

ASSESSING THE RELATIONSHIP BETWEEN LOCAL HEALTH DEPARTMENT  
WORKFORCE DIVERSITY AND HEALTH DISPARITY ELIMINATION ACTIVITIES

By

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## CHAPTER I

### INTRODUCTION

Local health departments (LHDs) play a major role in meeting health challenges both within their jurisdiction and on a national level (Mukherjee, Santerre, & Zhang, 2010). One challenge faced throughout cities, counties, and states in the U.S. a lack of racial equity in health (Braveman et al., 2011). According to the Centers for Disease Control, health equity occurs when “all people have the opportunity to attain their full health potential and no one is disadvantaged from achieving this potential because of their social position or other socially determined circumstance,” (2013). Research in recent years has increasingly focused on describing, understanding, and explaining factors that lead to a lack of health equity. Studies have assessed health equity on a number of different demographic variables, including gender, socioeconomic status (SES), age, and race (Adler & Rehkopf, 2008).

Race has been among the most salient of these with regard to social science research in the past few decades (Boone-Heinonen et al., 2011; Evans & Kantrowitz, 2002; Lantz et al., 1998). Additionally, myriad initiatives, projects, and policies have recently been implemented to attempt to achieve greater health equity between whites and non-whites (Shavers et al., 2012). Many such studies and interventions have been coordinated through or conducted in conjunction with LHDs (Merrill, Keeling, & Carley, 2010). LHD involvement can range from providing funding and direction for local health equity research or projects to the implementation of federal health policies and initiatives (Baum, DesRoches, Campbell, & Goold, 2011; Erwin, 2008; National Center for Health Statistics, 2012; Swain, Bennett, Etkind, & Ransom, 2006).

Despite these efforts, racial health inequity persists today (Henry, Scutchfield, & Perez, 2008; National Center on Health Statistics, 2013) and LHDs vary in their level of engagement in promoting health equity (Bekemeier, Grembowski, Yang, & Herting, 2012). Research has yet to thoroughly explore the reasons behind the lack of progress and consistent engagement by LHDs on racial health equity. This study is intended to explore one factor that may impact the extent to which LHDs take a more active role in pursuing racial health equity.

### *Health Disparities*

There are currently significant differences in the health of whites compared to racial minority groups in the U.S., particularly in the case of African-Americans (Adler & Rehkopf, 2008). These differences are often referred to as “health disparities,” or “health inequalities,” both of which have been defined and conceptualized in multiple ways. Whitehead defined “health inequalities” as “differences in health that are avoidable, unjust, and unfair (1992). More recently, the U.S. Department of Health and Human Services offered the following definition of health disparities as a part of its federal health initiative called Healthy People:

“A particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion,” (2010).

While they have received increased attention of late, racial health disparities have an extensive history in the U.S. In 1899, W.E.B. DuBois described in his famous work *The Philadelphia Negro* how poor health in the black community was a potent indicator of racial inequality. While many forms of racism were commonplace at the time, the healthcare system was characterized by discrimination, mistreatment, and neglect with regard to African American patients at the time of DuBois' writing (Byrd & Clayton, 2000a). DuBois' was one of the first to bring racial health disparities to the attention of the medical and scientific communities. Early causal theories attributed these disparities to innate biological differences between blacks and whites. These theories maintained popular acceptance in the medical and scientific community from the end of the late 1800s until the mid-1900s, since which time they have been widely discredited (Krieger, 1987).

Trends in racial health disparities throughout the previous century are discouraging at best, both in general indicators of health to specific outcome measures. The gap in life expectancy between blacks and whites has decreased only minimally in the past 50 years, especially among males (Heron et al., 2009; Williams & Sternthal, 2010). Cancer mortality has increased five times as fast for blacks as it has for whites from 1950-2000 (Byrd & Clayton, 2000b). For heart disease, population rates have declined overall but the decrease has been significantly smaller for blacks than for whites during the 20<sup>th</sup> century (Kochanek, Maurer, & Rosenberg, 1994). Other areas in which disparities have worsened in recent years include infant mortality, pre-term delivery, low-birth weight, and sexually transmitted diseases (Castro, 1993; Rowley et al., 1992).

These trends have pushed researchers and practitioners to increasingly focus on racial disparities in health. Since the late 1970s, collecting data on health indicators for racial and



ethnic minority populations has become a more salient research priority (Williams & Collins, 1995). The increase in available data has coincided with increases in published research literature on the subject. From 1980-1990, only one article was published with either “health disparity” or “health disparities” as a keyword. In the 1990s, that number increased but still constituted fewer than 30 empirical articles. From 2000 through 2004, however, more than 400 articles with one of those two words appeared in mainstream academic research journals (Institute of Medicine, 2006). Since then, the field of health disparity research has continued to grow and provide a deepening understanding of the nature, dynamics, and causes behind racial disparities in health.

#### *Current Status of Racial Disparities in Health*

At present, disparities between racial groups can be found on many different indicators of health. Some measures, such as life expectancy and self-reported health, offer a broad, general view of racial disparities. For example, in 2009, the percentage of African-Americans self-reporting fair or poor health was 14.2%, while for whites that number was 8.7% (National Center for Health Statistics, 2011). As of 2011, the average life expectancy for African-Americans was nearly five years shorter than that of whites (National Center on Health Statistics, 2011). Overall death rates on several leading causes of death, including heart disease, strokes, and cancers have been found to be higher for blacks than whites (U.S. Department of Health and Human Services, 2012a). Disparities between whites and non-white groups have also been found in self-reported overall mental health, access to adequate healthcare services, and health-related behaviors (Adeyemi, Livak, McLoyd, Smith, &

French, 2013; Bruckner, Kim, & Snowden, 2013; Depetris & Cook, 2013; Naftel et al., 2013; Trepka et al., 2013).

