Addressing Health Disparities: A Case Study of California

Analytical Paper

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INTRODUCTION

There is an extensive body of research that looks at health equity, the “attainment of the highest level of health for all people” (Williams and Sternthal, 2010; McKinlay, 2012; White, Haas, and Williams, 2012; Williams, 2012; Williams and Mohammed, 2013; Henderson, 2015; National Partnership for Action to End Health Disparities, 2016, p.1; Pappoe, 2016). A key reason to achieve health equity is that it supports social justice, defined as “justice in terms of the distribution of wealth, opportunities and privileges within a society” (American Public Health Association, 2015, p.1). To achieve health equity, and further social justice, the Centers for Disease Control and Prevention (CDC) recommend a Health in All Policies (HiAP) approach, which advocates for health conscious policy decisions, especially in sectors not typically associated with public health (such as transportation) (CDC, 2016). This approach aims to increase recognition of the life-enhancing resources that are critical for wellness, oft referred to as the social determinants of health (SDH) (Brennan, Ramirez, Baker, & Metzler, 2008). The CDC considers SDH to encompass, “life-enhancing resources, such as food supply, housing, economic and social relationships, transportation, education and health care, whose distribution across populations effectively determines length and quality of life” (Brennan, Ramirez, Baker, & Metzler, 2008:6). Recognizing the importance of SDH, California provides region and census level data on SDH and health disparities within their newly developed Health Disparities Index (HDI) (Public Health Alliance of Southern California, 2015). This paper evaluates HDI data and applicable proposed legislation to provide actionable recommendations from a policy level to enhance the integration of a HiAP approach.

The HiAP approach was released in 2013 from a joint effort by the CDC, the American Public Health Association (APHA), the Public Health Institute (PHI), and the California Department of Public Health (CDPH) (Rudolph et al., 2013). HiAP aims to enhance policies across varied federal, state, and local level disciplines such as transportation, agriculture, and education in a manner that improves population health (Rudolph et al., 2013). Under this
directive, the CDC (2016) supported the Health Impact in 5 Years (HI-5) initiative to provide
evidence-based approaches for state and local governments to improve community health. The
HI-5 initiative includes several cost-effective SDH focused models that resulted in positive
health impacts such as the “Clean Diesel Bus Fleets” intervention which reduced the number of
children with asthma (CDC, 2016). The HI-5 SDH-focused initiatives highlight early progress
trans-disciplinary health policies have made in improving population health.

However, many vulnerable populations continue to disproportionately experience worse
health outcomes (Commission on the Social Determinants of Health, 2008; Solar and Irwin,
2010; Galea, 2011; Office of Disease Prevention and Health Promotion Healthy People 2020,
2016; Robert Wood Johnson Foundation, 2016; World Health Organization, 2016). For
example, Healthy People 2020 has been tracking 26 key health indicators and of the 26, 8
indicators have neither improved nor declined and 3 are worse (ODPHP HP2020, 2016). One
indicator that is getting worse is mental health; suicide rates increased by 7% from 2006 to 2010
(ODPHP HP2020, 2016). With health equity as the goal of Healthy People 2020, these findings
of worsening health disparities and stagnantly disparate trends are extremely concerning and
should be prioritized at federal, state, and local levels.

This paper is based on data published by the Public Health Alliance of Southern
California (PHASC), a collaborative of nine California county public health departments, and
provides a case study within California to assess the potential benefits a standardized health
disparity measurement tool may offer to evaluate the current state of disparities based on the
neighborhood one lives in. I examine findings within transportation, education, and economics
along with current policies in development that aim to address insufficiencies within these
sectors. I assess the ability to significantly improve policies by utilizing the HDI’s hot spotting of
key influencers of health disparities. I suggest future methodological enhancements, broader
geographical applications, and areas for future research to more accurately assess the level of
health disparities within neighborhoods and support future utilization of the HDI to increasingly benefit some of the most health disadvantaged populations within the United States.

THEORETICAL CONTRIBUTIONS TO UNDERSTANDING HEALTH DISPARITIES

Ayanian (2015, p.2) estimates that racial health disparities cost about, “$35 billion in excess health care expenditures, $10 billion in illness-related lost productivity, and nearly $200 billion in premature deaths” annually. The Agency for Healthcare Research and Quality (AHRQ, 2016) reports annually on the progress the United States is making to address health disparities in the National Healthcare Disparities Report. AHRQ’s (2016) review continues to find significant health disparities in access to high quality health care by gender, race, and location. While significant strides have been made since AHRQ’s first report in 2003, the cost of current health disparities as estimated by Ayanian (2015) is unsustainable and a significant contributor to the present crisis of the cost of health care in the United States.

Implementing more effective and long term solutions to health care disparities is a priority from a federal and citizen standpoint. To develop better solutions, sociology, public health, and interdisciplinary institutions have researched casual pathways of health disparities and how we might better address the extraordinarily poor health outcomes we find today in vulnerable populations. In this section I review some main contributions from these fields such as key social structures and institutions that must be addressed within future health disparity interventions, the importance place has and why it affects health to the degree that it does, and how assessment of health disparities (especially racial health disparities) may be best accomplished.

McKinlay (2012) argues that health disparities cannot be effectively addressed by redistributing resources on a basic level. Instead, social structures, such as major corporations must be targeted (McKinlay, 2012). He notes that these corporations are the prime drivers of illness mainly due to the economic benefit the companies receive (McKinlay, 2012). For example, the food industry profits immensely from selling processed and nutrient poor items
versus more expensive and healthier items. This economic benefit is enough for companies to ignore the escalating prevalence of obesity that is nearly a direct result of poor diet (McKinlay, 2012).

Applying McKinlay’s (2012) argument to the HI-5 “Clean Diesel Bus Fleets” initiative highlights areas for improvement. While providing clean bus fleets improved respiratory health in children, the intervention did not target larger corporations that significantly contribute to air quality. Industries of specific focus could include major car manufacturers, energy, and utility companies. Plec and Pettenger (2012:473) especially call out ExxonMobil for their environmentally damaging practices and use of marketing that makes the consumer believe they are environmentally conscientious, a ploy known as “greenwashing.” Arguably, without targeting these companies, efforts to reduce air pollution will remain marginal overall.

