# Role of Rural Transformation in Reducing the Gender Wage Gap in Bangladesh: A Spatial Autoregressive Analysis with Fixed Effect

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***Selected Poster prepared for presentation at the 2024 Agricultural & Applied Economics Association Annual Meeting, New Orleans, LA: July 28-30, 2024***

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## Abstract

This study delves into the impact of rural transformation on the gender wage gap in Bangladesh. It utilizes longitudinal data from five national Household Income and Expenditure Surveys conducted between 1995 and 2016. The research reveals a promising trend in reducing the gender wage gap during the current rural transformation, especially as the country moves from agrarian-based economies to diverse rural environments characterized by a rise in non-farm activities. The study utilizes kernel density graphs, Oaxaca-Blinder decomposition analysis, and correlation studies to identify factors contributing to the gender wage gap. It distinguishes between explained and unexplained components, with the unexplained gap consistently decreasing over time. This suggests a decline in discriminatory practices within the labor market. Spatial Autoregressive models with Fixed Effects demonstrate the spatial dynamics that affect the wage gap, emphasizing the significant influence of high-value agricultural and rural non-farm jobs in mitigating gender wage discrepancies. To reduce the gender wage gap in Bangladesh, it is crucial to prioritize women's empowerment in rural areas, including their access to loans, markets, and resources in agriculture, investment in women's education, support for non-agricultural employment, implementation of anti-discrimination laws, and development of gender equality awareness for inclusive development.

**Keywords: Gender wage gap, Rural transformation, Oaxaca-Blinder, Spatial Autoregressive, High-value agriculture, Rural non-farm employment**

## Introduction

Rural transformation, a multifaceted process encompassing shifts in economic frameworks, social dynamics, and technological progress, holds significant implications for both economic development and gender equality, particularly in countries like Bangladesh (Rola-Rubzen et al., 2024).

The impact of rural transformations on the gender wage gap depends on various factors, including local employment opportunities, mobility barriers, and household characteristics (Heckert et al., 2021; Ørtenblad et al., 2019).

In Bangladesh, rural areas have experienced substantial changes over the years, transitioning from agrarian-based economies to more diversified and modernized settings due to urbanization, technological innovation, and changes in agricultural practices (Al Abbasi et al., 2024; Gautam & Faruqee, 2016). Despite commendable achievements in political empowerment and health parity, Bangladesh faces challenges in economic participation and opportunity, ranking 59th globally with a gender parity score of 72.2%, notably lower in economic participation and opportunity (World Economic Forum, 2023).

Gender wage disparities persist in rural regions, reflecting differences in the types of work performed by men and women (Broeck et al., 2023). While the gender earnings difference has decreased over time, Bangladesh still grapples with gender wage disparities, highlighting broader inequalities in economic opportunities and outcomes (ILO, 2018). This study aims to investigate the relationship between rural transformation and gender-based wage disparities in rural Bangladesh, shedding light on the underlying factors driving wage differentials and informing policy interventions to promote gender equality in rural areas.

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This study addresses gaps in understanding the gender wage gap and rural transformation in Bangladesh. It clarifies rural transformation indicators and measures the district-level wage gap. Using panel data, it explores the relationship between rural transformation and the wage gap over time. Additionally, it examines spatial wage gap interdependence across districts to inform policies promoting gender equality in rural Bangladesh.

## Objectives

- ✓ To analyze male and female wage distribution and rural transformation trends in Bangladesh.
- ✓ To analyze the effect of rural transformation on gender wage gap in Bangladesh.

## Methodology

### Indicators of rural transformation

Rural transformation in Bangladesh involves improving agricultural productivity and diversifying livelihoods (IFAD, 2016). It encompasses efforts to reduce poverty, increase agricultural output, and create non-farm employment opportunities (Arslan et al., 2021; Kosec et al., 2020; Miele et al., 2017; Pandit, 2017). This process is closely tied to changes in agricultural practices and non-farm employment patterns (IFPRI, 2019; Haggblade et al., 2010; Reardon et al., 2007). In this study, we focus on two key indicators: RT1, which measures the share of high-value agricultural commodities in total output, and RT2, which assesses rural labor engagement in non-farm employment. These indicators provide insights into the evolving rural landscape of Bangladesh.

### Data sources

This study utilizes data from the Household Income and Expenditure Survey (HIES) conducted by the Bangladesh Bureau of Statistics (BBS) in 1995, 2000, 2005, 2010, and 2016. The dataset covers all eight divisions and 64 districts of Bangladesh, ensuring national representativeness. Control variables, including female access to government stipends, average family size, working hours of females, female-headed households, female land ownership, and household expenditure on female education, were chosen based on previous research and data availability. Household-level data from the HIES were compiled for analysis, resulting in 320 observations across the districts. Refer to Table 1 for a summary of the data used.

