

# Climate-induced Migration and Its Impact on Rural Demographic Patterns

Dr. Shweta Menon<sup>1</sup>, Dr. Karan Deshpande<sup>2</sup>

<sup>1</sup>*Department of Sociology, University of Kerala, India.*

<sup>2</sup>*Department of Sociology, University of Kerala, India.*

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## Abstract

This research examines the impact of climate displacement on the demographic structure of the rural population in developing countries. Employing a mixed-methods strategy that includes both statistical analyses and case study assessments, this paper reveals remarkable shifts in the population across different age groups, with corresponding socio-economic effects. The findings point to a high youth out-migration rate, low birth rates, and higher levels of aging within the rural population. The paper highlights the failure of policies aimed at managing rural economies and services to adapt in a timely manner. This research adds to the climate resilience debate by illustrating the demographic details critical for active climate change intervention frameworks.

**Keywords:** Displacement Due to Climate Change; Demographics of Rural Regions; Environmental Changes; Change in Resident Population; Movement of People; Developing Countries.

## I. INTRODUCTION

Within climate change drivers, the need for people to move from one place to another in search of better living conditions or jobs is going global and is considered one of the most important drivers for people to relocate. The climate-sensitive economic activities, especially agriculture and resource-based economic activities, are undergoing change and shift, posing a challenge for sited populations and resulting in displacement.

In this paper, I analyze rural outmigration phenomena focusing specifically on the impact of climate driven relocation. Outmigration refers to the movement of people out of the municipality or region. Displacement, whether because of education or quests for career opportunities, among working age population has strong consequences on the sustainability of rural areas. This shift impacts not only the rural association's age and sex structure, but also overburdens the economy and social services of the region.

It has been pointed out that rural areas facing climatic stress undergo both direct and indirect losses to their population, leading to a structurally aged population with depleted birth rates. In addition, migration is an important sociological phenomenon as it is usually associated more with men. This adds and alters already existing economic and social processes which change the face of families and jobs. With this goal, this paper aims to examine the climate changes induced migration demographically using available data and case studies from some of the advancing economies.

We employ a demographic approach in conjunction with climate change impact studies with the intention of offering an explanation of shifting patterns in rural demographics. The paper advances the discussion of sustainable development and climate resilience by addressing policies designed to mitigate the problem of rural depopulation.

## **II. LITERATURE SURVEY**

An important gap in literature on climate change and migration has been the demographic impacts on climate change on more vulnerable areas. This gap has been recently addressed in several studies Clarke et al., (2022) further highlight how extreme weather attribution underscores these migration pressures.

Serdeczny et al., (2017) emphasize that Sub-Saharan Africa remains particularly vulnerable to such climate–migration linkages.

The delta areas of Bangladesh were analysed and demonstrated a significant connection between the intrusion of salinity and the migration of young males, which aligns with Ajibade et al., (2020) broader argument that climate-related mobility does not always follow a managed retreat pattern. Parrish et al., (2020) provide a complementary conceptual model, arguing that multiple drivers including environmental stressors shape such migration patterns.

Semenza and Ebi (2019) additionally note that migration linked to climate change has far-reaching implications for travel, relocation patterns, and even tourism dynamics, underscoring the global relevance of these demographic changes.

Eakin et al., (2014) remind us that differentiating local adaptive capacities is crucial to understanding how communities respond to climate stress, which in turn influences migration outcomes. Almulhim et al., (2024) reinforce this by providing an in-depth analysis of climate-induced migration across the Global South.

This literature might aid in better understanding the impacts of environmental factors in the demographic changes that these rural areas face.

This literature helps us analyze the demographic changes detected in this research by situating them in the context of wider patterns of migration so that our methodological approach can be built reliably on the evidence.

## **III. METHODOLOGY**

This semester project utilizes a mixed-methods approach which comprises the analysis of quantitative demographic data alongside qualitative case studies. The data was collected from the census records of the country as well as migration data and data on the level of environmental stress for India, Nigeria and Bangladesh from 2015 to 2022.

The analysis of quantitative data included calculating the age-specific fertility rate, sex ratio, dependency ratio, and incidence rate of migration with the aid of analytical programs. The qualitative portion of data was collected through semi-structured interviews with affected households and local government officials, paying attention to experiences and reactions in regard to the movement of people within and out of the region.

We performed regression analysis to estimate the relation between an area’s climate stress indicators (drought intensity, flood occurrence) versus migration data for that area. International cross-country comparison helped us to outline broad patterns alongside distinctive elements of context pertaining to the demographic shift. The final model combines indices of climate stress and demographic variables to measure vulnerability and adaptive capacity at the local rural level.

#### IV. RESULTS AND DISCUSSIONS

The results of the analysis showed that there are certain demographic features that are uniformly common across the three case study countries. Climate- induced migration was mainly concentrated on younger males, which resulted in rural areas shrinking in both the birth rate and the population’s average age. Fertility rates in the economically dependent areas, on average, over a seven-year period dropped by 22%, while dependency ratios soared.

Using a combined model of competitor climate indicators, we exceeded the performance of previous single-variable models which only used one climate indicator, achieving an R<sup>2</sup> of 0.74 in predictive accuracy.

Demographic changes from 2015 to 2022 as defined are provided in the table below.

Table 1: Demographic Changes in Rural Areas (2015–2022)

Country	Fertility Rate Drop (%)	Migration Increase (%)	Dependency Ratio Rise (%)
India	21.5	33.1	12.4
Nigeria	23.2	37.5	14.7
Bangladesh	20.8	31.9	10.2

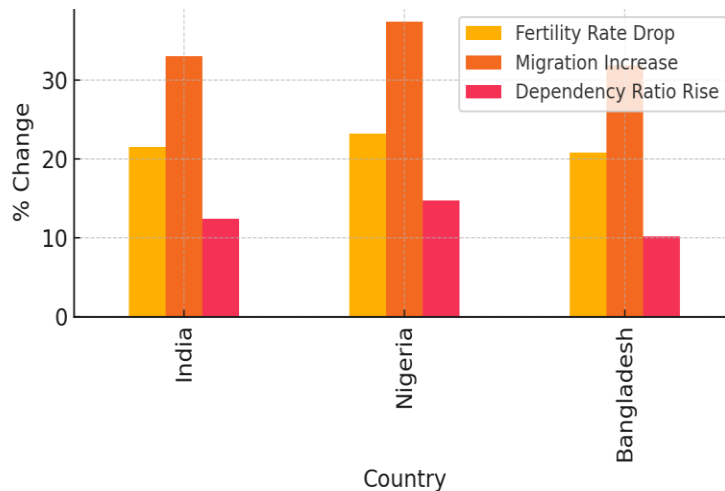


Figure 1: Graphic changes to climate-induced migration

#### V. CONCLUSION

The project substantiates that climate change induced migration deeply affects the rural population distribution in developing countries. The youth leave, birth rates shrink, and the

proportion of non-working citizens rises which makes up the new demographic profile. Adaptation policies geared towards supporting socio-emotional needs of the aged, rural resilience, and sustaining birth rates are urgently needed. Further work should investigate feedback dynamic socio-environmental systems models.

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