RESEARCH-ARTICLE

# Comparing Associations Of Chronic Health Outcomes with SDoH Indices Using Machine Learning

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## *Abstract*

Chronic health outcomes require ongoing medical attention and have a significant impact on a person's quality of life. It is widely accepted that social determinants of health (SDoH) shape the onset and management of chronic health outcomes. Among the many composite indices that assess SDoH, there is no consensus on which index best explains these associations between health outcomes and social determinants. Furthermore, chronic outcomes may be modulated by place or geography both through cultural, social, and political forces and spatial correlations. The novelty of this paper lies in building a machine learning (ML) methodology to compare the strengths of SDoH indices in explaining the associations between chronic health outcomes and social determinants while adjusting for geography. The methodology is illustrated by studying the relative strengths of the Social Vulnerability Index (SVI) and Social Deprivation Index (SDI) in explaining age-adjusted prevalence rates of 12 chronic health outcomes obtained from the CDC PLACES project. Results suggest that the SVI is more strongly associated with all 12 chronic health outcomes, however, the increase in the strength of SVI over SDI varies across the health outcomes. For each outcome, importance scores of all SVI measures are then normalized according to its four sub themes, while introducing geography/place as the fifth sub theme. Comparing the relative importance of these five sub themes leads to a grouping of the outcomes into three clusters depending on whether geography/place, racial minority status, or socio-economic measures shows the greatest impact. The emergence of geography as a dominant sub theme alongside conventional social determinants underscores the value of our approach in providing the capability to consider the modulating effect of geography on understanding the relationships between social determinants and health.



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*Comparing the impact of unhealthy behaviors and preventive services on chronic health outcomes*

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