Substantial improvements in population health also require policies that recognize the importance location has for the prevalence of health disparities. This importance is extensively highlighted in public health and medical sociology (Sampson, Morenoff, and Gannon-Rowley, 2002; Morenoff and Lynch, 2004; Kirby and Kaneda, 2005; Small and McDermott, 2006; Sampson, 2008; Albright, Chung, De Marco, and Yoo, 2011; McDermott, 2011; Williams and Sternthal, 2010; Williams, 2012; White, Haas, and Williams, 2012; Williams and Mohammed, 2013; Henderson, 2015; Pappoe, 2016). This research frequently emphasizes the significance of location specifically in regards to racial and ethnic neighborhood segregation (Morenoff and Lynch, 2004; Small and McDermott, 2006; Sampson, 2008; McDermott, 2011; Williams and Sternthal, 2010; Williams, 2012; White, Haas, and Williams, 2012; Williams and Mohammed, 2013; Henderson, 2015; Pappoe, 2016). For instance, White et al (2012) found that health disparities largely influenced by location are, in many ways, driven by highly racially segregated neighborhoods.

White et al (2012) note that highly segregated neighborhoods are often characterized by an extreme lack of social capital as well as access to health care services. These conditions
develop in part due to the inability of residents to pay medical bills (from lack of job prospects) which spurs financial crisis within local health care institutions. This limits the number of high quality medical providers who choose to work within these regions and cumulatively results in critical provider shortages (White et al, 2012).

White et al (2012) argue that future policy must address segregation in order to significantly improve racial and ethnic health care disparities. To do so, measuring segregation must be methodologically addressed. White et al (2012) note that current widespread use of racial and ethnic composition percentages may not be sufficient to capture the complete effects of racial and ethnic clustering of neighborhoods. They note that data systems should aim to also measure segregation features such as the degree to which interaction with different racial groups can and does occur (White et al, 2012). Additional public health and sociological research echoes the need for enhanced segregation measures (Kramer, Cooper, Drews-Botsch, Waller, and Hogue, 2010; Hynes, 2011; Williams, 2012; De Maio, Mazzeo, and Ritchie, 2013; Landrine and Corral, 2014; Krieger, Waterman, Spasojevic, Li, Maduro, and Van Wye, 2016).

Kramer et al (2010) argues that measuring residential racial segregation using spatial surface-density-derived measures offers a more detailed look into the existence and potency of racial segregation versus more commonly practiced assessment of census level racial percentages. Kramer et al (2010) defines spatial surface-density-derived racial measurements as when the researcher defines the area to be assessed for racial population percentages versus use of standardized census levels. This method is highly beneficial for more accurate assessment of segregation as neighborhoods may be better defined in this localized manner with resident input.

Additional recommended enhancements to measure racial segregation include incorporating more resident reported experiences such as experiences of discrimination (via the Experience of Discrimination (EOD) scale and the Everyday Discrimination Scale (EDS)).
situational extreme deprivation or privilege (via the Index of Concentration at the Extremes (ICE)) and instances of wage theft (De Maio et al, 2013; Landrine and Corral, 2014). Landrine and Corral (2014) define wage theft as being underpaid based upon the state’s minimum wage level through hidden employer practices such as lack of breaks and unpaid overtime work. These additional indicators are resident reported and may not be as accurate. However, findings suggest their inclusion would not overestimate racial segregation and discrimination as those affected typically underreport or do not report their experiences (Landrine and Corral, 2014). In addition, Morenoff and Lynch (2004) found that resident surveys collectively produce valid findings and offer a more nuanced understanding of the neighborhood. McDermott (2011) highlights this significantly as she cites how a large-scale assessment of individual experiences of racial stereotypes can be positively correlated with the percentage of Black respondents. This finding supports the argument that policies focused on combating institutional racism are still very needed as clearly Black populations continue to face the devastating health effects of racial stereotyping and racism.

These findings and the importance of addressing the needs of segregated neighborhoods are also highlighted in a case study format of Richmond, California presented in the “Unnatural Causes” documentary series episode “Place Matters” (California Newsreel, 2008). The case study of Richmond, California found the present makeup of distinct racial and ethnic segregation and health disparities were largely a result of racially discriminatory housing policies in place over 50 years ago (California Newsreel, 2008). Historically, when Richmond’s shipyards closed and residents lost their jobs, those who were able to move away to better job prospects were also rewarded with better social conditions and thus health care outcomes (California Newsreel, 2008). However, those who were able to move were largely White because supportive federal home loans were only provided to White residents (California Newsreel, 2008). Over time this resulted in a highly segregated Richmond, California with
residents suffering poor economic and social conditions and their associating chronic health conditions (California Newsreel, 2008).

Williams (2012) adds a thorough discussion of the role residential segregation to the literature on health disparities. He notes how systemic segregation leads to critical SDH resources such as job and education prospects being disproportionately taken away from minority neighborhoods (Williams, 2012). This occurs to such a degree that the most disadvantaged White children do not get exposed to neighborhoods that have the most health damaging effects as those neighborhoods are nearly exclusively exposed to Black and Latino children (Williams, 2012).

The strong effect neighborhoods have on health is also addressed by Schulz et al.’s (2012) research in Detroit, Michigan. Schulz, et al. (2012) found that when controlling for household poverty levels in an urban Detroit neighborhood, community-level poverty remained significantly associated with poorer health. This finding suggests that initiatives that target low income communities versus individual family units may result in greater health benefits as location was a significant contributor to health regardless of individual income. This finding also supports additional research to determine how location may be best addressed to combat health disparities.

To determine how health disadvantageous neighborhoods may be best addressed, Morenoff and Lynch (2004) review why place influences a resident’s health and income attainment to the degree that it does even when taking into account that resident’s health and educational attainment behaviors. Morenoff and Lynch (2004) find that despite a resident’s behaviors, their neighborhood of residence significantly influences their ultimate health outcomes through cumulative stress via the structural environment and the social makeup of the neighborhood. They note neighborhoods that expose residents to pollutants, overcrowding, frequent violent crime, and lack opportunities to engage in mutually beneficial relationships with
neighbors are expected to result in cumulative stress that in turn promotes poorer health outcomes for those residents (Morenoff and Lynch, 2004).