Table 1: Description of the variables

| Variable | Description | Units |
|---|---|---|
| Gender wage gap | Estimate the gender wage gap using the standard Oaxaca-Blinder wage decomposition. | Natural logarithm |
| Share of high-value agriculture | The district's total high-value agricultural product value, which includes fruits, vegetables, cattle, and fisheries, is divided by the district's total agricultural product value. | Ratio |
| Share of rural non-farm employment | The total number of rural non-agricultural employment in the district is divided by the total number of rural employments | Ratio |
| Share of female access to government stipends | Divide the number of females receiving stipends by the total number of individuals receiving stipends in a district. | Ratio |
| Average household size | The mean value of household size in a district | Number |
| Average working hours of female | The total number of hours women work is divided by the total number of women employed in a district. | Hours |
| Share of females as household heads | The total number of households with female heads is divided by the total number of households within the district. | Ratio |
| Share of female access to land ownership | The number of females who own land and dividing this figure by the total number of landowners in a district | Ratio |
| Share of household expenditure for female education | The household expense for female education is divided by the total household expenditure in a district | Ratio |

### Calculation of the gender wage gap

The gender wage gap is commonly analyzed using the Oaxaca-Blinder decomposition method (Blinder, 1973; Oaxaca, 1973). This method involves employing regression models to examine wage disparities by gender and decomposing the gap into explained and unexplained components. Logarithmic daily wage equations are computed separately for men and women in each district (i) and year (t) to initiate the analysis.

$$lnw_{it}^{m} = \beta_{it}^{m} X_{it}^{m} + \varepsilon_{it} \quad (1)$$

$$lnw_{it}^{f} = \beta_{it}^{f} X_{it}^{f} + \varepsilon_{it} \quad (2)$$

where m and f stand for male and female, respectively. The variable lnw represents the logarithm of wage, X represents the vector of factors (education level, age, field of occupation, marital status, and religion) that determine wages, and ε represents the error term. The raw wage gap can be broken down as the gap between the average wage logarithms of males and females.

$$\overline{lnw}_{it}^{m} - \overline{lnw}_{it}^{f} = \hat{\beta}_{it}^{f}\left(\bar{X}_{it}^{m} - \bar{X}_{it}^{f}\right) + \bar{X}_{it}^{m}\left(\hat{\beta}_{it}^{m} - \hat{\beta}_{it}^{f}\right) \quad (3)$$

Equation 3 includes two components: the endowment effect and the unexplained wage gap. The endowment effect reflects average differences in observed factors between genders, while the unexplained gap indicates wage disparities among individuals with similar characteristics, highlighting labor market discrimination.

### Econometric model

The spatial autoregressive model captures spatial dependencies among regions, essential for understanding how rural transformation affects land inequalities. Using panel data allows for analyzing temporal variations while considering region-specific factors. The model is as follows.

$$Y_{it} = \theta WY_{it} + \beta_i RT1_{it} + \beta_i RT2_{it} + \lambda_i FAG_{it} + \lambda_i AHS_{it} + \lambda_i AWF_{it} + \lambda_i FHH_{it} + \lambda_i FAL_{it} + \lambda_i HEFE_{it} + \alpha_i + \varepsilon_{it} \quad (4)$$

Where,

$Y_{it}$ = raw wage gap and unexplained wage gap in region i at time t.
W = contiguity weighting matrix for the spatial lags
θ = spatial autoregressive coefficient
RT1= share of high-value agriculture
RT2 = share of rural non-farm employment
FAG = share of female access to government stipend
AHS = average household size
AWF = average working hours of female
FHH = share of female as a household head
FAL = share of female access to land ownership
HEFE = share of household expenditure for female education
βi = coefficient for the independent variable
λi = coefficient for control variables
αi = district-specific fixed effects, and
εit = spatially lagged error term.

