                         | 9.07                             | 73.11                               |
| Gomati        | 82.35                  | 42.7                          | 18.93                            | 74.95                               |
| Khowai        | 91.7                   | 42.6                          | 12.08                            | 70.07                               |
| North Tripura | 143.88                 | 28.05                         | 19.04                            | 77.37                               |
| Unakoti       | 71.87                  | 22.54                         | 14.77                            | 62.9                                |
| Sepahijala    | 43.16                  | 24.69                         | 10.2                             | 62.22                               |
| West Tripura  | 53.75                  | 19.23                         | 64.11                            | 63.11                               |

*Source: ISFR 2023; Economic Review of Tripura 2020-21; \*Extracted from Google Earth by the authors*

#### 4. DATA AND METHODOLOGY

The empirical analysis of this study is based on three types of secondary datasets sourced from external authoritative institutions. This study independently constructs the Household Infrastructure Index (HII), which is synthesized via the equal-weight arithmetic average of three sub-indicators:

- (i) Access to improved drinking water
- (ii) Access to improved sanitation facilities
- (iii) Access to clean cooking fuel

The study also distinguishes two independent core dimensions: first, the household-level HII score;

second, the density of primary health centres (PHCs) per 100,000 people at the public service level. In addition, this study clarifies the corresponding measurement indicators for two core variables: educational capacity and fertility outcomes. For the analysis stage, this study adopts three types of methods, namely descriptive statistics, exploratory correlation analysis, and GIS spatial mapping. Constrained by the limited number of jurisdictional units within the study area, this study only conducts analysis to identify spatial patterns and correlations and does not carry out causal inference. Finally, the study integrates the above three categories of indicators to demarcate gender citizenship regions and interprets cross-regional differences in women's access to opportunities and substantive freedom.

#### 5. RESULTS AND DISCUSSION

##### 5.1 Spatial Inequality in Household Infrastructure

This study conducts an analysis of cross-administrative-region household infrastructure in Tripura, India, and identifies significant regional disparities in infrastructure provision across the state. West Tripura records the highest levels of access to improved drinking water, sanitation facilities, and clean cooking fuel in the entire state, while supply levels in Dhalai and Unakoti are relatively low. The household infrastructure index constructed for this study (as referenced in **Table 2**) verifies a core-periphery distribution pattern. Areas located near core cities generally outperform peripheral regions with complex terrain and low development levels. Such spatial inequalities exacerbate women's unpaid care responsibilities and increase their health risks, representing both a development challenge and a source of gender-based disadvantage.

##### 5.2 Educational Capability and Women's Development

This study takes educational capacity as its core dimension, conducts empirical analysis relying on district-level development data from India's Tripura state, and extends its research scope to topics related to women's reproductive health. Tripura's female literacy rate outperforms that of the vast majority of Indian states, but there are significant gaps in female secondary education completion rates across regions within the state.

**Table 2:** District-wise Household Infrastructure, Capability, and reproductive indicators in Tripura

| District      | Drinking Water (%) | Sanitation (%) | Clean Cooking Fuel (%) | HII   |
|---------------|--------------------|----------------|------------------------|-------|
| Dhalai        | 70.3               | 67.6           | 34.4                   | 57.43 |
| Gomati        | 87.7               | 77.4           | 47.7                   | 70.93 |
| Khowai        | 83.2               | 67.8           | 41.5                   | 64.17 |
| North Tripura | 75.6               | 74.1           | 41.6                   | 63.77 |
| Sepahijala    | 97.4               | 75.4           | 37.1                   | 69.97 |
| South Tripura | 90.5               | 68.6           | 29.4                   | 62.83 |
| Unakoti       | 78.6               | 61.8           | 29.2                   | 56.53 |
| West Tripura  | 98.5               | 80.2           | 65.2                   | 81.3  |

Source: Water, Sanitation and Clean Fuel, (NFHS 5); Female Literacy (Census 2011); Household Infrastructure Index (HII) (Computed by authors)

Literacy rate alone cannot measure the true inequality in the education sector. Secondary education acts as a core support for women to access information, secure stable employment, and gain reproductive decision-making power. The cross-regional educational gaps within the state will eventually translate into unequal development opportunities among groups of women. This transformation logic, which has not yet received sufficient attention, is the core practical problem that this study attempts to clarify and address.

### 5.3 Institutional Infrastructure and Reproductive Outcomes

This study focuses on institutional infrastructure and reproductive health outcomes and identifies a mismatch between the distribution of public medical resources and household

infrastructure: after policies aimed at addressing gaps in underdeveloped regions were implemented, some administrative regions with backward household infrastructure recorded a higher density of Primary Health Centres (PHCs). However, the early marriage rates and adolescent fertility rates in the three districts of Sepahijala, Gomati, and South Tripura remain far higher than those in other regions, and all conclusions are supported by **Table 3**.

