Multilayer Analysis of the Effect of Neighborhood Influence, Socioeconomic Status and Zoning Laws on the Gut Microbiome and Cardiometabolic Health of Native Hawaiian Pacific Islanders on Oahu

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Native Hawaiian Pacific Islanders (NHPI) suffer disproportionately from cardiometabolic health conditions compared to other major ethnic groups. This study aimed to address critical gaps in minority health research by investigating the impact of location-based zoning laws and neighborhood socioeonomic (SES) influences on the cardiometabolic health outcomes and gut microbiome of the NHPI population on Oahu, Hawaii. Using data from an observational cohort (n=547) that examined microbial stool samples, anthropometric measurements, and demographic information, individual location was mapped to neighborhood level census tract variables and correlated with individual BMI, Mean Arterial Pressure (MAP) and Hemoglobin A1c (HbA1c). There were distinct health differences between populations living in different zoning areas and NHPIs exhibited worse health outcomes across all zoning categories. There were differences in microbial taxa relative abundance and diversity when comparing White, Asian, and NHPI populations in which NHPI distinctly had prevotella as the most abundant bacteria in their gut microbiome and less diverse Simpson's diversity than other races. Populations living in residential areas had more diverse gut microbiomes than those living in other zones. NHPI health was disproportionately affected by neighborhood level variables such as educational attainment, quality of life, and homeownership. These findings highlight the importance of addressing systemic inequities such as location and neighborhood SES underlying minority health disparities and highlights the potential for targeted interventions to improve health outcomes in vulnerable populations.

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