

Do Shared History and Language Synchronize Fertility Rates between Regions across Countries? Evidence from India and Bangladesh

Manisha Chakrabarty

Amita Majumder

Ranjan Ray

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Background

Do we need to consider a country as a unit in international comparison and ignore shared history beyond international border?

Can strong cultural links bridge country divide?



Bangladesh

India

West Bengal

A good example is West Bengal (India) whose cultural and language identity are closer to East Bengal (East Pakistan, that became Bangladesh in 1971) than to regions in North, South and Western India. Both Bengals share a common language and a literature whose richness is recalled with pride on both sides of the border.



Framework

Total Fertility Rate (TFR) measures the average number of births a group of women would have by the time they reach age 50 if they were to give birth at the current age-specific fertility rates. TFR is expressed as the average number of births per woman.

- Comparison of the Total Fertility Rate and its relationship with key determinants between culturally aligned regions constitutes the methodology for the exercise.
- The study examines which identity is stronger- shared history and language or national?
- A three-way comparison of TFR between
 - (i) West Bengal and its neighbouring States that share a border with it, [[West Bengal and her neighbouring states in India share a common national identity but differ in their language, tradition and cultural practice,](#)] and
 - (ii) West Bengal & Bangladesh (also referred to as East Bengal) [[West Bengal and East Bengal share the common Bengali language, literature and cultural practice but have different national identities and religious compositions of their populations.](#)]
 - (iii) Bangladesh & Neighbouring states in India excluding West Bengal [[Though they share a common border, language is different](#)]
- One should note, however, that as many decades have elapsed since India's independence and the partition of Bengal, the cultural links between West Bengal and Bangladesh may have weakened. Moreover, since West Bengal has Hindu majority, while Bangladesh has Muslim majority, the finding of Arunachalam and Morgan (2004) that Muslims are more likely than Hindus to have additional children and less likely to use contraceptives will also drive a wedge between their cultural synergies in the context of fertility comparison.

Existing Studies

- Multi-country Analysis: Angeles (2010), Dreze and Sen (2013), Madsen, Moslehi and Wang (2018), Dev, James and Sen (2002) . However not considering the fact of cultural identity.
- Fernandez and Fogli (2006) who examine the effect of culture on fertility rate of women in the USA from different ethnic backgrounds using the total fertility rate in the woman's country of ancestry as a cultural proxy.
- Basu and Amin (2000) found historical, cultural, and political factors are responsible to create a unique trajectory in both parts of Bengal.
- Das and Husain (2020) provide a comparison between two Bengals, but while their study focussed on comparing the fertility decline between the two Bengals, we extend our analysis to West Bengal's neighbouring states and other determinants . Das, Husain and Ghosh (2020) also distinguish between border and non-border districts but restrict the comparison to West Bengal and Bangladesh, hence ignore point (i) of our study and therefore fails to address the question of which linkage is stronger?

Data

- District-level data mainly from two sources, viz., (a) Census data of India and Bangladesh for the years 2001 and 2011 and (b) the DHS data sets for India (National Family Health Survey (NFHS)) for the years 1998-99 (NFHS-2) and 2015-16 (NFHS-4) and for Bangladesh (Bangladesh Demographic and Health Surveys (BDHS)) for the years 1999 and 2014.
- For India, we consider states like Assam, Bihar, Jharkhand, Orissa and Sikkim which comprise the neighbouring states of West Bengal and Assam, Meghalaya. Mizoram, West Bengal and Tripura share common borders with Bangladesh. For Bangladesh, districts/zilla under all the 8 divisions have been considered.
- The divisions are: Barishal, Chittagong, Dhaka, Mymensingh, Khulna, Rajshahi, Rangpur and Sylhet. However, Mymensingh came into being after 2001. Previously, the districts under this Division belonged to Dhaka Division.

