

## Spatiotemporal Modeling of Under-Five Mortality and Associated Risk Factors in Ethiopia

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**Abstract :** Background: Under-five mortality is the likelihood that a baby will pass away before turning exactly 5 years old, represented as a percentage per 1,000 live births. Exploring the spatial distribution and identifying the temporal pattern is important to reducing under-five child mortality globally, including in Ethiopia. Thus, this study aimed to identify the risk factors of under-five mortality and the spatiotemporal variation in Ethiopian administrative zones. Method: This study used the 2000-2016 Ethiopian Demographic and Health Survey (EDHS) data, which were collected using a two-stage sampling method. A total of 43,029 (10,873 in 2000, 9,861 in 2005, 11,654 in 2011, and 10,641 in 2016) weighted sample under-five child mortality was used. The space-time dynamic model was employed to account for spatial and time effects in 65 administrative zones in Ethiopia. Results: From the result of a general nesting spatial-temporal dynamic model, there was a significant space-time interaction effect [ $\gamma = -0.1444$ , 95 % CI (-0.6680, -0.1355)] for under-five mortality. The increase in the percentages of mothers illiteracy [ $\beta = 0.4501$ , 95% CI (0.2442, 0.6559)], not vaccinated [ $\beta = 0.7681$ , 95% CI (0.5683, 0.9678)], unimproved water [ $\beta = 0.5801$ , CI (0.3793, 0.7808)] were increased death rates for under five children while increased percentage of contraceptive use [ $\beta = -0.6609$ , 95% CI (-0.8636, -0.4582)] and ANC visit > 4 times [ $\beta = -0.1585$ , 95% CI(-0.1812, -0.1357)] were contributed to the decreased under-five mortality rate at the zone in Ethiopia. Conclusions: Even though the mortality rate for children under five has decreased over time, still there is still higher in different zones of Ethiopia. There exists spatial and temporal variation in under-five mortality among zones. Therefore, it is very important to consider spatial neighbourhoods and temporal context when aiming to avoid under-five mortality.

**Keywords :** under-five children mortality, space-time dynamic, spatiotemporal, Ethiopia

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