More concrete examples of disparities appear on several targeted health indicators. For example, infant mortality rates are significantly higher for African-American newborns than for whites (Centers for Disease Control, 2011). Mexican-Americans and African-Americans both suffer from higher rates of obesity than do Whites (Centers for Disease Control, 2011). American Indians and Alaska Natives have a 60 percent higher infant death rate than that of whites in the U.S. (U.S. Department of Health and Human Services, 2012b). Non-white Americans also experience higher rates of coronary heart disease, stroke, asthma, diabetes, HIV/AIDS, and hypertension than white Americans even when controlling for other demographic factors such as gender or socioeconomic status (Centers for Disease Control, 2011; National Institute of Allergy and Infectious Diseases, 2013). Together with the general measures of health and well-being, these targeted findings illuminate the breadth and depth of racial health disparities in the U.S. today.

### *Health Disparities: Causes and Mechanisms*

Some recent research has focused on understanding why health outcomes vary so drastically between different racial groups (Boone-Heinonen et al., 2011; Evans & Kantrowitz, 2002; Lantz et al., 1998). The field is far from consensus, and studies have increasingly shown the complex nature behind disparities in health. There are three primary areas of focus in explanatory research on health disparities: 1) differential exposure to and impact of environmental hazards to health, 2) physiological impact of psychosocial stressors, and 3) unequal access to high-quality medical care.

Different racial groups experience different levels of harmful impact from their environment. Non-whites in the U.S. disproportionately live in under-resourced urban neighborhoods. This phenomenon, described as “residential segregation,” is thought to be a product of external social forces and statistical discrimination (Sampson & Wilson, 2005). Living in these neighborhoods leads to increased exposure to environmental hazards, unhealthy built environments, and higher levels of community stress. Additionally, the increased psychosocial stress frequently experienced by non-white Americans can amplify negative health impacts of environmental hazards (Gee & Payne-Sturges, 2004; Landrine & Corral, 2009). Residential segregation also leads to differences in access to economic, medical, environmental, and political resources that may constrain the ability to improve health (Schulz, Williams, Israel, & Lempert, 2002). Other social factors, including disproportionate incarceration rates in the juvenile and adult justice systems, have been identified as ways in which the health of minority racial groups is more negatively impacted relative to whites (Iguchi, Bell, Ramchand, & Fain, 2005).

Studies have shown that in addition to environmental impacts, the negative psychosocial impacts of racial discrimination can produce physiological harm. Daily stressors from race-based “micro-aggressions,” subtle and often unintentional expressions of racism, can lead to an accumulation of stress that causes physiological dysfunction and vulnerability to negative health outcomes. This concept is referred to as “allostatic load,” (McEwen, 1993; Szanton, Gill, & Allen, 2005). A specific example of this was found in 2009, when perceptions of powerlessness and injustice evoked by social inequality were found to increase unhealthy risk-taking behaviors that impact physiological and psychosocial functioning in children (Sanders-Phillips, Settles-Reaves, Walker, & Brownlow, 2009).

Harmful physical effects of psychosocial stressors may also be passed on generationally. One study suggests that biological “memories” of events harmful to health are passed epigenetically from parents to their children, perpetuating the cycle of racial health disparities (Thayer & Kuzawa, 2011).

Finally, several studies have assessed differences in accessibility to medical care and quality of care received by non-white groups compared to whites (Chin, Alexander-Young, & Burnet, 2009). For example, providers have been found to refer Hispanic or African-American children to specialists significantly less often than white children (Flores, Olson, & Tomany-Korman, 2005). Providers have also been found to prescribe less preventative physical and mental health care to children of racial minority groups relative to white children (Chung, Lee, Morrison, & Schuster, 2006). Healthcare clinics in predominantly African-American neighborhoods have been found to have older, less advanced medical equipment and to have higher incidences of clinical errors than predominantly white neighborhoods (Landrine & Corral, 2009; Lurie & Buntin, 2002; Smedley & Stith, 2003; Trivedi, Zaslavsky, Schneider, & Ayanian, 2005). These studies indicate that there are a multitude of environmental, social, and medical factors that are leading for disproportionate negative health outcomes among minority groups in the U.S., further illuminating the complexity and durability of racial health disparities.

### *Progress toward Health Equity*

Descriptive and explanatory research on racial health disparities is plentiful. While fewer studies have focused on how to alleviate disparities in health, some recent research has begun to explore intervention strategies. For example, quality improvement initiatives for

providers and hospitals for socially disadvantaged groups have been found to produce moderate success in disparity reduction on multiple health outcomes (Chassin & Anderson, 2008; Chin et al., 2009). Interventions in community-based clinics that utilize lay-health volunteers in racial minority communities have shown potential to reduce black-white cardiovascular health disparities (Crook et al., 2009). Broader interventions that target multiple levels of health systems have also shown promise in alleviating disparities in preventable chronic conditions such as diabetes (Peek, Cargill, & Huang, 2007). These sorts of multi-level interventions can also lead to significant improvements in health behaviors such as cancer prevention and screenings, as well as improvements in the quality of healthcare system processes (Gorin, Badr, Krebs, & Prabhu Das, 2012). These results give cause for hope but have yet to be effectively “scaled-up” to achieve broader, sustainable population-level progress.