TFR

NFHS/BDHS based TFR, nearest with the census periods [1999 ~ 2001 & 2014 ~ 2011] following Schoumaker (2013) using data on birth history of individual ever married women.

| Country/ Region | Census* | | NFHS/ BDHS | |
|---|---------|------|------------|------|
| | 2001 | 2011 | 2001 | 2011 |
| India | 3.20 | 2.70 | 2.82 | 2.44 |
| Bangladesh | 3.07 | 2.14 | 3.13 | 2.39 |
| West Bengal (WB) | 2.64 | 2.00 | 2.37 | 1.89 |
| Neighbouring States** Bordering with WB | 3.91 | 3.55 | 3.31 | 3.13 |

**Assam, Bihar, Jharkhand, Orissa and Sikkim

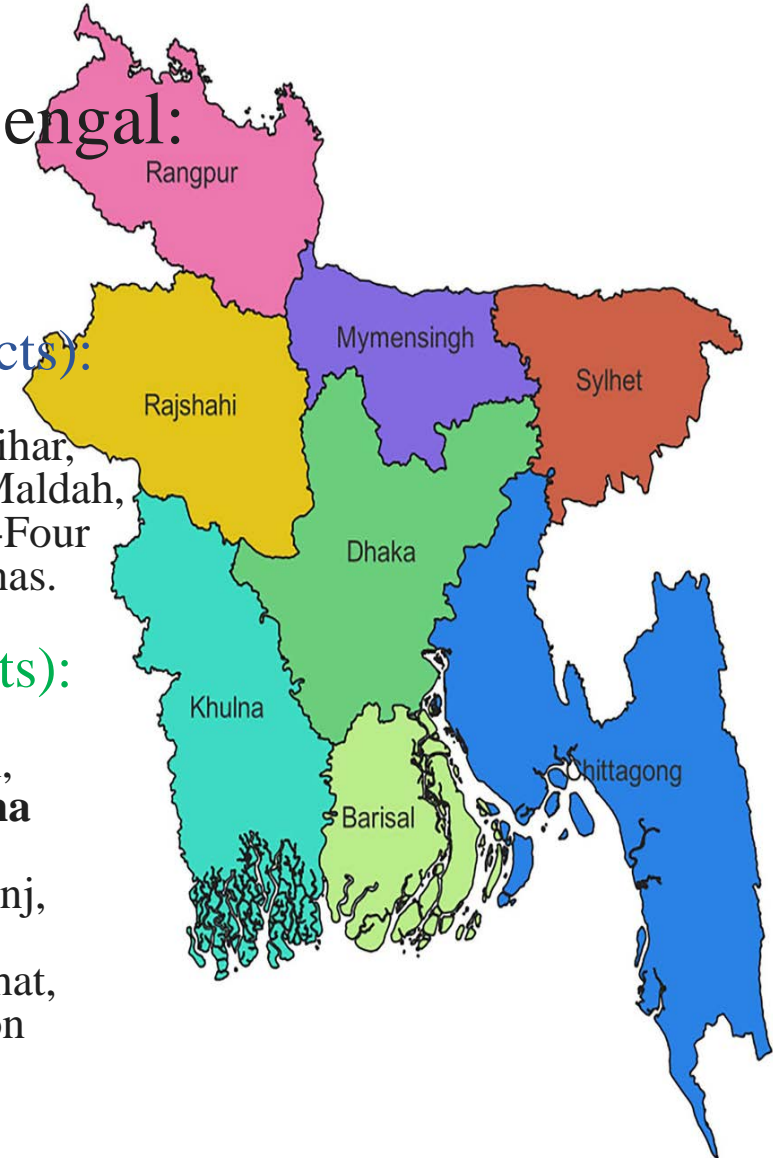
Border Districts of Bangladesh and West Bengal: 2011

West Bengal (10 Districts):

Darjeeling, Jalpaiguri, Koch Bihar, Uttar Dinajpur, Dakshin Dinajpur, Malda, Murshidabad, Nadia, North Twenty-Four Parganas, South Twenty-four Parganas.

Bangladesh (16 Districts):

Chuadanga, Jessore, Jhenaidah, Kushtia, Meherpur, Satkhira (**Khulna Division**),
Joypurhat, Naogaon, Nawabganj, Rajshahi (**Rajshahi Division**)
Dinajpur, Kurigram, Lalmonirhat, Nilphamari, Panchagarh, Thakurgaon (**Rangpur Division**).



Interesting Facts from descriptive statistics

| Comparison between Border Districts of | Group | No. of Observations | Mean TFR | Absolute Difference in TFR |
|--|---|---------------------|----------|----------------------------|
| Bangladesh and West Bengal | Bangladesh Border Districts with West Bengal (WB) | 16 | 2.090 | 0.122 (0.524) |
| | WB Border Districts with Bangladesh | 10 | 1.968 | |
| Bangladesh and States Other than West Bengal | Bangladesh Border Districts with Rest of India | 14 | 2.767 | 0.537** (0.027) |
| | Rest of India Border Districts with Bangladesh | 15 | 3.304 | |

Two sample t-test for Equality in Mean Values of TFR between Border Districts of India and Bangladesh (2011)

These bordering states are Assam (3 districts), Meghalaya (5 districts), Mizoram (3 districts) and Tripura (4 districts).