### 5.4 Infrastructure, Education, and Reproductive Risk

Building on the analytical framework established in the preceding text, this paper puts forward its core claim: women's reproductive health outcomes are not determined solely by the single factor of access to public healthcare services. This study selects three core observational indicators: the early marriage rate, adolescent fertility rate, and

**Table 3.** District-wise Household Infrastructure Index (HII), capability, and Reproductive Indicators in Tripura

| District      | HII   | PHC Density (per lakh) | Female Literacy (%) | Women ≥10 yrs Schooling (%) | Early marriage (%) | Adolescent Fertility (%) |
|---------------|-------|------------------------|---------------------|-----------------------------|--------------------|--------------------------|
| Dhalai        | 57.43 | 4.23                   | 71.6                | 13.9                        | 38.9               | 26.9                     |
| Gomati        | 70.93 | 2.72                   | 77.2                | 22.8                        | 42.8               | 24.4                     |
| Khowai        | 64.17 | 3.05                   | 80.5                | 18.9                        | 28.3               | 24.3                     |
| North Tripura | 63.77 | 3.83                   | 83.1                | 23.7                        | 34.2               | 11.9                     |
| Sepahij-ala   | 69.97 | 3.1                    | 79.6                | 21.7                        | 51.9               | 26.6                     |
| South Tripura | 62.83 | 4.64                   | 80.3                | 21.6                        | 46.2               | 23.1                     |
| Unakot-i      | 56.53 | 4.34                   | 76.4                | 18.7                        | 38                 | 21.2                     |
| West T-ripura | 81.3  | 2.18                   | 86.2                | 30.9                        | 37.1               | 20.2                     |

Source: Women Schooling, Early Marriage, Adolescent Fertility (NFHS5); Female Literacy (Census 2011); HII and PHC Density (Computed by authors)



reproductive vulnerability. In the Pearson correlation coefficient matrix presented in this paper's **Table 4** (sample size  $n=8$ , including variables such as HII, PHC Density, used only for exploratory analysis and not for causal inference), a preliminary positive correlation between household infrastructure and reproductive well-being emerges, and the impact of women's secondary education is even more pronounced.

To address the paradox of mismatches between infrastructure levels and social development outcomes observed in some zones, this study introduces exogenous classic social science theories to propose the concept of a "conversion gap." All analyses tie back to the core proposition of spatial differentiation. The four zones are, in order: the structurally inclusive zone, which includes West Tripura; the zone with adequate infrastructure but

**Table 4:** Correlation Matrix (Pearson's  $r$ )

| Variables                        | HII   | PHC Density | Women $\geq 10$ yrs<br>Schooling | Early Marriage | Adolescent Fertility |
|----------------------------------|-------|-------------|----------------------------------|----------------|----------------------|
| HII                              | 1     | -0.61       | 0.79                             | -0.67          | -0.58                |
| PHC Density                      | -0.61 | 1           | -0.54                            | 0.32           | 0.21                 |
| Women $\geq 10$ yrs<br>Schooling | 0.79  | -0.54       | 1                                | -0.72          | -0.69                |
| Early Marriage                   | -0.67 | 0.32        | -0.72                            | 1              | 0.76                 |
| Adolescent Fertility             | -0.58 | 0.21        | -0.69                            | 0.76           | 1                    |

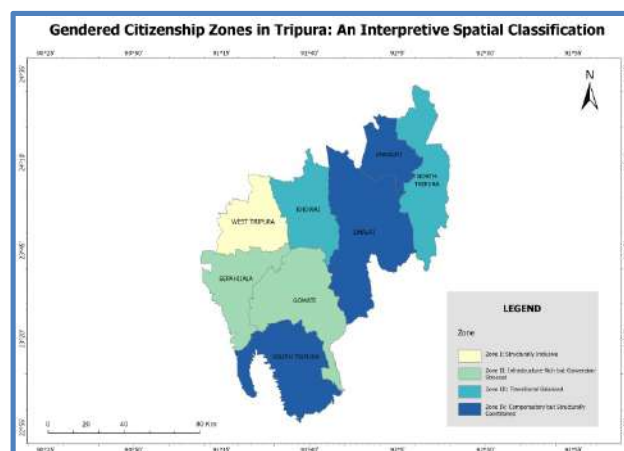
**Note:** Correlations are exploratory ( $n = 8$ ). No causal inference implied.