The Healthy People initiative—a federal program funded and operated by the U.S. Department of Health and Human Services (HHS)—is an example of a sizeable, population-level intervention intended to eliminate racial disparities that is largely implemented through LHDs. Every ten years, HHS sets new national goals for population health and wellness as a part of the Health People program. Healthy People 2010 had two major goals--1) increase quality and years of healthy living for Americans and 2) eliminate health disparities. After ten years and millions of dollars in financial support, only 27 of 169 measures of health disparities showed improvement, while 117 showed no progress and the remaining 25 showed increases in disparities (National Center for Health Statistics, 2012). This exemplifies yet another example of potential without meaningful, durable progress in achieving health equity despite abundant resources. The current initiative, Healthy People

2020, has four goals, one of which is to “Achieve health equity, eliminate disparities, and improve the health of all groups,” (U.S. Department of Health and Human Services, 2012c). This renewed effort to achieve health equity at a national level will require new approaches to eliminating health disparities and a deeper understanding of factors that lead to meaningful progress.

### *Local Health Departments*

Many health equity initiatives such as Healthy People are operated through or in coordination with LHDs. Emerson described LHDs as "the base, the foundation structure, and essential functioning element in all public health service," (1947, p. 469). There are nearly 3000 LHDs actively delivering public health services in nearly all parts of the U.S. (Mukherjee et al., 2010). In 2007, spending on public health services in the U.S. was nearly \$64 billion---approximately 3% of total healthcare spending for that year (Hartman, Martin, McDonnell, & Catlin, 2009). Despite this small percentage, LHD initiatives have had a substantial impact on population health in terms of number of people served and intensity of benefit (Cawley, Meyerhoefer, & Newhouse, 2007; Gordon, Gerzoff, & Richards, 1997; Mehrotra & Kim, 2011). For example, LHDs across the U.S. took an active role in addressing the outbreak of the H1N1 virus in 2009. Approximately one-third of American adults received H1N1 immunizations from public health staff via LHD outreach (Soulliere, 2010). While some critics argue that LHDs are wasteful in spending public funds, multiple studies have found that LHDs administering public health resources with comparable efficiency relative to the broader healthcare system (Mukherjee et al., 2010; Reid, Compton, Grossman, & Fanjiang, 2005).

Overall performance of LHDs in improving health outcomes for a jurisdiction is often dependent upon several contextual factors, including location, collaboration, and funding. More centralized, urban LHDs that serve larger populations have been found to be less efficient at producing local public health services than rural LHDs or LHDs with smaller populations (Mukherjee et al., 2010). A systematic literature review by Hyde & Shortell (2012) found that increases in LHD public health spending was positively associated with improved overall jurisdictional health outcomes across 77 studies. One example of these studies found that increases in public health spending via LHDs lead to significant reductions in preventable deaths due to cardiovascular disease, diabetes, and cancer, as well as infant mortality (Mays & Smith, 2011). LHDs that maintained active partnerships with academic and health services organizations have also been found to be associated with increased effectiveness in public health outreach performance (Hyde & Shortell, 2012).

Research on contextual factors related to performance in achieving health equity is limited. One national study found that higher LHD spending and greater share of local public revenue were associated with reductions in black-white mortality between the ages of 15-44. However, no association was found for overall black-white mortality for all age groups (Grembowski, Bekemeier, Conrad, & Kreuter, 2010). A case study in Boston found that increases in available grant funding, training, and technical assistance services administered through LHDs lead to increases in organizational capacity on projects targeting health disparities (Baril, Patterson, Boen, Gowler, & Norman, 2011).

While evidence suggests meaningful potential among LHDs to significantly impact population health, the importance of understand factors associated with high performance is illustrated by situations in which LHDs fail to effectively address jurisdictional health

challenges and disparities. For example, concentration and frequency of LHD obesity initiatives has been found to be unrelated to jurisdictional obesity prevalence nationwide (Stamatakis et al., 2012). This suggests a chasm between the LHD's efforts and the need of the communities that it serves, presenting a risk of allocative inefficiency and ineffective health outreach. Additionally, a survey of local public health organizations found that fewer than half utilized needs assessments or economic analyses when determining allocation of their health resources (Baum et al., 2011). These findings suggest the need for creating more connection between those administering public health resources, the LHD workforce and leadership, and the people receiving those resources.

### *Organizational Factors*

Research suggests that contextual and environmental factors play a role in the performance of many types of organizations, including LHDs. These factors include (but are not limited to) the size of the workforce, demographic characteristics of the workforce, education and skills of the workforce, demographic qualities of the leadership, and education and skills of the leadership (Bolman & Deal, 2008). Research on organizational factors that impact LHD performance is less plentiful than research on contextual factors. However, emerging research on the topic suggests some interesting relationships.

A 2008 study found that the size of a LHD workforce and the educational level of the LHD director have been shown to affect LHD performance in achieving positive health outcomes (Erwin, 2008). Another found that having an executive who scores highly on innovation, collaboration, and positivity on leadership assessment scales has been associated with greater success in having pro-health impacts on built environment within LHD



jurisdictions (Kuiper, Jackson, Barna, & Satariano, 2012). Qualitatively-oriented assessments have produced similar results. One study that focused on LHD immunization service for children as a health outcome found the following factors to be strongly associated with improved performance: organizational leadership and management quality, coordination of funding, involvement of community stakeholders, and cultural competency of LHD staff (Ransom, Schaff, & Kan, 2012). These findings are indicative of a potentially meaningful relationship between organizational factors and outcomes. This supports the notion that organizational optimization could have a positive impact on overall population health.

Research on how organizational factors impact health disparities is scarcer still, but a few recent studies have begun to explore the issue. Studies have found that LHDs with lead executives with higher educational levels (those with PhDs compared to Masters and Bachelor degrees) have lower overall racial mortality disparities as well as faster rates of mortality disparity decreases from 1993 to 2005. This outcome is also associated with having a lead executive with a clinical background (Bekemeier et al., 2012; Bhandari, Scutchfield, Charnigo, Riddell, & Mays, 2010). Promotion of uniform standards for service delivery and organizational structure to diverse populations has been suggested as one way to enhance LHD performance on jurisdictional health equity (Merrill et al., 2010). Recent efforts to incentivize accreditation of LHDs based on structural, operational, and outcome standards have been cited as a primary mechanism by which health disparities may be improved (Henry et al., 2008).