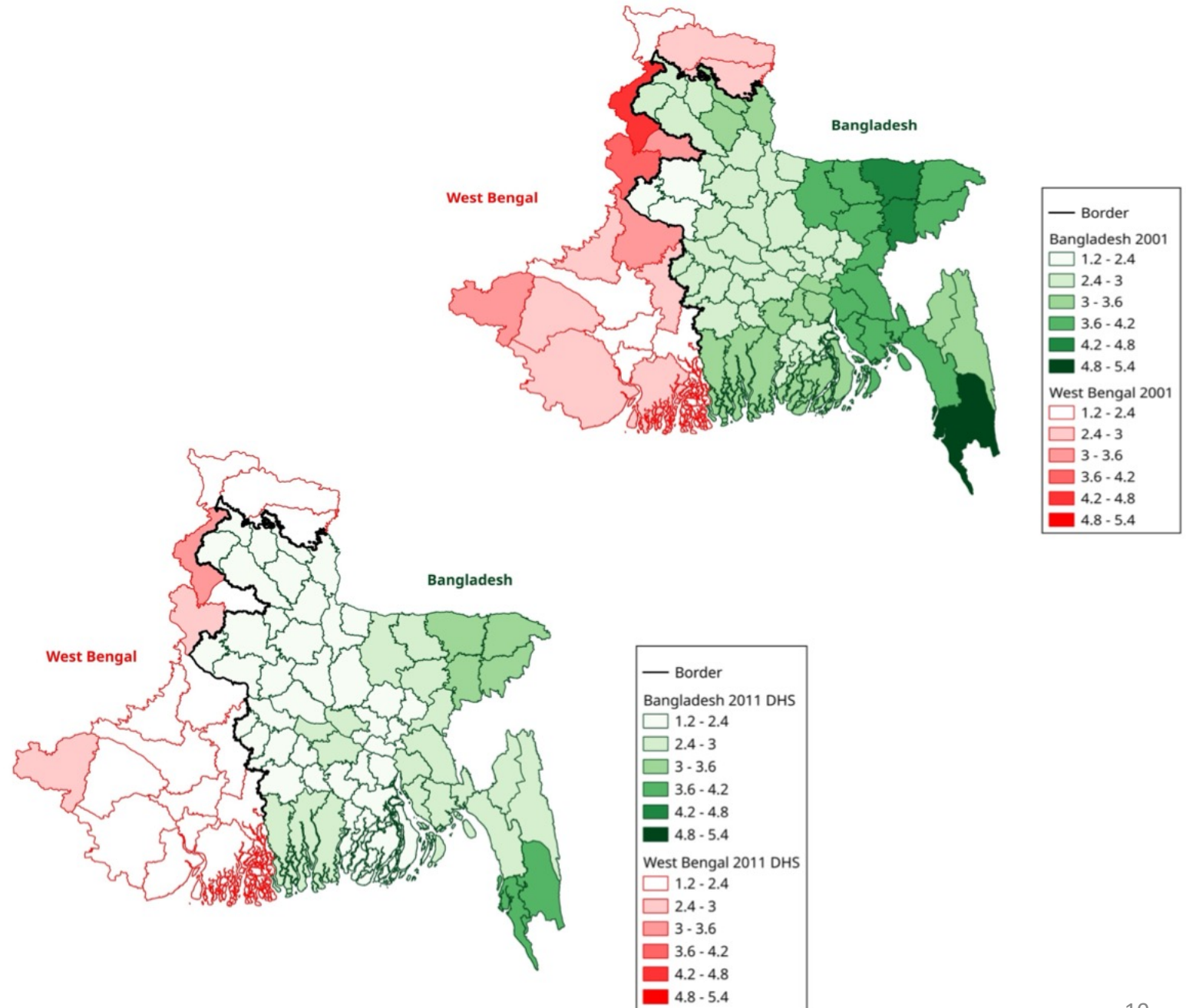
| Comparison between Border Districts of | Group | No. of Observations | Mean TFR | Absolute Difference in TFR |
|--|--|---------------------|----------|----------------------------|
| West Bengal and Neighbouring States | Districts from West Bengal (WB) bordering with Neighbouring States | 11 | 1.996 | 0.692** (0.030) |
| | Districts from Neighbouring States Bordering with WB | 19 | 2.688 | |
| Uttar Pradesh and Bihar | Uttar Pradesh border districts with Bihar | 7 | 3.145 | 0.213*** (0.006) |
| | Bihar border districts with Uttar Pradesh | 7 | 3.358 | |

Two sample t-tests for Difference in Mean Values of TFR between States within India (2011)

\$\$ These states are Assam (2 Districts), Bihar (3 Districts), Jharkhand (9 Districts), Orissa (2 Districts) and Sikkim (3 Districts).

