

NCCOR

Exploration of Social Determinants of Health, Structural Racism, Environments, and Childhood Obesity

Phase 1 Report

Introduction and Scope of Work

Recent public health research has focused on how social determinants of health (SDoH) and structural racism impact health outcomes and how environments, such as schools and neighborhoods, influence health. To advance progress in reducing childhood obesity, NCCOR identified a need to summarize relevant information about environments that are influenced by SDoH and structural racism that in turn influence childhood obesity, as well as measures that exist to capture these relationships. This brief report summarizes the methods and findings of an initial “phase 1” study to address this research gap identified by NCCOR.

The primary research questions of this phase 1 study are as follows:

- What measures are available to assess social determinants of health and structural racism that could be relevant to childhood obesity research?
- What data exists and/or is needed to show how social determinants of health and structural racism impact childhood obesity?

To address these questions, the research activities included in the scope of work for this initial study included 2-3 informal interviews with experts and a preliminary scan of the literature to identify relevant publications. The insight gained in this small exploratory study will be used to provide direction for future research activities.

Methods

Literature Review

The literature review conducted as part of this initial study was designed to be a high-level overview of prominent literature in the area. It was not designed to be a systematic review of the literature, given the scope of this project and the limited timeline. The literature review methods included an initial online search using keywords such as “social determinants of health AND childhood obesity” and “measures of structural racism” in PubMed, Google Scholar, and Google. Additional searches were guided by sources identified in interviews (described below), hand searching the reference lists of identified articles, and recommendations from experts.

A data extraction tool was created in Microsoft Excel with data extraction fields developed iteratively with steering committee members. Measures for SDoH and structural racism were input into separate tables with similar extraction fields. The fields included: measure title, description, factors or variables assessed, scope of measurement, first author, year developed, study population or data source, reliability, validity, measure strengths and limitations, and whether or not the measure was listed in the NCCOR Measures Registry. The SDoH table included an additional field for the domain(s) each measure is categorized in. Extracted data from each identified resource was populated in the excel spreadsheet and organized by those that measure at the individual-level, environmental level, or a combination of both. Similarly, the structural racism measures were organized by those that measure perceptions of racism and those that objectively measure racism at the environmental level. If a data field was unavailable or not reported by the tool, then these fields were left blank. The data extraction tool underwent further review by FHI 360 and members of the steering committee before being finalized.

Interviews

Semi-structured interviews were conducted with experts in the fields of nutrition, obesity, public health, SDoH, and structural racism. A guide for the interviews was developed with iterative rounds of review by FHI 360 and members of the steering committee. The final version of the guide contained two parallel sets of five questions: one set of the questions focused on SDoH and the other on structural racism. The five questions collected information on the conceptualization of SDoH/structural racism and how these concepts related to environments and childhood obesity, recommended measures of SDoH and structural racism, additional measures that are needed in these areas, and key researchers in this field. The interview guides contained standardized definitions of SDoH from CDC/Healthy People 2030 and structural racism from National Institute on Minority Health and Health Disparities that were provided to interviewees at the start of the interview as a level-setting technique. Twelve experts, identified with feedback from FHI 360 and members of the steering committee, were invited to participate in the interviews through a recruitment email. Seven experts responded to the recruitment emails, five completed interviews, one expert provided feedback by email, and another was unavailable during the study period. Interviews were audio-recorded with permission, audio transcribed by a professional transcription service, and reviewed by the research team for accuracy. Due to the small data set, an open coding strategy was used to identify relevant themes.

Results

Literature review

A total of 47 measures were identified in this preliminary review, 31 of which were measures of SDoH ([Appendix A](#)) and 16 were measures of structural racism ([Appendix B](#)). Individual-level measures (n=12) were those that assess factors that directly impact a child and/or their family, while environmental measures assessed the conditions of their community. Due to the focus on environments, more than half of the SDoH measures fell under the Neighborhood and Built Environment domain and/or provided context about area-level factors rather than individual factors. Several area-level measures (n=17) and tools were developed by government agencies and

institutions, such as the Environmental Protection Agency (EPA) and the US Department of Health and Human Services (DHHS) and utilize publicly available data. Most individual-level measures collected information through questionnaires and were developed as a tool to use in primary research. Two measures assessed both individual and area level factors to provide both qualitative and quantitative data.

The measures of structural racism included those that capture perceptions of racism at an individual level (n=4), perceptions of racism at the environmental level (n=2), objective measures of the environment (n=9), and measures that combine one or more of these factors (n=1). Perceptions were measured through questionnaires while environmental measures used public data to quantify impacts of structural racism. Many measures have long been used in disciplines outside the scope of nutrition (e.g., sociology, economics, political science), but could be applied in a public health context.