One organizational factor that has seemingly not been studied is the racial diversity of the workforce of a LHD. The impact of diversity on performance has been studied in other organizations—increasingly so in the last several decades (Hays-Thomas, 2004). Cultural

diversity can have a significant effect on a number of organizational processes including communication, member satisfaction, cohesion commitment and decision-making (Milliken & Martins, 1996). Additionally, having people of different backgrounds and perspectives in an organization can lead to increases in divergent thinking, improved decision making, and enhanced group performance (De Dreu & West, 2001). Diversity also has been shown to increase the likelihood of groups selecting and developing more optimal solutions and results, particularly to complex problems (Nemeth, 1992). Furthermore, groups low in diversity are more prone to accepting status-quo solutions (Marques, Abrams, Páez, & Hogg, 2008). Racial disparities in health are a complex problem that has not responded well to status-quo health interventions, which seems to suggest that organizational diversity could potentially play a role in LHD performance in achieving health equity.

### *Current Study*

LHDs have shown capacity to significantly impact overall population health, and in some cases produce jurisdictional improvements in health equity. However, inconsistency in the levels of effectiveness and engagement in working to eliminate health disparities among LHDs gives cause for concern. This inconsistency includes considerable variance in the level of health disparity elimination (HDE) activity—actions explicitly focused on reducing or eradicating disparities in health. Paired with the robust nature of racial health disparities in the U.S., the lack of consistency and progress warrants further research into factors associated with LHD engagement in promotion of racial health equity. This study assesses the relationship between the racial diversity of the LHD workforce and its level of HDE activity. The hypothesis of this study is that higher levels of racial diversity, as defined by

the percentage of the LHD workforce that is of racial minority status, will be associated with more engagement in activities focused specifically on health equity. This hypothesis is based on the assumption that a more diverse LHD workforce will have a better collective understanding of racial health disparities, will be more likely to consider racial disparities a priority, will be less prone to acceptance of status-quo solutions, and will be more aware of the needs of communities who are victims of racial health disparities. The null hypothesis is that racial diversity of the LHD workforce has no predictive relationship to HDE activity.

## CHAPTER II

### METHODS

This study involves analysis of secondary data obtained from the Inter-university Consortium for Political and Social Research (ICPSR) database. The original study for which this data was collected, the “National Profile of Local Health Departments, 2008” was conducted by the National Association of County and City Health Officials (NACCHO) with Carolyn Leep as the principal investigator. It is a part of a recurring process of surveying LHDs throughout the U.S. in order to develop a working database of the structure, function, capacities, and activities of LHDs (Leep, 2010).

The first of these profile studies was conducted in 1989-1990 in response to concern expressed by the Institute of Medicine (IOM) that data on LHD activity was sparse and much needed to guide future public health initiatives (National Association for County and City Health Officials, 2009). Since then, profile studies were conducted in 1992-1993, 1996-1997, and 2005 prior to the 2008 profile. The most recent profile was conducted in 2010—however, questions regarding HDE activity that are central to the research question of the current study were not included in the 2010 profile questionnaire (National Association for County and City Health Officials, 2013). Therefore, the 2008 profile data was chosen as the most current and appropriate data source for addressing the research question of this study. The 2008 profile study was funded by the U.S. Department of Health and Human Services (U50/CCU302718, U38/HM000449-01) as well as the Robert Wood Johnson Foundation (61911) (National Association for County and City Health Officials, 2009). The current

study has been reviewed by the Vanderbilt University Institutional Review Board and granted an exemption for secondary analysis of previously collected data.

### *Sample*

The original study administered the profile questionnaire to all 2,794 LHDs active in 2008 in the U.S. LHDs were defined as “administrative or service units of local or state government concerned with health and carrying some responsibility for the health of a jurisdiction smaller than the state.” (Inter-university Consortium for & Political and Social Research, 2010, p. 3). This definition included LHDs the city, county, city and county hybrid, town or township, and multi-county/district/region levels. This definition did not include health departments in the states of Hawaii or Rhode Island because they have no sub-state level health departments—only a single state-level health department that oversees all public health funding and initiatives in their respective states. Because of this, Hawaii and Rhode Island are the two U.S. states excluded from the sample (Inter-university Consortium for & Political and Social Research, 2010).

Of the 2,794 LHDs that were sent the study questionnaire, 2,332 returned completed questionnaires—an 83% response rate (National Association for County and City Health Officials, 2009). Because the profile questionnaire is the primary mechanism for collecting data on LHD characteristics nationwide, the original study cannot provide data on characteristics of non-responding LHDs. As a result, a comparison of the sample of respondents versus non-respondents is not available. Because LHDs from different jurisdiction types (ex. region vs. township) often have meaningful organizational and operational differences, county-level LHDs were selected for this study’s analyses to ensure

consistency and comparability. County-level LHDs were chosen because of their large sample size (1378 cases) and because county-level LHDs often encompass city and township populations.

### *Survey Instrument*

The survey instrument, titled “The 2008 National Profile of Local Health Departments Study Questionnaire” includes 160 core questions regarding jurisdictional information, governance, funding, workforce (staffing levels, occupations employed, top executive education and licensure, and percentages of staff by gender, race, and Hispanic origin), LHD activities, health disparities, and community health assessment and planning. The “LHD activities” assessed in the questionnaire were immunization, screening for diseases and conditions, treatment for communicable diseases, maternal and child health, epidemiology and surveillance activities, and regulation, inspection and/or licensing activities (Inter-university Consortium for & Political and Social Research, 2010). Most core questions were included in previous profile studies, with a small number of new questions included in the core questionnaire.

