

Effect of coastal marine protection on childhood health: an exploratory study

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Abstract

Background The integrity of ocean ecosystems are currently under threat from a suite of anthropogenic drivers including climate change, over-fishing, land-based pollution, and resource exploitation. Recent research has shown that this degradation is likely to lead to negative, long-term livelihood, biodiversity, and economic impacts. In view of the level of dependence of those in the developing countries on well-functioning ecosystems, already marginalised coastal populations are likely to suffer most of the costs of the degradation of coastal and marine ecosystems. One policy intervention that has been touted to deliver on conservation and longer-term development goals is the continued establishment of marine protected areas (MPAs). While preliminary research has shown mixed results on the effects of MPAs, some studies show, in certain contexts, positive benefits of MPAs flowing to impoverished local populations.

Methods Here, we used a three-step process to see if we could detect an association between creation of MPAs and particular human health outcomes. We used childhood stunting as the dependent measure of human health. We built a database of 47 992 children living less than 25 km from a marine coast in 25 developing countries. We combined socioeconomic and health data from Demographic and Health Surveys with available climate and environmental data to examine this relationship. For analysis, we first used an information-theoretic approach to examine the potential association between distance to MPA and childhood stunting, while controlling for a suite of covariates and potential confounding socioeconomic variables. Second, we used a mixed-effect logit model to test proximity to MPAs and severe stunting in children. Third, we used propensity score matching to test the treatment effect of an MPA further while controlling for the same environmental and socioeconomic factors as in the logit models.

Findings We find that the distance to MPA does show up in the top models using an information-theoretic approach. With the logit models, we find that the further from an MPA a child lives, the greater the chance a child has of being severely stunted ($p < 0.001$). Third, we find that a significant negative effect of the treatment on severe stunting ($p < 0.001$)—ie, proximity to an MPA reduces the incidence of severe stunting. The effect is larger for the sample living within 25 km of large MPAs.

Interpretation While much work needs to be done to uncover a potential causal link between well-functioning marine ecosystems and childhood health, our results indicate that such an examination might prove fruitful, and ultimately that marine conservation could be a key mechanism to improve the health of the millions of marginalised coastal peoples worldwide.

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Contributors

BF, DA, HEF, DAG, CDG, MM, SSM, AP, ERS, and THR designed the study. BF, DH, DAG, MM, and THR extracted and collected the data. BF, DH, DAG, AP, and THR did the statistical analysis. BF and DH wrote the Abstract. All authors reviewed the final Abstract.

Declaration of interests

We declare no competing interests.

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