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Sea Level Rise and Household Vulnerability: Evidence from Coastal Bangladesh

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Abstract

Bangladesh's coastline faces sea-level-rise-related shocks, yet evidence on how coastal exposure shapes household economic and water security remains limited. Using the 2022 Household Income and Expenditure Survey, this study constructs a composite Economic Vulnerability Index (EVI) drawing on the IPCC framework: exposure (climate-related shocks), sensitivity (dependency ratio), and adaptive capacity (expenditure, bank account ownership, durable assets, and access to safe water and sanitation), equally weighted on a 0–1 scale. Using the official WARPO (2003) coastal-zone delineation, mean EVI is significantly higher in the 48 upazilas directly exposed to the sea or estuaries than in the 99 interior-coast upazilas (diff = 0.006, p = 0.007, n = 3,806). Pooling Chattogram, Khulna, and Barisal divisions, coastal districts are significantly more vulnerable than non-coastal districts (diff = 0.008, $p < 0.001$, n = 5,293); propensity score matching confirms this (ATT = 0.008, $p < 0.001$). Within the 14 BBS coastal districts (n = 2,713, EVI range 0.09–0.63, mean 0.26), education is negatively associated with vulnerability and household size positively associated (both $p < 0.001$; R-squared = 0.047). Matching shock-exposed and non-exposed households on the non-exposure components of EVI shows no significant difference (ATT = –0.006, p = 0.41), indicating vulnerability differences are geographic rather than driven by a single year's shocks. These findings support a spatial, exposure-graded view of coastal vulnerability, with implications for water infrastructure and disaster preparedness.

Keywords: *coastal Bangladesh; economic vulnerability; propensity score matching; sea level rise; water security*