Each LHD was also sent one of three supplementary questionnaire modules. Topics covered by Module 1 included the operational definition of a functional local health department as defined by NACCHO, a voluntary national accreditation program (VNAP) for LHDs, promotional activities, marketing for local governmental public health, and characteristics of LHD Web sites. Module 2 examined human resources, core competencies related to public health, academic partnerships and interaction, strategic planning, resource sharing with other LHDs, and information technology. Module 3 asked about community

health assessment and health improvement planning, land use planning, policy-making and advocacy, essential services and activities, organizational partnership and collaboration, and access to health care services (Inter-university Consortium for & Political and Social Research, 2010). Stratified random sampling defined by population size of jurisdiction was used to assign modules to LHDs (National Association for County and City Health Officials, 2009).

The focus of this profile questionnaire and its predecessors was collecting basic descriptive data on organizational structure, characteristics, and behaviors of LHDs. As a result, survey items do not have the empirical or theoretical basis that other organizational or psychological measures might possess. No psychometric data on reliability, validity, or theoretical underpinnings was found for this questionnaire. The instrument was published in a web-based format, with the top executive of all LHDs (aside from those in Rhode Island and Hawaii) receiving an E-mail directing them to the online questionnaire form.

Approximately three percent of LHDs requested and were provided with paper copies of the survey instead of completing the online questionnaire (National Association for County and City Health Officials, 2009). The study codebook, which contains the complete questionnaire, all three supplementary modules, and other study documentation can be found at <<http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/26962>>.

The dependent variable for this study's analyses comes from the "Health Disparities" section which assessed whether or not the LHD had engaged in any selected HDE activities in the previous two years (Leep, 2010). A list of the HDE activities in the profile questionnaire can be found in Figure 1. The positive responses to the eight items in this section were summed to create an index of HDE activity, with a possible range of zero to

eight for the dependent variable in this model. This index cannot account for quality of engagement in these activities, effectiveness of process, or outcomes of these activities. However, it provides a preliminary measure by which to assess the relationship between racial diversity in the workforce and engagement in HDE activity. This issue will be discussed as a limitation further in the discussion section.

### *Analysis*

The focus of this study is assessing the relationship between the racial diversity of a LHD workforce and that LHD's level of HDE activity. To answer the research question of this study, multiple regression was employed to assess whether or not LHD workforce

Figure 1. *Health Disparities Section of 2008 Profile Questionnaire*

<p><b>Health Disparities</b></p> <p>Health disparities can be defined as differences in health status that occur among population groups.</p> <p><b>Check each activity that your LHD has done <u>in the past two years</u> to address health disparities.</b> (select all that apply)</p> <p>(Variable values: unchecked= 0, checked= 1)</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Describing health disparities in your jurisdiction using data (q146a)</li><li><input type="checkbox"/> Conducting original research that links health disparities to differences in social or environmental conditions (q146b)</li><li><input type="checkbox"/> Educating elected or appointed officials about health disparities and their causes (q146c)</li><li><input type="checkbox"/> Training your workforce on health disparities and their causes (q146d)</li><li><input type="checkbox"/> Recruiting workforce from communities adversely impacted by health disparities (q146e)</li><li><input type="checkbox"/> Prioritizing resources and programs specifically for the reduction in health disparities (q146f)</li><li><input type="checkbox"/> Taking public policy positions on health disparities (through testimony, written statements, media, etc) (q146g)</li><li><input type="checkbox"/> Supporting community efforts to change the causes of health disparities (q146h)</li><li><input type="checkbox"/> None of the above (q146i)</li></ul>
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[Leep, 2010, p. 23]



racial diversity is predictive of HDE activity, and, if so, to what extent. Multiple regression was chosen because of the cross-sectional nature of the data and the advantage in predictive capacity over simple correlational analysis. Workforce racial diversity, the primary predictor of interest in the study model, is operationalized in this model as the percentage of employees identified as being of racial or ethnic minority status.

Other organizational factors are included in the model as secondary predictor variables. The size of a LHD workforce and the gender distribution of the workforce were both included as secondary predictors. LHD workforce size has previously been found to be predictive of certain types of LHD activities as well as measures of performance (Erwin, 2008), and was operationalized as the number of full-time equivalents (FTEs) per capita. Gender distribution of the workforce has seemingly not been assessed in previous studies on LHD performance, and was therefore included in order to identify any potential unseen relationships to HDE activity. Characteristics of the lead executive of a LHD have been shown to be related to multiple indicators of performance (Erwin, 2008; Kuiper et al., 2012; Ransom et al., 2012). Because of this, the following variables regarding the lead executive were also included as secondary predictor variables: education level, years of experience in the current position, previous experience as a LHD executive, racial minority status (white versus non-white), gender, and work status (full-time versus part-time).

The model also included several contextual factors as control variables selected based on findings from previous studies. LHD and expenditures per capita (Hyde & Shortell, 2012) and jurisdiction size (Mukherjee et al., 2010) were included as control variables because both have been found to be related various aspects of LHD performance and activity. Racial diversity of the jurisdiction (percentage of population identified as non-white) was also

included as a control based on the assumption that jurisdictional diversity may likely impact the need for HDE activity as well as the visibility of racial health disparities.

