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Forging Partnerships between Local Health Departments and Community-Based Organizations to Address the Obesity Epidemic

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Forging Partnerships between Local Health Departments and Community-Based Organizations to Address the Obesity Epidemic

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by

Chikarlo Robert Leak

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ABSTRACT OF THE DISSERTATION

Forging Partnerships between Local Health Departments and Community-Based Organizations to Address the Obesity Epidemic

by

Chikarlo Robert Leak

Doctor of Public Health

in Public Health

University of California, Los Angeles, 2014

Professor Ninez A. Ponce, Co-chair

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Results from recent research studies examining the direct effect of local health department obesity prevention efforts on county-level variations in obesity are inconclusive. Local health departments' inability to decrease the prevalence of obesity within their jurisdiction with existing public health resources will likely persist as a result of organizational inefficiencies and limited funding available to provide obesity risk reduction programs and services to communities most adversely affected by the epidemic. To broaden their impact despite these barriers, local health departments would do well to identify other strategies that improve their ability to deliver obesity prevention programs to diverse communities, such as using partnerships with community-based organizations that have relevant obesity prevention expertise.

This dissertation comprises two studies that examine the role of local health department organizational characteristics and area-level factors on the presence of local health department community-based partnerships and the effect of these partnerships on the percentage point change in county-level obesity prevalence. Multiple waves of data from the National Profile Survey of Local Health Departments, U.S. Census Bureau, and the obesity prevalence data from the Behavioral Risk Factor Surveillance System were analyzed using multinomial logistic regression and ordinary least squares regression modeling. Additionally, key informant interviews (n=4) with stakeholders from the Los Angeles County Department of Public Health complemented the secondary data analyses

Results indicated that local health departments are providing a substantial amount of obesity prevention programs through partnerships with other organizations in the local public health system. The probability of partnering to provide obesity prevention programs increased with the size of the population served. The benefit of local health department community-based partnerships for decreasing the county-level prevalence of obesity was not confirmed. Local health departments experience barriers to the formation of community-based partnerships, including the administrative burden associated with the processing of formal contracts.

Findings suggest that local health departments are interested in improving their obesity prevention efforts and value partnerships with community-based organizations. However there are other important agencies that local health departments must partner with for policy adoption and advocacy activities. Local health departments within larger jurisdictions can benefit from the economies of scale and improve their population-based obesity prevention programs. Results suggest that future obesity risk reduction research should continue assessing the benefits achieved from local health department partnerships with community-based organizations.

The dissertation for Chikarlo Robert Leak is approved.

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This body of work is dedicated to one of my heroes, my grandfather George W. Hall, as well as my loving nieces and nephews who inspire me.

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CHAPTER 1

Introduction and Background

1.1 Preface

Chronic diseases such as obesity are a major health concern for local health departments (LHDs), despite being largely preventable. However organizations in the U.S. responsible for providing public health efforts within their catchment areas encounter a significant number of challenges, including organizational inefficiencies, a complicated funding structure and limited financial resources (Hyde and Shortell 2012). Partnerships have been suggested as a strategy to improve the capacity of all organizations involved, especially collaborations between LHDs and non-governmental and governmental agencies (Mays and Scutchfield 2010, Hyde and Shortell 2012).

The purpose of this dissertation is to identify whether certain LHD organizational characteristics influence the likelihood of LHDs to partner to provide obesity prevention programs to residents within their catchment area. Community-based organizations include public or private nonprofits and voluntary organizations that are active within the local community and assist with meeting community needs. The dissertation is comprised of two studies and aims to address the following: (1) whether LHD organizational characteristics and area-level factors are associated with LHD partnerships for obesity prevention, (2) whether the LHD organizational characteristics, area-level factors and LHD obesity prevention partnership activities are related to county level variations in obesity prevalence. This chapter provides an overview of obesity prevalence and public health implications, challenges within the local public

health system, the role of local health departments in addressing obesity epidemic and the use of partnerships.

1.2 Obesity Epidemic and Burden

Obesity represents a significant public health challenge despite decades of research and prevention efforts. Currently, more that two-thirds or 69% of the US adult population is overweight or obese, although the prevalence of overweight and obesity is even higher among blacks (77%) and Mexican Americans (81%) (Flegal, Carroll et al. 2012). The prevalence of overweight and obesity has increased consistently over the past two decades in every single state and the District of Columbia, with no state exempt from experiencing an increase (Robert Wood Johnson Foundation 2009, Flegal, Carroll et al. 2010). Based on the most recent survey data from the National Health and Nutrition Examination Survey, the prevalence of adult obesity may be slowing down or flattening (Flegal, Carroll et al. 2012). Nevertheless, the current prevalence of obesity still represents a significant public health burden that requires an effective set of solutions.

Poor food choices and sedentary behaviors such as TV watching are the principal contributors to obesity, and account for over 300,000 deaths each year (McGinnis and Foege 2004, Mokdad, Marks et al. 2004). Based on the estimates of excess deaths attributable to obesity, obesity is the second leading contributor to preventable mortality after tobacco use (Allison, Fontaine et al. 1999, Mokdad, Marks et al. 2004). Although the estimated number of deaths per year attributable to obesity has recently been disputed and revised to approximately 112,000 excess deaths each year (Flegal, Graubard et al. 2005). The discrepancy hinges largely upon the statistical methodology used to calculate mortality attributable to obesity (Manson, Bassuk et al. 2007, Flegal, Graubard et al. 2010). Furthermore, the more recent estimates of

obesity related mortality fail to account for the impact certain behaviors or disease conditions have on the burden of obesity and loss of life, thus leading to reverse causation (Manson, Bassuk et al. 2007).

Annual medical expenditures related to obesity have been estimated at roughly 10% of annual medical spending or approximately $147 billion per year (in 2008 dollars) (Finkelstein, Trogdon et al. 2009). This translates to differences in spending on medical care based on body weight, whereby obese adults spent on average nearly $2030 on obesity-related diseases (including: coronary heart disease, type II diabetes, certain cancers, hypertension, dyslipidemia, stroke, some depressive disorders, etc.) in 2007 compared to $1090 spent by normal weight adults (Congressional Budget Office). Reducing the burden and cost of obesity and physical inactivity are of great concern to individuals, organizations, and many communities, whose rising health care expenditures have consistently outpaced inflation (Borger, Smith et al. 2006, Keehan, Sisko et al. 2008).

1.3 Challenges within the Local Public Health System

Within the local public health system, governmental and nongovernmental organizations contribute significantly to the three core functions of public health; (i) assessment of health issues, (ii) policy development and (iii) assurance of health services (Centers for Disease Control and Prevention 2013). However, factors such as financial constraints and the limited reach of these organizations diminish the effectiveness of the local public health system (Hyde and Shortell 2012). For example, the limited reach of local health departments (LHDs) with respect to the population size has repeatedly been demonstrated by the National Association of County and City Health Officials (NACCHO) profile surveys (Hyde and Shortell 2012). Furthermore, research suggests that the optimal population size covered by a local health agency may be

between 50,000 to 500,000 (Suen and Magruder 2004). Suen and Magruder analyzed data from 2,007 local health departments and found as the population size increases from less than 25,000 to 500,00; the mean summary scores on the 20 survey questions assessing the three core functions of public health (assessment, assurance and policy development) increased from 58.1% to 74.4% (Suen and Magruder 2004). The improved performance of the LHD relative to population size may plateau when an LHDs jurisdiction is greater than 500,000. However the increased performance relative to population size may be related to increased funding, planning and enhanced infrastructure of the LHD. This is of particular relevance because at the local level, LHDs are often at the center of the local public health system, providing a direct link between communities in need and the resources needed to improve communities' health outcomes. Limitations in revenue, staffing and means may prohibit their ability to deliver obesity prevention strategies to communities within their jurisdiction.

1.4 Role of Governmental Organizations in Obesity Prevention

Federal, state and local governments in the U.S. share the responsibility of mobilizing communities to address conditions that prevent people from living optimally healthy and productive lives (Association of State and Territiorial Health Officials (ASTHO) 2009). Almost 3,000 LHDs currently exist within the United States and these LHDs play a critical role in controlling infectious disease, conducting public health surveillance and eradicating emerging threats (Prentice and Flores 2007). Furthermore, with over 80% of deaths in the US caused at least in part by noncommunicable diseases, LHDs have become the community leader in battling chronic diseases (Erwin 2008).

LHDs' provision of the 10 essential public health services for obesity increased between 2005 and 2008. In 2005, approximately 28% (95% CI: 23.1, 32.7) of LHDs stated they did not

provide any of the essential services, however significantly fewer LHD's stated they did not provide any of the essential services in 2008 (17%) (95% CI: 12.8, 21.1) (Luo, Sotnikov et al.). Given the magnitude of the obesity epidemic, an increase in the number of LHDs that provide the essential prevention and treatment services for residents at risk of obesity seems like an appropriate response. However, the average number of essential services provided by LHD's remained relatively low, with fewer than 4 services provided on average in both years (95%, CI: 2.76-3.33 in 2005 and CI: 3.38-4.00 in 2008). The low level of essential services provided by LHDs indicates there is still a need to improve the response of LHDs to the epidemic (Luo, Sotnikov et al.).

This inadequate response is alarming considering LHDs are better situated than many community-based organizations within their catchment area to address the obesity epidemic because of their institutional stability, developed programs, public health expertise and ability to partner with diverse stakeholders (Cheadle, Hsu et al. 2008, Schwarte, Samuels et al. 2010). Despite LHDs having the resources and infrastructure to implement obesity prevention programs and services, they however may need to utilize agencies within disadvantaged, under resourced, and largely ethnic minority communities that are more knowledgeable and trusted within the community (Berger, Neuhaus et al. 1996, Mays and Scutchfield 2010, Wei-Skillern 2010, Erwin 2011).

1.5 Partnering to Improve Obesity Prevention Efforts

Partnerships with local community-based organizations, agencies, universities and entities provide an undeniable opportunity to affect desirable behavior change among the population. Although the empirical evidence is mixed, there is support for the use of partnerships to improve health equity, maximize resources, increase the provision of services, and advance

population level health outcomes (Scutchfield, Knight et al. 2004, Beatty, Harris et al. 2010, Fawcett, Schultz et al. 2010). The overall public health systems performance is significantly related to the extent of participation of outside agencies in the planning and provisions of public health services (Halverson, Miller et al. 1996, Scutchfield, Knight et al. 2004). The Institute of Medicine's 2007 report, "Progress in Preventing Childhood Obesity: How Do We Measure Up?" stated that successfully childhood obesity initiatives would more than likely be comprised of partnerships between public, private, and voluntary organizations that share resources, coalesce activities and coordinate efforts (Institute of Medicine of the National Academies 2007). However, there is still a need for evidence that demonstrates that LHD partnerships with community-based organizations (CBOs) within the local catchment area improves the capacity of the LHDs involved to implement obesity prevention programs, which in turn improve population health outcomes (Zahner 2005).

1.6 Statement of the Problem

1.6.1 Financial Constraints of Local Health Departments

Local health departments have the ability to influence health through provisions that improve access to preventive services, engaging in population-directed activities and participating in effective partnerships (Erwin, Greene et al. 2011). Furthermore, LHDs are at the forefront of combating the obesity epidemic due to their close relationships with communities within their jurisdiction. Therefore increasing the capacity and performance of LHDs obesity prevention efforts is key (Beitsch, Brooks et al. 2006, Slater, Powell et al. 2007).

A common concern is the funding structure of chronic disease prevention and control programs within local health departments, which typically varies between health departments and may influence efficiency (Brownson, Ballew et al. 2007, Prentice and Flores 2007, Yancey,

Fielding et al. 2007). For example, California County/City Health Departments are typically organized around categorically funded programs, including injury prevention, maternal, child and adolescent health, environmental health and vital statistics (Prentice and Flores 2007). However, federal and state categorical funding streams may limit the ability of local agencies to fulfill the 10 essential public health services and activities that fall outside the specified categories (Mays, McHugh et al. 2004). Furthermore, this type of independent silo funding structure may not be the most effective approach to addressing the obesity epidemic or other chronic diseases, especially considering many of the disease conditions have multiple risk factors. Despite the fact that Los Angeles County Department of Public Health serves as concrete example of a health department that has consolidated previously dispersed categorical programs into one chronic disease and injury prevention unit, many LHDs still have a fragmented approach to obesity prevention.

A more appropriate and effective funding mechanism may include providing funding across the full spectrum of prevention for obesity that addresses the social determinants of health and transforms the environments in which people live (Schwarte, Samuels et al. 2010). Given that many LHDs are currently operating in a limited fiscal resource environment, funding levels are a critical determinant of LHD capacity to address the obesity epidemic. Nationally, government public health activities totaled approximately $77.2 billion in 2009, accounting for approximately 3.1% of the $2.5 trillion spent on health (CMS (Centers for Medicare and Medicaid Services) 2011). This breaks down to approximately $251 per person that was spent on public health activities by the federal, state, and local government (CMS (Centers for Medicare and Medicaid Services) 2011). Conversely when examining how much was spent at the local level, only $29.57 was spent on public health activities in 2005, which highlights the limited

funding LHD have for obesity prevention (Trust for America's Health 2010). This is concerning because public health services have been found to be more sensitive to local spending than state or federal spending (Mays, McHugh et al. 2004, Mays, McHugh et al. 2006).

Recent NACCHO data has also illustrated the relatively small proportion of federal funds that are directed to local public health activities. Of all the money spent on local public health activities in 2010, only 23% of local public health agency revenues were received from federal funding sources (including funds passed through states) (National Research Council 2012). Although increased funding would be an ideal strategy to improve the LHDs' ability to offer obesity prevention programs and services, it is highly unlikely given state and local government budget deficits and federal spending restrictions (Mays, McHugh et al. 2004, Mays and Smith). LHDs must therefore be creative with spending and think of other ways to the meet the needs of residents within their catchment areas, such as leveraging resources through the use of partnerships to provide obesity prevention programs or policies. Important to note, although increased funding is not likely given our current economic environment, the Community Transformation Grants for obesity and chronic disease prevention that were awarded in September of 2011 serve as a prime opportunity to examine the impact that increased funding has on the obesity epidemic.

1.6.2 Inadequate LHD Obesity Prevention Efforts and Prevalence Estimates

Local health departments serve a critical role in providing the ten essential public health services, which have also been applied to obesity prevention at the local level. This includes health needs assessment, policy creation and enforcement, and assurance efforts to reduce or prevent obesity among their jurisdictions (Handler, Issel et al. 2001). Although over half of LHDs offer obesity prevention programs, the presence of obesity prevention programs is

significantly associated with the structural capacity and general performance of LHDs (Zhang, Luo et al. 2010). Moreover, it was recently reported that the prevalence of obesity at the state-level increased between 1997 and 2005 by a mean of fifty-eight percent (58%) among the 42 LHDs that were examined (Erwin, Greene et al. 2011). The increasing prevalence of obesity signals a need for the dissemination and adoption of effective evidence-based obesity prevention programs and interventions at the local level, such as the obesity prevention strategies recommended by The Guide to Community Preventive Services (Community Preventive Services Task Force 2013).

Recently, two articles have been published that attempt to establish the correlation between obesity prevention programs or services provided by LHDs and the population obesity rate within their respective county in 2005. In Stamatakis et al., the existence of obesity prevention activities was not associated with the prevalence of obesity in the jurisdiction and most of the variance was explained by the effect of state-level clustering (Stamatakis, Leatherdale et al. 2012). However in contrast, Chen and colleagues found that those LHDs that provide obesity prevention services experienced smaller increases in the prevalence of obesity within their jurisdictions than LHDs that did not provide obesity prevention services. The authors recommend carefully interpreting results because the study examined prevention services and not treatment indicators. However the authors ruled out several issues of causality and selection bias. Particularly the fact that their study focused on the relative change in risk of obesity, the lack of direct link in causal pathway between the dependent variable, outcome and other confounders, and measurement error. All things considered, the study also showed that women and low income populations were more receptive to LHD programs (Chen, Roy et al. 2012).

Both of these two studies however failed to examine the effect of partnering with other organizations or agencies within the local public health system that are situated in communities most adversely affected by obesity. The changes observed in the prevalence of obesity may be a factor of the increased number of more effective partnerships with community-based organizations for the purpose of obesity prevention.

1.6.3 Examples of Public Health Partnerships

Local health departments are in a unique position to influence the health of the population through their potential to role model a behavior and disseminate effective strategies to partner organizations and through their adherence to the 10 essential public health services. The rise of lifestyle-related chronic diseases in the U.S. provides an opportunity for LHDs to partner with other organizations in the public and private sectors in order to improve physical activity and nutrition programs (Simon, Gonzalez et al. 2009). Two examples of effective LHDs partnerships to combat obesity include the Bay Area Regional Health Inequities Initiative (BARHII) [http://www.barhii.org/] and the Central California Regional Obesity Prevention Program [http://www.ccropp.org/]. Although both of these collaborations included LHDs partnering with other LHDs, the collaborations highlight benefits to all the organizations involved, including their improved reach, enhanced sharing of resources, and improved efficiency in implementing obesity prevention activities. Furthermore, the Institute of Medicine has long supported and advocated for partnerships as a means of improving health outcomes (National Research Council 1988).

Several other comprehensive community-based partnership initiatives to improve health, such as the Partnership for the Public's Health Initiative, address the social determinants of health, are categorized under the "Healthy Cities and Communities" movement and emphasize

partnerships as a means of building community capacity (Cheadle, Hsu et al. 2008). Although this research is important for establishing the validity and usefulness of community-based partnerships, many of these initiatives failed to have the LHD at the center of these partnership activities (Cheadle, Hsu et al. 2008). Future research needs to assess factors that improve LHDs ability to form partnerships with community-based organizations and whether partnerships increase the likelihood of LHDs to offer obesity prevention programs or services in local communities. Additionally, it is important to assess whether these partnerships in return influence population level obesity, physical activity and healthy eating.

1.6.4 Partnerships as a Strategy to Prevent Obesity

Numerous strategies have been suggested to combat the obesity epidemic. A socio-ecological approach to obesity includes interventions that target:

- Individual-level factors (e.g. utilizing pedometers to motivate people to be physically active (Bravata, Smith-Spangler et al. 2007),
- Interpersonal processes (e.g., active transportation to school (Rosenberg, Sallis et al. 2006),
- Institutional and organizational level factors (e.g., bouts of physical activity on nondiscretionary time (Yancey, McCarthy et al. 2004),
- Community characteristics (e.g., farmers markets or farm stands to increase fruit and vegetable consumption (Evans, Jennings et al. 2012), and
- Policy factors (e.g., including changes in food menu labeling (Pomeranz, Teret et al. 2009) and moratorium on fast food zoning (Sturm and Cohen 2009)).