Interview Results

Five experts completed interviews, and another provided a response by email, exceeding the initial goal of 2-3 interviews. Participants included three academic researchers and two government employees who work in research. Four main themes were identified from the interviews (Figure 1).

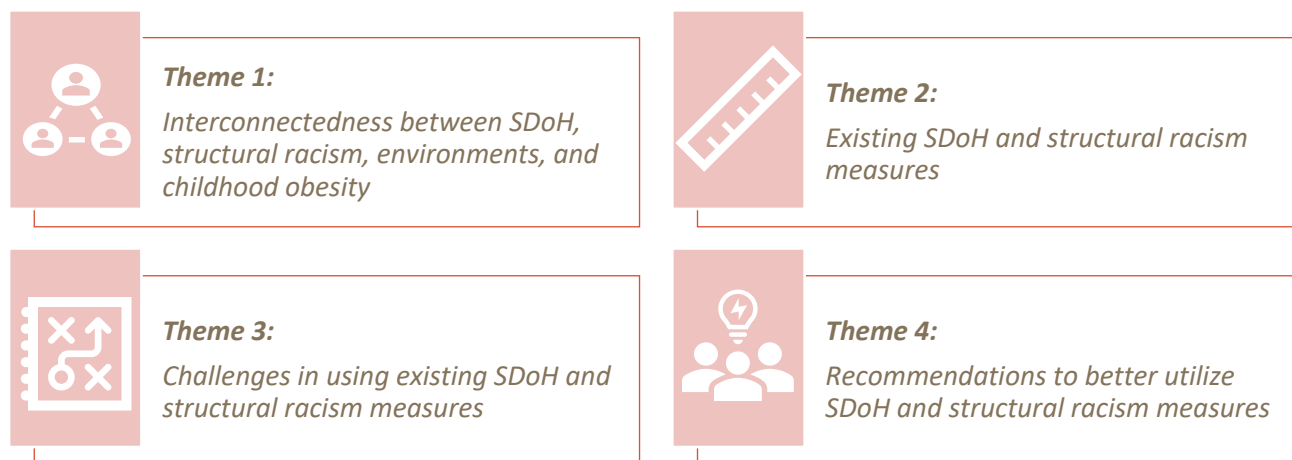


Figure 1. Four Main Themes Identified from Interviews with Key Experts

Theme 1: Interconnectedness between SDoH, structural racism, environments, and childhood obesity.

Interview participants reported that most environments that children are exposed to are influenced by SDoH and/or structural racism, and that most environments also impact childhood obesity and other health outcomes. One participant summed this up by saying that “[SDoH, structural racism, and environments] are linked to childhood obesity because child obesity is

associated with poverty. You can see that disparity in outcomes." (Participant 002). Participants elaborated on examples of how various environments such as home/neighborhood environments and education settings are impacted by SDoH and structural racism and impact childhood obesity. Participant 003 provided a detailed example of how the neighborhood environment is impacted by multiple place-based SDoH and structural racism elements such as air pollution level, access to clean drinking water, exposure to household "forever chemicals", lack of greenspace, and presence of heat domes. This participant went on to say *"So all of these things impact your behaviors. So if it's too hot, if there's no access to green space, kids are less likely to be able to go outside, and less likely to engage in activity, and so forth. So, I mean, historically there's redlining, and different reasons why certain groups live in certain areas."* (Participant 003).

Some participants also described how the constructs of SDoH and structural racism are related to each, with one reporting *"that [racism is] one of the structural determinants of health"* (Participant 001). Another participant reported that they believed structural racism was a moderator of SDoH in many cases, providing the example that *"under conditions of structural racism, the way that these social determinants impact health is going to be different. Housing. Housing isn't universally good or bad. Under conditions of structural racism, housing may have a negative influence or positive."* (Participant 005).

Theme 2: Existing SDoH and structural racism measures

When asked about the most important existing measures of SDoH and structural racism, several participants responded that the PhenX toolkit created and vetted by NIH is a top-tier set of resources for measuring SDoH. The PhenX toolkit is a web-based catalogue of measurement protocols that includes a collection of SDoH measures. One participant described the PhenX toolkit saying *"You don't have to do all the early work on test, retest, re-interviewing your test cases. It's already been done. They're standardized. The groups that did the prior testing and approval of this are absolutely top-flight. So just go to PhenX, use their measures."* (Participant 001). However, it is important to note that while the PhenX toolkit is a powerful resource, it is designed for an adult population and does not focus on obesity, thus has limited relevance to the work of NCCOR.