Table 1  
*Missing Data: Multiple Regression Model Variables*

<b>Variable Name</b>	<b>% Missing Data</b>
Total Population ( <i>C</i> )	0.00
% of Population w/Minority Race ( <i>C</i> )	0.52
Total LHD Expenditures ( <i>C</i> )	6.80
LHD Workforce	
Number of FTEs ( <i>S</i> )	4.13
% Minority Race ( <i>P</i> )	5.22
% Males ( <i>S</i> )	1.22
LHD Executive	
Years in Position ( <i>S</i> )	2.22
First Position as LHD Leader ( <i>S</i> )	1.91
Fulltime Work Status ( <i>S</i> )	0.53
Gender ( <i>S</i> )	0.84
Education Level ( <i>S</i> )	5.58
Racial Minority Status ( <i>S</i> )	3.51
HDE Activity Index ( <i>DV</i> )	6.67

*P = Primary Predictor; S = Secondary Predictor; C = Control Variable;  
DV = Dependent Variable*

There was a significant proportion of missing data across variables included in the regression model. Details on missing data for model variables can be found in Table 1. While most variables had less than five percent of values missing, list-wise deletion procedures used in multiple-regression analyses were causing a large proportion of cases to be excluded from the model. This necessitated taking action to correct for missing values. There are several possible approaches to addressing missing data. For this study, multiple imputation was selected as the most effective method to prevent excessive list-wise deletion of cases when running the regression model. Multiple imputation involves the creation of several datasets in which substituted values are inserted in place of missing values (Cohen, Cohen, West, & Aiken, 2002). The regression model is then run on each of the imputed

datasets, and the resulting regression coefficients are “pooled” or synthesized. The number of imputed datasets can vary depending on the needs of the study, but it has been suggested that between two and ten imputations is sufficient to resolve list-wise deletion without sacrificing accuracy of estimates (Rubin, 2004). Therefore, five imputed datasets were created and analyzed to produce pooled regression results.

Study analyses employed IBM SPSS Statistics 20 statistical software. Because multiple regression is not robust to outliers, all model variables were assessed for potential outliers. Leverage and DFFITs diagnostics options in the statistical software were used to identify cases with abnormal influence on regression coefficients. Only one case was identified as falling outside of acceptable limits for these two diagnostics. That case was removed from the dataset in accordance with standard procedure when the number problematic outliers identified is small (Cohen et al., 2002).

## CHAPTER III

### RESULTS

Descriptive statistics results regarding the characteristics of county-level LHDs and their jurisdictions in the study sample are shown in Table 2. Descriptive analyses revealed

Table 2  
*Descriptive Results: County-Level LHD Characteristics*

<b>LHD/Jurisdiction Characteristic (N = 1378)</b>	<b>Mean (SD)</b>	<b>Percentage</b>
Total Population	119,155.47 (374,550.47)	<i>n/a</i>
% of Population w/Minority Race	13.53 (14.49)	<i>n/a</i>
Total LHD Expenditures (\$)	7,439,781.95 (39,036,535.02)	<i>n/a</i>
LHD Workforce		
Number of Employees	64.96 (189.85)	<i>n/a</i>
Number of Full-Time Equivalent (FTEs)	57.62 (169.12)	<i>n/a</i>
% Minority Race	8.84 (15.83)	<i>n/a</i>
% Males	11.77 (13.27)	<i>n/a</i>
% Hispanic	5.25 (12.29)	<i>n/a</i>
% of Workforce with Available Race Data	99.6 (3.13)	<i>n/a</i>
LHD Executive		
Years in Position	8.20 (7.92)	<i>n/a</i>
First Position as LHD Leader (Yes)	<i>n/a</i>	79.2%
Fulltime Work Status (Yes)	<i>n/a</i>	87.9%
Male (Yes)	<i>n/a</i>	35.6%
Highest Education - Less than Bachelor's	<i>n/a</i>	8.1%
Highest Education – Bachelor's	<i>n/a</i>	30.2%
Highest Education – Master's	<i>n/a</i>	38.6%
Highest Education – PhD	<i>n/a</i>	17.5%
Additional Licensing (Yes)	<i>n/a</i>	81.1%

significant variation among LHDs in the sample as illustrated by large standard deviations relative to mean values on continuous variables. Correlational analyses were also conducted to assess relationships between model variables, revealing several significant correlations.

The results of correlational analyses can be found in Table 3. Diagnostic analyses indicated a positively skewed distribution on the following variables: total population, percentage of population with minority racial or ethnic status, total expenditures, number of LHD workforce full-time equivalent employees, and percentage of LHD workforce of racial minority status. This skew violates the regression assumption of normal distribution of model variables. Additionally, further diagnostics revealed non-linear relationships between model residuals and predictor variables including heteroscedasticity, both violations of the assumption of linearity (Cohen et al., 2002).

Table 3.  
*Bivariate Correlation Results*

<b>Variable Name</b>	Total Population	% of Population w/Minority Race	Total Expenditures	Workforce: # of FTEs	Workforce: % of Minority Race	Workforce: % Male	Lead Executive: Years in Position
% of Population w/Minority Race	.437**						
Expenditures per Capita	-.208**	.027*					
Workforce: # of FTEs per Capita	-.353**	-.084**	.620**				
Workforce: % of Minority Race	.410**	.611**	.040**	-.058**			
Workforce: % Male	.364**	.142**	-.184**	-.270**	.138**		
Lead Executive: Years in Position	-.035**	-.095**	-.041**	.013	-.087**	.010	
HDE Activity Index	.291**	.241**	.121**	.075**	.261**	.039**	-.082**

\* p<.05, \*\*p<.01

Variable transformations are often utilized to resolve such violations of form for regression analyses. In the event of positive skew, negative power transformations are required to produce a normal distribution. It is recommended to use the smallest power transformation possible to achieve acceptable variable distributions and relationships (Cohen et al., 2002). After a square root transformation proved insufficient to create a normal distribution, a natural log transformation was used on the variables with significant positive skew, non-linear residual relationships, and heteroscedasticity. This corrected for all violations of assumptions and resulted in appropriate linear relationships between variables and model residuals. As a result, the natural log of total population, percentage of population with minority racial or ethnic status, expenditures per capita, number of LHD workforce full-time equivalent employees, and percentage of LHD workforce of minority racial or ethnic status were used in the final regression model. No transformations were necessary on

