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Assessment of the Future Health Burden Attributable to Undernutrition under the Latest Scenario Framework for Climate Change Research

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There are growing concerns that future food security will be negatively affected by various factors, such as changes in socioeconomic and climate conditions. The health burden attributable to childhood undernutrition is among the most severe problems related to food crisis in the world. This study assessed the health burden attributable to childhood underweight through 2050 focusing on disability-adjusted life years (DALYs), by considering the latest scenarios for climate change studies (Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs)) and conducting sensitivity analysis. We used three SSPs (SSP1, SSP2 and SSP3) as future population and gross domestic products (GDP), three RCPs (RCP2.6, RCP4.5 and RCP8.5) for a greenhouse gas emissions constraint, and 12 Global Circulation Models (12 GCMs) to estimate climate conditions. A regression model for estimating DALYs attributable to childhood underweight (DAtU) was developed using the relationship between DAtU and childhood stunting. A logarithmic relationship was proposed for the regression model. We combined a global computable general equilibrium model, a crop model (M-GAEZ), and two regression models to assess the future health burden. We found that i) world total DAtU decreases from 2005 by 23 $\sim$ 60% in 2030 depending on the socioeconomic scenarios. DAtU decreases further by 2050 for SSP1 and SSP2 scenario, whereas it slightly increases for SSP3. Per capita DAtU also decreases in all regions under either scenario in 2050, but the decreases vary significantly by regions and scenarios. ii) the impact of climate change is relatively small in the framework of this study but, on the other hand, socioeconomic conditions have a great impact on the future health burden. The impact of changes in socioeconomic conditions on the health burden is greater in the regions where current health burden is high. iii) parameter uncertainty of the regression models is the second largest factor on uncertainty of the result following the changes in socioeconomic condition, and uncertainty derived from the difference in 12 GCMs is the smallest in the framework of this study.