Integrating Demographic and Infrastructural Data for COVID-19 Risk Zonation Using GIS and Analytical Hierarchy Process in Kwara State, Nigeria

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SUMMARY

This study applies a Geographic Information System (GIS)-based Analytical Hierarchy Process (AHP) combined with Multi-Criteria Decision Analysis (MCDA) to map potential COVID-19 risk zones in Kwara State, Nigeria. By integrating seven thematic layers, including population distribution, population density, elderly population, healthcare facilities, road networks, sample collection sites, and isolation centers, within the ArcGIS environment, the study identifies spatial variations in COVID-19 transmission vulnerability across local government areas. The resulting risk map classifies the state into five categories of risk: very low, low, moderate, high, and very high. Findings reveal that densely populated urban areas, particularly the Ilorin metropolis, and major transport corridors exhibit the highest risk levels, while peripheral rural areas display lower risk. The study highlights critical zones requiring focused public health interventions and resource allocation. Despite data limitations such as underreporting and incomplete datasets, this spatial approach provides an effective framework for risk prioritization in resource-constrained settings. The methodology and outcomes offer valuable insights for policymakers and health authorities in Kwara State and comparable developing regions confronting infectious disease challenges.

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FIG Congress 2026
The Future We Want - The SDGs and Beyond
Cape Town, South Africa, 24–29 May 2026