Table 4  
*Multiple Regression Results (Pooled Imputed Data)*

<b>Independent Variable</b>	<b>B-Values (SE)</b>	<b>p-value</b>
Total Population**	.409 (.060)	<.001
% of Population w/Minority Race	.116 (.071)	.104
Total LHD Expenditures (\$)	.178 (.094)	.064
LHD Workforce		
Number of FTEs**	.270 (.090)	.004
% Minority Race**	.017 (.005)	<.001
% Males	-.007 (.005)	.195
LHD Executive		
Years in Position	-.013 (.008)	.073
First Position as LHD Leader (Yes)	-.100 (.151)	.508
Fulltime Work Status (Yes)**	.635 (.199)	.001
Male (Yes)	-.059 (.143)	.678
Education Level (highest degree)	.164 (.089)	.067
Racial Minority Status	-.272 (.243)	.262

\*\* p<.01

variables regarding LHD lead executives or on the gender distribution of the LHD workforce. This was because these variables were either dichotomous or because they were continuous and displayed sufficiently normal distributions.

Results from the regression model run on the pooled imputed data are available in Table 3. Four variables were found to be significant in the pooled data as predictors of HDE activity. The number of full-time equivalent employees was found to be a significant positive predictor at the  $p < .05$  level. The primary predictor variable, percentage of LHD workforce with minority race status, as well as lead executive work status and total population were each found to be significant positive predictors at the  $p < .01$  level. Findings for the original, non-imputed data, as well as for each imputation can be found in Table 4. In the original dataset, five independent variables were found to be significant predictors of HDE activity: 1) percentage of LHD workforce with minority race status, 2) full-time work status of the lead executive, 3) size of the LHD workforce, 4) total population, and 5) percentage of population with minority race status. The first four remained significant in the pooled regression analysis while the latter did not. Independent variables varied as to the number of imputations in which they were found to be significant predictors: total population (5), percentage of LHD workforce with minority race status (5), number of FTEs (5), having a full-time lead executive (5), total LHD expenditures (3), education level of the lead executive (2), and number of years as lead executive (1).

Pooled regression results from imputed data in the statistical software used only provide unstandardized regression coefficients (B-values). Unstandardized coefficients cannot be directly compared to evaluate relative predictive power because of differences in unit of measurement for each variable. However, this comparison can be done using

standardized coefficients ( $\beta$ -values or beta-values). To this end, the mean of the  $\beta$ -values from each imputed dataset was calculated for all variables. The four variables found to be significant predictors of HDE activity were ranked by  $\beta$ -value in the following order: 1) total population ( $\beta = 0.250$ ), 2) the number of FTEs ( $\beta = 0.116$ ), 3) percentage of minority race LHD workforce, ( $\beta = 0.115$ ), and 4) lead executive work status ( $\beta = .086$ ).

Table 5  
*Multiple Regression Results: Beta-values by Imputation (I)*

Variable Name	$\beta$ -Values						
	Original	I-1	I-2	I-3	I-4	I-5	I-Mean
Total Population	.246**	.248**	.244**	.259**	.252**	.248**	<b>.250</b>
% of Population w/Minority Race	.076*	.050	.055	.054	.058	.059	<b>.059</b>
Total LHD Expenditures (\$)	.108	.073*	.055	.086**	.101**	.054	<b>.080</b>
LHD Workforce							
Number of FTEs	.131*	.119**	.122**	.114**	.087**	.125**	<b>.116</b>
% Minority Race	.095*	.121**	.119**	.112**	.123**	.120**	<b>.115</b>
% Males	-.009	-.034	-.037	-.040	-.040	-.039	<b>-.033</b>
LHD Executive							
Years in Position	-.047	-.051*	-.041	-.046	-.050	-.047	<b>-.047</b>
First Position as LHD Leader	.024	-.014	-.020	-.015	-.013	-.021	<b>-.010</b>
Fulltime Work Status (Yes)	.065*	.089**	.094**	.087**	.091**	.092**	<b>.086</b>
Male (Yes)	-.017	-.019	-.015	-.007	-.010	-.012	<b>-.013</b>
Education Level (top degree)	.058	.074*	.071*	.050	.054	.069	<b>.063</b>
Racial Minority Status	-.034	-.029	-.027	-.029	-.036	-.033	<b>-.031</b>

\*  $p < .05$ , \*\* $p < .01$

The significance of total population in predicting HDE activity is congruent with previous findings that LHDs serving larger populations more efficiently deliver public health services (Mukherjee et al., 2010). The significance of the number of FTEs as a predictor supports other previous findings that suggest size of the LHD workforce affects performance (Erwin, 2008). The significance of lead executive work status may support the previously stated assumption that this variable is related to the quality of executive leadership, which has been found to be predictive of increased performance as well (Kuiper et al., 2012;



Ransom et al., 2012). Of the four variables found to be significant predictors, the primary predictor variable (racial diversity of the LHD workforce) was the third most powerful predictor according to measures available in this study's analyses. This suggests that the null hypothesis be rejected, and supports the study hypothesis that LHD workforce diversity is predictive of level of engagement in HDE activity for a given LHD.