Chronic diseases such as obesity are a major health concern for local health departments, despite being largely preventable. However organizations in the U.S. responsible for providing

public health efforts within their catchment areas encounter a significant number of challenges, including organizational inefficiencies, a complicated funding structure and limited fiscal resources (Hyde and Shortell 2012). Partnerships with other local community based organizations; agencies, universities and entities provide a propitious opportunity to improve health behavior change in targeted, underserved populations and to improve the overall effectiveness of the local public health system.

1.7 Contributions to the field of local public health system research

This dissertation makes two significant contributions to the body of research examining the performance of the local public health systems. Previous research that assessed the LHD influence on county-level variations in obesity prevalence utilized only one generic variable to capture all obesity activities conducted by the department and failed to acknowledge the possible obesity risk reduction contributions of other organizations centrally located within communities where interventions were most needed (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). Given the financial, staffing and other resource constraints LHDs are currently operating under, it is important to identify and evaluate non-fiscal methods to increase the capacity of LHDs. Doyle et al. suggested that community-based organizations are trusted entities within the community that can utilize their unique position and easy access to community members in order to advocate for change (Doyle 2009). Additionally, community-based organizations can form coalitions with like-minded organizations to leverage their influence on obesity prevention policies and programs (Doyle 2009).

Although Beatty et al. found that partnerships mediated resources and service differences between rural and urban LHDs (Beatty, Harris et al. 2010), research is limited in regards to factors that improve LHDs' ability to partner with community-based organizations and whether

these community-based partnerships reduce the burden of obesity within their jurisdiction. This study is the first to my knowledge to assess the benefit of LHD obesity prevention partnerships with key organizations within the local public health, specifically community-based organizations that typically deliver essential services and programs to many communities with limited resources.

Secondly, this study makes an important contribution to the literature regarding LHD obesity prevention efforts by independently examining three obesity prevention activities that may be commonly conducted by LHDs, instead of using one global measure of obesity as has been done in previous research. Effective obesity prevention strategies need to be implemented and disseminated throughout the entire U.S. population given the current high prevalence of obesity. However, prior research has found that women are typically responsible for food purchasing and preparation within the household, eat healthier diets and overall have a greater interest in food and nutrition than men (Bowman 2005, Satia, Galanko et al. 2005). Conversely, men are typically more interested in playing sports and may have a higher level of occupational activity thus exerting a higher level of energy expenditure (Crespo 2000). These differences suggest that certain LHD obesity prevention programs may be more effective when delivered to certain populations. These differences support examining the effectiveness of population-based chronic disease prevention, physical activity and nutrition-education programs independently.

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CHAPTER 2

Organizational Profile

2.1 Los Angeles County Department of Public Health

The Los Angeles County Department of Public Health (DPH) is responsible for protecting and improving the health of its ethnically diverse population. The resident and working population of Los Angeles County exceeds 10 million people, residing in 88 cities, 140 unincorporated communities and 2 islands (County of Los Angeles Department of Public Health 2008). In order for the DPH to achieve its goal of health improvement and protection, the department must consider a multi-level, ecological approach to addressing the root causes of poor health. This includes addressing social determinants of health such as poverty and low access to higher education, as well as factors in the physical and social environment such as land use, polluted air and lack of community safety (County of Los Angeles Department of Public Health 2008).

2.2 Vision and Mission

The mission of the Los Angeles County Department of Public Health is "to protect health, prevent disease and promote health and well-being for all persons" in Los Angeles County (County of Los Angeles Department of Public Health 2008). The vision of the Los Angeles County Department of Public Health is "Healthy People in Healthy Communities" (County of Los Angeles Department of Public Health 2008). Employees of the DPH are guided by 7 core values in accomplishing the organization's mission and vision. The core values, as stated by the DPH, are:(County of Los Angeles Department of Public Health 2008)

- Leadership – “We are recognized at the local, regional, national, and international levels for our proactive, trusted, innovative, and future-oriented approach to public health.”

- Customer Service – “We provide outstanding customer service to both internal and external customers.” “We deliver our services sensitively and confidentially, with dignity and compassion.”

- Quality – “We are known for our efficient, effective, and responsive performance that is evidence-based, fact-based, and driven by data.” “We are dedicated to improving quality through performance monitoring and use of public health research and best practices.”

- Collaboration, Coordination, and Cooperation – “We strive to develop, sustain, and leverage participatory relationships both internally and externally.” “This is inherent in all that we are and all that we do.”

- Accountability – “We are faithful stewards of the public’s trust and the public’s funds.” “In fulfilling this role, we are responsive, transparent, and demonstrate integrity and honesty.”

- Respect – “We demonstrate respect for the diversity of people, cultures, communities, ethnicities, opinions, and ways of doing things.”

- Professionalism – “Our professionalism is demonstrated by a well-trained, competent workforce that is open- minded and flexible, involved in continuous learning, and performs at a high level within the scope of each person’s responsibility regardless of the circumstances.”

2.3 History

The City of Los Angeles Health Department was established in 1879 and was primarily responsible for all public health activities and administration until 1915 (Cousineau and Tranquada 2007). In order to address health issues in smaller cities and unincorporated areas, the Board of Supervisors passed an ordinance to create the Los Angeles County Health Department in 1903. However, the department began to have an even greater role in 1915 with the appointment of the first county health officer (Los Angeles County Department of Public Health April 2012);Cousineau, 2007 #98}. Due to the high rates of immigration from the East Coast and Midwest, as well as Asia and Mexico, the major health challenges at that time were infant mortality and controlling infectious diseases (Cousineau and Tranquada 2007).

Until the 1960's when the two departments merged into one county health department, both the city and county health departments were in operation to address distinct populations (Cousineau and Tranquada 2007). Additional efforts to consolidate and integrate county services that improved the deployment of health services led to the County Departments of Hospitals, Public Health, Mental Health and the County Veterinarian's Office merging into the Department of Health Services in 1972 (Cousineau and Tranquada 2007). In 2006, under the direction of the Public Health Officer and County Health Officer Dr. Jonathan Fielding, the Department of Public Health separated from the Department of Health Services to become its own freestanding department.

The DPH established the Division of Chronic Disease and Injury Prevention in September 2005 (Div. of Chronic Disease & Prevention Report/Brochure 2009). The Division consists of 6 programs; 1) Injury and Violence Prevention Program, 2) Nutrition Program, 3) Office of Senior Health, 4) Physical Activity and Cardiovascular Health Program, 5) Policies for Livable, Active Communities and Environments (PLACE) and 6) the Tobacco Control and Prevention Program. Additionally, the Division has 2 surveillance activities and data resources units: 1) the Office of Health Assessment and Epidemiology and Research, 2) Development and Evaluation.

2.4 Organizational Structure and Workforce

Los Angeles County is a sprawling geographic area that spans over 4,000 square miles. For administrative efficiency, the county is divided into four geographic regions known as Area Health Offices in order to reach residents in communities of the county's eight (8) service-planning areas (SPAs). These areas include: 1) Antelope Valley, 2) San Fernando, 3) San Gabriel, 4) Metro, 5) West, 6) South, 7) East and 8) South Bay. The creation of the smaller

distinct areas allows the DPH to address the specific public health and clinical services needs of residents within those local communities.

In fiscal year 2010-2011, the DPH operated with a budget of over $850 million, employed approximately 4,000 people, and was responsible for administering 39 health programs and operating 14 public health centers (Los Angeles County Department of Public Health April 2012). Additionally, these financial resources are used to operate the Department's wide array of services and activities including direct medical services for immunizations and specific communicable diseases, disease surveillance and outbreak control, health assessment and data analysis, health inspections, policy development and advocacy (Los Angeles County Department of Public Health April 2012).

2.5 Statement of the Problem Within the Context of The Los Angeles County Department of Public Health

Disease burden associated with obesity and physical inactivity. The prevalence of obesity and physical inactivity within Los Angeles County continues to be a major problem and has significant cost implications. For example, the prevalence of obesity in Los Angeles County rose from 13.6% in 1997 to 22.2% in 2007 among adults, and more than 20% of youth are obese (Office of Health Assessment and Epidemiology September 2011) (Los Angeles County Department of Public Health April 2012). The highest rates of childhood obesity are observed in low-income neighborhoods such that within a given 10-mile radius, the childhood obesity rate can be 4% in one high-income neighborhood and 34% in another low-income one (Los Angeles County Department of Public Health April 2012). This disparity in obesity prevalence highlights the burden placed on already disadvantaged communities with limited resources. Recent data has suggested that the obesity trends among adults may be leveling off nationwide (Flegal, Carroll et

al. 2010, Flegal, Carroll et al. 2012); however continued efforts to decrease the current epidemic and improve population-based health outcomes are still needed.

Physical activity is a health behavior recommended to prevent obesity and therefore the low physical activity attainment among residents in Los Angeles County presents a significant problem. The percentage of Los Angeles County adults that self-reported meeting recommended guidelines of physical activity has increased from 48% in 2003 to 53% in 2007 (Los Angeles County Department of Public Health and Office of Health Assessment and Epidemiology May 2011). However, disparities in leisure-time physical activity have been observed between racial and ethnic minority populations and among geographic locations (Los Angeles County Department of Public Health and Office of Health Assessment and Epidemiology May 2011). White residents (57%) are most likely to self-report meeting physical activity guidelines compared to Asian/Pacific Islander (41.4%), Latino (53%) and African American (54.2%) residents. In addition, residents within the health districts of Alhambra, South, Compton, San Antonio and El Monte were less likely to report being physically active (Los Angeles County Department of Public Health and Office of Health Assessment and Epidemiology May 2011). Realizing that respondents of self-reported physical activity data are likely to overestimate physical activity levels, the disparities observed still underscore the need to continue assessing the needs of communities and for effective evidence-based strategies that address those communities most likely to be overweight or obese, sedentary, and physical inactivity.

The economic burden associated with overweight and obesity in Los Angeles County was estimated at $6 billion, including $3.6 billion in health care costs and $2.4 billion in costs due to lost productivity (The California Center for Public Health Advocacy July 2009). Similar estimates were observed when examining the financial burden of physical inactivity, which

brings the combined economic burden of overweight, obesity and physical inactivity to staggering $11.8 billion dollars (The California Center for Public Health Advocacy July 2009). As a result, the unsupportably high health care expenditures observed in Los Angeles are directly related to the influence obesity has on three leading causes of death in the county, diabetes, stroke and coronary heart disease.

In 2010, DPH received two grants totaling $32.1 million from the U.S. Department of Health and Human Services and the Centers for Disease Control and Prevention's Communities Putting Prevention to Work Initiative. One of the programs to emerge from this grant was Project RENEW (Renew Environments for Nutrition, Exercise, and Wellness), a two-year $15.9 million grant to create a multiple-prong approach to obesity prevention. This multi-pronged approach included developing and implementing policies, systems, and environmental approaches that make the healthy choice the default choice in the communities most adversely affected by unfavorable conditions (Office of Health Assessment and Epidemiology September 2011). It was noted that multiple stakeholders including residents, cities, schools, community organizations, public agencies, private employers and health care communities must be involved in these efforts in order for the strategies to be successful and sustained (Office of Health Assessment and Epidemiology September 2011).

Furthermore, the DPH identified 6 strategic priorities for the years 2008-2011. Among those were: health improvements, health protection, preparedness, organizational effectiveness, workforce excellence, and fiscal accountability (County of Los Angeles Department of Public Health 2008). In order for the organization to work effectively, internal collaborations within the local jurisdiction and external partnerships with community organizations must be established

(County of Los Angeles Department of Public Health 2008). This is to ensure changes in health outcomes within communities and ultimately achieve the organizational mission and vision.

One example of a DPH partnership to prevent obesity conducted in collaboration with the Nutrition Program was the Healthy Eating Active Communities (HEAC), a program funded by a $14 million grant from the California Endowment. The goal of HEAC was to improve access to healthy food and physical activity in six (6) low-income communities to reduce childhood obesity. Although a final evaluation to identify whether the HEAC partnerships had an impact on the prevalence of obesity has not been performed, a midpoint review found a substantial change in the physical activity and food environment of children (Samuels, Craypo et al. 2010). For example, HEAC accomplished its goal of increasing healthy eating and physical activity in schools by getting them to adopt new state nutrition standards within 11 school districts that reached 885,000 elementary, middle and high school students (Samuels, Craypo et al. 2010).

Within DPH, the Division of Chronic Disease and Injury Prevention is responsible for reducing the occurrence, severity, and consequences of chronic diseases and injuries (Los Angeles County Department of Public Health April 2012). In order to accomplish its mission, the division must work with government and community partners to address the underlying causes of chronic diseases such as obesity, including those related to physical and social environments (Los Angeles County Department of Public Health April 2012). External factors such as funding shortfalls affect the DPH's ability to implement and operate programs. For example, the recent recession created a funding shortfall that resulted in a 2.6% budget reduction for Los Angeles County in fiscal year 2008-2009. In Los Angeles County, this resulted in a decrease of 35 staff positions and a $36 million decrease in spending across all departments (Hammond and Lew

2008). Such reductions in resources may affect the capacity, quantity and quality of obesity prevention programs offered by DPH.

2.6 Opportunities for DPH to Address the Problem

The DPH is well positioned to improve the health of its large, ethnically and geographically diverse population, through the provision of effective preventive health services, programs, and policies. A sizeable proportion of the county's residents do not meet national recommendations for physical activity and as a result obesity rates have risen. Obesity and physical inactivity are associated with significant health care expenditures and affect implementation of chronic disease prevention programs. Other challenges such as the shortage of staff and resources limit the DPH's ability to fully address the local obesity epidemic. DPH staff must therefore be proactive and creative in their approach to combat the local obesity epidemic.

Although DPH has developed partnerships in the past with various stakeholders within the local public health system (i.e. schools, community organizations, public agencies, private employers and health care communities), the outcomes of such efforts are unknown. However if partnerships were found to increase the reach and capacity of the DPH to implement chronic disease programs equivalent to what partnerships achieved in tobacco control, then the DPH could serve as a model LHD for the rest of the country. Outcomes of this dissertation would identify the most essential organizational and area-level factors that increase the ability of the DPH to form partnerships to improve population-level health outcomes.

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CHAPTER 3

Addressing the Problem and Conceptual Model

3.1 Addressing the Problem

Given the alarming prevalence of overweight and obesity within the U.S., LHDs' provision of obesity prevention programs and services would seem like a common practice. However, in reality not all LHDs are providing the essential public health services and programs for obesity prevention. Furthermore, it is unknown whether LHD efforts to address the obesity epidemic lead to improved population level outcomes, such as decreased prevalence of obesity within the county. For LHDs to provide obesity prevention programs, especially in the most adversely affected communities, one must consider the LHD infrastructure, governance and partnerships that facilitate the occurrence of these activities. Ultimately, a LHD's capacity to provide obesity prevention programs in adversely affected communities may depend on their ability to forge partnerships with specific organizations with known obesity prevention capacity within the local public health system and could determine whether population-level health outcomes are improved.

3.1.1 Addressing the Problem: Dissertation Research Questions

This dissertation employed a social ecological perspective and focuses on improving the capacity of the local health department, a key player within the local public health system, to address the following questions:

1) What are the motivations, roles, actions and perspectives of LHD leadership and key decision makers in regards to the adoption of obesity prevention programs and partnerships?

2) Which LHD organizational characteristics (including infrastructure, resources, and governance) and area level factors are most influential to LHD partnerships with community-based organizations to provide obesity prevention programming?

3) Which LHD obesity prevention programming structure (i.e. provides directly, partners or no involvement/no activity), organizational-level characteristics, and area level factors are associated with county-level variations of obesity prevalence?

Multiple datasets were used to address the primary research questions including individual level data collected from the Behavioral Risk Factors Surveillance System, area-level data from the U.S. Census Bureau Small Area Resource File, organizational level data collected from the National Association of County and City Health Officials, and data from key informant interviews with chronic disease prevention leaders in the Los Angeles County Department of Public Health.

3.2 Theoretical Framework

Social ecological theories have been recommended to address a multitude of health promotion topics because they recognize multiple levels of influence on behaviors. Originally developed by Urie Bronfenbrenner as a framework for understanding human development through the consideration of the ecological system in which growth takes place(Bronfenbrenner 1994). However Daniel Stokols proposed an social ecology model more specific to health promotion and behavior change through an holistic and integrative approach that recognizes individual behaviors but also considers attributes of the environment and the availability of community resources (Stokols 1992) (Stokols 1996). Recently, the Centers for Disease Control

and Prevention have employed a five level social ecological model to address and mitigate issues having to do with overweight and obesity (Hamre, Kuester et al. 2006). The model suggests that although there are distinct levels, the five-levels (i.e. individual factors, interpersonal, organizational, community and societal) are interrelated and must be addressed in order to combat the obesity epidemic.

This dissertation employed a social ecological approach to obesity prevention by examining an upstream approach to reducing the obesity epidemic. Although this dissertation recognizes the benefit of individual level approaches to the obesity epidemic, it employs an organizational or institutional level approach to obesity prevention by identifying means in which local health departments can leverage resources in order to improve their capacity to deliver obesity prevention programs and policies. These more upstream approaches may have a larger impact on obesity outcomes because they intervene at the macro-level and focus on larger determinants of health to intervene closer to where the problem it is believe to start (Dorfman and Wallack 2007, Sacks, Swinburn et al. 2009).

3.3 Conceptual Model

The conceptual model used in this dissertation was derived from several other models relevant to public health system performance, community coalitions and partnerships to improve health.

The first model by Handler et al. was developed to assess the performance of the public health system (Handler, Issel et al. 2001) and was based on previously published frameworks from Donabedian, which examined the relationship between structure, processes, outputs and outcomes to system quality and system monitoring. A prior model developed by Bernard Turnock and Arden Handler in the mid-1990s that assessed the performance of the public health

system laid the foundation for the current Handler model. The new Handler model consists of 5 domains, macro context, mission, structural capacity, processes and outcomes. The model allows for an examination of the public health system, including the agencies, organizations and programs that are a part of the system. Although there are limited measures or measures do not exist to assess each domain, this model is still helpful to identify factors that influence the public health system's ability to improve population health outcomes.

Macro Context. The macro context domain includes larger concepts or forces such as the social, economic and political environment that influence the ability and capacity of the public health system. These area-level factors include factors such as the demand for services and programs, demographics in the catchment area, economic resources, and the relationships between federal, state and local organizations. Inclusion of the macro context in this model recognizes factors external to the public health system or local health departments that influence the system's ability to achieve its mission and goals (Handler, Issel et al. 2001). Additionally, these factors can influence multiple processes by which local health departments achieve their mission, the capacity of local health departments to offer programs or services, the fiscal or human capital to get the work done and overall health outcomes.