Participants conveyed that measures of structural racism also exist, many of which were developed outside of the public health nutrition field, in complimentary fields such as sociology. Participants reported and described some constructs that were more commonly used measures of structural racism, such as housing and grocery retail redlining, blockbusting, chronic disinvestment, and persistent poverty; however, they expressed concern over the inconsistency of how these measures are currently being operationalized and used in the literature and provided recommendations on how to enhance use of these measures, which are described in Themes 3 and 4.

Theme 3: Challenges in Using Existing SDoH and Structural Racism Measures

Participants described the challenges they perceived researchers and evaluators face when trying to measure SDoH and structural racism one of which was the difference between measuring race and racism. Participants described how in the current literature and scientific reporting, measures of racial differences in outcomes are frequently reported without a full interpretation of those findings, which often have racism (not race) as the underlying driver of the differences seen between racial groups. Participant 001 described this by stating *"the individual levels of race pick up*

not just the individual race, how [the research participants] identify themselves or as others identify them, but racism. So, researchers need to be mindful of what this variable is capturing." Another participant expanded on this by stating that obesity researchers typically only measure race and fail to measure underlying constructs such as racism. This participant stated *"In my experience with the obesity studies that I had at [redacted], there weren't that many studies that actually asked about racism. They talked about racial differences, but they didn't really get to racism or discrimination."* (Participant 003). Another participant furthered this discussion by stating *"There's tons of papers that have looked at racial ethnic inequities and access to healthy food. The field is very much saturated between nutrition, research, the public health space, sociology, economics and business...I feel like we don't need to look at that no more. We need people to develop strong measures that represent structural racism and actually look at that."* (Participant 004). As these quotes indicate, the participants thought that the ability of researchers and evaluators to be able to discern racial categorizations from racial discrimination is critical in advancing this conversation.

Another challenge described by the participants in using SDoH and structural racism measures is the lack of data available in the units needed from national-level datasets (such as the US Census) to be used in analyses, which has in turn led to inappropriate usage of data by researchers for the analysis being done. This was described related to income data with Participant 001 reporting *"One problem with a lot of measures that people use are, they're actually measuring individual level of characteristics at a population level and then calling it a social determinant of health. You can't get individual information on income, so you use the income of somebody's census tract or county as a proxy, that's not a social determinant of health...what you've got is a crummy measure of individual income."* Participant 004 identified the similar issues with race and ethnicity data stating *"[measures of structural racism are] the inconsistent part across these studies. And I feel like it's just because they're using whatever data they can find and all these different units of analysis."*

Theme 4: Recommendations to better utilize SDoH and structural racism measures

After identifying challenges with using structural racism measures, participants provided suggestions for what they thought was needed to enhance measurement of these factors. One suggestion they reported was developing databases of readily available and easily accessible SDoH and structural racism data. One participant stated *"It would be wonderful if there was some central hub for data and measurement tools or whatever that we could pull together to really look at all of these things. Well, if somebody says, 'Oh, you know what? I really want to look at redlining in the United States and map that on to whatever outcome.'" (Participant 004).* Participants expressed that having a centralized data hub of structural racism measures, similar to the USDA Food Access Research Atlas, would allow researchers to easily obtain data and examine trends.

In addition, participants reported that developing conceptual frameworks of how structural racism and SDoH influence environments and health outcomes, such as childhood obesity, could be helpful advancing measurement and analyses in these areas. Participant 002 stated their perception that development of new measures was less important, saying that we could draw from other disciplines to obtain or adapt appropriate measurement tools, and noting that *"we need more pathways versus more tools."* Participant 001 expanded on this by saying *"it isn't just, 'Oh, this is a cool measure.' It is, 'How is it operating on the individual or the family?' There should be a*

theoretical, or there should be a reason that you're dropping it in, and you should be able to articulate how you think it's going to affect individual and family behaviors and outcomes. That seems to be a weakness of a lot of the discussion of social determinants of health."

Key Takeaways









Some research tools, such as the PhenX toolkit, already exist and could be used to measure SDoH and structural racism; however, the PhenX tools are designed and validated for an adult population and no such toolkit is available for measures developed for children and/or are focused on obesity. The development of a companion resource to PhenX that is focused on SDoH measures and protocols focused on measurement among children could be a next step for NCCOR. It is also imperative to help researchers and practitioners obtain tools and datasets to measure structural racism concepts consistently and develop conceptual frameworks of how to operationalize and model the use of these measures. Some aggregated indices do exist, such as the Child Opportunity Index ([Appendix A](#)) and the Redlining Index ([Appendix B](#)); however, increased awareness and improved operationalization could increase their usability. It should be emphasized that SDoH and structural racism are not mutually exclusive concepts and their impact on environments must be considered together when examining the influences on childhood obesity.