## CHAPTER IV

### DISCUSSION

The primary purpose of this study was to assess the relationship between racial diversity in a LHD workforce and level of HDE activity. Results of the regression model supported the hypothesis that higher levels of racial diversity within a LHD workforce are predictive of HDE activity. Workforce racial diversity was one of four statistically significant predictor variables found in the pooled imputed results. Based on mean  $\beta$ -values, workforce racial diversity was found to be the third most potent predictor by weight behind number of FTEs. This suggests that aside from the size of a LHD workforce and the population they serve, racial diversity of the workforce is one of the more meaningful predictors of a LHD's level of HDE activity. Interestingly, while workforce racial diversity was a strong significant predictor, racial minority status of the lead executive was not found to be a significant predictor of HDE activity. This finding warrants further investigation into the potentially differential impacts of racial diversity at different levels of the organizational structure.

Some of the descriptive results of this study's analyses merit comment. First, the mean level of racial population diversity within jurisdictions (13.53%) was considerably higher than the mean level of racial diversity within LHD workforces (8.84%). This finding suggests that non-whites are underrepresented in county-level LHDs. Underrepresentation among LHDs may contribute to the lack of effectiveness in HDE activities and initiatives in the U.S. Predominantly white LHD workforces may be less equipped to build relationships with racial minority communities in their jurisdiction and comprehend the health challenges

they face. While non-whites are significantly underrepresented, women are overrepresented in county-level LHD workforces. Among the county-level LHD workforces in this study's sample, 88.23% of employees are women, as are 64.4% of lead executives of these LHDs. Another finding regarding to lead executives is that 38.3% of county-level LHDs have a lead executive whose highest level of education is a bachelor's degree or less. Given previous findings on the impact of education and leadership quality on LHD performance (Bekemeier et al., 2012; Erwin, 2008), this may indicate a need for efforts to attract more highly-qualified and educated individuals to fill positions as lead executive for LHDs. The high percentage of less-educated executives may also speak, in part, to the lack of progress among many LHDs in achieving health equity.

The regression model used in this study produced some noteworthy secondary findings. First, the size of the LHD workforce (number of FTEs) and the size of the jurisdictional population were significant predictors of HDE activity. This finding is consistent with previous findings about the relationships between LHD workforce size and jurisdictional population size and LHD performance (Erwin, 2008). This also adheres to the conceptual assumption that a LHD with a larger staff would be able to engage in more activities of any kind, including HDE activities. Additionally, a larger population would likely necessitate more public health activities be undertaken to produce sufficient public health results, both in overall health and health equity. Lead executive work-status was also a significant predictor, which seems to follow similar logic—a LHD with only a part-time lead executive is likely to have fewer resources than one with a full-time lead executive. Limited resources would likely lead to engaging in fewer total public health activities.

There is a clear need for future research to guide efforts to achieve health equity. This study focuses on only one organizational factor and one measure of HDE activity. Additional research should expand to assessing other factors that impact LHD engagement in HDE activity to facilitate more consistent engagement among LHDs nationwide. Furthermore, future studies that assess factors associated with *achieving* jurisdictional health equity will be essential to making progress toward eliminating health disparities. While engagement and activity are important constructs, factors associated with HDE *outcomes* have yet to be sufficiently explored and will be necessary to break the stagnation in progress on nationwide health equity. In addition to LHDs, research on HDE activities and promotion of health equity should be broadened to include other health-focused institutions such as non-profit and academic organizations. There are many types of organizations with the capacity to make meaningful progress on racial health equity. A better understanding of factors that lead to such progress in LHDs and other health-focused organizations may be the difference between continued failure and true progress in eliminating racial health disparities.

In addition to implications for future research, this study's findings have some practical implications. First, the relationship between LHD workforce racial diversity and HDE activity may support affirmative action policies and diversity pipeline programs that encourage diversity in public health organizations as a means of increasing HDE activity. It should be noted, however, that results of this study are cross-sectional, and causal research is needed to determine whether or not these policies and programs are effective in increasing diversity or increasing HDE activity. Another implication relates to community engagement and outreach on the part of LHDs. One of the assumptions behind this study's research question is that a more racially diverse LHD workforce will better understand the health

challenges faced by members of racial minority communities and be better able to connect to these communities. If this assumption holds, then LHDs should strive to build relationships and community partnerships, particularly in minority communities, regardless of the diversity of their workforce. Establishing trust and communication between public health officials and communities may increase HDE activity and performance in achieving health equity even in the absence of representative racial diversity within a LHD workforce.

### *Limitations*

This study has several limitations. First, the operationalization of racial diversity within jurisdictions and among the LHD workforce is a one-dimensional measure—the proportion of non-white members. This variable fails to take into account representativeness of different racial groups in a LHD workforce relative to the population. Another limitation is this study's inability to account for the quality, effectiveness, or variation in HDE activities undertaken by LHDs. In other words, two LHDs may engage in the same number of HDE activities but commit different levels of resources or achieve different levels of success—no data was available in the study dataset to differentiate two such LHDs. The HDE index also does not specifically measure activities focused on racial health disparities, but is a general index of activities focused on any type of health disparity. Additionally, the cross-sectional nature of these analyses prevents any causal inferences to be drawn from study results. Finally, the data used for this study were collected five years prior to this study. Trends in public health challenges, interventions, as well as factors such as cultural attitudes regarding race can change rapidly, suggesting a limitation in the applicability of this study's findings to current operation of LHDs and other health-focused organizations.

### *Conclusion*

Racial health equity may not be achievable in the immediate future. While health initiatives such as Healthy People 2020 should continue to strive to eliminate racial health disparities, progress will likely take time and the continued dedication of researchers, elected officials, practitioners, and community stakeholders. One way to accelerate and enhance progress toward racial health equity will be continuing the recent surge in academic research focused on understanding and addressing racial disparities in health. As LHDs and other health-focused organizations direct resources and energy toward these disparities, research should focus on the organizational structure, characteristics, and operations of these institutions, particularly with regard to performance on measures of health equity. Increased knowledge in these areas will be essential to fully realizing the potential that these organizations have to improve the health and well-being of underserved groups in our society.

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