One of the most consistent macro level factors shown to affect provision of programs and the performance of the health departments is population size. LHDs serving populations between 50,000 - 500,000 appear to be the most favorable for ensuring a positive performance by the LHD (Scutchfield, Knight et al. 2004, Suen and Magruder 2004, Mays, McHugh et al. 2006, Erwin 2008, Porterfield, Reaves et al. 2009). For example, Porterfield and colleagues found that LHDs serving a populations size of 100,000 or greater compared to those serving population sizes less than 100,000 had a higher mean index on the 10-point mean performance index of

essential public health services applied to diabetes, respectively 4.3 compared to 3.1 ($p<.01$) (Porterfield, Reaves et al. 2009). Furthermore findings from Santerre (2009) highlighted the challenges that smaller health departments have in terms of higher spending per capita and suggest smaller health agencies are at a disadvantage when trying to produce local health services (Santerre 2009). Social indicators or area level factors such as the unemployment rate within the catchment area have also been associated with the performance of health departments (Mays and Smith 2011). Given their previous associations with the performance of the public health system, population size and area level factors will be examined in regards to their influence on LHDs capacity to provide obesity prevention programs and improve negative population level health outcomes.

Mission. The mission of the public health system provides the purpose of the system and guides overall actions in order to achieve objectives. Furthermore, the mission of the public health system is carried out through the core functions of public health; assessment, assurance and policy development (Handler, Issel et al. 2001). When applied to LHDs specifically, the mission would be conceptualized to include the ten essential services of public health. Handler et al. suggest that the mission of the public health system can be measured by examining the impact of changes over time, where time would serve as a surrogate for changes in mission (Handler, Issel et al. 2001). Therefore, an increase in the quantity or intensity of the ten essential services of public health from one year to the next would reflect a positive change in the organization's mission.

Structural Capacity. The structural capacity domain in the model refers to the resources and relationships required to accomplish the goals and objectives of the public health system (Handler, Issel et al. 2001). This includes information resources, staffing/workforce, physical

assets, financial capital, and organizational resources. The NACCHO Profile survey provides an extensive assessment of the public health infrastructure that currently exists among local health departments. A fair amount of research has been done to identify key structural elements that influence performance of specific programs or services (Turnock, Handler et al. 1994, Mays, McHugh et al. 2004, Scutchfield, Knight et al. 2004, Porterfield, Reaves et al. 2009, Mays, Scutchfield et al. 2010, Hyde and Shortell 2012). However, it is unknown which of these factors are most relevant to public health systems' ability to provide obesity prevention strategies.

Several LHD infrastructure and resource factors have been shown to affect the performance of LHD. These factors include expenditures (Erwin, Greene et al. 2011) and per capita spending at the local level (Mays, McHugh et al. 2004, Mays and Smith 2011) and staffing levels (Mays, McHugh et al. 2006, Erwin, Greene et al. 2011). LHD budgetary constraints have limited their capacity to deliver programs. A 2003 study of LHDs serving 13% of U.S. population, found that approximately 2% of health departments' overall budgets were spent on chronic disease related programs and many received an insufficient amount of federal funding for these programs (Georgeson, Thorpe et al. 2005). Furthermore, using thirteen years of data that included 3 waves of the National Profile Survey and the Centers for Disease Control and Prevention Compressed Mortality File, Mays and colleagues (2011) found that for each 10% increase in per capita public health spending there was a decrease in mortality rates ranging from 1.1-6.9% ($p<.05$) (Mays and Smith 2011).

Two recent studies with longitudinal studies have also supported the link between increases in LHD expenditures per capita with significant decreases in morbidity and mortality, after controlling for social indicators or community level factors (Erwin 2011 and Mays 2011). Although research has yet to establish a definitive link between LHD funding and obesity

outcomes, it is plausible that the reason obesity rates have not decreased over the course of the past decade may be a function of insufficient funding dedicated to chronic disease prevention.

Staffing levels have been found to influence performance of the LHD. The recent study by Erwin (2011) found that increases in LHD staffing as measured by FTEs per capita was significantly associated with decreases in cardiovascular disease mortality after controlling for other factors such as expenditures per capita (Erwin, Greene et al. 2011). Furthermore, staffing has also been linked to provision of two of the ten essential public health services (Mays, McHugh et al. 2006).

In terms of governance of the LHD, characteristics of the top executive and the presence of a local board of health have been associated with performance. The type of degree held by the LHD top executive degree has been strongly associated with performance (Bhandari, Scutchfield et al. 2010). While Scutchfield et al. (2004) found that the highest level of degree obtained by LHD agency director was related to the capacity of the LHD and strong leadership by the agency directors is related to public health performance (Hyde and Shortell 2012). The presence of a local board of health has demonstrated mixed results in terms of health department performance. Mays et al (2011) found that per capita spending was more than 17% higher in communities governed by a board of health. Although Bhandari (2011) found that having a board of health was not sufficient enough to affect performance, he however did identify that it is necessary for a local board of health to set policies in order to improve the provisions of the essential public health services. This dissertation examined the effect of LHD infrastructure and resources (staffing, expenditures and financing) and governance (local board of health and director characteristics) on LHDs partnering with community-based organizations to provide obesity prevention activities in order to reduce the prevalence of obesity.

Processes. The processes of the public health system refer to the strategies and activities that enable the system to discover and mitigate health problems; which also includes the programs and services required by mandates or community priorities(Handler, Issel et al. 2001). Presently, obesity prevention programs represent the processes in which LHDs must execute in order to change the prevalence of obesity within their catchment areas. Currently, there are mixed results regarding the impact that LHD obesity prevention programming activities have on the reduction of obesity prevalence within their jurisdictions (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). Evaluating the quantity, quality, intensity or capacity to implement these prevention activities could provide an assessment of the processes to improve the burden of the obesity epidemic.

Outcomes. Finally, the outcomes domain in the model reflects the interrelated connections between all of the other components in the model that enable the system to achieve short and long term goals, such that the structural capacity and processes of the system are influenced by the overall macro context and mission of the system. Vaguely defined, outcomes provide the overall results for the system in terms of its efficiency, effectiveness, and ability to achieve comparable population-level health benefits between populations. The principal outcome examined in this dissertation is the county level prevalence of obesity.

Previous work has been done to examine the performance of the public health system by examining the implementation of specific categorical public health interventions and their impact on overall health status (Handler, Issel et al. 2001). However limited research exists linking public health system outcomes to public health system processes such as assessment or planning or to the structural capacity of the system. The model used in this dissertation contributes to

research on public health system performance by examining the impact of macro context, processes, and structural capacity on the outcomes of local health departments.

LHD Partnerships. A key factor missing in the Handler et al. model is the use of partnerships to expand the provision of activities or services provided by the public health system that improve population-level outcomes. More specifically, the use of partnerships with community-based organizations that improve the structural capacity and processes of the LHD to provide obesity prevention programs and in term, enhance efficiency and outcomes. Several national and local organizations have suggested the use of partnerships to achieve organizational mission, vision, goals, programs and health outcomes (National Research Council 1988, National Association of County and City Health Officials December 2011). However, limited research exists regarding whether these partnerships increase the ability to provide obesity prevention programs, adopt policies and progress health outcomes. Therefore, the model used in this dissertation also borrowed from a framework that highlighted the use of community-based organizations (CBO) partnerships on public health system performance. Fawcett et al adapts the Institute of Medicine's framework for collaborative public health action and outlines 12 key processes (including analyzing information, sustaining work, implementing effective interventions, developing a logic model or framework, establishing a vision and mission, using strategic and action plans, developing effective leadership, assuring technical assistance, arranging for community mobilization, delineation of organizational structure and operating mechanisms, documenting progress and using feedback, and making outcomes matter) for effecting change and improvement (Fawcett, Schultz et al. 2010).

The model suggests that the 12 key processes are not linear, yet are interactive and interdependent across phases or processes. The model also is helpful in providing 7

recommendations for strengthening collaborative CBO partnerships for population health and health equity. The seven recommendations include:

1. Establishing monitoring systems that can detect changes in population health outcomes and health equities between populations over time,
2. Designing actions that assign responsibilities for changing community health outcomes, which can include new or more engaged CBO partners,
3. Reinforce the cultivation of collaborative efforts across sectors in social settings as means of recognizing the value of the CBO partnerships,
4. Ensuring a sufficient amount of funding is available in order to achieve population health outcomes,
5. Provide technical support and training to ensure CBO partners have necessary tools and skills to achieve goals,
6. Establish a participatory evaluation system for documenting progress and making adjustments,
7. Establish contingencies to ensure accountability for progress and improvements

These seven recommendations can help improve partnerships between local health departments and other organizations within the public health system. CBOs are important partners in the local public health system because of their unique ties and familiarity to communities and as a result, are beneficial to identifying community health needs, developing effective interventions, and evaluating the impact of such activities in their community (Studnicki, Platonova et al.). The model used in this dissertation will include an examination of the benefit of partnering with community-based organizations to improve the obesity prevention efforts. Previous literature has explained the differences in resources and the provision of

services observed between rural and urban LHDs through the use of community partnerships which serve as a partially mediator (Beatty, Harris et al. 2010). Additionally, LHDs with more community-based organizations partnerships, in communities with greater economic means and community interaction and support from elected officials performed better (Erwin 2008). Although the definitive research linking partnerships with population level outcomes has yet to be established, it has been suggested that LHDs should form more collaborations across governmental and non-governmental organizations to improve the public health systems capacity (Hyde and Shortell 2012).

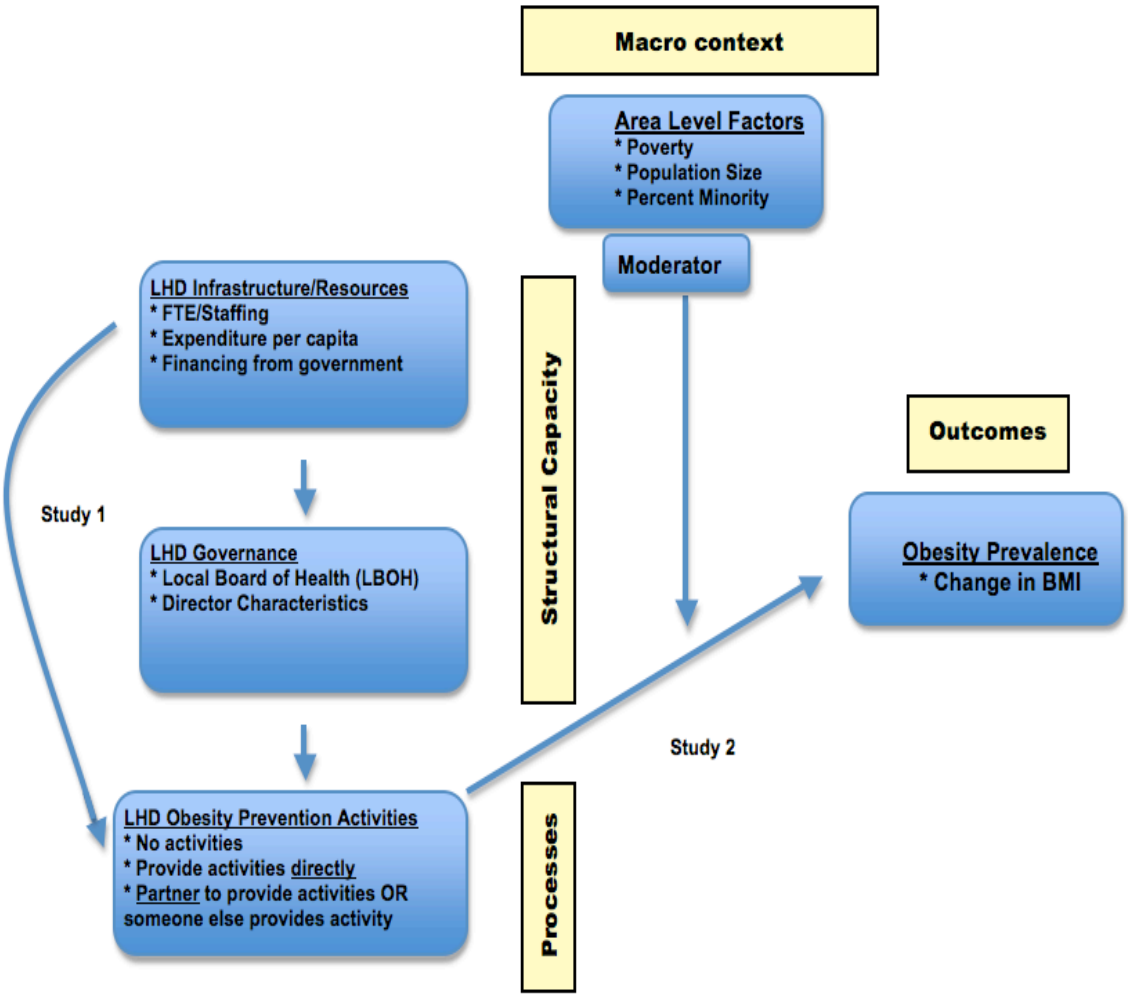
Overall, this dissertation examines several factors most strongly associated with LHD performance, specifically area level factors (population size), LHD infrastructure and resource factors (expenditures, funding, staffing). However this dissertation also includes factors that have weaker associations or factors hypothesized to be related to performance such as LHD governance (local board of health and Director characteristics), community-based organizations partnerships and community characteristics (poverty and percent minority).

3.3.1 Description of Primary Model used for Dissertation

The primary model used for this dissertation merges the Handler and Fawcett models together in order to contextualize the most salient LHD infrastructure, resources, governance, and partnership structure to improve county level obesity prevalence. A conceptual framework depicting the primary relationship assessed in this dissertation is shown in Figure 3.1. LHDs play an essential role in providing access to services and programs for the communities they serve and thus have the ability to influence the health of the population. However the varying organizational structures of local health departments may impede their ability to effect change and may decrease their reach, thereby limiting the capacity of the LHD to improve health

prospects for its constituents. However fewer studies have examined the relationship between organizational characteristics and population or county level health outcomes.

Figure 3.1 LHD Partnerships for Obesity Prevention (Conceptual Model)



3.4 Innovations and Contributions of Dissertation Research

The current literature on the effectiveness of LHD obesity prevention programs is mixed (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). However few studies examining the role of LHD chronic disease or obesity prevention programs have included the use of community-based organizations partnerships. Findings from this dissertation align with previous studies examining community-based organizations partnership activities occurring within LHD,

including obesity prevention services and screening activities (Zahner 2005, Beatty, Harris et al. 2010, Zhang, Luo et al.). However this dissertation is unique in that it is the first study to comprehensively assess the relationship between LHD organizational characteristics (including infrastructure, resources and governance) and area level or community indicators on changes in obesity prevalence over time.

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CHAPTER 4

Perspectives of Key Decision Makers within the Los Angeles County Department of Public Health (Key Informant Interviews)

4.1 Rationale for Key Informant Interviews

Local health departments (LHD) are cornerstones within the local public health system and provide programs and services directly or in collaboration with other organizations in the system in order to improve local health outcomes. Recently, LHDs have started to modify their organizational structures and processes in an attempt to create a systematic and an effective approach that reduces the prevalence and morbidity of chronic disease in their catchment areas (Leep, Beitsch et al. 2009). However, the latest research examining the impact of LHD efforts on the reduction of chronic diseases such as obesity has been mixed (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012).

The utilization of partnerships has been recommended in order to enhance public health organizations' ability to accomplish their goals, increase programmatic offerings and improve health outcomes (National Research Council , National Association of County and City Health Officials). In order to fully understand the local public health systems efforts and capacity to implement obesity prevention programs, there needs to be an examination of partnerships between the LHD and other organizations at the local level (Mays and Scutchfield 2010, Hyde and Shortell 2012, Stamatakis, Lewis et al. 2014). Although LHD partnerships with community-based organizations may be becoming more prevalent, previous studies have failed to evaluate the outcomes of LHD community-based partnerships to improve the provision of obesity and chronic disease prevention programs and adverse health outcomes. This dissertation explores the

factors that increase the capacity of LHDs to partner with community-based organizations in order to administer obesity prevention programs that improve population-level health outcomes.

As one of the largest health departments in the country, the Los Angeles County Department of Public Health (DPH) conducts surveillance activities, provides programming and services, and influences policies that improve the health outcomes of over 10 million people under their purview. A report by Dr. Lester Breslow highlighting that the emerging public health threats would no longer be infectious diseases but rather chronic conditions was the impetus for the creation of the Division of Chronic Disease and Injury Prevention of the DPH (Interviewee #3 April 14, 2014). The Division of Chronic Disease and Injury Prevention is charged with conducting chronic disease prevention activities for the entire County of Los Angeles. Brownson et al. (2007) suggested that LHDs may face numerous challenges implementing obesity prevention programs given the large degree of variability in funding structures, varied program areas of focus, and challenges integrating innovations into existing infrastructure (Brownson, Ballew et al. 2007). Furthermore, given the complexity and sheer size of Los Angeles County, the Division of Chronic Disease and Injury Prevention must partner to achieve their mission, goals and objectives.

Currently, research is limited regarding the types of organizations that LHDs collaborate with and how or why these organizations are selected as partners. Therefore, key informant interviews were conducted with managers or directors within the Division of Chronic Disease and Injury Prevention to expound on topics that were not included in a nationwide examination of LHD community-based obesity partnership efforts, especially factors that may be relevant to large LHDs. Specifically, the aims of the interviews were to: a) help identify additional factors that facilitate establishing and maintaining community-based partnerships for obesity and

chronic disease prevention; b) to explore facilitators and barriers to large LHDs engaging in community-based partnerships for obesity prevention and c) to discover methods by which LHDs can improve community-based partnerships. Results from the key informant interviews underscore the modifiable LHD-level and area-level factors that can facilitate or impede a LHD's ability to forge partnerships with other organizations within the public health system, particularly community-based organizations. Moreover, the information obtained informs the overall results of the dissertation study and confirms the continued use of partnerships as a means of increasing the capacity of the Los Angeles County Department of Public Health to decrease county level obesity prevalence.

4.2 Materials and Methods

Development of Informant Interview Guide

The interview guide was developed to ensure that sufficient information was obtained regarding the partnership activities of large public health departments and how to increase the utilization of community-based organization partnerships to improve obesity prevention efforts. The key informant interview guide was developed based on the conceptual model and hypotheses for the dissertation. Furthermore, the interview guide consisted of a series of open-ended questions, which were divided into 3 overall sections: 1) obesity prevention efforts 2) current organizational partners and practices, and 3) factors relevant to partnership uptake, processes, capacity and outcomes. Additional probes were created to allow further exploration of ideas that emerged during the interview.