## Results and Discussion

### Trend of RT

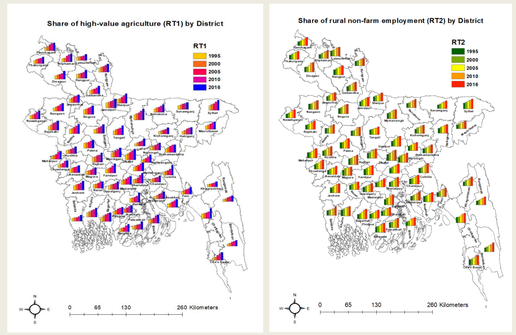


Figure 1: Trend of RT1 and RT2 by district

### Distribution of daily wage

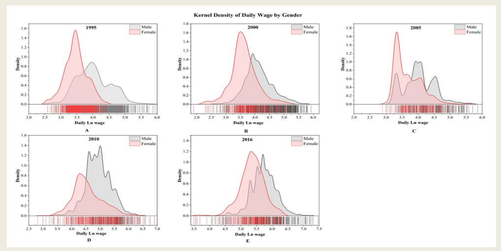


Figure 2 : Distribution of daily wage by gender

### Correlation between the gender wage gap and RT

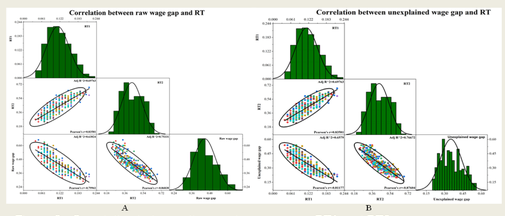


Figure 3 : Correlation between the gender wage gap, RT1 and RT2

### Regression results of the impact of RT on the gender wage gap

Table 2: Regression results of SAR-FE for the raw wage gap

| | SAR-FE | Direct impact | Indirect impact | Total impact |
|---|---|---|---|---|
| | Raw wage gap | | | |
| Raw wage gap | | | | |
| RT1 | -0.274** | -0.277** | -0.074** | -0.351** |
| | (0.022) | (0.022) | (0.024) | (0.020) |
| RT2 | -0.359*** | -0.363*** | -0.097*** | -0.460*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| FAG | -0.335** | -0.338** | -0.091** | -0.429** |
| | (0.012) | (0.012) | (0.030) | (0.013) |
| AHS | -0.013*** | -0.013*** | -0.004*** | -0.017*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| AWF | -0.002 | -0.002 | -0.001 | -0.003 |
| | (0.326) | (0.325) | (0.311) | (0.321) |
| FHH | -0.021 | -0.022 | -0.006 | -0.028 |
| | (0.690) | (0.690) | (0.687) | (0.689) |
| FAL | -0.296 | -0.299 | -0.080 | -0.379 |
| | (0.346) | (0.347) | (0.371) | (0.350) |
| HEFE | -0.181** | -0.183** | -0.049** | -0.232** |
| | (0.049) | (0.049) | (0.048) | (0.045) |
| W | | | | |
| Spatial lag of dependent variable | 0.256*** | | | |
| | (0.000) | | | |
| Spatial autoregressive error term | -0.457*** | | | |
| | (0.006) | | | |
| sigma_e _cons | 0.019*** | | | |
| | (0.000) | | | |
| Observations | 320.000 | | | |
| Pseudo R-squared | 0.6404 | | | |

*p-values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01*

Table 3: Regression results of SAR-FE for the unexplained wage gap

| | SAR-FE | Direct impact | Indirect impact | Total impact |
|---|---|---|---|---|
| | Unexplained wage gap | | | |
| Unexplained wage gap | | | | |
| RT1 | -0.247* | -0.248* | -0.050* | -0.299* |
| | (0.078) | (0.078) | (0.087) | (0.074) |
| RT2 | -0.436*** | -0.449*** | -0.089*** | -0.528*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| FAG | -0.446*** | -0.450*** | -0.091** | -0.540*** |
| | (0.006) | (0.006) | (0.045) | (0.007) |
| AHS | -0.011*** | -0.011*** | -0.002*** | -0.013*** |
| | (0.000) | (0.000) | (0.003) | (0.000) |
| AWF | -0.005** | -0.005** | -0.001** | -0.006** |
| | (0.030) | (0.030) | (0.033) | (0.026) |
| FHH | -0.019 | -0.019 | -0.004 | -0.023 |
| | (0.761) | (0.761) | (0.759) | (0.760) |
| FAL | -0.532 | -0.535 | -0.109 | -0.644 |
| | (0.147) | (0.148) | (0.198) | (0.151) |
| HEFE | -0.229** | -0.230** | -0.047** | -0.277** |
| | (0.041) | (0.040) | (0.039) | (0.035) |
| W | | | | |
| Spatial lag of dependent variable | 0.204*** | | | |
| | (0.000) | | | |
| Spatial autoregressive error term | -0.369* | | | |
| | (0.052) | | | |
| sigma_e _cons | 0.022*** | | | |
| | (0.000) | | | |
| Observations | 320.000 | | | |
| Pseudo R-squared | 0.7026 | | | |

*p-values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01*

## Conclusions

- ✓ Districts in Bangladesh show diverse rural transformation rates, indicating economic diversification.
- ✓ Although the gender wage gap is decreasing, discriminatory factors still influence it.
- ✓ High-value agriculture and non-farm employment play significant roles in narrowing the gap.
- ✓ Spatial autoregressive models affirm the impact of rural activities on the wage disparity.
- ✓ Policy actions should focus on agricultural investment, non-farm job promotion, gender-responsive labor policies, enhanced female education, and addressing household dynamics to mitigate the wage gap

**Acknowledgment:** The research is financed under Understanding the Drivers of Successful and Inclusive Rural Regional Transformation: Sharing Experiences and Policy Advice in Bangladesh, China, Indonesia and Pakistan project (ID: ACIAR ADP/2017/024 Project) where Commissioned Organization in Australia National University.

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