Both Morenoff and Lynch (2004) and Small and McDermott (2006) note that neighborhoods influence resident’s health through the quantity of SDH resources as well as the quality of those resources. Small and McDermott (2006) further this discussion as they note the difficulty in assessing quality between majority White versus racial minority neighborhoods. They note that stores may need to be evaluated beyond price of goods offered as a grocery store that accepts food stamps or WIC and sells ethnic-specific foods may be considered higher quality and meet more needs versus a store that offers a larger selection of American products (Small and McDermott, 2006). Albright, Chung, De Marco, and Yoo (2011) further this evaluation of quality by noting that a neighborhood’s reputation by the residents and outsiders significantly contribute to resident health via their morale over time and engagement within the neighborhood. To continue the grocery store assessment, a neighborhood that has a poor reputation from outsiders’ perspectives may influence residents’ by giving them less cause to invest in their neighborhood stores.

**CASE STUDY METHODOLOGY**

I reviewed several CDC-supported and publically available data sets on SDH for potential use in this paper’s case study framework. Data sets reviewed included the Chronic Disease Indicators, Community Health Status Indicators, Health Indicators Warehouse, Interactive Atlas of Heart Disease and Stroke, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Atlas, National Environmental Public Health Tracking Network, The Social Vulnerability Index, and the Vulnerable Populations Footprint Tool (CDC, 2015; CDC, 2016). These data sets were ultimately not chosen for analysis based upon their specificity to certain diseases, limited number of SDH indicators, and lack of a methodology that allows for direct comparison of multiple SDH components across locations.
Further review of publicly available data sets on SDH identified the work of the Social Science Research Council nonprofit (SSRC, 2016) and their Measure of America project. The SSRC (2016) innovatively combined indicators across the major components of SDH including health outcomes, education, and economics in a standardized way to begin ranking locations at the local and state level. From these data, the SSRC developed state level reports for California, Mississippi, and Louisiana to provide greater insight into how these states fared on SDH. By reviewing these states further, the PHASC’s (2015) California HDI project was identified. The PHASC (2015) is a group of California local health departments that improved upon the work of the SSRC by ranking California census tracks on 27 SDH indicators to provide a composite score of health disparity (PHASC, 2015). This ranking is geographically mapped and may be seen in Appendix A. This census level standardized SDH data were only available for California and thus chosen for further research.

*California Health Disadvantage Index*

The California HDI identifies disadvantaged communities by scoring them on 27 economic, social, and environmental factors, available in Appendices B and C, to create an overall SDH composite score (PHASC, 2015). This identification supports PHASC’s (2015) overarching goal of developing health initiatives and health-impacting policies that more precisely target the most disadvantaged communities as promoted by the HiAP directive. Maintaining the HDI will support California’s efforts as it provides a benchmark to estimate overall success post-intervention.

The CA HDI provides a perspective that was previously unavailable from existing health disadvantage indices (PHASC, 2015). The California HDI uniquely weighs SDH factors based upon their proposed impact on overall health and wellness which offers a more standardized methodology to study SDH inequities (PHASC, 2015). While the weights are based on expert input, the PHASC (2015) recognizes that reported scores are estimates and subject to change. Despite this limitation, this index expands the possible research on SDH by quantifying complex
phenomena into measures that may be more easily evaluated such as the concept of social inclusion.

Previous research highlights how complex phenomena like social inclusion can impact overall health (Wright and Stickley, 2013; Belle-Isle, Benoit, & Pauly, 2014). The California HDI allows researchers to build upon this knowledge by comparing these phenomena in standardized levels across diverse communities. For instance, researchers may recognize certain areas have a higher proportion of socially excluded groups but are unable to standardize the level to quickly identify the areas in most need. With the California HDI tool, this standardization is inherent and allows the user to geographically map those communities (PHASC, 2015). This offers additional evidence that funding would be impactful as the communities most lacking social inclusion would be effectively targeted.

Notably the California HDI is a new tool that may be improved upon in future enhancements as suggested by the PHASC (2015) and PHI (2016). The PHASC (2015) recognizes additional limitations beyond the estimated weighting of indicators within their methodology to include the lack of data for public transit, crime, educational system quality, and limited data on health care quality and outcomes. Further, the PHASC (2015) notes that they were unable to incorporate race and ethnicity into the HDI composite score as state law prevents such factors from influencing funding decisions regardless of the well-known associations race and ethnicity have with health inequities (California Newsreel, 2008). The PHI (2016) adds that future iterations of the California HDI may include options such as the ability to combine census levels to address research questions specific to certain geographic locales that are currently independently assessed in the California HDI.

The current iteration of the California HDI identifies three major regions with the worst scores across the 27 SDH indicators including (in order from worst to best) San Joaquin Valley, Los Angeles, and the Inland Empire (PHASC, 2015). I reviewed these regions and ultimately chose Los Angeles and the Inland Empire for the following case study. These regions are
advantageous to study further as they allow for a census level review of place-based SDH inequities across both urban and rural geographies. I identified several census tracts with extremely poor or positive HDI scores (in comparison to the region and neighboring census tracks) as well as having diverse communities as determined by average racial and ethnic makeup. Future research should consider analyzing San Joaquin Valley.

Within Los Angeles, I identified diverse communities by comparing the racial and ethnic demographics to United States averages. I picked two census tracks for their polar diversity of Latino demographics and geographic proximity. The Harbor City community reviewed contains 72.5% Latino persons while the United States average is only 17.6% (PHASC, 2015; United States Census Bureau, 2015). The community 4.5 miles away in Rolling Hills Estates contains only 8.9% Latino persons (PHASC, 2015). I picked these two communities to gain perspective on the differences in SDH that adjacent and racially segregated communities experience.

Within the Inland Empire, diverse communities were also defined by the racial and ethnic makeup compared to United States averages. I identified important demographic differences between adjacent census tracks 06071025100 or zip code 92332 and track 06071010409 or zip code 92277. These census tracks both reside in the San Bernardino County of the Inland Empire. In zip code 92332 the population contains 23.5% American Indian/Alaskan Native while the overall average of American Indian/Alaskan Native across the United States is only 1.2% (PHASC, 2015; United States Census Bureau, 2015). Zip code 92277 contains no American Indian/Alaskan Natives and is largely made up of White residents at 74.1% (PHASC, 2015). I further reviewed these two communities to understand how a high representation of American Indians (based on geography Alaskan Natives are not referenced further) impacts SDH between two otherwise similar rural communities.