The initial guide consisted of 20 questions; however the guide was later refined to include a total of 12 questions (Appendix "4.1"). The semi-structured interview guide included information from multiple domains in the conceptual model such as 1) LHD obesity prevention

and partnership efforts to offer obesity programming, 2) LHD organizational characteristics and resources that impede or foster the use of partnerships, and 3) factors within the larger macro context that influence the use of obesity prevention partnerships. Table 4.1 highlights the constructs from the conceptual model and topics covered in the interviews. Although all of the constructs from the conceptual model (mission, structural capacity, processes, outcomes and macro context) were included in the interview guide, the interview guide was created in order to delve deeper into the constructs and elicit responses that ascertain the drivers of community-based partnerships efforts by large local health departments.

Recruitment, Inclusion Criteria, and Selection of Key Informants

Key informants were identified through the Division of Chronic Disease and Injury Prevention website, as well as a listing of physical activity, obesity and chronic disease prevention program directors obtained from the first key informant. An email was sent to each participant (see email script –See Appendix "4.2") to explain the details of the study and confirm interest in participating in the interview. The following three inclusion criteria were utilized to identify key informants; 1) an employee of Los Angeles County Department of Public Health, 2) knowledgeable about chronic disease and obesity prevention activities conducted within Los Angeles County, and 3) a mid-level or senior level manager with some decisional latitude.

Administration of Key Informant Interviews

Follow-up phone calls were placed 3-4 days after the recruitment email was sent to prospective informants if an email response was not received. During the follow-up call prospective informants were screened to determine eligibility and asked to participate (see eligibility screener and consent script –See Appendix "4.3"). If eligible, participants were asked to provide their consent to participate orally. This qualitative study consisted of 4 semi-structured

interviews with Directors of several large-scale obesity prevention programs or departments within the Division of Chronic Disease and Injury Prevention. Interviews were carried out over a 4-month period (February 2014 to May 2014), lasted approximately 30-minutes in duration and were conducted via in-person meeting (n=1) or telephone (n=3). The University of California Los Angeles Institutional Review Board approved this study.

Table 4.1: Constructs and topics covered in the key informant interviews

Constructs from Conceptual Model	**Topics Covered in Key Informant Interview**
Mission	• Relationship of obesity prevention efforts to overall organizational goals • Typical partners
Structural Capacity	• Facilitators and barriers to the implementation of obesity prevention activities • Facilitators and barriers to formation of partnerships • Influence of workforce and staffing • Capacity to implement obesity prevention efforts • Structure of partnership efforts and Resources • Funding
Processes	• Competing priorities • Rationale for creation of programs and partnerships • Strategies used to promote partnerships • Factors that improve efficiency • Delineation of roles and expectations
Outcomes	• Formation of formal and informal partnerships
Macro Context	• Influence of area-level resources

Qualitative Data Analysis

Only one of the four interviews were audio recorded and transcribed verbatim. For the other three interviews, the shorthand notes taken during the interview were appended within 24 hours of the interview to ensure that all information was sufficiently captured. Interviews were analyzed using Dedoose 4.5; a web-based data management and statistical analysis application software used for qualitative data analysis and mixed method research (Dedoose Version 4.5. 2013). A general inductive content analysis approach was used to guide this analysis (Thomas

2006). Initial themes were created in advance based on the semi-structured interview guide, hypotheses, conceptual model and the current literature surrounding the use of partnerships. However an inductive analytical approach was taken because additional codes and subcodes were identified as they emerged from the data and existing codes were also revised. A hierarchical coding framework was used and interview excerpts were tagged to highlight relevant themes within the domains of interest.

4.3 Results

The main focus of inquiry for this dissertation was the local health department, not its members, so limited information was recorded about the demographic characteristics of the four key informants. Nevertheless on average, the key informants interviewed had worked for the DPH for over 10 years, were responsible for the oversight and direction of at least one large-scale obesity or chronic disease prevention program and had substantial decisional latitude in regards to the types of programs adopted and implemented (average involvement = 5 very strongly involved, on a Likert scale ranging from 1-5). The initial goal was to recruit and conduct 5 key informant interviews with stakeholders from the Los Angeles County Department of Public Health. Only 4 interviews were conducted because it was determined that the fifth potential informant passively refused to participate due to challenges of scheduling the interview, which included cancelled and missed appointments. Important to note, the potential fifth interviewee oversaw one large physical activity and nutrition-related program at the county. It is believed that the fifth potential informant's likely responses would have been redundant with information provided by two other informants who also oversaw the programmatic efforts of one independent obesity prevention program.

Informants confirmed the Division of Chronic Disease and Injury Prevention is responsible for implementing the majority of obesity prevention programs offered by the Los Angeles County Department of Public Health. The diverse chronic disease and obesity prevention initiatives provided by the Division are disseminated through various departmental program areas, which include but are not limited to the Nutrition program, PLACE program, Active Living and School based initiatives, and Choose Health LA.

All informants stated that the rationale behind the creation of the Division of Chronic Disease and Injury and Prevention obesity prevention initiatives is two fold. Initiatives were created both in response to the burden of the obesity epidemic within the County, as well as their desire to be proactive and implement strategies that hold promise within certain communities or populations. Key informants expressed that the Division must partner with multiple stakeholders in Los Angeles County in order to provide the breadth of programs needed to achieve their public health mission. Among the organizations or stakeholders that are regular partners include cities, schools, hospitals, universities and nonprofits or community-based organizations. However, the key informants also suggested that the Division must be creative and identify partners outside of their usual selection, who could be conducting innovative work with greater potential to decrease the prevalence of obesity than existing partners in order to truly arrest the obesity epidemic.

Overall, six (**6)** main themes emerged from the analysis; 1) rationale for the formation of partnerships, 2) factors that facilitate partnership engagement, 3) the influence of adequate funding, 4) the structural capacity of organizations involved to implement obesity prevention activities, 5) adequate workforce and 6) factors that serve as barriers to partnership engagement. Interview themes were organized around the three specific aims of the key informant interviews.

(1) Establishing and maintaining partnerships for obesity and chronic disease prevention

The Division of Chronic Disease and Injury Prevention provides a robust array of obesity prevention initiatives, and many of the initiatives are currently being conducted in partnership with other organizations. Although there is diversity among the partners reported, the rationale for the creation of most of their partnerships was because it increased the organizations' "reach" and improved their "capacity" to implement programs.

> "Partnerships assist the department in reaching communities that they don't have access to. Sometimes community-based organizations can organize and plan activities within communities that county couldn't do. At times these organizations are connected to a larger organization, which helps form partnerships." (Interviewee #2 February 2014)

> "CBO's are partners for obesity prevention efforts because [their] 1) knowledge, skills and relationships they have within the community and 2) [they have a] certain level of freedom to advocate for policies. CBO's have a deeper understanding of the community. LHD can bring stats and data but CBO's have better understanding of barriers, systems and policies needed. Policy-makers are often more responsive to community members. (Interviewee #1 February 2014)

Additionally, another common reason for partnering with community-based organizations was based on the need in certain communities. This illustrates the Division responsiveness to the needs of the communities in which they serve and how they utilize data to support focusing efforts within specific communities or populations.

> "I think just the massive negative impact of the obesity epidemic is just so widespread that there are so many aspects of our society that have an interest or may have an interest in turning this trend back that I think it's really an area that we have to be very open and work hard to identify new partnerships." (Interviewee #4 April 21, 2014)

> "There is a need to prioritize needs and goals of partnership. We use data to illustrate a need for obesity prevention and why we are focusing our efforts on certain populations." (Interviewee #2 February 2014)

> "But in terms of what drives a partnership, often times it's dictated by the funding source. And then, when it's not and we do have more leeway, it's really looking at first kind of the level of need, and what area of LA County we really need to focus on, which ones have the highest level of health disparities…and then we want to think about

> organizations that can be most effective in helping us reach those populations and really expand health equity and focus on reducing those disparities in some of the highest need communities." (Interviewee #4 April 21, 2014)

(2) Facilitators and barriers to community-based partnerships for obesity prevention

Key informants were asked to identify factors that facilitate their ability to engage in community-based partnerships for obesity prevention. Among all the topics discussed during the interview, key informants most frequently detailed the factors that assist the Division of Chronic Disease and Injury Prevention's ability to form partnerships with CBOs. The mostly commonly reported factors involved the infrastructure or resources and knowledge of the community-based organization.

Among the infrastructure and resource factors discussed during the interview, funding was one of the main resources that increased their ability to partner. The opportunity to obtain funding was the main motivation for other organizations within the local public health system to contact the Division regarding obesity prevention opportunities. However, the Division was primarily responsible for contacting outside organizations to form collaborations or partnerships for obesity prevention. It was stated that partnerships help facilitate a more coordinated approach to obesity prevention by reducing the duplication of obesity prevention strategies provided by the Division and other organizations involved in prevention activities within the county and creates more robust obesity prevention initiatives.

> "The one caveat is when funding is available, then people come to or approach the county." (Interviewee #3 April 14, 2014)

> "The use of partnerships allows for all organizations involved to pull together resources and have more robust campaigns. There is a need to build better collaborations through a concerted effort to reduce duplication between multi-agencies doing same thing." (Interviewee #2 February 2014)

> "We're very interested in umm…built environment strategies, strategies that increase the ability for people to safely walk and bike and that's something we've been really excited

> about…our ability to really move within that area and that's really happened in the past few years. That's an area we don't have as much expertise in and that really requires us to establish new partnerships with regional planners, other departments that work in this area, and other nonprofits that have expertise in planning." (Interviewee #4 April 21, 2014)

Although federal, state, and local grants assist the Division's ability to partner with community-based organizations, it's not a requirement for effective partnerships. The stipulations associated with funding and formal contracts, enhance the structure and organization of the partnership, and may improve overall effectiveness.

> "So that's tied to the money that we allocate to the community based organization…so it increases the accountability, it provides for a structure to get the funds out and very clear about what type of work should be done so it's a trade off. In a voluntary partnership, you are gonna avoid all of those items but you certainly lack some accountability for some of the work products." (Interviewee #4 April 21, 2014)

> "No, definitely not! Many instances where we have had effective partnerships just identifying common goals of various organizations that are in line with goals of division and our department and have had successful partnerships in that way…There are other times where funding creates a new partnership or a more formal partnership that is also effective too. So it definitely doesn't have to be part of the equation." (Interviewee #4 April 21, 2014)

Several informants stated that many outside organizations are unaware of public health, although they may be conducting research that is relevant to public health. Outside organizations may be conducting these efforts for reasons other than to improve the obesity epidemic. However, if the organizations had the adequate staffing (i.e. a workforce with the necessary skills) then that precipitated partnership efforts.

> "I think it [partnerships] really helps us have a larger reach in LA County and benefit from the expertise of organization that has been working in a community say for 25 years and has an excellent track record there and relationships and a lot of expertise in doing community based work that hopefully we can lend help to but then we also certainly benefit from all the previous work they have done and capacity of their staff." (Interviewee #4 April 21, 2014)

> "Workforce skills/knowledge is very much a reason for partnering but level of community need is also a driving factor. Sometimes CBO's don't have all the skills but the department wants to assist with capacity building so they have informal and formal relationships." (Interviewee #1 February 2014)

One of the main barriers to the formation of partnerships was the use of formal contracts. All of the key informants interviewed described the administrative processes as very laborious; at times a discouragement to partnerships and hindrance to the outcomes of programs implemented by the Division of Chronic Disease and Injury Prevention.

> "…Although important to note is contracts can be very laborious, which can discourage partnerships. Formal contracts require an RFP or competitive process, which can take a year and then once selected it can still take 1-3 months to review the contract." (Interviewee #1 February 2014)

> "Official contracts can be cumbersome and time demanding…[this process] affects the division's ability to accomplish goals of projects because [the Division will typically have] a smaller window of time to accomplish objectives." (Interviewee #3 April 14, 2014)

Partnerships with multiple organizations for the sake of implementing prevention programs that reduce the obesity epidemic were another challenge identified by the informants.

> "But that also brings into a new coordination issue, so there is just coordinating a larger group. And then there are also new goals and mindsets of each organization that you're trying to mesh and so you might have more chances for disagreement among your approach or among the overall vision of the project once you bring in additional organizations. That can be the challenge but I think going back to the significant level of the obesity crisis, it sort of requires those multiple partnerships." (Interviewee #4 April 21, 2014)

(3) Discover methods by which LHDs can improve community-based partnerships

The final aim of the interviews was to identify factors or methods that improve large LHDs' ability to partner with community-based organizations and improve outcomes. Two themes that emerged from the key informant interviews was a need to focus on organizations that can improve the outcomes of the division, influence their ability to address upstream domains of the obesity prevention and approach organizations outside of the organizations usually

approached for obesity prevention partnerships. Additionally, an increased information sharing and explanation of the Division's processes between the Division and community-based organization emerged as a potential way to improve partnerships activities.

> "…goal is to create safe places to engage in physical activity. Has to use partnerships (sometimes contractual) to conduct policy work because division is about to change policy directly. It's a MUST that they partner with cities, non-profits and schools to get this done." (Interviewee #3 April 14, 2014)

> "I think another thing is for us to identify new and unique partnerships is something we are really trying to strive for and look for areas we can work in that may not have been typical places we are doing obesity prevention work. But it might be an unusual partner that shares the goal of obesity prevention but it might be someone we haven't engaged in the past so I think constantly looking for new and innovative partnerships is a high priority for us." (Interviewee #4 April 21, 2014)

> "I think increased information sharing is really helpful…to understand us as a department doing more to educate partners about our system and the process that we use in putting contracts together, in monitoring contracts, and keeping people up to speed on our larger goals. I really think that is something we can do even more of to help build a partnership." (Interviewee #4 April 21, 2014)

Furthermore, informants identified several factors that are important to the formation of partnerships. These factors were suggested as essential to healthy and productive partnerships but may not have always been present in each of the partnerships the Division engaged in.

> "It takes developing long-standing relationships with CBO's…however there is a need bi-directional communication…sharing what you think will work and being respectful of everyone's views. Sometimes the department hears complaints from the community about transparency about why they are doing the work…[need to be] being open and honest." (Interviewee #1 February 2014)

> "So I think having those set meeting times, those set deliverables that people are working on in between the meetings, and then the accountability when you get back together is really critical. And I just think that varies…in some collaborations, I think that is happening in a big way and in others it might be kind of looser and not an aspect in terms of what each side will be working on." (Interviewee #4 April 21, 2014)

4.4 Discussion

Key informants from the Division of Chronic Disease and Injury Prevention stated that the Division regularly partners with multiple organizations in the local public health system, including community-based organizations to deliver obesity prevention programs. Given the limited resources of the Division, community-based partnerships are implemented to improve their ability to achieve their goals and increase their capacity to provide obesity prevention strategies in communities of need. With the proper delineation of efforts, facilitators and barriers, large LHD's will be better equipped to deliver obesity prevention efforts. More importantly, they may be more likely to partner with community-based organizations that may possess skills and knowledge that the LHD lacks. Formal contracts are essential to the obesity prevention strategies offered by LHDs because it allows LHDs to provide funds to organizations with deficient financial resources to complete programmatic tasks, improves the coordination of programs offered, increases efficiency of all organizations involved and expands LHDs' reach into communities with disparately high rates of obesity. Although funding is not mandatory for partnerships to be formed, it does influence the ability of the LHD to forge a more stable partnership.

The importance of adequate funding was highlighted during the interviews. Limitations in funding and staffing observed by the LHD may be the major impetus for LHDs to increase community-based partnership efforts. For example, US LHDs experienced a significant decrease in staffing between 2008 and 2010 by approximately 12,000 (National Association of County and City Health Officials 2011) and prevention programs were among those most frequently eliminated (National Association of County and City Health Officials 2012). Furthermore, a

potential driver of partnerships with initiation, especially partnerships with community-based organizations would be the workforce skill set of the partnering organization.

The goal of the interviews was to identify ways in which large LHD community-based partnership activities could be increased and thus the results of the key informant interviews may not be relevant to smaller or rural local health departments. Previous research has demonstrated that smaller centralized LHDs compared to decentralized LHDs have less-decision making authority regarding types of programs that should be implemented (Stamatakis, Lewis et al. 2014). Although community-based organizations are one type of organization that the Division partners with, barriers to forming partnerships were identified. Partnering with community-based organizations improves their reach into communities where their access has been limited; however the informants consistently and thoroughly discussed obesity prevention partnership efforts with cities and schools. This could be related to the ability of cities and schools to affect large segments of the population through policy adoption, as highlighted by one of the informants.

> "Yes, CBO's are partners of the division but not primary partners. Primary partners are larger organizations because division is limited…both in staff, funding, [resources]…so we have to prioritize. CBO's don't have direct control over any large segment of population...has to partner with some larger policymaking organization…CBO's are for more assistance. Small non-profits don't' have the ability to change policies directly. For example, 9 million residents live in 1 of the cities within the county [limits]… so partnering with cities can change thousands of lives, CBO's can't do that." (Interviewee #3 April 14, 2014)

Additionally, although this dissertation focuses on partnerships with community-based organizations, informants stated that partnerships with academic institutions are extremely important to their ability to obtain additional funding to conduct research and programming activities. This suggests that a multipronged, multiple organizational partnerships approach is necessary to truly turn the tide on the obesity epidemic.

The secondary data analyses discussed in the following chapters of this dissertation fail to evaluate factors related to the quality of the partnership, as well as strategies that could improve the LHD's ability to initiate a community-based partnership. Furthermore, the results of the key informant interviews highlighted the uses of multiple organizations to address the obesity epidemic. The fact that one informant reported a greater interest in partnerships with cities and schools than community-based organizations suggests that future studies need to assess partnerships with different types of community organizations; as well as the type of programs delivered by each organization. Based on information obtained from the key informant interviews, the type of program implemented will depend heavily on workforce skills of the organization, especially when addressing larger built environment initiatives.

The chapter includes the perspectives of key stakeholders from a large LHD. Future research needs to assess the perspectives of decision-makers from LHDs of varying sizes and serving a range population sizes to identify the concordance with the limited perspectives of the large LHD decision-makers included in this study. This assertion notwithstanding, the findings from the key informant interviews included in this study highlight the prominent resources necessary for LHDs to initiate and maintain partnerships activities with community-based organizations to address the "upstream" social determinants of health.

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Appendix 4.1

Questions for Key Informant Interviews

Thank you for agreeing to speak/meet with me today. In the research that we are doing, we seek to identify factors that improve a local health department's capacity to provide obesity prevention programs and services and reduce population-level negative health outcomes. We are particularly interested in partnerships as a means to increase the capacity of the Local Health Department to implement obesity prevention programs. This exploration is being conducted in two parts. One study examines the effect of Local Health Department [use abbreviations in oral communications sparingly] obesity prevention programming on the county-level prevalence of obesity. The second study examines the effect of LHD partnerships on the adoption of obesity-related policies and ordinances. I am interested in speaking with you regarding the importance of partnerships with community-based organizations for achieving the mission and goals of such a large local health department because you are someone who has been instrumental in the development and adoption of obesity prevention programs within the Los Angeles County Department of Public Health. This call shouldn't take too long, approximately 30 minutes.