About the Gretchen Swanson Center for Nutrition













The Gretchen Swanson Center is a national nonprofit research institute that provides expertise in measurement and evaluation to help develop, enhance and expand programs focused on healthy eating and active living, improving food security and healthy food access, promoting local food systems and applying a health equity lens in all we do.












Appendix A



Table 1. Social Determinants of Health

First Author	Year	Measure	Description	Economic Stability	Education Access and Quality	Healthcare Access and Quality	Neighborhood and Built Environment	Social and Community Context
<i>Individual-level Measures</i>								
Bevans	2017	PROMIS Pediatric Family Relationships	Questionnaire to assess the subjective experience of being involved with one's family, feeling like an important person in the family, feeling accepted and cared for, and feeling that family members can be trusted and depended on for help and understanding					
CDC	2020	Access to Health Services	Questionnaire that captures when medical care was last sought, usual place of care, frequency of getting medical care and reasons for not getting medical care					
Cedillo	2019	Allostatic Load via biomarkers	Assesses cumulative physiological stress which is associated with higher anthropometric values such as BMI, percent body fat, and waist circumference					
DeWalt	2013	PROMIS Pediatric Peer Relationships	Questionnaire to assess perceived quality of relationships with friends and other acquaintances					
Multiple sources	2009	Characteristics of Current Residence	Questionnaire to assess the conditions of a respondent's home					
Olshan	1993	Day Care Attendance	Assesses a child's daycare or preschool attendance, which is associated with exposure to environmental contaminants					

UNC Chapel Hill, Carolina Population Center	1998	Child-Reported Parental Education Attainment	Questionnaire for adolescents to identify parents' highest level of education					
University of California, Davis	2015	Health and Wellness Before, During, and After Pregnancy	Questionnaire to assess a woman's health before, during, and after pregnancy					
US Census Bureau	2020	Occupational Prestige	Describes a person's relative social class based on occupation and can be used to calculate a community-level view of careers	\$				
USDA-Economic Research Service	2012	Food Insecurity	Questionnaire to assess availability, accessibility, and affordability of nutritionally adequate foods	\$				
Widom	2005	Exposures to Violence, Trauma, and Victimization - Child	Questionnaire to assess trauma and victimization experienced by children					
Zullig	2010	School Social Environment	Questionnaire to assess an adolescent respondent's perceptions of the quality and character of their school social environment					
First Author	Year	Measure	Description	Economic Stability	Education Access and Quality	Healthcare Access and Quality	Neighborhood and Built Environment	Social and Community Context
Area-level Measures								
Agency for Toxic Substances Disease Registry (ATSDR)	2022	Environmental Justice Index	Assesses and ranks the impacts of environmental injustice on census tracts and provides score based on 36 indicators in 3 categories (environmental burden, social vulnerability, and health vulnerability)					

<u>ATSDR</u>	2011	Social Vulnerability Index (SVI)	The degree to which a community exhibits certain social conditions, including high poverty, low percentage of vehicle access, or crowded households, that may affect that community's ability to prevent human suffering and financial loss in the event of disaster	\$				
<u>Burdette</u>	2004	Proximity of Fast Food Restaurants	Examines relationship between overweight in preschool age children with proximity to fast food restaurants, playgrounds, and neighborhood safety					
<u>Cooksey-Stowers</u>	2017	Food Swamp/Expanded Retail Food Environment Index	Measures proportion of fast food and convenience stores to grocery stores in an area to describe areas with high density of nutrient poor food relative to healthier food options					
<u>Earls</u>	1994	Neighborhood Collective Efficacy - Community Cohesion and Informal Social Control	Questionnaire to assess neighborhood relationships – can be used to determine how community context can modify disease risk and prevalence				 	
<u>Environmental Protection Agency (EPA)</u>	2021	National Walkability Index	Measures the relative walkability of communities based on census blocks					
<u>EPA</u>	2014	Access to Jobs and Workers via Transit	Compares the performance of neighborhoods based on their accessibility to destinations via public transit service					
<u>EPA</u>	2019	Air Quality Index	Location-based estimation of air pollution that can be used as a proxy for exposure to air pollution					
<u>EPA</u>	2015	Environmental Justice Screening and Mapping Tool	Scores and ranks areas based on environmental and demographic indicators to highlight communities with potential environmental issues				 	
<u>Jargowsky</u>	2003	Concentrated Poverty	The percentage of households or people residing in census tracts or blocks where poverty is high	\$				
<u>Kind</u>	2018	Area Deprivation Index (ADI)	Ranks neighborhoods by socioeconomic disadvantage	\$				