A CASE STUDY OF CALIFORNIA

The California HDI represents its findings geographically on a map as seen in Appendix A with communities scoring worse in a darker red (PHASC, 2015). San Joaquin Valley, Los
Angeles, and the Inland Empire (in that order) scored disproportionately worse across economic, social, and environmental indicators (PHASC, 2015). These regions are displayed in Appendix D. The California HDI scored the domains that impacted the regions’ rankings between 0 to 1, where 1 is the worst possible score (PHASC, 2015). San Joaquin’s scored worst on economic (0.66) and social (0.52), Los Angeles’s social (0.61) and health (0.52), and Inland Empire’s neighborhood (0.55) and economic (0.50) (PHASC, 2015). The mean disadvantage scores for all influencing domains by region are included in Appendix E. This paper further assesses Los Angeles and the Inland Empire to determine if the California HDI should be utilized in the future to systematically evaluate and enhance health policy efforts. Future research should also consider a more detailed assessment of San Joaquin to enhance my preliminary findings.

Los Angeles

As of 2015 Los Angeles is home to a little over 10,000,000 people (United States Census Bureau, 2016). A significant portion of this population experiences poor health outcomes and lacks access to key SDH as reflected in their HDI score. However, these findings are not evenly distributed. Several areas or “hot spots” disproportionately lack SDH resources and experience worse health outcomes in such a magnitude that the entire Los Angeles composite HDI score is affected. For instance, HDI scores in San Pedro neighborhoods range from 0.58 and higher while Rolling Hills Estates neighborhoods range below 0.06 (PHASC, 2015). These hot spots with poor HDI scores are home to majority Latino and African American populations, which result in these groups disproportionately experiencing the negative effects of neighborhoods lacking economic, educational, and social resources (Lewis & Burd-Sharps, 2015).

The Los Angeles County Department of Public Health, the California Endowment, and the Public Health Alliance of Southern California recognize that this large differential is likely caused and sustained in part from the significant segregation in terms of race and ethnicity (Los
Angeles County Department of Public Health and The California Endowment, 2013; PHASC, 2015). This segregation is highlighted in their “Health Atlas” 2013 report for Los Angeles. They note that neighborhoods with 12 times the income of residents of the poorest communities are made up of less than 15% Non-White and Hispanic residents while the poorest communities are nearly exclusively Non-White and Hispanic (Los Angeles County Department of Public Health and The California Endowment, 2013). The California HDI offers additional levels of insight into this racial segregation.

I compare two adjacent Los Angeles neighborhoods, Rolling Hills Estates (Census Track: 06037670201) and Harbor City (Census Track: 06037294421), to illustrate the level of segregation present. The communities are approximately 4.5 miles away from one another yet Rolling Hills Estate has an HDI score of 0.03 and Harbor City 0.68 (Google Maps, 2016; PHASC, 2015). The residents of Rolling Hills Estate are 69.8% White, 16.6% Asian, 8.9% Latino, and 4.6% Multiple Races (PHASC, 2015). In Harbor City, 4.5 miles away, residents are 72.5% Latino, 11.8% Asian, and 8.9% White (PHASC, 2015). Economically these two communities are at extremes. Rolling Hills Estate residents’ median incomes is $126,400 with less than 2.9% in poverty, while Harbor City residents live on median incomes of $32,778 and 64.7% are in poverty (PHASC, 2015).

Because of their geographic proximity, it is reasonable to expect Rolling Hills Estates and Harbor City to score similarly on transportation related indicators. Yet, no residents of Rolling Hills Estate have experienced a pedestrian injury over the past five years while, on average, 28.8 injuries have occurred in Harbor City (PHASC, 2015). This large differential is especially concerning as the level of traffic density in both areas is approximately equal with Rolling Hills Estate having a slightly higher level of traffic than Harbor City (PHASC, 2015). With essentially equivalent traffic and geographically adjacent locales similar figures of accidents are expected. Future iterations of the California HDI may consider adding additional transportation related indicators to evaluate where the issues arise from. It is possible that different public
transportation access levels (an indicator currently under consideration for future iterations of the California HDI) would explain some of the different pedestrian injury figures (PHI, 2016).

Residents of Rolling Hills Estate and Harbor City continue to have notable differences on the rate of those uninsured, percent with less than a high school education, single parent households, and access to supermarkets and parks (PHASC, 2015). On almost all measures, Harbor City residents fair worse except for access to supermarkets and parks. Of Harbor City residents, 30.7% are uninsured, 40.7% have less than a high school education, 71.6% of households are single parent and 100% have access to supermarkets and parks (PHASC, 2015). In comparison Rolling Hills Estate residents have 2.7% uninsured, 0.9% with less than high school education, 13.9% single parent households, 2.8% lack access to supermarkets and 19% lack access to parks (PHASC, 2015).

Rolling Hills Estate residents are especially high on the spectrum of access to SDH yet fair worse in regards to years of life lost compared to Harbor City residents. On average a Rolling Hills Estate resident is expected to lose 3.3 years of life while a Harbor City resident loses only 0.6 years (PHASC, 2015). This difference highlights the assumption that SDH access is only one of several important causal components of health and wellbeing. The majority Latino population in Harbor City may account in part for the difference in years of life lost. Previous research has linked Latino populations with longer life despite often poorer community conditions (Ruiz, Steffen & Smith, 2013). This phenomenon is frequently referenced as the Hispanic or Latino paradox and “healthy immigrant” effect. Morenoff and Lynch (2004) recognize that Hispanic or Latino segregation results in stronger aspects of Mexican culture among residents which include beneficial family support and some health promoting behaviors. Additional indicators not yet integrated within the California HDI and refinement of indicator weights may also further explain the gap in years of life lost in the future.

While on opposite spectrums of the above measures, residents of both communities fair similarly in regards to high housing costs, car accessibility, and age-eligible children in high
school (PHASC, 2015). Both communities face generally high housing costs (67.5% Harbor City; 57.6% Rolling Hills Estate) and most households have access to a car (6.7% no access Harbor City; 0.3% Rolling Hills Estate) (PHASC, 2015). Notably, both communities have 100% of age eligible youth enrolled in high school but 42.9% of Harbor City pre-school age-eligible children are not enrolled compared to 21.1% in Rolling Hills Estate (PHASC, 2015). While high school attendance is required preschool attendance is not. This suggests that policies supporting (if not requiring) preschool attendance may have the best effect in both Harbor City and Rolling Hills Estate. However, as preschool attendance requirements stand, the notable difference between these two neighborhoods may suggest that access or financial restraints are limiting pre-school enrollment instead of a lack of understanding about the benefits of education.