Convergence

A remarkable feature of the study is the result that the fertility rates in the border districts of West Bengal and Bangladesh have moved much closer to one another in the period between the last two Censuses (2001-2011) than the non-border districts, thus providing strong evidence of the role that cultural synergy can play in bridging country divide.



Empirical Model

$$\bullet \quad TFR_{jt} = \sum_{i=1}^k \beta_i X_{ijt} + \theta_1 * WBBT1 + \theta_2 * BDBT1 + \theta_3 * WBBT2 + \theta_4 * BDBT2 + \theta_5 * WBNBT1 + \theta_6 * BDNBT1 + \theta_7 * WBNBT2 + \theta_8 * BDNBT2 + \varepsilon_{jt}.$$

- The dummies are defined as:
- WBBT1 = 1 for West Bengal border districts in 2001, 0 otherwise
- BDBT1 = 1 for Bangladesh border districts in 2001, 0 otherwise
- WBBT2 = 1 for West Bengal border districts in 2011, 0 otherwise
- BDBT2 = 1 for Bangladesh border districts in 2011, 0 otherwise
- WBNBT1 = 1 for West Bengal non-border districts in 2001, 0 otherwise
- BDNBT1 = 1 for Bangladesh non-border districts in 2001, 0 otherwise
- WBNBT2 = 1 for West Bengal non-border districts in 2011, 0 otherwise
- BDNBT2 = 1 for Bangladesh non-border districts in 2011, 0 otherwise

A brief about choice of variables in final Model

- ^ Refers to the probability of dying between birth and exactly five years of age expressed per 1,000 live births.

| Category | Variable | Source |
|---------------------------|---|---------------------------|
| Biological factors | Child Mortality Rate^ | DHS |
| Social Factors | Women's average age at Marriage | DHS |
| | Proportion of women with son preference | Author's own calculation |
| | Women Empowerment | Author's own calculation, |
| Economic factors | Female Work Participation | Census |
| Family Planning Practices | Proportion of women using contraceptive | DHS |

‘Son preference’ is calculated based on the response against ideal number of boys and girls

| Domain (Dimensions) | Variables | Weights | |
|------------------------|--|---------------|---------------|
| | | India | Bangladesh |
| 1. Knowledge Domain | 1. Woman is literate (x_{11}) | $w_{11}=1/8$ | $w_{11}=1/8$ |
| | 1. Woman has knowledge of family planning (x_{12}) | $w_{12}=1/8$ | $w_{12}=1/8$ |
| 1. Health Domain | 1. BMI > 18.5 (x_{21}) | $w_{21}=1/12$ | $w_{21}=1/8$ |
| | 1. Availability of sanitation and safe drinking water (x_{22}) | $w_{22}=1/12$ | $w_{22}=1/8$ |
| | 1. Anaemia free health (x_{23}) | $w_{32}=1/12$ | - |
| 1. Domestic Autonomy | 1. Influence on decision on purchase and sales of household resources (x_{31}) | $w_{31}=1/12$ | $w_{31}=1/12$ |
| | 1. Influence on decision on use of contraceptives (x_{32}) | $w_{32}=1/12$ | $w_{32}=1/12$ |
| | 1. Influence on decision on spending (x_{33}) | $w_{33}=1/12$ | $w_{33}=1/12$ |
| 1. Social Interactions | 1. Freedom of mobility without concession (x_{41}) | $w_{41}=1/4$ | $w_{41}=1/4$ |