I. What kind of organizations does your LHD usually partner with?

1. What has been the reason or rationale for the creation of most of the Department's **obesity prevention initiatives** (i.e. Is it in response to current epidemic or proactive)?

2. How can public health departments be more efficient while meeting the health needs of their communities through the use of partnerships?

3. What types of obesity prevention programs does your LHD offer? Are these programs usually conducted by the LHD directly or in partnership with other organizations?

4. If in partnerships with other organizations, what organizations or types of organizations do you partner with? Which are you most likely to partner with?

II. Questions about Partnerships Factors (Domains: Mission, Structural Capacity, Processes, Outcomes and Macro Context)

5. What drives most partnerships that focus on obesity prevention, activity promotion strategies or chronic disease prevention strategies (i.e. what is the reason for the creation of most **partnerships**)? (**prompt:** And what tools or strategies are used to promote obesity prevention strategies in organizational partnerships?)

6. Is workforce skills/knowledge ever a reason for partnering?

7. What about community-based organizations, are they ever partners in obesity prevention efforts? Why or why not (what is the main reason for partnering with CBO's)?

8. What is the nature of most of your partnerships for health promotion / obesity prevention? In your partnerships with community-based organizations, do you share resources, share staff/personnel, policies, a written agreement, regularly scheduled meetings, and exchange information? How does multiple partners affect the outcome of the partnership? Does that hinder or improve goals and objectives?

9. What do you think are the essentials of a successful partnership? (**prompt:** a knowledgeable and committed stakeholder group, establishment of trust, Understanding of each organization's strengths and limitations, establishment of a clear objective, understanding of trends in the community's health care needs, and focus on addressing the needs of the community's most vulnerable populations) (**prompt:** How do you think partnership activities within the division can be improved?

10. Are expectations explicitly stated at the beginning of the formation of partnerships?

11. What sources of funding are required? What additional sources of funding may be available?

12. What additional type of information, beyond what has been touched on above, would be useful in helping you decide with which organization to partner with in the LHD's efforts to reduce community obesity risk?

Appendix 4.2

Key Informant Interview Email Invitation

From: Chikarlo R. Leak, Doctoral Student

To: [First] [Last], [Position]

Subject: Invitation to Participate in Key Informant Interview

Dear [Title] [First] [Last]

My name is Chikarlo Leak and I'm a doctoral candidate in Health Policy and Management. I am currently conducting my dissertation examining Local Health Departments chronic disease prevention programming activities and the use of partnerships. I would like to speak with you for 30 minutes via telephone or face to face to ask you a few questions regarding the utility of my exploration to a large local health department such as Los County Department of Public Health. The goal of my dissertation is to examine the capacity of local health departments (LHD) to deliver obesity prevention programming. A significant part of my dissertation is examining the role partnerships play in the provision of programming activities. I believe you will find the interview questions interesting and worthwhile, and the results will be used to determine how local health departments can increase their capacity and reach of obesity prevention activities.

What happens next:
Unless you tell me otherwise, I will contact you in the next 3-4 days to inquire about your participation decision. If you agree to participate, we can schedule a day and time for your interview. If you need extra time to make a decision please let me know and I will contact you at a convenient time. If you wish to have your name removed from my list, please reply to this email with "remove" in the subject line. If you prefer to be contacted at a later date, please let me know.

Contact information:
If you have questions or wish to discuss your participation as a prospective key informant, please email me at crleak@gmail.com or reach me by phone at (202) 210-0572.

Thank you!

Chikarlo Leak, M.P.H.
Doctoral Candidate, Health Policy and Management
UCLA Fielding School of Public Health
crleak@gmail.com
(202) 210-0572

Appendix 4.3

Key Informant Interview Consent Script

Thank you for expressing interest in my research study seeking to identify factors that improve a local health department's capacity to provide obesity prevention programs and reduce population-level negative health outcomes. The main goal of this study is to examine the effect of Local Health Department obesity prevention programming on the county-level prevalence of obesity. I am interested in speaking with you regarding the importance of partnerships with community-based organizations for achieving the mission and goals of a large local health department. However, before you can participate in the key informant interviews we need to determine your eligibility. Can I ask you 3 questions to determine your eligibility?
[IF YES] ask three questions below]
[IF NO] thank you for your time and if you change your mind feel free to contact me at crleak@gmail.com]

Eligibility Questions:

1. What is your job title and primary responsibility within LAC DPH?

   [Code as **YES** if the information is same as information obtained online or **NO** if the information is different]

   [Also code as 1 if upper management, 2 middle management and 3 for entry level]

   DO NOT RECORD NAMES OF INTERVIEWEE OR TITLES TO ENSURE CONFIDENTIALITY. INFORMATION OBTAINED FROM ONLINE WILL BE SHREDDED AFTER CALL.

2. How long have you been in your current position? And how long have you been with LAC DPH?

   [Code as stated by participant]

3. How involved are you with selecting or approving which obesity prevention programs are offered by the department?

   [Code as stated by participant]

[NOTE: Write down if the person is eligible for the study and agree to participate at this time.

Now that we have determined your eligibility for the study, we can complete your interview or schedule a time to complete the interview that is more convenient for you.

[IF AGREE TO PARTICIPATE RIGHT NOW] I would you like to record the interview to ensure I capture all of the detailed information you have given me today. Do you mind if I record the interview? **[IF NO]** START the recording at this time. **[IF YES]** State, the recording just

ensures that I don't miss any of the information you have provided during this interview however the recording is voluntary. If you still want to participate, we can continue without recording. Do you want to continue without recording the interview? **[IF YES]** Start the interview **[IF NO]** thank you for your time and if you change your mind feel free to contact me at crleak@gmail.com]

[IF DON'T AGREE TO PARTICIPATE AT THIS TIME AND WANTS A CALL BACK] Thank you for your interest in participating in my interviews, please let me know a day and time that is more convenient for you to conduct the interview. [**NOTE: date and time given]**

Also I would like to record the interview when we do speak again to ensure I capture all of the detailed information you give me during the interview. Would you mind if I recorded the interview? **[IF YES]** State, recording just ensures that I don't miss any of the information you have said however the recording is voluntary. We can conduct the interview without recording **[IF NO]** Great, I will let you know before I start the recording the next time we speak. If you have changed your mind, please let me know at that time and I will not record the interview.

CHAPTER 5

The effect of LHD infrastructure and resources and area-level factors on the initiation of LHD obesity prevention partnerships (Study 1)

5.1 Abstract

Purpose: Given the current fiscal climate, local health departments need to identify means by which to increase their capacity to provide obesity prevention activities within their catchment area, such as through the use of partnerships. The size of the population served has been one of the factors most consistently found to affect the performance of the local health departments, such that a population size of 50,000 to 500,000 has been suggested optimal size to guarantee sufficient performance (Suen and Magruder 2004, Mays, McHugh et al. 2006, Hyde and Shortell 2012). However, research is limited regarding impact of population size on the provision of LHD obesity prevention programs, provided directly or through partnerships. This study examines whether the size of population served, LHD organizational characteristics and area-level factors are associated with LHD partnerships for obesity prevention. We hypothesized that having a greater population size of the jurisdiction would be associated with increased LHD obesity prevention community-based partnerships.

Methods: The data for this study were drawn from the 2008 National Profile of Local Health Departments surveys conducted by National Association of County and City Health Officials. Multinomial logistic regression models were performed to estimate the association between LHD obesity prevention partnerships and total population size while controlling for other factors in the model

Results: LHDs reported providing a high proportion of obesity prevention programs, with an average of 4% or less reporting no obesity prevention activity. The magnitude of association varied between the LHD obesity prevention programs. However population size and the presence of a local board of health improved the probability of partnering to provide obesity prevention programs and the conducting of chronic disease surveillance programs decreased the probability of partnering to provide obesity prevention programs. LHD with larger population sizes were predicted to partner to provide obesity prevention programs more than smaller LHD.

Conclusions: This study shows that within a national sample of LHDs, many of the larger LHDs are partnering to provide obesity prevention activities. Albeit, LHD serving smaller population sizes or located in rural areas may have fewer organizations to form obesity prevention partnerships with. Identifying strategies that enhance the effectiveness and reach of partnerships with community-based organizations is likely to mitigate contributors to the obesity epidemic. Future research should investigate the quality and structure of the partnerships, as well as which strategies are most effective.

5.2 Introduction

Obesity is a significant public health problem despite decades of concerted efforts to turn the tide. More than one-third of American adults are currently obese (Ogden 2010, Ogden, Carroll et al. 2014). Being obese increases the risk of developing other chronic diseases such as heart disease, stroke, diabetes and cancer (Centers for Disease Control and Prevention) and is associated with a formidable financial burden both to the individual and the health care system (measured in terms of estimated annual medical cost) (Finkelstein, Trogdon et al. 2009). Furthermore, the burden of obesity continues to be unevenly distributed across socioeconomic status (with the exception of non-Hispanic black and Mexican American men), racial/ethnic

groups and geography (Kumanyika, Obarzanek et al. 2008, Flegal, Carroll et al. 2012). Communities and organizations alike are gravely concerned with reducing the burden and cost of obesity, whose rising health care expenditures have consistently outpaced inflation (Borger, Smith et al. 2006, Keehan, Sisko et al. 2008).

Although the prevalence of obesity may be flattening (Flegal, Carroll et al. 2012), the prevalence estimates of obesity are still above national goals and suggest that current efforts may not be reaching the communities with the greatest burden of obesity. One of the goals in *Healthy People 2010* was to decrease the prevalence of obesity to 15%, however no state has a prevalence of obesity below 20% (Centers for Disease Control and Prevention). The role of public health is to address community-level problems and develop effective solutions that bring about change and allow residents to live healthier lives, while taking into account individual responsibility to improving health outcomes (Frieden 2010). Given the high prevalence of obesity, effective programs are needed to decrease the prevalence of obesity within states. Experts within the public health system are currently trying to identify cost-effective strategies to arrest the epidemic (Burbage, Gonzalez et al. 2014).

Over half of local health departments (LHDs) currently offer obesity prevention programs and the presence of obesity prevention programs is significantly associated with the structural capacity and general performance of LHDs (Zhang, Luo et al. 2010). The average number of the ten essential public health services applied to obesity provided by LHDs has slightly increased over time from 3.09 in 2005 to 3.69 in 2008 (Luo, Sotnikov et al.). This signifies an increased focus on reducing the burden and impact of obesity within their catchment areas. Although the number of LHDs that provide obesity prevention programming has

increased, the overall number of essential public health services applied to obesity implemented by LHDs remains relatively low given the current epidemic.

Increased funding would be an ideal strategy to improve LHDs' ability to offer obesity prevention programs and services, however it is highly unlikely given state and local government budget deficits and federal spending restrictions (Mays, McHugh et al. 2004, Mays and Smith). Local level funding to address public health concerns is relatively low, with only $29.57 spent on public health activities in 2005 (Trust for America's Health 2010). This highlights the limited funding available to LHDs to address the obesity epidemic and the need to form partnerships with organizations in communities most adversely affected by the epidemic such as community-based organizations. Several recent comprehensive community-based partnership initiatives have been implemented to improve health, such as the Partnership for the Public's Health Initiative (PPH). The PPH initiative addresses the social determinants of health, is categorized under the "Healthy Cities and Communities" movement and emphasizes partnerships as a means of building community capacity (Cheadle, Hsu et al. 2008).

The empirical evidence regarding the use of partnerships is mixed, however there is support for the use of partnerships to improve health equity, maximize resources, increase the provision of services, and advance population level health outcomes (Scutchfield, Knight et al. 2004, Beatty, Harris et al. 2010, Fawcett, Schultz et al. 2010). Joint use agreements are an example of an obesity prevention strategy that can be implemented through the use of partnership efforts to decrease obesity prevalence (Burbage, 2014). However, literature regarding LHD use of partnerships, especially partnerships with community-based organizations to increase their provision of obesity prevention strategies and improve population health outcomes is limited (Zahner 2005).

Many LHDs have diversified their scope of core public health activities, integrated efforts with collaborators within the public health system and changed focus in order to address upstream factors such as policy development and improving the social determinants of negative health outcomes (Mays, Scutchfield et al. 2010). However, the growing body of evidence suggests that LHD organizational characteristics and factors in the macro context influence LHDs' ability to assure key public health services and programs and collaborative efforts. Three LHD organizational characteristics that measure size and resources of the system include population size, the number of full time equivalent employees (FTE), and expenditures per capita. These factors have been commonly used in studies assessing the performance of the local public health system and the results are mixed. Due to high correlations between these variables, some studies have included only one measure of size in the model along with other LHD organizational-level covariates.

Several studies have demonstrated the effect of population size on LHD programs and services. Santere (2009) identified that there was significant reduction in per capita spending when the size of the population served by the LHD is less than 100,000 (Santerre 2009). This reduced spending affects the LHD's ability to provide essential health services or programs and negatively impacts approximately 80% of LHDs serving population sizes of 100,000 or below in 2008 (National Association of County and City Health Officials (NACCHO) July 2009). However, a prior study suggested that LHDs serving populations sizes between 50,000 and 500,000 would ensure optimal performance (Suen and Magruder 2004).

The size of the population and the number of FTE have been found to improve the performance of LHDs on a 10-point mean index of LHD essential services of public health applied to obesity (Porterfield, Reaves et al. 2009). Furthermore, Erwin and colleagues found

that increased expenditures per capita were associated with decreases in infectious diseases while increases in the number of FTE per capita were associated with a decrease in cardiovascular deaths (Erwin 2011), and 1.1 to 6.9% decrease in cancer mortality ($p<.05$) and infant mortality ($p<.001$) respectively (Mays and Smith 2011). Although this study aggregated the local health department efforts to the state level, it highlights the effect of adequate LHD resources on the ability of the LHD to achieve health objectives. Previous literature suggests that population size may be predictive of LHD performance, whereby smaller departments may be at a slight disadvantage because they don't enjoy the economies of scale that the larger LHDs do. However, research is needed to determine whether one measure of size is more effective than the others in improving the performance of LHDs to partner with community organizations to provide obesity prevention strategies.

Few studies to date have investigated whether LHD organizational characteristics and area-level factors are associated with the uptake of partnerships for obesity prevention specifically. This study examined whether LHD organizational infrastructure, resources, and governance and area-level factors within their jurisdiction increase LHD ability to partner with other organizations in the local public health system. Given the consistent association of the size of the population served with performance of the LHD, there is a need to assess whether population size determines the type of obesity prevention activity delivered and the structure of LHD obesity prevention programming. We hypothesized that having a greater population size of the jurisdiction would be associated with increased LHD obesity prevention community-based partnerships. It is hypothesized that other LHD organizational factors will be associated with the presence of LHD obesity prevention partnerships.

5.3 Materials and Methods

5.3.1 Local Health Department Survey Data

This study utilized the 2008 survey data from the National Profile of Local Health Departments surveys, which was collected by the National Association of City and County Health Officers (NACCHO) and funded by the Centers for Disease Control and Prevention and the Robert Wood Johnson Foundation. The core questionnaire was sent to every LHD in the United States, except Hawaii and Rhode Island because the state health department functions on behalf of the local public health department and there are no sub-state units. States that have a public health structure that includes only a local or regional state office, the state health agency decides whether to respond at the state level or the local level. A stratified random sampling frame (without replacement) was used to assign LHDs to strata based on the size of population served within their jurisdiction (National Association of County and City Health Officials (NACCHO) July 2009) (National Association of County and City Health Officials (NACCHO) August 2011).

The purpose of the National Profile of Local Health Departments study is to develop a comprehensive and accurate description of city and county local health departments' jurisdiction information, governance, funding, LHD top executive, workforce, emergency preparedness, activities and services, partnerships, health disparities, community health assessment and planning, and communication among leaders. The 2008 surveys is the fifth survey among the profile series including 1989, 1992-1993, 1996-1997 and 2005. Beginning in 2005, the profile surveys were administered in a web-based format. The response rate for the profile survey was above 80%, with 2,332 of 2,794 (83%) local health department respondents completing the survey in 2008 (National Association of County and City Health Officials (NACCHO) August

2011, National Association of County and City Health Officials (NACCHO) July 2009). Although the overall response rate was greater than 80%, the response rate of local health departments within individual states ranged from 49% to 100%. With the exception of Georgia, every state had a response rate of 60% or higher. Due to the unique structure of the local public health system in Massachusetts with every city or town within the state required to have a local health department, Massachusetts had the highest number of overall individual responses in both years (with 211 of 353 LHD responses).

The profile survey data has been used in previous studies to examine factors of the local public health system including but not limited to spending of local health departments (Santerre 2009, Mays and Smith 2011), obesity (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012), partnerships in health services (Beatty, Harris et al. 2010) and public health performance (Leep, Beitsch et al. 2009, Bhandari, Scutchfield et al. 2010). The Profile survey changed between survey years 2008 and 2010, which made it impossible to examine the delayed effect of multiple years of local health department obesity prevention efforts on county-level prevalence. In 2010, respondents were provided only 3 response options for obesity prevention programming activities; either provided directly, contracted and neither provided nor contracted out. The analyses in this chapter are limited to 2008 only. However additional information about LHD direct provision of obesity prevention programming activities was assessed and is included in Appendix 5.1.

5.3.2 Measures

LHD obesity prevention programming activities

Obesity prevention programming conducted within LHDs was conceptualized as the provision of three distinct activities 1) chronic disease prevention, 2) nutrition, and 3) physical

activity programs reported in 2008. Each programming activity was analyzed separately. In 2008, LHDs were instructed to check which organization within their jurisdiction was responsible for providing the programming activity, with seven (7) response options: the LHD provided the activity directly or had contractual arrangement, the state provided the activity, another local agency provided the activity, someone else within the jurisdiction provided the activity, the activity is not available in the jurisdiction and unknown. The seven options were combined into a categorical variable with 3 mutually exclusive categories: 1) provided directly by the LHD, 2) partners to provide the activity and 3) no LHD involvement and no activity. LHD obesity prevention partnerships was categorized according to whether the LHD indicated on the survey that they provided the program directly or contracted it out and also indicated that one of the other organizations within the local public health system provided the program.

Important to note that this dissertation is intended to focus on partnerships between the LHD and community-based organizations despite the fact that the partnership variable utilized in this dissertation does not differentiate between the various organizations within the public health system that local health departments could partner with. LHDs may have the resources and infrastructure to implement obesity prevention programs and services, it is important that they utilize agencies within disadvantaged, resource constrained, and largely ethnic minority communities that are more knowledgeable and trusted within the community to improve population-level health outcomes (Berger, Neuhaus et al. 1996, Mays and Scutchfield 2010, Wei-Skillern 2010, Erwin 2011).

