

Title: Factors Associated with Population-level Geographic Healthcare Access Coverage: Global Ecological Analysis of 191 Countries

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Conflicts of Interest: None

Background:

Globally, over 50% of the population lacks access to essential health services. Various Socio-economic factors contribute to the inaccessibility of healthcare facilities. Our aim was to find the correlations between country-level estimates for geospatial access by walking and motorized transport to healthcare facilities and various other global health indicators.

Methods:

We acquired 1km² rasters for motorized and walking travel times to healthcare facilities from the Malaria Atlas Project, high resolution population estimates (1 km²) from WorldPop, and administrative boundaries of sovereign states and dependent territories from GADM-3.6. Healthcare access coverages (HAC) were defined as the population proportions (%) within 60 minutes from their nearest healthcare facility by motorized (HAC-M₆₀) and 30 minutes for walking (HAC-W₃₀) modes of transport, respectively. These values were obtained by a custom raster analysis pipeline that uses geospatial intersections and overlays among MAP and WorldPop rasters. HAC outcomes were correlated against Socio-demographic Index (SDI), Universal Health Coverage (UHC) Effective Coverage Index (ECI) obtained from Institute for Health Metrics and Evaluation (IHME) Global Burden of Diseases (GBD) 2019, per gdp total health spending (THS) as a percent of the GDP for each country from IHME's Global Expected health Spending dataset, UHC Service Coverage Index (SCI) from the Global Health Observatory (GHO), and Sustainable Development Goal (SDG) Index from the Sustainable Development Report 2020. Spearman's Rank correlation test was used with a 5% significance level.

Findings:

For n=191 countries, HAC-M₆₀ was significantly correlated with per capita THS (r=0.31, p<0.001), SCI (r=0.52, p<0.001), SDI (r=0.55, p<0.001), SDG (r=0.58, p<0.001) and ECI (r=0.62, p<0.001). HAC-W₃₀ was significantly correlated with THS (r=0.13, p=0.028) but not other indicators: SCI (r=-0.017, p=0.518), ECI (r=0.14, p=0.29), SDG(r=0.09, p=0.512), or SDI (r=0.06, p=0.48).

Interpretation:

Our analysis depicts meaningful associations between health care access and host of other global health care facilities access indices. Greater health spending can improve geographic healthcare accessibility. Our findings are limited by limitations of the parent data sources. Future studies should investigate the predictive value of indices for healthcare accessibility.

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