ABSTRACT

The developing countries of Asia are frequently devastated by tropical cyclones. About 80% of the tropical cyclones in the North Indian Ocean are formed in the Bay of Bengal. This study focuses on the following three major issues regarding cyclonic disturbances on the Bay of Bengal: trends and long-term forecasting, macro and micro impacts, and responses through adaptation. Cyclonic disturbances and severe cyclonic storms are forecasted till 2050 over the Bay of Bengal using three different time-series statistical models. The results indicate that cyclonic disturbances will vary from 5 to 13 annually, and there will be at least one severe cyclonic storm every year. Secondly, we explore the macro impacts of cyclonic disturbances on three key sustainable development indicators. The dynamic panel data models by generalized method of moments are formulated to estimate the impact of occurrences over 8 select Asian developing countries. Results show that recurrent tropical cyclones increase income inequality and mortality rates and decrease human capital accumulation. However, there seems to be a threshold limit to such impacts, indicating nonlinear impacts. The weakening impacts provide evidence of reinforcing feedback loops. The micro impact study quantifies the vulnerability to tropical cyclones. It estimates the cyclone-induced household vulnerability based on primary survey of 13 villages in the Indian east coast. Employing the 3FGLS in a multilevel model, we find that fishery and casual laborers are most vulnerable, with greater exposure to consumption volatility and chronic poverty. Contrary to earlier studies, the covariate vulnerability becomes equal to the idiosyncratic vulnerability. Lastly, we examine the responses to cyclones through adaptation and coping strategies. Using multivariate probit and endogenous switching regression models, the determinants of the choices and the corresponding welfare gains are estimated. The results indicate that the households achieve an increase in welfare from coping strategies but no welfare from adaptation strategies, which again affects the choice of strategies in the long-term. With recurrent cyclonic disturbances, the associated risks are diverse and complex. Consequently, there may be a need for a multi-pronged strategy for disaster risk management, preparedness and mitigation and sustained welfare measures.

***Keywords*:** Cyclonic Disturbances; East Coast of India; Forecasting; Sustainable Development; Coastal Households; Vulnerability; Adaptation Strategies; Coping Strategies