| Explanatory Variables | Estimated Parameters |
|--|----------------------|
| Proportion of Female workers | -0.004 (0.423) |
| Proportion of Women with Son Preference | 0.903 (0.237) |
| Age at First Marriage (Women aged 20-50) | 0.219*** (0.000) |
| Child Mortality | 0.023*** (0.001) |
| Women Empowerment | -2.029** (0.040) |
| Interaction: Women Empowerment × Country Dummy (=1 for West Bengal) | -4.626*** (0.000) |
| Proportion of Women using Contraceptives | -1.817*** (0.001) |
| West Bengal-Border Dummy, 2011 (WBBT2) | 0.431 (0.615) |
| Bangladesh-Border Dummy, 2011 (BDBT2) | 0.261 (0.730) |
| West Bengal-Border Dummy, 2001 (WBBT1) | 2.190** (0.015) |
| Bangladesh-Border Dummy, 2001 (BDBT1) | 0.260 (0.746) |
| West Bengal-Non Border Dummy, 2011 (WBNBT2) | 0.276 (0.750) |
| Bangladesh-Non Border Dummy, 2011 (BDNBT2) | 0.080 (0.918) |
| West Bengal-Non Border Dummy, 2001 (WBNBBT1) | 1.764* (0.066) |
| Bangladesh-Non Border Dummy, 2001 (BDNBT1) | 0.597 (0.456) |

Endogeneity

- **Prospective endogenous variables:** Proportion of Female worker, Child Mortality.
- **Instruments:**
Dependency ratio, Proportion of households with safe drinking water,
Proportion of households, Hospital per 1000 population and
Doctors per 1000 population'
- **Test of over identifying Restrictions:** H_0 : Instruments are valid
Score $\chi^2_{(2)} = 2.103$ (p-value: 0.349)
- **Test of Endogeneity:** H_0 : Variables are exogenous
Robust score $\chi^2_{(3)} = 3.297$ (p-value: 0.348)
Robust Regression $F_{3,69} = 1.102$ (p-value: 0.354)

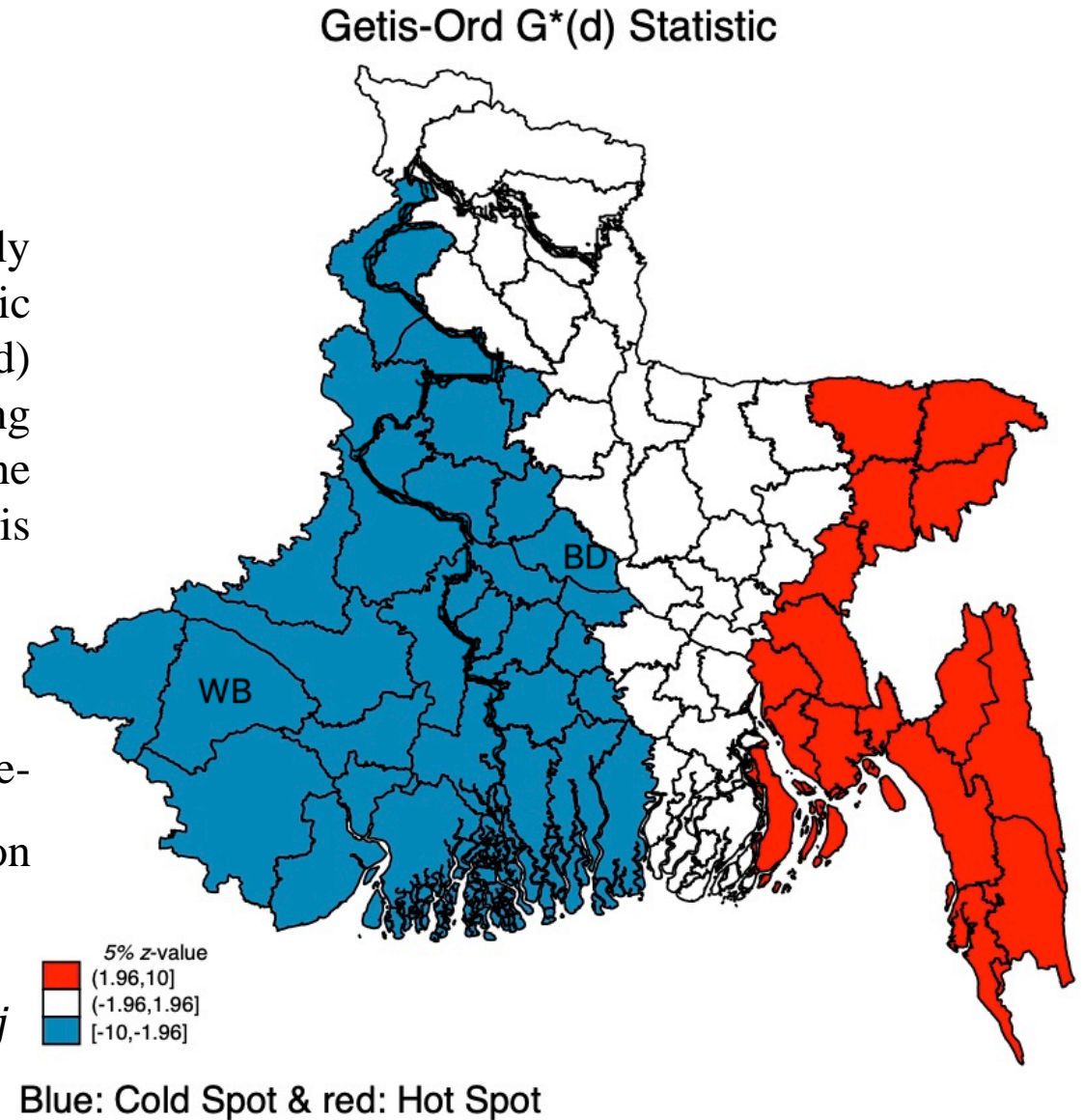
| Test of equality of coefficients of | Comparison of Estimated Mean TFR Values Between | F-statistic F(1,147) |
|-------------------------------------|--|-------------------------|
| WBBT1 & BDBT1 | Border districts of West Bengal and Bangladesh in 2001 | 15.18*** (0.000) |
| WBBT2 & BDBT2 | Border districts of West Bengal and Bangladesh in 2011 | 0.17 (0.680) |
| WBBT1 & WBNBT1 | Border and Non-border districts of West Bengal in 2001 | 5.22** (0.024) |
| WBBT2 & WBNBT2 | Border and Non-border districts of West Bengal in 2011 | 1.12 (0.292) |
| BDBT1 & BDNBT1 | Border and Non-border districts of Bangladesh in 2001 | 6.56** (0.011) |
| BDBT2 & BDNBT2 | Border and Non-border districts of Bangladesh in 2011 | 3.78* (0.054) |