The comparison of Rolling Hills Estate and Harbor City neighborhoods provides a concrete example of the level of segregation and disparate indicator scores that are present across Los Angeles. While these are two specific areas, overall data on Los Angeles suggest that these two communities reflect a widespread issue and are not atypical of the city. The Los Angeles County Public Health Department and The California Endowment (2013) support this claim as they found approximately 43% of all Non-White and Hispanic individuals live within five community areas out of 35 established areas within Los Angeles. This finding is strongly suggestive of widespread racial segregation and its associating disproportionate health disparities.

**Inland Empire**

As of 2015 San Bernardino county had a little over 2,000,000 people (United States Census Bureau, 2016). A significant portion of this population experiences poor health outcomes and lacks access to key SDH as reflected in their HDI score. In comparison to Los Angeles, the level of disproportionate distribution of poor HDI scores across census tracks is limited. Due to rural geography, the number of census tracks is much smaller. This reduces the
ability of the California HDI to call out “hot spots.” To understand the area further, I review two communities in San Bernardino County, zip code 92332 and zip code 92277.

Zip code 92332 is located on the most eastern side of San Bernardino county and California’s border. Approximately 1,688 people reside here with an HDI score of 0.92 (PHASC, 2015). Zip code 92277 is directly adjacent to the above San Bernardino locale and hosts approximately 3,018 people with an HDI score of 0.47 (PHASC, 2015). While not as racially segregated as the previously reviewed Los Angeles counties, there are notable differences in racial/ethnic makeup. In zip code 92332 the population is 21.2% Latino, 23.5% American Indian, and 55.4% White (PHASC, 2015). Comparatively, zip code 92277 is 4.4% Black, 16.6% Latino, 4.9% Multiple Races, and 74.1% White (PHASC, 2015). One of the most striking racial differences between the areas is that zip code 92332 has a substantial American Indian population while zip code 92277 does not have any American Indians. The correlation between the worse HDI score and the population of American Indians is notable as this racial/ethnic group is a vulnerable population with known health disparities (Jones, 2013; Bauer, and Plescia, 2014). As a group they likely disproportionately lack SDH resources and experience poor health outcomes within the census track resulting in the overall poor composite score. At this time the California HDI cannot effectively confirm this as all measures are provided at the census track level (PHASC, 2015).

Noting this granularity limitation, insight at the census track level helps expand our knowledge of San Bernardino county. Zip code 92332 (HDI: 0.92) is especially affected by economic and educational factors as 61.1% are in poverty (median income $29,201) and 43.5% of age eligible children are not in preschool (PHASC, 2015). In comparison, zip code 92277 (HDI: 0.47) is also affected by economic and educational factors (42.4% in poverty, $51,429 median income, and 100% of age eligible children not in preschool) but also largely by health as on average the population has 7.7 years of life lost (PHASC, 2015). Health in regards to years of life lost is actually a positive influencer for zip code 92332 with negative 1.1 years of life lost
(or net gain) despite their overall lower HDI score (PHASC, 2015). This is especially notable as zip 92332 has a significant American Indian population who consistently suffer higher mortality trends as a group (Espey et al, 2014). Espey et al. (2014) note that this mortality disparity has been offset when access to high quality SDH resources is provided to this vulnerable population. The lack of disparity warrants further research to determine why this common pattern of disparity is not reflected here.

Reviewing these two census tracks in a rural locale also identifies some limitations in the California HDI. For instance, both locales scored poorly on access to supermarkets and parks (zip code 92332: 93.3% lack access to supermarkets and 16.6% to parks; zip code 92277: 100% lack access to supermarkets and 56.5% to parks) (PHASC, 2015). However, the definitions of “access” to supermarkets and park (1 mile and 0.5 miles respectfully) did not change from the Los Angeles area to the rural San Bernardino county (PHASC, 2015). It would be beneficial to provide realistic access benchmarks for these rural areas as both counties scored relatively well on auto access (defined as percentage of households without access to a car) with zip code 92332: 13.3% and zip code 92277: 6.5% without access (PHASC, 2015). These relatively high levels of transportation access (especially for zip code 92277) may suggest that both areas actually have reasonable access to both supermarkets and parks for their geography.

CALIFORNIA LEGISLATIVE REVIEW

Transportation

Transportation is a highlighted geographically segregated issue in regards to pedestrian injuries in Los Angeles (PHASC, 2015). This issue is also systemic across the state as recent legislation cites that California had more pedestrian injuries in 2015 than any other state (California Legislative Information, 2016). In response to this disparity, bill SR 87 proposes widespread pedestrian safety education (California Legislative Information, 2016). Further proposed legislation includes bill AB-4, titled Transportation Funding, which supports enacting
“legislation to establish permanent, sustainable sources of transportation funding to improve the state’s key trade corridors and support efforts by local governments to repair and improve local transportation infrastructure” (California Legislative Information, 2016, p.1). Yet this proposal has mixed support from public officials with the most recent vote on the assembly floor recording 50 approving, 29 against, and 1 no vote received (NVR) (California Legislative Information, 2016). At present the bill is in the Senate Rules committee and has not been voted upon (California Legislative Information, 2016).

At present AB-4 is a new bill and should undergo further development and refinement. However, a main component of AB-4 may be affecting the most recent mixed vote on the assembly floor. AB-4 proposes to use data on the percentage of roads and bridges in good condition as measures of performance in improving California’s transportation issues (California Legislative Information, 2016). While roads and bridges in good condition are very important to measure, drafting a more comprehensive set of key performance indicators should be considered. For instance, by adding in rates of pedestrian injuries and access to public transportation, local areas in most need could be more readily identified ultimately resulting in a better prioritization of funding. As the California HDI offers data on pedestrian injury rates and may continue to expand its indicators it may be beneficial to include it as one option in this bill’s evaluation methodology section. Evaluating these additional indicators offered in the California HDI will lend a more complete perspective on how transportation issues are progressing if this or similar bills are enacted.