Main predictor

The main predictor in this study was the total population size. The continuous variable was combined into categorical variable with five categories (less than 25,000, 25,000 to less than

49,999, 500,000 to 999,999, 100,000 to 499,999 and greater than 500,000. Approximately only 6% of LHDs stated they served a population greater than 500,000. However the 6% of LHDs serving populations 500,000 or greater were responsible for providing program and services to more than 50% of the U.S. population (National Association of County and City Health Officials (NACCHO) August 2011)

Organizational correlates

The Profile survey asked respondents to indicate the type of jurisdiction their LHD resides in, with five response options available (county, city-county, multi-county, city, township or district or region). For this study, a three-category jurisdiction type variable was created with county, city-county or multi-city or city, and multi-county. Expenditures per capita were skewed and therefore the data were log transformed to make the data approximate a normal distribution. LHDs reported all revenue sources including their revenue from local revenue sources. This study included the proportion of total revenue from local sources. Additionally, LHDs reported whether they provided chronic disease surveillance/epidemiology activities (yes/no), whether a local board of health existed (yes/no), and the race of the top executive director (dichotomized into the percent white and percent nonwhite). The total number of FTE reported by the LHD was categorized into less than 15 FTE, 15 to less than 31, 31 to less than 75 and 75 or greater.

Macro-level correlates

The change in percentage of the population in poverty from 2008 to 2010 was included in this study. Also this study included the percent of the population that was minority within the jurisdiction. The change in percent minority was not used in this study because the percent minority variable was derived from the NACCHO data, which included racial and ethnic breakdown for 2008 only.

5.3.3 Statistical Analysis

Using the 2008 NACCHO data, this study examined the main research question regarding the relationship of the population size of the jurisdiction served by the LHD, LHD organizational characteristics and factors in the macro-context on LHD community-based partnerships for obesity. Initial descriptive statistics were conducted to describe the study sample and to examine the distributions of the primary outcome and predictor variables. Independent variables were assessed for multicollinearity (e.g. jurisdiction type and expenditures per capita) as well as the need for transformations, such as log-transforming or categorizing continuous variables. Bivariate associations between LHD obesity partnership activities and independent variables were assessed. In order to assess factors that improve LHD ability to partner, multinomial logistic regression models were performed to estimate the association between the three level LHD obesity prevention partnership variable and total population size while controlling for other factors in the model. Each LHD obesity prevention activity was analyzed separately (i.e. chronic disease, nutrition and physical activity). In the 3-category dependent variable: 1) provided directly by the LHD, 2) partners to provide the activity and 3) no LHD obesity involvement and no activity, the base outcome was the first category:

$$\text{Logit}\left[\pi(\textit{LHD partners to provide the activity}) \mid \textit{LHD provided activity directly}\right] = \beta 0 + \beta 1(X1=\textit{population size}) + \ldots + \beta x X\ x$$

$$\text{Logit}\left[\pi(\textit{no LHD involvement and no activity} \mid \textit{LHD provided activity directly}\right) = \beta 0 + \beta 1(X1=\textit{population size}) + \ldots + \beta x X\ x$$

Statistical significance for all analyses was determined at the $p<0.05$ level. Regression results were exponentiated; results are therefore reported in terms of relative risk ratios and their associated standard errors. All analyses were conducted using STATA 13.1 statistical software (Statacorp, College Station, Texas).

Predicted probability plots were performed in order to better understand the relationship between the size of the population served by the LHD (with 5 categories ranging from less than 25,000 to 500,000 or greater) and the structure of LHD obesity prevention partnerships. The predicted probability plots were performed by program (i.e. chronic disease prevention, physical activity and nutrition) after running the full model. For each program, I calculated the predicted probability of each level of obesity prevention partnerships at each population size category, while holding all other variables in the model at their mean. Additionally, sensitivity analyses testing was performed using different population size category cutpoints, the results did not differ appreciably from original predicted probability plots and confirmed that LHDs serving larger population sizes are more likely to partner for obesity prevention programming activities.

5.4 Results

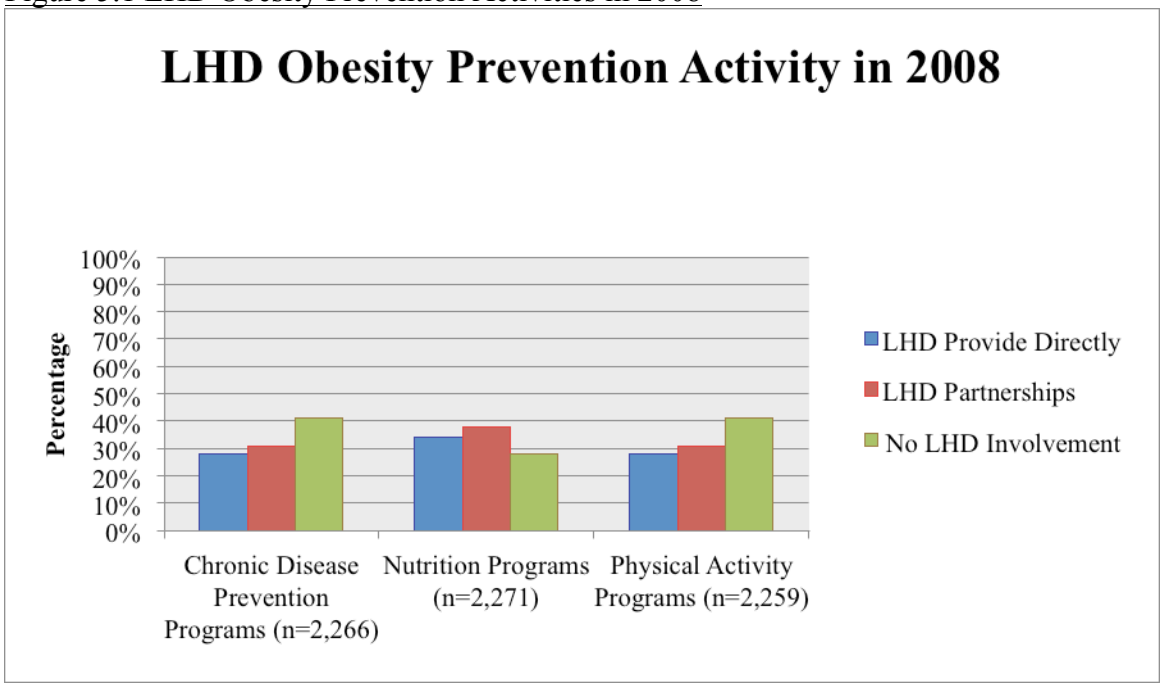
5.4.1 Sample Characteristics

A total of 2,332 LHDs in 2008 from the National Profile Survey were included in this study. The survey respondents included in 2008 sample were on average white top executives (92.71%), female (56%-not displayed in table), from LHDs serving 250,000 people or greater (60%), within county jurisdictions (67%), and with expenditures below $50,000 (67%), less than 31 FTEs (approximately 66%) and the majority had a local board of health (79.41%) (Table 5.1). This study includes county, city-county and multi-county local health departments, which represent 88% of the total local health departments included in 2008. The goal of this study was to examine the factors that increase LHDs' ability to partner with organizations within the local public health system, specifically community-based organizations to provide obesity prevention strategies. On average, in 2008 LHDs provided approximately 30% or more of chronic disease prevention, nutrition, and physical activity activities through partnerships (Figure 5.1).

TABLE 5.1: Characteristics of Local Health Departments: United States, National Profile of Local Health Departments in 2008

	n	%
Infrastructure		
Size of population served		
<25000	912	39.1
25000-49000	501	21.5
50000-99000	376	16.1
100000-499999	417	17.9
500000+	126	5.4
Total number of counties	***2,332***	***100***
All potentially eligible counties & county-equivalents in the U.S.	3,147	74.1
Jurisdiction type		
County	1,380	67.4
City/County	441	21.5
Multi-County	227	11.1
Total	***2,048***	***100***
Expenditures per capita		
<$25K	682	32.5
$25K - <$50K	739	35.2
$50K - <$75K	318	15.2
$75K+	358	17.1
Total	***2,097***	***100.00***
Total local revenue sources (mean)		24.9
Chronic Disease Surveillance/Activities (yes)	902	39.6
Governance		
Nonwhite Top Executive	166	7.3
Local board of health (yes)	1,782	79.4
Workforce		
Total Number of FTE		
<15 Employees	1,052	47.7
15 to <31 Employees	403	18.3
31 to <75 Employees	373	16.9
75+ Employees	377	17.1
Total	***2,205***	***100***
Change in Poverty (mean)		1.6

Figure 5.1 LHD Obesity Prevention Activities in 2008



5.4.2 LHD obesity prevention partnerships

LHD chronic disease prevention partnerships

Local health departments reported robust partnership activities, and several organizational and area level factors were related to partnership activities. In all of the analyses examining partnership activities conducted within LHDs, providing the activity directly was the reference group. Results from the multinomial logistic regressions observed mixed effects between population size, expenditures per capita, local revenue sources, the number of FTE, chronic disease surveillance/epidemiology program activities, percent minority in jurisdiction, jurisdiction type, and the presence of a local board of health were all significantly related to chronic disease programming activities (Table 5.2). However the size of the population served, having chronic disease surveillance/epidemiology program activities and the number of FTE were the most consistent factors to affect all levels chronic disease programming activities.

Factors that Affect LHD Chronic Disease Prevention Partnerships

When examining factors that influence chronic disease prevention partnership activities, population size was the only variable to be significant at the bivariate and multivariate level. The relative risk ratio of partnering to provide the chronic disease prevention activities increased with population size category. For example, comparing a LHD with a population size 500,000 or greater relative to a LHD with a population of less than 25,000, the relative risk ratio of partnering to provide chronic disease programming compared to providing chronic disease prevention activities directly would be expected to increase by a factor of 6.609 ($p<.001$). This relationship held true in the multivariate analyses. A LHD with a population size of 500,000 compared to one with a population size of less than 25,000 was more likely to partner to provide chronic disease prevention activities than provide activities directly (18.309, $p<.001$). Also the relative risk ratio of partnering to provide chronic disease programming compared to providing the activity directly was influenced by whether the LHD had a local board of health and the presence of chronic disease surveillance activities. The relative risk ratio of partnering to provided chronic disease programming activities increases with the presence of a local board of health by a factor of 1.552, ($p<.05$)(Table 5.2). However the relative risk ratio of partnering to provide chronic disease programs decreases by a factor of .708 ($p<.05$) if the LHD conducts chronic disease surveillance activities (Table 5.2). However,

Although this study is focused on factors that improved partnerships to deliver obesity prevention activities, this study also found that LHDs serving a population size of 100k->500k relative to less than 25,000 were more likely not be involved in chronic disease programming activities (4.886, $p<.01$)(Table 5.2). Also a LHD located in a multi-county compared to county (.438, $p<.05$), having greater expenditures per capita (.637, $p<.01$) and conducting chronic

disease surveillance activities (.127, p<.001) were related to the LHD not being involved in chronic disease programming activities within the catchment area (Table 5.2).

The predicted probability of LHD chronic disease partnership activities was assessed in order to examine the relationship between the main independent variable, total population size and partnership activity (Figure 5.2). The predicted probability of partnering to provide chronic disease prevention programming activities increases with population size. The probability of partnering to provide chronic disease programs is 0.25 if the population size is less than 25,000, it increases to 0.36 if the population size is 50,000 -99,000 and 0.72 when population size is 500,000 or greater (See Figure 5.2). This relationship is statistically significant; probabilities of partnering are displayed on the left of Figure 5.2. In contrast, the predicted probability of providing chronic disease activity directly decreases as the total population served by the LHD increases (See Figure 5.2). The probability of providing chronic disease programming activities directly is 0.42 if the population size is less than 25,000, it decreases to 0.26 if the population size is 50,000 -99,000 and further decreases to 0.07 when population size is 500,000 or greater. This relationship is statistically significant; probabilities are displayed on the right of Figure 5.2.

LHD nutrition prevention partnerships

Results from the multinomial regression examining LHD nutrition related programming partnerships efforts found that population size was the factor most significantly related to partnership activities (Table 5.3). In the multivariate analyses, population size was significantly related to partnering to provide nutrition activities. The relative risk ratio of partnering to provide nutrition programs increases with population size categories. For example, a LHD populations size category 25,000 to less than 50,000 relative to less than 25,000, the relative risk ratio of partnering to provide nutrition-education programs would be expected to increase by a

factor of 2.049 (p<.001) (Table 5.3). A LHD with a population size of 500,000 or greater relative to 25,000, the relative risk ratio of partnering to provide nutrition education programs would be expected to increase by a factor of 11.409 (p<.001) (Table 5.3).

Similar to chronic disease programming activities, the predicted probability of partnering to provide nutrition activities increases with population size. The probability of partnering to provide nutrition programs is 0.31 (p<.001) if the population size is less than 25,000, it increases to 0.44 (p<.001) if the population size is 50,000 -99,000 and 0.78 (p<.001) when population size is 500,000 or greater. This relationship is statistically significant; probabilities for partnering are displayed on the right of Figure 5.3. In contrast, the predicted probability of providing nutrition programs directly decreases as the total population served by the LHD increases. The probability of providing nutrition programming activities directly is 0.49 (p<.001) if the population size is less than 25,000, it decreases to 0.39 (p<.001) if the population size is 50,000 -99,000 and further decreases to 0.11 (p<.001) when population size is 500,000 or greater. This relationship is statistically significant; probabilities are displayed on the left of Figure 5.3.

LHD physical activity partnerships

Similar to the results from chronic disease and nutrition programming activities, population size of LHD catchment area was statistically related to the provision of physical activity programs. However this relationship between population size and partnering for physical activity programs only remained true at population size 500,000 or greater in the multivariate analyses. A LHD in the larger population size category 500,000 or greater, the relative risk ratio of partnering to provide physical activity programs relative to providing the activity directly would increase by a factor of 7.031 (p<.001) (Table 5.4).

The predicted probability of partnering to provide physical activity programs increases with the size of the population being served. The probability of partnering to provide physical activity programs is 0.29 ($p<.001$) if the population size is less than 25,000, it increases to 0.36 ($p<.001$) if the population size is 50,000 -99,000 and 0.69 ($p<.001$) when population size is 500,000 or greater (Table 5.4). This relationship is statistically significant; probabilities are displayed on the right of Figure 5.4. In contrast, the predicted probability of providing physical activity programs directly decreases as the total population served by the LHD increases. The probability of providing chronic disease programming activities directly is 0.33 ($p<.001$) if the population size is less than 25,000; it decreases slightly to 0.32 ($p<.001$) if the population size is 50,000 -99,000 and further decreases to 0.12 ($p<.001$) when population size is 500,000 or greater. This relationship is statistically significant; probabilities are displayed on the left of Figure 5.4.

5.5 Discussion

The results of our study show that a high proportion of LHDs are providing obesity prevention programs, with an average of 4% or less reporting no obesity prevention activity. Furthermore, chronic disease prevention and nutrition programs appear to be slightly more prevalent within LHDs than physical activity programs. The results of the study also show that the size of the population served increases the likelihood of partnering to deliver obesity prevention activities. Although not completely linear, the predicted probabilities performed also demonstrated that population size increases the probability of partnering for each activity and decreases the probability of LHDs providing the activity directly. Previous research has identified the optimal range of population size covered by a local health department as 50,000 to 500,000 (Suen and Magruder 2004). However, the results from this study are aligned with

previous literature demonstrating the effect of population size on the performance of the public health system (Scutchfield, Knight et al. 2004, Suen and Magruder 2004, Mays, McHugh et al. 2006, Erwin 2008, Porterfield, Reaves et al. 2009, Santerre 2009, Hyde and Shortell 2012). However this study is one of the first to examine the effect of population size on obesity prevention partnership activities. Additionally, previous research has used one global measure to estimate LHD obesity prevention efforts (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012).

This study represents a significant contribution to the field of research on LHD obesity prevention efforts by evaluating all three obesity prevention activities individually. Conducting chronic disease surveillance/epidemiology was inversely related to LHD partnering to provide obesity prevention activities. For example, the relative risk ratio of partnering to provide chronic disease prevention programs decreases (.708, $p<.05$) if a LHD provided chronic disease surveillance. This could be related to the resource-limited environment that LHDs currently operate in and competing demands for obesity prevention programs and services within their jurisdiction. Previous research has demonstrated that federal funding is not required to provide public health programs. However programs that existed after funding sources have expired do so typically in a diminished capacity, either from providing fewer programs or reaching fewer people within the jurisdiction (Freedman, Kuester et al. 2013). The results of this study as well as the results from Freedman et al. demonstrate a need to further examine the benefits achieved by LHDs through the use of partnerships with community-based organizations.

The presence of a local board of health was positively related to LHDs partnering to provide chronic disease and nutrition programs. Previous literature has found mixed results regarding the impact that a local board of health has on the performance of the local public

health system (Bhandari, Scutchfield et al. 2010, Mays and Smith 2011). Bhandari et al, found that a local board of health is not sufficient to improve the performance of the public health system, although a local board of health is essential to the adoption of obesity prevention policies within the jurisdiction. This study suggests that a local board of health is beneficial to the formation of obesity prevention partnerships. Future research should examine more closely the power of local boards of health to generate partnerships between LHDs and community-based organizations.

Results from this study should be interpreted with caution given the limitations of the study. The cross-sectional nature of the data and changes in questions between survey years limit our ability to make causal inferences and cross year comparisons. However the study was the first to identify major factors associated with LHDs' ability to form partnerships with community-based organizations for obesity prevention. This study was intended to examine partnerships between LHDs and community-based organizations. However, the study was limited to the response options given in the survey, which did not include community-based organizations specifically. Furthermore, the partnership variable included all LHD partnership activity. Based on information obtained from the key informant interviews, community-based organizations may be one of many organizations that the LHD partners with to provide obesity prevention programming and they may not be the most prevalent partners. Theoretically, community-based partnerships may be more effective in improving physical activity and nutrition related programs provided within adversely affected communities because of their wealth of knowledge regarding community attributes and the trust the have established with community members.

Future additional research is needed to examine whether LHD obesity prevention activities decrease county-level obesity prevalence. In addition, future research is needed to focus on the mutable factors that LHDs can improve in order to increase their capacity to partner with community-based organizations to deliver obesity prevention programs.