A more prominent boosting effect is also observed. A study conducted by Saikia et al. corroborates that education can enhance women's reproductive autonomy. Meanwhile, the correlation between grassroots public primary healthcare (PHC) density and the study outcomes is the weakest. It should be clarified that healthcare infrastructure itself still carries inherent value; its utility is only constrained by external social environments, so a single-dimensional intervention approach that relies solely on building more medical institutions is not valid.

### 5.5 Gendered Citizenship Zones

This study draws on three core sets of indicators—household infrastructure, institutional access, and reproductive health—to delineate the spatial patterns of gendered citizenship across India's Tripura state, in order to analyse the characteristics of each sub-region and the internal logic of rights conversion. This study develops an original zoning framework that divides the state's 8 districts into four types of gendered citizenship spatial zones for analysis (Figure 3). All zones uniformly follow the standardized paradigm of "indicator listing - feature positioning - causal inference": first, the unique quantitative indicators for each zone are presented, then the causal logic of rights conversion is derived.

conversion pressures, which includes Gomati and Sepahijala; the transitional balanced zone, which includes Khowai and North Tripura; and the compensatory yet structurally constrained zone, which includes South Tripura, Dhalai, and Unakoti.



**Figure 3.** Gendered Citizenship Zones.

## 6. DISCUSSION

The central findings of the study are that the persisting spatial gender inequality in Tripura cannot be explained merely by social and cultural factors. Variables such as access to public infrastructure and services that shape women's everyday experiences and development opportunities need to be integrated equally.

The theoretical framework of Folbre (2001) and Tronto (1993), with a perspective of feminist political economy adopted for the study, demonstrates the link between access to public infrastructure and women's care burdens. Districts with low access to drinking water, sanitation, and clean fuels often register poorer reproductive and lower educational outcomes.

The infrastructural deficits shift the burden of unmet service needs onto households, and the elevated unpaid care work of women puts constraints on their opportunities to attain education, earning opportunities, and political participation. This study substantiates that household infrastructure has a far greater influence on reproductive outcomes than merely public health care infrastructure. This is reflected in districts like Dhalai, which have a high density of Primary Health Centres (PHCs) but still register high rates of early marriage and adolescent fertility. Meanwhile, West Tripura district performs well on those indicators with lower PHC density. This is exactly what Painter (2006) argues in his theory distinguishing between the mere presence of public infrastructure and its effectiveness.

Public infrastructure and services can produce desirable results only when combined with empowering social and material conditions. This study further point out that, the share of women who have completed 10 or more years of schooling has a strong positive correlation with reproductive outcomes than female literacy. In contrast, districts with higher secondary education attainment register lower rates of early marriage and adolescent fertility. The empirical findings of this paper support the conclusions of prior research by Saikia et al. (2016). We argue that education holds a dual nature: it functions both as a "development outcome" and a "core mechanism for women to control their life trajectories."

We also expand the spatial analysis dimension: in the ecologically constrained peripheral zones of northeast India, weak infrastructure and high female reproductive vulnerability are widespread. This geographic pattern is tied to regional remoteness, unequal national investment, and long-term historical marginalization, an inference that corroborates the findings of studies by Baruah (2005) and Karlsson (2011).

## **7. CONCLUSION**

The study is primarily based on secondary data using a gendered citizenship framework. The study has two fundamental findings.

First, there exist spatial development gaps between the districts of the state. Household infrastructure and women's secondary education levels have stronger positive correlation with fertility outcomes than public healthcare infrastructure alone.

Second, educational capacity is fundamental to women's reproductive autonomy. Women with higher secondary education attainment generally have lower rates of child marriage and adolescent fertility, which confirms the critical role of capacity building. This study originally proposes the concept of "Gendered Citizenship Zones," adding a spatial perspective to gender inequality analysis for the state. It points out that the actual experience of citizenship varies due to differences in cross-district access to infrastructure, public services, and development opportunities, and women's ability to convert legal rights into substantive freedom shows significant spatial differentiation.

We argue that Tripura's gender inequality must be interpreted from the dimensions of spatial governance and infrastructure justice. Policies to improve women's well-being must abandon one-size-fits-all uniform plans, prioritize investments in household infrastructure, women's access to education, and efficient public service delivery, to reduce women's care burden, expand the boundaries of their capabilities, and strengthen their substantive citizenship.

This study has limitations of relying solely on district-level secondary data and including a limited number of spatial units. Future research can incorporate household-level survey data and time-use data, and adopt qualitative research methods, to further explore the links between relevant factors and women's real experiences of citizenship.

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## CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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