Additional considerations for AB-4 may include adding how to approach transportation issues in urban and rural locales. Research on transportation access and utilization issues notes the importance of addressing problems in a more specific manner than broadly addressing existing transportation route conditions (McAndrews, Beyer, Guse, & Layde, 2016; Pyrialakou, Gkritza, & Fricker, 2016). Specific recommendations from a transportation disadvantage policy perspective include developing policy in a manner that takes into
consideration additional factors such as urban and rural geography, population density, accessibility, mobility, and actual resident travel behavior (McAndrews, Beyer, Guse, & Layde, 2016; Pyrialakou, Gkritza, & Fricker, 2016).

After reviewing transportation legislation explicitly notating rural approaches relevant for the Inland Empire, I identified bill AB-23, Transportation (California Legislative Information, 2016). Bill AB-23 seeks to prioritize funding to allocate additional resources to both rural and urban disadvantaged communities to improve their mobility and safety needs (California Legislative Information, 2016). Bill AB-23 specifies that ten percent of total funds allocated must be directed to rural and low density urban locales as defined by populations less than 200,000 (California Legislative Information, 2016).

AB-23 also defines disadvantaged communities as areas meeting any one of the three following characteristics (California Legislative Information, 2016, p.1).

(1) An area with median household income less than 80 percent of the statewide median household income based on the most current census tract-level data from the American Community Survey.
(2) An area identified as among the most disadvantaged 25 percent of areas in the state according to the California Environmental Protection Agency, based on the latest version of the California Communities Environmental Health Screening Tool (CalEnviroScreen) scores.
(3) An area where at least 75 percent of public school students are eligible to receive free or reduced-price meals under the National School Lunch Program.

These sufficient characteristics to define a community as disadvantaged are supported as limited income, the CalEnviroScreen score, and proportion of children receiving free or reduced meals are key indicators that a population is in need (Office of Environmental Health Hazard Assessment, 2016). The CalEnviroScreen develops its composite indicator score by taking pollution variables such as ozone concentrations, drinking water contaminants, and toxic releases into account (OEHHA, 2016). These variables are lacking in the California HDI yet the California HDI offers additional indicators that are strongly correlated to disadvantage that are not included in any one of the three sufficient characteristics.
HDI indicators considered for prioritizing communities may include years of life lost, percent uninsured, and percent of those with less than a high school education (PHASC, 2015). Adding the worst scoring census tracks (in regards to these indicators) to the existing sufficient qualifiers might allow better identification of regions in most need. Also, the combination of the CalEnviroScreen score and the California HDI score may be especially beneficial as poor scores on both of these composite indicators of disadvantage, one focused on environmental and the other SDH, would effectively highlight hot spot locales.

Education

Education is a highly geographically segregated issue in regards to rate of high school graduation in Los Angeles (PHASC, 2015). Current California bills to address educational attainment issues include AB-1181, which supports offering career technical education to adults and minors in evening high schools (California Legislative Information, 2016). This bill states that geographic location should not prevent access to these programs, yet each district’s school board would be able to determine if minors are allowed in these evening programs (California Legislative Information, 2016).

From the level of disparate high school attainment percentages found across Los Angeles it may be beneficial to add in language to define what would constitute acceptable reasons for school boards to decline minors access to these programs. This policy is beneficial for areas with especially low high school graduate attainment as it provides another time frame in which students may receive education and another type of education. Technical education may prove more useful to students who are seeking employment versus attending a higher education program following high school.

Based upon these expected benefits, AB-1181 should emphasize that locales with low high school graduation rates are prioritized to implement this legislation to the fullest extent possible. They may also consider noting that this benefit of the legislation will be evaluated via several mechanisms which may include tracking educational attainment via the California HDI.
Additional indicators in the California HDI however may be warranted to ensure increased technical education is recognized versus a standard high school diploma. To test if the legislation is impactful, it is critical to follow up on communities with low graduation rates that offered minors access to these programs.

I reviewed educational legislation focused on preschool accessibility for relevance to the findings within the Inland Empire and identified bill AB-47, State Preschool Program. AB-47 aims to address the thousands of eligible children who do not attend preschool or Head Start programs by mandating that all eligible children have access to a state supported preschool program (California Legislative Information, 2016). This mandate is limited by a contingency that enough funding to do so is provided in the annual Budget Act (California Legislative Information, 2016). Votes against AB-47 have ranged on the Assembly floor from 22 (56 Approved) to most recently 4 (69 Approved) (California Legislative Information, 2016). This bill has a lofty goal and recognizes the realities of funding approbation but does not provide a middle ground of how to utilize funding if it is passed and given only 30, 50, or 70% of the undetermined target budget.

AB-47 should address these potential outcomes. The current lack of detail may be fueling those voting against it. The case study of the Inland Empire in comparison to Los Angeles shows that access to preschool education may be significantly worse in rural areas, with the Inland Empire ranging from 43.5% - 100% of age eligible children not enrolled in preschool compared to 21.1% - 42.9% in the Los Angeles areas studied (PHASC, 2015). This finding supports amending the bill to prioritize rural areas due to historically disproportionately reduced access and need. This amendment would require AB-47 to clearly delineate the sources of data (such as the CA HDI) that would be used to make the judgement calls for where limited funds would be spent and how consistent limited funding over the years would be addressed.

Economic
Economic wellbeing is potentially the most segregated issue in terms of annual salary and poverty rates in Los Angeles (PHASC, 2015). There are many bills up for vote to assist CA in addressing this stark disparity. Bill SCR-158, Promise Zones, is presently under review by California’s legislators. SCR-158 aims to “give priority consideration and preferred access to state programs and resources to federally designated Promise Zones in California that support job creation and economic security, expand educational opportunities, increase access to affordable quality housing, and improve public safety” (California Legislative Information, 2016, p. 1). The U.S. Department of Housing and Urban Development (2016) identifies Promise Zones mainly through targeting communities with extreme economic disparities. Through this review, South Los Angeles and San Diego California were identified (U.S. Department of Housing and Urban Development, 2016).

