Project Title: Supplemental Nutrition Assistance Program (SNAP) and Food Insecurity related Healthcare Costs in the High Obesity Counties in the United States

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Project Aims

Evaluate SNAP policy, healthcare infrastructure, and food and built environment that affect child health outcomes related to food and nutrition insecurity

Aim I: Investigate the impact of SNAP on healthcare costs related to food insecurity.

Hypothesis I: SNAP participation is associated with lower healthcare cost among pediatric patients residing in high obesity counties in the US. *Hypothesis II*: The cost savings from lower healthcare costs will be higher among pediatric patients with obesity.

Aim II: Analyze the mediating/moderating role of food and physical activity environments, and healthcare infrastructure on the impact of SNAP on lowering food insecurity related healthcare costs. *Hypothesis I*: The healthcare cost savings with SNAP participation will be higher in regions with healthy and safe built environments and higher access to healthcare services.

Rationale

The prevalence of being obese or overweight has been on the rise in the US and coincides with poverty and food insecurity. In 2020, 527 (17%) counties across thirty states in the US had obesity rate >=40%. These counties also have higher rates of poverty, obesogenic environments,. and lack of the necessary food and healthcare infrastructure to address the chronic health issues linked to obesity. Past studies have shown the impact of stable participation in programs like the Supplemental Nutrition Assistance Program (SNAP) on preventative healthcare utilization, such as well-child visits, and childhood asthma–health conditions associated with food insecurity. Impact of changes in food, built, and socioeconomic environment on obesity is also well documented. *However, it remains to capture the potentially important role of food and built environment, and healthcare infrastructure for promoting physical activity, healthy food purchases with SNAP benefits and improve overall child health.*

Target Population, Sample, and Setting: The target population of this study are families with children in the high obesity program (HOP) counties (N=527) designated by the Centers for Disease Control and Prevention (CDC). Through the CDC's HOP more than 100 communities across these states have implemented policy, systems and environmental (PSE) changes that enhanced places for physical activity and increased access to healthier foods. How these changes in PSE interact with federal nutrition assistance programs in lowering healthcare costs

related to food insecurity is unknown.

Research Strategy

Study design: Aim I will be a secondary-retrospective analysis (cross-sectional and longitudinal) using three years of Medicaid claims data and SNAP participation data publicly available. Aim II is an ecological study on the influence of food and built environment, healthcare infrastructure on the effect of SNAP on healthcare costs related to food insecurity. A data fusion approach will be applied to integrate and interpolate data from multiple sources with varied scales and aggregation levels. Data sources include US Census Household Pulse Survey (HPS), CDC, USDA and more.

Outcomes of interest: In both the Aims, the primary outcome of interest is childhood obesity, and the secondary outcomes of interest are conditions associated with obesity and nutrition insecurity, such as asthma episodes, depressive symptoms, and emergency room visits, which are directly associated with food insecurity and lack of nutrition. Other measures: individual pediatric patients with obesity in the Medicaid dataset has 3-digit zipcode, and will be used to geocode a regional identifier. The independent variable will be captured at two levels: 1) individual level: age, race, comorbid disease condition of the patients, and 2) regional level: food, built, and safety environment, healthcare coverage, healthcare resources, housing, air pollution and more.

Approach: Aim 1: We will categorize regions based on SNAP participation rates, and SNAP-eligible but non-participation households. Cluster and outlier analyses will be applied to predict the impact on healthcare costs in the Medicaid claims data. A cohort with continuous enrollment during the study years will be established to develop a longitudinal analysis of SNAP enrollment in lowering healthcare costs. Aim 2 will be completed in three steps: 1) study the food, built, and safety environment; 2) build an index for healthcare services accessibility utilizing AHRQ's area health resource files and GIS based analytic techniques, and 3) conduct a multilevel path analysis to study the mediating role of the safe and healthy physical environment on the impact of access and utilization of health services on child health outcomes. The Area Deprivation Index will be used as a covariate in the model to adjust for the effect of social determinants of health. Children Medicaid enrollees are also children who have higher risk sociodemographic profiles. Table 1 shows the data sources for food and physical activity environment mapping.

Table 1: Data sources	
Aim 1 county level data	
Food environment	USDA: Food Environment Atlas (FEA), NAICS codes for food outlets, ongoing research (Drs. Thapa, Zhang, Mu Lan, and Zhen).
Physical activity environment	Parks and recreation, private recreation facilities, WalkScore, ongoing research (Drs. Gay and Schmidt)
Community Characteristics	American Community Survey; Rural Urban Commuting Area Codes

Social Determinants of Health	Area Deprivation Index
Health Outcomes	Medicaid Claims data

A series of geospatial-socioeconomic analyses will be performed to present evidence for decision support. We will design several scenarios to help explain the evidence and associations between the built environment, food scarcity, healthcare cost of living and childhood obesity. To name a few: 1) Are there geographic variations in the prevalence of childhood obesity, and how are these variations distributed in the HOP counties? 2) To what degree do built environment measures such as availability and type of grocery stores, accessibility of the stores, and accessibility of public open space explain variations in program implementation and impact? 3) Does rurality play a role in the above relationships? 4) Use confirmatory and exploratory clustering analysis to investigate the relationships of healthcare cost savings with SNAP participation, healthy and safe built environments, and access to healthcare services.

We have some preliminary observations. Food scarcity, nutrition deficiency, and obesity seem to form a vicious cycle. Figure 1 shows that the majority of HOP counties are geographically located in higher food scarcity states with not-so-high SNAP participation rates. At the state level, the percentage of households with food scarcity is
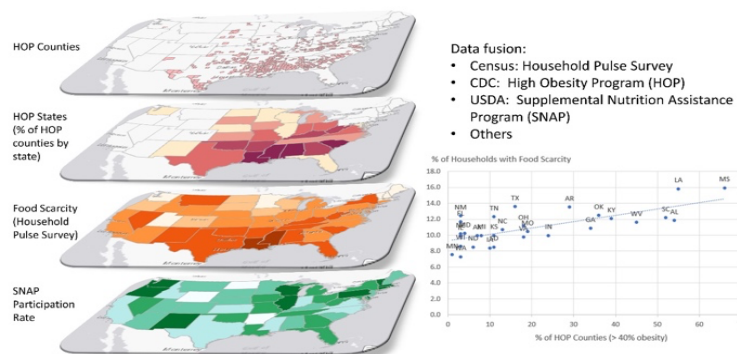

Figure 1: Food scarcity and obesity

associated with the percentage of HOP counties. This intertwined phenomenon may be depressing, but it has a silver lining too–tackling the problem from one perspective, either obesity or nutrition, would benefit multiple solutions.

Names and Qualifications of the Principal Investigator and Key Project Staff

Janani Thapa, PhD, (PI) is an Applied Economist and an Associate Professor of Health Policy and Management at UGA, and her research focuses on policy and program evaluation as it is related to childhood obesity prevention and treatment. Dr. Lan Mu (Co-I) is Professor of Geography at UGA. Her research focuses on Geographic Information Science for health and the environment, spatial analysis and modeling, and geovisualization. Drs. Thapa and Mu have a long history of collaboration in studying physical activity disparity, rural-urban disparity and have compiled data on built environments from previously funded projects that will ensure execution of the Aims.