Figure 5.2 Predicted Probabilities of Chronic Disease Prevention Programming Activity

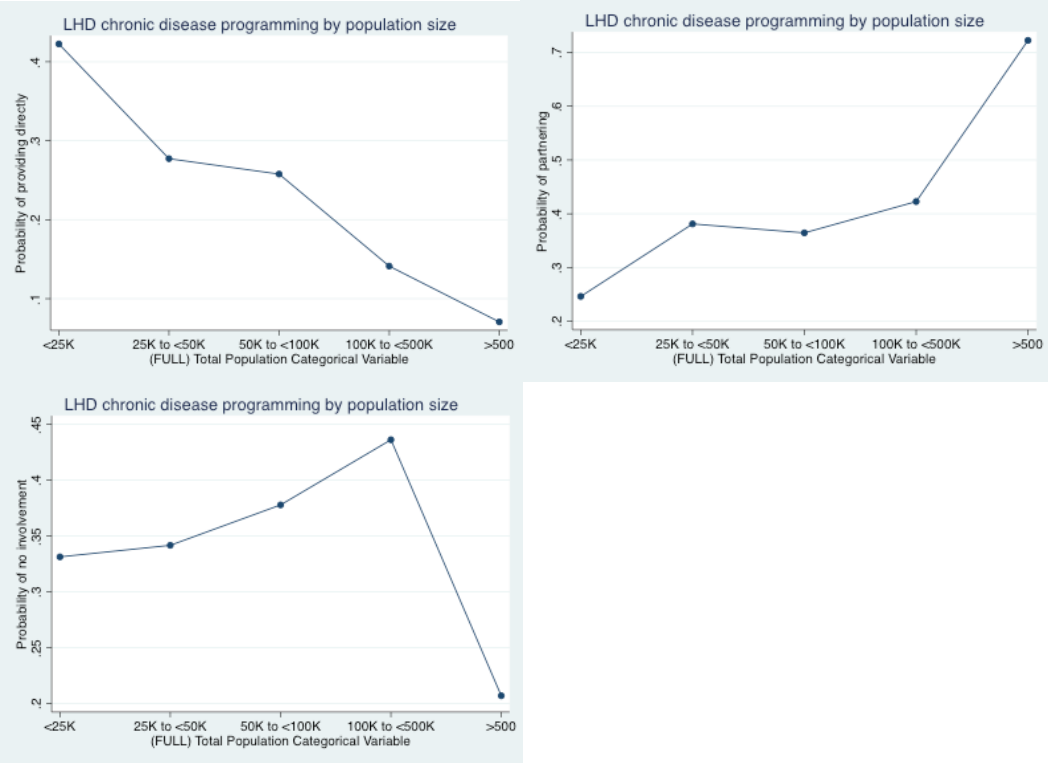
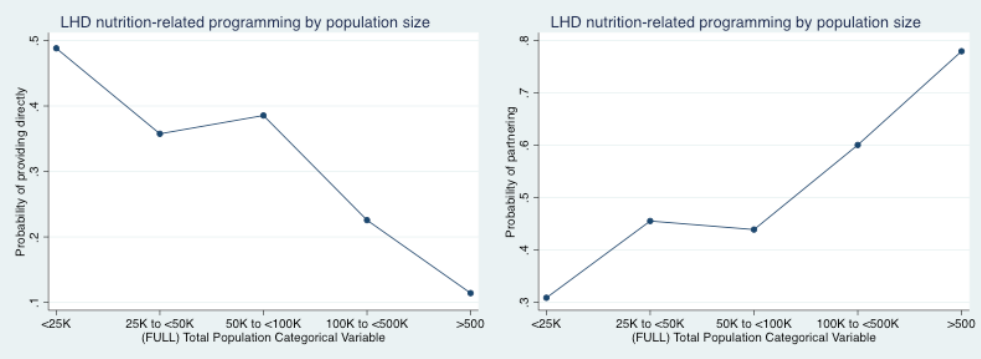


Figure 5.2 Note: Left -provides directly, Right-partners to provide, Bottom-no involvement/no activity

Table 5.2- The Association of Characteristics of Local Health Departments with LHD Chronic Disease Prevention Programming in 2008 n=1171				
Factor Category and Variable	Bivariate		Multivariate	
Partners to Provide Chronic Disease Programming				
	RRR	SE	RRR	SE
Population size (<25,000, referent)				
25000-49000	2.030***	(.3091)	2.418***	(.5777)
50000-99000	2.191***	(.3631)	2.511**	(.8037)
100000-499999	3.185***	(.5186)	5.490***	(2.2799)
500000+	6.609***	(1.7445)	18.309***	(10.4336)
Jurisdiction type (County, referent)				
City/County	.972	(.1459)	.874	(.1975)
Multi-County	1.736**	(.3172)	.839	(.2392)
Expenditures per capita, log	.929	(.0584)	.882	(.1349)
Local revenue sources	1.000	(.0026)	.996	(.0045)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	1.572**	(.2488)	1.024	(.2528)
31 to <75 Employees	1.768***	(.2811)	.912	(.2942)
75+ Employees	2.764***	(.4340)	.659	(.2936)
Chronic disease surveillance (yes/no)	.955	(.1067)	.708*	(.1133)
Nonwhite top executive vs. white top executive	.903	(.1928)	1.745	(.6061)
Local board of health (yes/no)	.947	(.1354)	1.552*	(.3454)
Percent population nonwhite	1.006	(.0033)	1.002	(.0059)
Percent poverty	1.037	(.0329)	.999	(.0429)
No LHD Involvement in Chronic Disease Programming				
Population size (<25,000, referent)				
25000-49000	.915	(.1246)	1.666	(.4403)
50000-99000	.963	(.1454)	2.076	(.7445)
100000-499999	1.109	(.1699)	4.886**	(2.3661)
500000+	.729	(.2273)	3.702	(2.7224)
Jurisdiction type (County, referent)				
City/County	1.519**	(.2079)	1.112	(.2554)
Multi-County	1.059	(.2057)	.438*	(.1452)
Expenditures per capita, log	.579***	(.0441)	.637**	(.1117)
Local revenue sources	1.000	(.0027)	.993	(.0048)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	.742*	(.1074)	.899	(.2421)
31 to <75 Employees	.664**	(.1004)	.929	(.3350)
75+ Employees	.517***	(.0858)	.375	(.1956)
Chronic disease surveillance (yes/no)	.127***	(.0157)	.127***	(.0240)
Nonwhite top executive vs. white top executive	.917	(.1847)	1.475	(.4650)
Local board of health (yes/no)	.742*	(.0976)	.769	(.1672)
Percent population nonwhite	.999	(.0035)	1.004	(.0057)
Percent poverty	1.028	(.0327)	1.007	(.0424)
F-statistic (p-value)				7.49(0.000)

Note: Reference group: LHD provides obesity prevention programming activity directly, RRR: Relative Risk Ratio, *** p<.001, **p<.001, * p<.05

Figure 5.3 Predicted Probabilities for LHD Nutrition Programming Activity



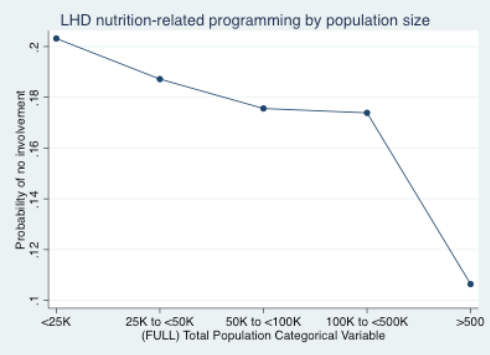


Figure 5.3 Note: Left -provides directly, Right-partners to provide, Bottom-no involvement/no activity

Table 5.3- The Association of Characteristics of Local Health Departments with LHD Nutrition Programming in 2008 (standard errors in parentheses) n=1172				
Factor Category and Variable	Bivariate		Multivariate	
Partners to Provide Nutrition Programming				
	RRR	**SE**	**RRR**	**SE**
Population size (<25,000, referent)				
25000-49000	1.657***	(.2291)	2.049***	(.4279)
50000-99000	1.889***	(.2803)	1.825*	(.4942)
100000-499999	2.383***	(.3357)	4.367***	(1.566)
500000+	4.509***	(1.0711)	11.409***	(5.6733)
Jurisdiction type (County, referent)				
City/County	.7864	(.1041)	.650*	(.1246)
Multi-County	1.393*	(.2342)	.719	(.1826)
Expenditures per capita, log	.968	(.0548)	.963	(.1278)
Local revenue sources	.999	(.0024)	.9965	(.0038)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	1.393**	(.1967)	1.059	(.2233)
31 to <75 Employees	1.856***	(.2653)	1.143	(.3181)
75+ Employees	1.972***	(.2724)	.625	(.2425)
Chronic disease surveillance (yes/no)	1.189	(.1197)	.993	(.1384)
Nonwhite top executive vs. white top executive	.949	(.1779)	1.220	(.3796)
Local board of health (yes/no)	.870	(.1073)	1.442*	(.2657)
Percent population nonwhite	1.002	(.0029)	1.002	(.0049)
Percent poverty	.999	(.0284)	.952	(.0337)
No LHD Involvement in Nutrition Programming				
Population size (<25,000, referent)				
25000-49000	.909	(.1277)	1.270	(.3439)
50000-99000	.824	(.1305)	1.095	(.4049)
100000-499999	.608**	(.1008)	1.896	(.9756)
500000+	.630	(.2048)	2.263	(1.831)
Jurisdiction type (County, referent)				
City/County	1.492**	(.2097)	1.013**	(.2408)
Multi-County	1.371	(.2740)	.896	(.2989)
Expenditures per capita, log	.445***	(.0901)	.507***	(.0933)
Local revenue sources	1.009**	(.0029)	.995	(.0048)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	.523***	(.0801)	1.006	(.2874)
31 to <75 Employees	.439***	(.0749)	1.016	(.4056)
75+ Employees	.208***	(.0433)	.496	(.2992)
Chronic disease surveillance (yes/no)	.402***	(.0479)	.511***	(.0989)
Nonwhite top executive vs. white top executive	1.305	(.2827)	.744	(.2841)
Local board of health (yes/no)	1.202	(.1684)	1.486	(.3681)
Percent population nonwhite	.982***	(.0041)	.990	(.0074)
Percent poverty	.957	(.0334)	.954	(.0438)
F-statistic (p-value)				3.58(0.000)

Note: Reference group: LHD provides obesity prevention programming activity directly, RRR: Relative Risk Ratio, *** p<.001, **p<.001, * p<.05

Figure 5.4 Predicted Probabilities for LHD Physical Activity Programming Activity

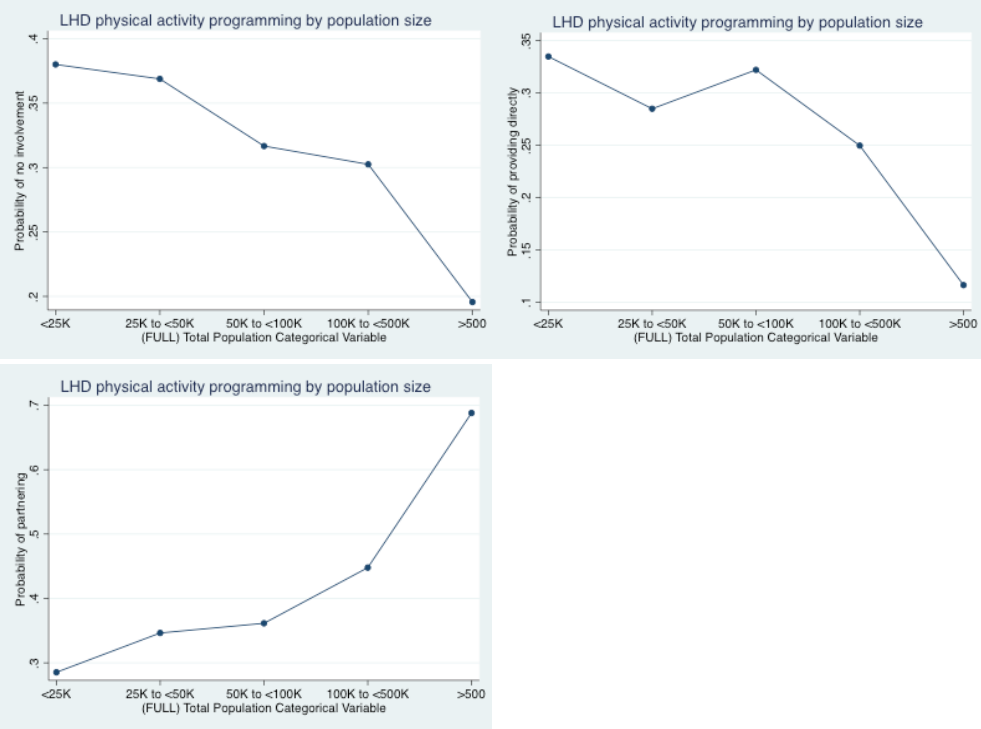


Figure 5.4 Note: Left -provides directly, Right-partners to provide, Bottom-no involvement/no activity

Table 5.4- The Association of Characteristics of Local Health Departments with Physical Activity Programming in 2008 (standard errors in parentheses) n=1168				
Factor Category and Variable	Bivariate		Multivariate	
Partners to Provide Physical Activity Programming				
	RRR	**SE**	**RRR**	**SE**
Population size (<25,000, referent)				
25000-49000	1.473**	(.2226)	1.431	(.3323)
50000-99000	1.820***	(.3002)	1.319	(.3944)
100000-499999	2.239***	(.3500)	2.116	(.8192)
500000+	4.923***	(1.3060)	7.031***	(.3832)
Jurisdiction type (County, referent)				
City/County	1.003	(.1481)	.995	(.2158)
Multi-County	1.937***	(.3666)	1.261	(.3581)
Expenditures per capita, log	1.007	(.0624)	.995	(.1399)
Local revenue sources	.996	(.0025)	.9972	(.0041)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	1.467*	(.2315)	1.373	(.3272)
31 to <75 Employees	1.776***	(.2793)	1.215	(.3706)
75+ Employees	2.196***	(.1543)	.833	(.3552)
Chronic disease surveillance (yes/no)	1.057	(.1169)	1.028	(.1589)
Nonwhite top executive vs. white top executive	.784	(.1678)	.899	(.3058)
Local board of health (yes/no)	.786	(.1073)	1.275	(.2604)
Percent population nonwhite	1.004	(.0034)	.997	(.0059)
Percent poverty	1.060	(.0329)	1.043	(.0418)
No LHD Involvement in Physical Activity Programming				
Population size (<25,000, referent)				
25000-49000	.857	(.1162)	.137	(.2806)
50000-99000	.925	(.1413)	.841	(.2739)
100000-499999	.783	(.1194)	1.033	(.4564)
500000+	.935	(.2744)	1.372	(.8963)
Jurisdiction type (County, referent)				
City/County	1.317*	(.1809)	1.022	(.2192)
Multi-County	1.324	(.2597)	.795	(.2556)
Expenditures per capita, log	.620***	(.0451)	.501***	(.0818)
Local revenue sources	.994*	(.0027)	.984***	(.0045)
No. of FTE				
15 to <31 Employees	.823	(.1194)	1.437	(.3646)
31 to <75 Employees	.671**	(.1037)	1.285	(.4337)
75+ Employees	.594***	(.0950)	1.496	(.7073)
Chronic disease surveillance (yes/no)	.327***	(.0365)	.364***	(.0607)
Nonwhite top executive vs. white top executive	.878	(.1811)	.975	(.3214)
Local board of health (yes/no)	1.018*	(.1362)	1.352	(.2773)
Percent population nonwhite	.998	(.0034)	1.003	(.0057)
Percent poverty	1.029	(.0321)	.999	(.0381)
F-statistic (p-value)				4.18(0.000)

Note: Reference group: LHD provides obesity prevention programming activity directly
RRR: Relative Risk Ratio *** p<.001, **p<.001, * p<.05

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Appendix 5.1

LHD Direct Provision of Obesity Prevention Programs

Overview

This appendix addresses local health departments (LHD) direct provision of obesity prevention programs, including chronic disease prevention, nutrition and physical activity. The goal of this appendix is to assess the LHD organizational and area-level factors that influence the direct provision of LHD obesity prevention programs.

Materials & Methods

Local Health Department Survey Data

This study utilized the 2010 survey data from the National Profile of Local Health Departments surveys, which was collected by the National Association of City and County Health Officers (NACCHO) and funded by the Centers for Disease Control and Prevention and the Robert Wood Johnson Foundation. The core questionnaire was sent to every LHD in the United States, except Hawaii and Rhode Island because the state health department functions on behalf of the local public health department and there are no sub-state units. A stratified random sampling frame (without replacement) was used to assign LHDs to strata based on the size of population served within their jurisdiction (National Association of County and City Health Officials (NACCHO), July 2009) (National Association of County and City Health Officials (NACCHO), August 2011).

The 2010 survey is the sixth profiles in the profile series, with 2,107 of 2,565 (82%) local health department respondents completing the survey in 2010 (National Association of County and City Health Officials (NACCHO), August 2011, July 2009). Similar to the information stated in Chapter 5, every state had a response rate of 60% or higher with exception to

Massachusetts. Due to the unique structure of the local public health system in Massachusetts, Massachusetts had the highest number of overall individual responses in both years (with 136 of 330 LHD responses in 2010).

Measures

LHD direct provision of obesity prevention programming activities

Obesity prevention programming activities conducted within LHDs was conceptualized as the provision of three distinct activities 1) chronic disease prevention, 2) nutrition, and 3) physical activity activities reported in 2010. The response options changed between 2008 and 2010, with only three response options available in 2010. A dichotomous LHD obesity prevention programming activity variable was created from the three response options in 2010. Approximately 5% of the sample stated they contracted the activity out thus contracted out was added to LHD direct provision of obesity prevention programs. The second option utilized in this study was the activity was neither provided directly by the LHD nor contracted out. Two response options in 2010 are used to predict LHD obesity prevention programming activities.

Main predictor

The main predictor in this study was the total population size. The continuous variable was combined into categorical variable with five categories (less than 25,000, 25,000 to less than 49,999, 500,000 to 999,999, 100,000 to 499,999 and greater than 500,000. Approximately only 6% of LHDs stated they served a population greater than 500,000. However the 6% of LHDs serving populations 500,000 or greater were responsible for providing program and services to more than 50% of the U.S. population (National Association of County and City Health Officials (NACCHO), August 2011)

Organizational correlates

The Profile survey asked respondents to indicate the type of jurisdiction their LHD resides in, with five response options available (county, city-county, multi-county, city, township or district or region). In 2010, multi-city was also included as a type of jurisdiction. For this study, a three-category jurisdiction type variable was created with county, city-county or multi-city or city, and multi-county. Expenditures per capita were skewed and therefore the data was log transformed to make the data approximate a normal distribution. LHDs reported their revenue sources including their revenue from local revenue sources. This study included the proportion of total revenue from local sources. Additionally, LHDs reported whether they provided chronic disease surveillance/epidemiology activities (yes/no), whether a local board of health existed (yes/no), and the race of the top executive director (dichotomized into the percent white and percent nonwhite). The total number of FTE reported by the LHD was categorized into less than 15 FTE, 15 to less than 31, 31 to less than 75 and 75 or greater.