SCR-158 has been voted on across the Senate in the governmental organization, appropriations committee and the Senate floor (California Legislative Information, 2016). SCR-158’s most recent vote resulted in a pass from the Senate floor, but the votes were highly divided with 24 approving, 12 against, and 3 NVR (California Legislative Information, 2016). While no detailed explanation for the divided votes is publicly available, the bill may be assessed for areas that may be concerning from a public funding standpoint. The bill’s focus on South Los Angeles overall is supported by the California HDI as Los Angeles is within the top three worst scoring regions for the composite measures across California in regards to SDH (PHASC, 2015). On average Los Angeles reports a 0.29 HDI economic score (0-1 with 1 being the worst possible) that signifies clear economic disparity yet is not the worst scoring California region on this indicator (PHASC, 2015). The case study of Los Angeles has shown, regardless of the 0.29 economic score, extreme economic disparities within neighboring census tracks at the city level exist within Los Angeles. This suggests that Los Angeles would benefit immensely from a more targeted approach than encompassing all of South Los Angeles for Promise Zone funding. A fuller assessment of all the census level economic scores from the California HDI
within South Los Angeles should provide the needed data to prioritize neighborhoods. Amending SCR-158 to clearly state how funding will target only the most economically deprived communities in South Los Angeles is therefore warranted.

While only South Los Angeles and San Diego California were identified as promise zones subject to SCR-158, economic disparities are also significant in San Bernardino county of California’s Inland Empire. The case study found widespread poverty across census tracks studied with populations reporting from 43.5% up to 61.1% in poverty (PHASC, 2015). These findings and the extreme polarity across Los Angeles warrant a different economic policy approach. To better match the consistent prevalence of economic disparity across California’s rural regions, I recommend a more generalized approach. Rural regions may not significantly benefit from a neighborhood level approach versus policy broadly targeting rural regions averaging high poverty levels. A neighborhood level approach may only offer a significant advantage for areas that experience widely disparate economic makeup between geographically close communities like in the studied Los Angeles areas.

Policy targeting rural regions to improve economic disparities may take several approaches to address high poverty levels. For instance, research recognizes that economic disparities prevalent in rural regions are often associated with residents lacking access to jobs entirely or jobs that pay above minimum wage (Pyrialakou, Gkritza, and Fricker, 2016). Of relevance to promoting sustainable job opportunities is Bill AJR-27, The Land and Water Conservation Fund (LWCF) (California Legislative Information, 2016). Bill AJR-27 aims to authorize permanent funding for the 1965 LWCF and reverse the current time-limited fiscal allocation requirement and potential expiration (California Legislative Information, 2016). To support this funding request, Bill AJR-27 notes that the LWCF has successfully conserved California’s natural resources and provided approximately 723,000 jobs to both urban and rural communities (California Legislative Information, 2016). Bill AJR-27 has experienced mixed
support across the Assembly and Senate floor with the most recent Senate floor vote recording 30 approving, 7 against, and 3 NVR (California Legislative Information, 2016).

AJR-27 may have mixed support from the lack of discussion of what LWCF would be able to accomplish with permanent funding. The bill does not mention any specific goals but does note that vulnerable resources and underserved rural and urban populations continue to exist that may be the purview of LWCF to address (California Legislative Information, 2016). AJR-27 may be enhanced by specifically noting what goals are attainable with permanent funding and how they would accomplish them in a set timeframe. As the California HDI Inland Empire review found significant rural economic disparity and these areas are often in proximity to natural resources, a focus on goals for rural areas may be in the best interest for proponents of AJR-27.

To ensure the benefits are clear for new California representatives voting for legislation it would be prudent to highlight more of the economic benefits this environmentally focused legislation would provide. For instance, AJR-27 may be amended to include figures on the number of potential jobs that would be provided to rural residents, associating tax revenues, and long term economic benefit of conserving natural resources. An evaluation component via the California HDI could place these benefits in perspective. Before funding is provided, poverty levels in rural areas that will be targeted for involvement with the extended LWCF can be documented and tracked as residents are provided increased access to job opportunities. Providing a comprehensive action plan with the ability to evaluate the success would significantly address the current limitations within AJR-27.

FUTURE APPLICATIONS

The California HDI is an innovative analytical approach to identify the unique SDH needs at the neighborhood/community level. The methodology to create a composite SDH score will require further refinement from additional experts and inclusion of indicators not currently available. Of special importance from the literature review is the inclusion of additional
segregation indicators such as the level of interaction between racial groups, experiences of discrimination, and instances of wage theft (White et al, 2012; De Maio et al, 2013; Landrine and Corral, 2014). With refinement this tool may provide a near complete, accurate, and standardized perspective of how communities are faring in a way that is usable at both the local and federal level.

The standardized score that can be used to compare vastly different locales is of most significance for federal and state level policy makers as they can use the scores to quickly identify areas in need, what causal factors should be addressed first (economic, transportation, housing, etc.) and be able to evaluate enacted policy’s outcomes over time from the composite score and individual indicator level scores. As the tool broadens (via additional indicators like crime, segregation, and others) the breadth of legislation that may be applicable to develop in conjunction with this data will grow. This aligns with the HiAP approach that aims to improve the legislation and policies of disciplines outside of direct health care providers (such as housing, food supply, transportation, law) by increasingly linking their policies with population health and highlighting ways industry specific policies may be updated to improve health disparities. These benefits are significant and suggest that the census level detail currently available only in California may be worth spreading to additional states.

Regions of the United States with comparable demographic distributions to California could especially utilize the key findings of the California HDI. As of 2015, California maintains a similar population to the total U.S. in regards to age ranges and sex demographics, bachelor’s level graduates, individuals in poverty, and health, including disabilities and health insurance coverage as defined by differences less than positive or negative 2% (United States Census Bureau, 2016). However, California has a more unique racial and ethnic mix.

As of 2015, California reports a higher percentage of Asians (14.7% versus 5.6% in the U.S.), Hispanic or Latino (38.8% versus 17.6%) and a substantially lower percentage of Black or African Americans (1.7% versus 13.3%) (United States Census Bureau, 2016). In addition,
California has a higher percentage of foreign born individuals (27% versus 13.1%) and a slightly lower percentage of high school graduates (81.5% versus 86.3%) (United States Census Bureau, 2016). These differences suggest that findings may be best applicable to areas in the United States with higher percentages of minorities and immigrants.