Lynch	2009	Water Source	Assesses the sources of drinking water in a home, water supply, and filtration system					
National Cancer Institute	2012	Classification of Laws Associated with School Students (CLASS)	Scores school policies for physical education and nutrition in elementary, middle, and high schools for comparison across states					
Noelke	2014	Childhood Opportunity Index	Scores the level of opportunity for children in an area based on neighborhood resources and conditions that matter for children's healthy development	\$				
Sampson	1997	Neighborhood Concentrated Disadvantage	Measures various population characteristics at the neighborhood level to determine the concentration of poverty					
US Census Bureau	2020	Educational Attainment - Community	Measures percentage of people with college degrees living in a census unit to assess community education level					
US Department of Health and Human Services (DHHS)	2000	Healthy Food Environments	Questionnaire to assess a respondent's access to healthy foods and healthy eating alternatives in their neighborhood					
First Author	Year	Measure	Description	Economic Stability	Education Access and Quality	Healthcare Access and Quality	Neighborhood and Built Environment	Social and Community Context
<i>Combined Individual- and Area-level Measures</i>								
Child and Adolescent Health Measurement Initiative	2003	National Survey of Children's Health	Questionnaire to assess children's health, neighborhood, school, access to healthcare, family home, household income, and more	\$				

<u>Mujahid</u>	2007	Neighborhood Safety	Compares respondent's perceptions about safety and crime in their neighborhood to census tract data for the same area					
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Appendix B

Table 2. Structural Racism

First Author	Year	Measure	Description
<i>Perception of Racism at Individual Level</i>			
<u>Brondolo</u>	2005	Perceived Ethnic Discrimination Questionnaire - Community Version	Questionnaire to assess perceived racism, both inter-group and intra-group, or ethnic discrimination
<u>James</u>	1983	John Henryism Scale for Active Coping	Questionnaire to assess an individual's self-perception that they can meet the demands of their environment through hard work and determination
<u>LaFont</u>	2018	Child Perceived Discrimination Questionnaire (CPDQ)	Questionnaire to assess perceived everyday discrimination from adults and other children
<u>Williams</u>	1997	Everyday Discrimination Scale	Questionnaire to assess an individual's perception of discrimination based on interactions with others during routine activities of life
<i>Perception of Racism at Environmental Level</i>			
<u>Carvajal</u>	2012	Border Community and Immigration Stress Scale	Questionnaire to assess stressors within immigrant communities
<u>Tawa</u>	2012	Perceived Structural Racism	Questionnaire to assess perceptions of racism at the structural level
<i>Objective Measures of the Environment</i>			
<u>Beyer</u>	2016	Index of Racial Bias in Mortgage Lending	Calculates odds ratio of mortgage denial from a Black applicant compared to white applicant within an area
		Redlining Index	Measures the odds that an applicant inside a specified area would receive a mortgage denial compared to an applicant outside of the area
<u>Carrington</u>	1997	Race/ethnic Residential Segregation - Separation (S) Index, Unbiased	Examines various population characteristics to determine the degree of racial/ethnic residential segregation of an area among 2 or 3 groups
<u>Chambers</u>	2018	Felony Incarcerations	Ratio of Black to White people incarcerated for a felony at county level

		Racial composition of county board of supervisors	Ratio of Black to White people elected to county board of supervisors
<u>Lukachko</u>	2014	Judicial Treatment	Ratio of Black to White representation in the criminal justice system
<u>Massey</u>	2001	Index of Concentrations at the Extremes	Quantifies the extent to which persons in a specified area are concentrated into the most privileged vs the most deprived (polarization) of a specified social distribution $ICE_i = (A_i - P_i) / T_i$
<u>Massey</u>	1988	Indices of Segregation	Measures of residential segregation calculated as an index ranging from -1 to 1: centralization, isolation, concentration, clustering, and evenness
<u>Mesic</u>	2018	State-level Racism Index	Calculated score using data on disparities and segregation across housing, education, economic, employment, and incarceration
<i>Combination of Individual and Environmental Factors</i>			
<u>Sabo</u>	2014	Perceived ethno-racial profiling	Combination of qualitative and quantitative data to assess the prevalence of and ways in which immigration enforcement policy and militarization of the US-Mexico border is experienced as everyday violence