In order to explore the pattern of local clusters, particularly in the border districts we employ *Getis-Ord $G_i^*(d)$* statistic (Getis and Ord, 1992). The test statistic detects hot (cold) spots describing whether a region and its neighbouring regions have similar and higher (lower) values than the average. The test statistic for any variable x_i (e.g., TFR) is calculated as

$$G_i^*(d) = \frac{\sum_{j=1}^N w_{ij}(d)x_j}{\sum_{j=1}^N x_j}$$

where N is the number of districts and a binary distance-based weight matrix is considered using the expression below:

$$w_{ij}(d) = \begin{cases} 1 & \text{if } d_{ij} < d, \forall i, j \\ 0 & \text{else} \end{cases} \quad w_{ij}(d) = \begin{cases} 1 & \text{if } d_{ij} < d, \forall i, j \\ 0 & \text{else} \end{cases}$$



If time permits: See spatial Drivers

| | |
|------------------------------|--------------------|
| Spatial Weight Matrix | $\chi^2_{(1)}$ |
| Contiguity Weight (Wc) | 8.22*** (0.004) |
| Inverse Distance Weight (Wi) | 1.56 (0.211) |

$$TFR_j = \alpha_0 + \alpha_1 D_j + \sum_{i=1}^k \beta_i X_{ij} + \rho TFR_{j,c} + u_j;$$
$$TFR_{j,c} = (W_c(TFR))_j$$
$$u_j = \lambda W_c u_j + \varepsilon_j$$

| Explanatory Variables | Estimated Parameters |
|--|----------------------|
| Proportion of Female workers | -0.006* (0.096) |
| Proportion of Women with Son Preference | 1.014** (0.031) |
| Age at First Marriage (Women aged 20-50) | 0.215*** (0.001) |
| Child mortality | 0.023*** (0.001) |
| Women Empowerment) | -2.149** (0.017) |
| Interaction: Women Empowerment × Country Dummy (=1 for West Bengal | -3.970*** (0.000) |
| Proportion of Women using Contraceptives | -0.248 (0.652) |
| Border Districts Dummy (=1 for Border Districts) | 0.183* (0.083) |
| Constant | -0.844 (0.451) |
| Spatial Factors | |
| ρ | 0.137 (0.472) |
| λ | 0.471** (0.014) |
| Pseudo R^2 | 0.641 |
| Number of Observations | 83 |
| Wald Test of Spatial Terms ($\chi^2_{(2)}$) | 22.62*** (0.000) |



Thank You