In addition, the ratio of spending California allocates to social services and health spending is a unique factor that may be important to consider. Bradley et al. (2016) find that California’s proportion of spending on social services to health is very close to Georgia, Oregon, Kansas, Nebraska, Maryland, and New Jersey. This is shown graphically in Appendix F, which highlights California for reference. As California updates policy approaches by utilizing the HDI, levels of impact may be offset by the level of spending they already allocate to social services. States with similar social spending allocations may expect comparable improvements if they implement and utilize the HDI as California does. This hypothesis may be further reviewed if the HDI tool spreads to the aforementioned states.

Funding realities and the efforts required across local and federal government to spread this tool at the census level are expected to be significant. Therefore, prioritizing the next states and local areas for replication may be the best next step for a realistic approach to eventual adoption across all states. James (2014) and James and Cossman (2016) provide evidence that states with prominent rural populations could potentially benefit significantly from this enhanced SDH understanding that the census level HDI tool provides.

James (2014) found that a rural mortality penalty exists between rural and urban locales in which rural residents die significantly earlier based on their location with the worst mortality penalties in the southern most regions of the U.S. However, within the rural regions studied, James (2014) found that key influencing variables such as health utilization and infrastructure and practitioner access varied distinctly within the regions. James (2014) argued the differing level of effects of these factors were unique enough to warrant future research on how rural places may be conceptualized to benefit from additional granularity. The application of census
level HDI scoring may get closer to the level of granularity suggested that would assist researchers to more fully understand these disparate trends.

Further research by James and Cossman (2016) found that the rural mortality penalty is even more severe for demographically segregated rural communities, especially for majority Black communities compared to their urban counterparts. This level of disadvantage is such that the least affected Black rural communities have worse mortality rates than the most affected majority White rural communities (James and Cossman, 2016). Specifically, James and Cossman (2016) found Black Americans in certain rural sub-regions classified by Rural-Urban Continuum Codes (RUCC) suffer the worst rural mortality penalties. Black Americans in RUCC 5 counties (population of 20,000 or more not adjacent to metro area) experience the worst mortality penalty overall with most RUCC 5 counties found in the Upper Great Plains (Montana, North Dakota, South Dakota, Nebraska, Iowa, and Minnesota).

This finding is surprising as previous research by James (2014) found the worst rural mortality penalties to exist in the South. James and Cossman (2016) replicated this finding but only for White rural residents. James and Cossman (2016) noted that poverty levels in RUCC 5 counties were especially high and may contribute to the extraordinary high rural mortality penalty for these segregated rural Black communities. However, they note that further research into this marginalized region is warranted to determine other causal factors (James and Cossman, 2016). Future research may consider studying these regions to determine if the relatively high population density for a rural region within RUCC 5 is associated with the number and quality of SDH resources available to Black residents. Previous research suggests population density is related to racially dependent resource allocation within urban areas and may be extended to this unique rurally segregated region (Richardson, Boone-Heinonen, Popkin, and Gordon-Larsen, 2012).

While immediate expansion to these disadvantaged communities would be ideal, certain existing limitations in the HDI tool should be addressed to enhance the potential benefits. For
instance, in states that do not share California’s law that racial and ethnic demographic distribution cannot be used to support public initiatives, it would be very beneficial to add demographic composition to the composite score methodology. Nebraska, like California, implemented Initiative 424 which prevents affirmative action and funding for policies specifically targeting certain race and ethnic groups (National Conference of State Legislatures, 2016). However, the other states in the Upper Great Plains highlighted by James and Cossman (2016) could update the California HDI methodology to have race and ethnicity as an influencing component of overall HDI scores based upon recognizable segregation.

This in effect would help ensure that the most segregated Black communities are accurately identified in regards to the correlation they often have with poor health outcomes and the rural mortality penalty. In addition, previous analysis of the California HDI found that indicator parameters may need updating for rurally classified censuses as one mile increments to define access to supermarkets and other key SDH resources do not properly match the realities of rural living. Experimenting with larger increments and placing more emphasis on the existence of roads and actual travel behavior may prove more helpful in assessing these communities in regards to their transportation issues.

CONCLUSION

This paper completed a small-scale case study on two of the worst scoring regions in California within the HDI to evaluate the current makeup of health disparities and provide actionable recommendations from a policy level that integrates both key findings from health disparity sociological research and the HDI. The HDI tool furthers our understanding of community wellbeing and offers a standardized methodological approach to study complex components of SDH in a way that is actionable from a health policy perspective. Policy makers need tools like the HDI that simplify the breadth of health disparities across the state into understandable measures and provide actionable place-based information such as hot spotting and evaluation of trends over time at both local (census) and broader (region) levels. The HDI is
enhanced by key health disparity research as studies reviewed found additional important place-based determinants of individual health outcomes that should be considered for integration within the HDI such as racial segregation (including resident reported experiences of racial stereotyping and opportunities for interaction among racial groups), neighborhood levels of violent crime, and the quality of existing SDH resources (Morenoff and Lynch, 2004; Small and McDermott, 2006; Williams, 2012; White et al, 2012). In addition to expanding the indicators that make up the HDI composite score, I argued that states with extremely segregated rural, Black communities should be prioritized for expansion of the HDI based on known extreme health inequities in these Midwest regions (James and Cossman, 2016). Without prioritizing these areas our efforts of supporting social justice and reaching health equity across the United States will not be successful.

While integration of extreme racial segregation into composite scores of the HDI would better reflect the current understanding of how health disparities are fueled and increase the accuracy of the composite scores, this tool (in its current configuration) offers a significant advantage that wasn’t previously available. The clarity of the HDI composite score and indicators such as years of life lost and other measures is unique in that it simplifies and makes tangible the inequities that sociologists and public health researchers have been reporting since the early 2000s (Morenoff and Lynch, 2004; Small and McDermott, 2006; Williams, 2012; White et al, 2012). The benefit of actionable information is increasingly important for times of changing political administrations as oncoming leadership needs to quickly focus their attention and efforts towards areas that may benefit most from new approaches and targeted efforts to address extreme and persistent disparities. The HDI is a mechanism to address the previous lack of adequate place based measures on health disparities and with increased robustness should support a consensus between political, sociological, and public health disciplines of the need for action within HDI identified hot spots as the methodology of identifying inequitable
suffering becomes near irrefutable and I expect in tandem, political will for social justice within
these areas.

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