Macro-level correlates

The change in percentage of the population in poverty from 2010 to 2012 was included in this study.

Statistical Analyses

The statistical analyses conducted for this study, using 2010 NACCHO data examined the relationships of LHD organizational characteristics and factors in the macro-context on LHD provision of obesity activities directly. Initial descriptive statistics were conducted to describe the study sample and to examine the distributions of the primary outcome and predictor variables. Independent variables were assessed for multicollinearity (e.g. jurisdiction type and expenditures per capita) as well as the need for transformations, such as log-transforming expenditures per capita or categorizing continuous variables. Bivariate associations between

LHD obesity prevention programming activities and independent variables were assessed. Each LHD obesity prevention activity was analyzed separately (i.e. chronic disease, nutrition and physical activity). Logistic regression models were used to estimate the association between total population size and LHD obesity prevention activities while controlling for other factors:

$$\text{Logit}\,[\pi(\textit{LHD provided activity})] = \beta 0 + \beta 1(X1 = \textit{population size}) + \ldots + \beta x\, X\, x$$

This model was used repeatedly to evaluate each LHD obesity prevention measure separately (i.e. chronic disease, nutrition and physical activity). The city/county (n= 385) category was omitted from the multivariate logistic regression analyses because it predicted success perfectly. Statistical significance for all analyses was determined at the $p<0.05$ level. All analyses were conducted using STATA 13.1 statistical software (Statacorp, College Station, Texas).

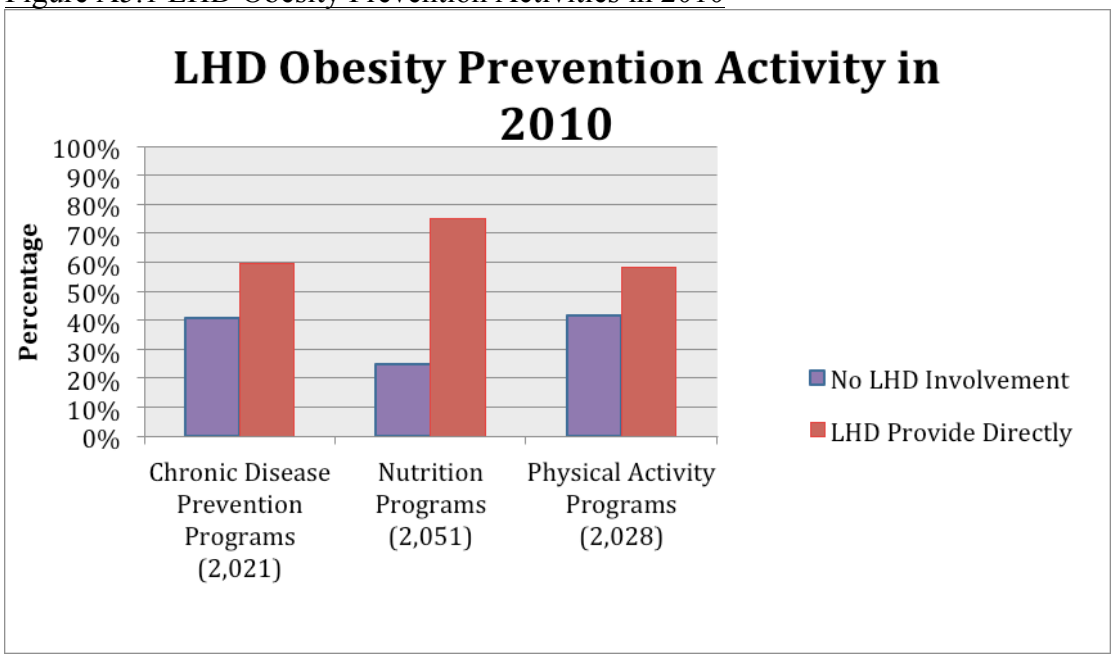
Results

Sample Characteristics

A total of 2,107 LHDs in 2010 from the National Profile Survey were included in this study. The demographics of the respondents in 2010 were similar to 2008, primarily female and white, on average serving population size greater residents, from county jurisdictions, and on average with expenditures below 50,000 (60% of sample) and with a local board of health (Table A5.1). However, a slightly higher percentage (24.35%) of the sample reported more than 75 FTEs in 2010. The goal of this study is to examine the factors that increase LHDs direct provision of obesity prevention strategies. On average, LHDs provided approximately 64% of all activities were provided directly in 2010 (Figure A5.1).

TABLE A5.1: Characteristics of Local Health Departments: United States, National Profile of Local Health Departments in 2010		
	2010	
	n	%
Infrastructure		
Size of population served		
<25000	748	37.2
25000-49000	455	21.6
50000-99000	324	15.4
100000-499999	417	19.8
500000+	127	6.0
Total number of counties	***2,107***	***100***
Percent of all counties & county-equivalents in the U.S.	3,147	67.0
Jurisdiction type		
County	1,535	72.9
City/County	385	18.3
Multi-County	187	8.9
Total	***2,107***	***100***
Expenditures per capita		
<$25K	475	27.8
$25K - <$50K	569	33.3
$50K - <$75K	282	16.5
$75K+	384	22.5
Total	***1,710***	***100.00***
Total local revenue sources (mean)		26.6
Chronic Disease Surveillance/Activities (yes)	1,195	58.6
Governance		
Nonwhite Top Executive	101	7.4
Local board of health (yes)	1,577	75.1
Workforce		
Total Number of FTE		
<15 Employees	856	40.6
15 to <31 Employees	377	17.9
31 to <75 Employees	361	17.1
75+ Employees	513	24.4
Total	***2,107***	***100***
Change in Poverty (mean)		0.4

Figure A5.1 LHD Obesity Prevention Activities in 2010



LHD direct provision of obesity prevention activities

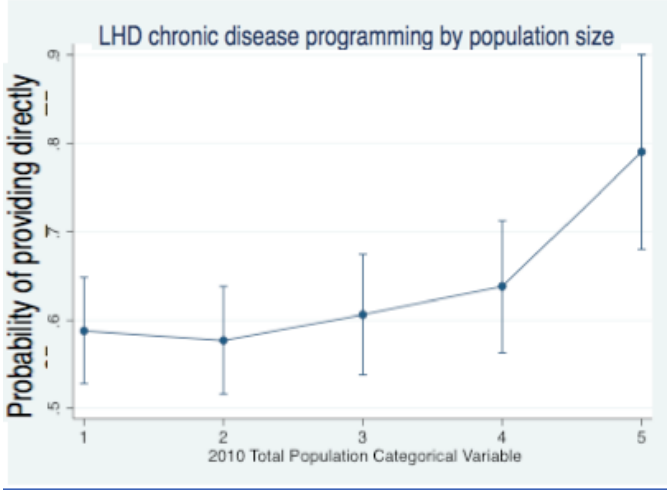
Results from the bivariate logistic regression models conducted in 2010 showed that population size, jurisdiction, expenditures per capita, number of FTE, presence of chronic disease surveillance and the change in percent poverty were related to providing chronic disease programming (Table A5.2). However only population size 500,000 or greater, multi-county jurisdiction, expenditures per capita, chronic disease surveillance and change in percent poverty remained positively associated with providing chronic disease prevention programming activity directly in the multivariate analyses. For example, LHD serving a population size 500,000+ were more likely to provide chronic disease prevention programs directly compared to LHD serving population sizes less than 25,000 (1.202, .4711) (Table A5.2). Whereas, LHD that provided chronic disease prevention surveillance programs were more likely to provide chronic disease prevention programs directly compared to LHD that do not conduct chronic disease prevention surveillance (2.032, .1613) (Table A5.2).

The predicted probability of providing chronic disease prevention activities directly compared to not providing the activity directly increased with population size. The probability of providing the chronic disease programs directly in 2010 was 0.59 (p<.001) if the population size is less than 25,000, it increased to 0.61(p<.001) if the population size was 50,000 -99,000 and to 0.79 (p<.001) when population size was 500,000 or greater (Figure A5.2).

Table 1.2 Characteristics of Local Health Departments and Chronic Disease Prevention Programming Activities

Table A5.2- The Association of Characteristics of Local Health Departments with the Chronic Disease Prevention Programming in 2010 (n=1065)				
Factor Category and Variable	Bivariate		Multivariate	
	β	**SE**	**β**	**SE**
Population size (<25,000, referent)				
25000-49000	.301*	(.1220)	-.058	(.2297)
50000-99000	.558***	(.1389)	.098	(.2769)
100000-499999	.727***	(.1283)	.555	(.3204)
500000+	1.598***	(.2503)	1.202*	(.4711)
Jurisdiction type (County, referent)				
City/County	-.341**	(.1181)	-.798	(.9397)
Multi-County	.615***	(.1732)	.701**	(.2729)
Expenditures per capita, log	.469***	(.0623)	.411***	(.1237)
Local revenue sources	-.001	(.0026)	.007	(.0041)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	.556***	(.1288)	.080	(.2312)
31 to <75 Employees	.843***	(.1345)	.420	(.2840)
75+ Employees	1.036***	(.1229)	.246	(.3181)
Chronic disease epidemiology/surveillance (yes/no)	2.114***	(.1145)	2.032***	(.1613)
Nonwhite top executive vs. white top executive	.093	(.1850)	-.492	(.2809)
Local board of health (yes/no)	.0932	(.1054)	-.048	(.1765)
Percent population nonwhite	NA	NA	NA	NA
Change in percent poverty	.0794**	(.0277)	.077*	(.6273)
Overall Model Statistics				
P-value				0.000
F-statistic				13.48***

Figure A5.2 Predicted Probabilities for LHD Chronic Disease Prevention Programming Activity



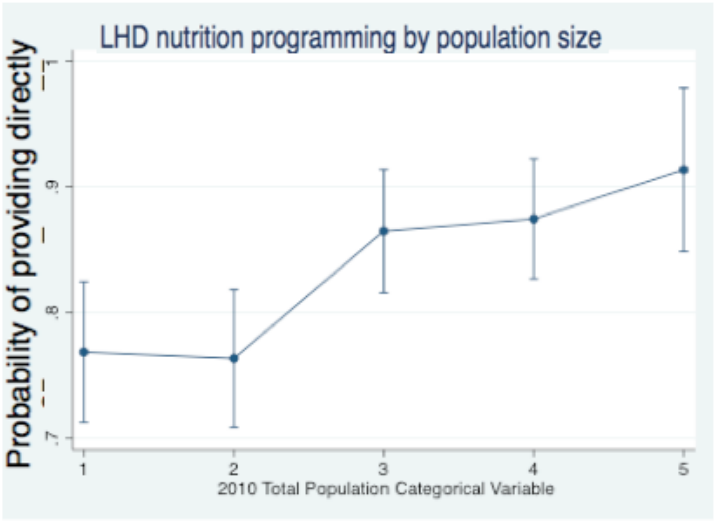
Results from the bivariate logistic regression examining LHD nutrition programming activities provided directly were similar to chronic disease prevention programming activities. However, multivariate regressions results found a population size greater than 50,000, expenditures per capita, chronic disease surveillance, local board of health and change in percent poverty were related to nutrition programming activities provided directly by LHDs. For example, a population size 500,000 or greater was 1.271 ($p<.05$) more likely to provide nutrition programs directly compared to not providing the activity directly (Table A5.3). The presence of chronic disease prevention surveillance was also associated with the direct provision of LHD chronic disease prevention programs (1.088, .1918)

The predicted probability of providing nutrition activities directly compared to not providing the activity directly increased with population size. The probability of providing the chronic disease programs directly in 2010 was 0.77 ($p<.001$) if the population size was less than 25,000, it increased to 0.86 ($p<.001$) if the population size was 50,000 -99,000 and to 0.91($p<.001$) when population size was 500,000 or greater (Figure A5.3).

Table A5.3 Characteristics of Local Health Departments and Nutrition Programming Activities

Table 4.3- The Association of Characteristics of Local Health Department Associated with LHD Nutrition Programming in 2010 (standard errors in parentheses) (n=1070)				
Factor Category and Variable	Bivariate		Multivariate	
	β	**SE**	**β**	**SE**
Population size (<25,000, referent)				
25000-49000	.205	(.1305)	-.032	(.2517)
50000-99000	.828***	(.1664)	.729*	(.3232)
100000-499999	.931***	(.1544)	.823*	(.3557)
500000+	1.736***	(.3387)	1.271*	(.5205)
Jurisdiction type (County, referent)				
City/County	-1.143***	(.1225)	0 (empty)	
Multi-County	.753***	(.2362)	.428	(.3136)
Expenditures per capita, log	.919***	(.0881)	.706***	(.1479)
Local revenue sources	-.0142***	(.0030)	-.002	(.0045)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	.851***	(.1467)	-.231	(.2598)
31 to <75 Employees	1.286***	(.1657)	-.034	(.3265)
75+ Employees	1.478***	(.1558)	-.143	(.3244)
Chronic disease epidemiology/surveillance (yes/no)	1.398***	(.1376)	1.088***	(.1918)
Nonwhite top executive vs. white top executive	.449*	(.2328)	-.492	(.2809)
Local board of health (yes/no)	-.470***	(.1283)	-.668**	(.2333)
Percent population nonwhite	NA	NA	NA	NA
Change in percent poverty	.120***	(.0315)	.102*	(.6273)
Overall Model Statistics				
P-value				0.000
F-statistic				6.90***

Figure A5.3 Predicted Probabilities for LHD Nutrition Programming Activity



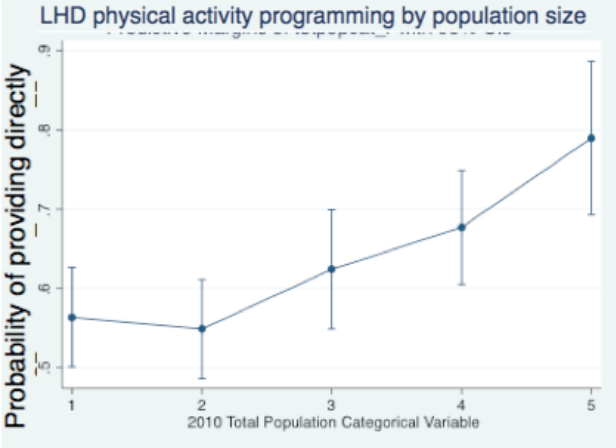
Finally, the results from the bivariate logistic regression examining LHD physical activity programming activities provided directly were similar to chronic disease prevention and nutrition programming activities. The results of multivariate logistic regressions analyses showed that the size of the population served by the LHD, (1.209, $p<0.001$), expenditures per capita (0.467, $p<0.001$), multi-county jurisdiction (0.772, $p<0.001$), chronic disease surveillance (1.08, $p<0.001$), and change in percent poverty (0.143, $p<0.001$) were related to nutrition programming activities provided directly by LHDs (Table A5.4). For example, the probability of partnering to provide physical activity programs directly compared to not providing the activity directly is 1.209 (.5205) if the population size served is 500,000 or greater (Table A5.4).

As expected, the predicted probability of providing physical activities directly compared to not providing the activity directly increased with the size of the population served by the LHD. The probability of providing the chronic disease programs directly in 2010 was 0.56 if the population size was less than 25,000, it increased to 0.62 if the population size was 50,000 - 99,000 and to 0.79 when population size was 500,000 or greater (Figure A5.4).

Table A5.4 Characteristics of Local Health Departments and Physical Activity Programming Activities

Table 4.4- The Association of Characteristics of Local Health Departments with LHD Physical Activity Programming in 2010 (standard errors in parentheses) (n=1064)				
Factor Category and Variable	Bivariate		Multivariate	
	β	**SE**	**β**	**SE**
Population size (<25,000, referent)				
25000-49000	.256*	(.1210)	-.069	(.2072)
50000-99000	.569***	(.1389)	.288	(.2589)
100000-499999	.631***	(.1273)	.555*	(.3557)
500000+	1.109***	(.2227)	1.209**	(.5205)
Jurisdiction type (County, referent)				
City/County	-.588***	(.1179)	0 (empty)	
Multi-County	.514**	(.1709)	.772**	(.2490)
Expenditures per capita, log	.498***	(.0618)	.467***	(.1137)
Local revenue sources	-.004	(.0025)	-.002	(.0038)
No. of FTE (<15 FTE, referent)				
15 to <31 Employees	.698***	(.1296)	-.016	(.2182)
31 to <75 Employees	.752***	(.1323)	.044	(.2606)
75+ Employees	.966***	(.1209)	.165	(.2807)
Chronic disease epidemiology/surveillance (yes/no)	1.346***	(.1008)	1.088***	(.1438)
Nonwhite top executive vs. white top executive	-.296	(.1819)	-.935	(.2563)
Local board of health (yes/no)	.089	(.1054)	.246	(.1723)
Percent population nonwhite	NA	NA	NA	NA
Change in percent poverty	.115***	(.0274)	.143***	(.0393)
Overall Model Statistics				
P-value				0.000
F-statistic				10.10***

Figure A5.4 Predicted Probabilities for LHD Physical Activity Programming Activity



Discussion

The results of our study show that a high proportion of LHDs are providing obesity prevention programs, with an average of 4% or less reporting no obesity prevention activity (Figure A5.1). The high proportion of LHDs providing obesity prevention programs in 2010 could be in response to the obesity epidemic, considering the prevalence of obesity at the state level increased by a mean of 58% between 1997 and 2005 in the populations served by the 42 LHDs that were examined (Erwin, 2011). Additionally, the population size and the presence of chronic disease prevention surveillance activities were associated with LHD direct provision of all three programs evaluated. Furthermore, the as the size of the population served increase the predict probability of providing LHD obesity prevention activities increased.

Several factors were consistently negatively associated with the direct provision of LHD obesity prevention activities, including log-transformed expenditures per capita and the percentage change in poverty. For example, the model assess the direct provision of chronic disease prevention programs found that inverse relationship between expenditures and the direct provision of chronic disease prevention programs (.411,.1237) (Table A5.2). Additionally, as the

change in percent in poverty increases LHD are less likely to provide physical activity programs directly (.143, .0393) (Table A5.4).

The results from this analyses suggest there may be different factors associated with the direct provision of LHD obesity prevention programs than those examined in the main exploration for this study examining the utility of partnerships. However, the added benefit of population size with respect to an increase probability to provide obesity prevention services is likely associated with increased resources. With increased resources, LHD have to option to provide activities directly and/or partner with other organizations with the local public health system. The positive associations in the direct provision of obesity prevention activities need further evaluation because previous has suggested that the direct provision of programs may be inadequate to illicit the expected response, a decrease in obesity prevalence.

CHAPTER 6

Do Partnerships Matter? The Effect of LHD Obesity Prevention Partnerships on Decreasing County-level Obesity Prevalence (Study 2)

6.1 Abstract

Purpose: Given the economic downturn and the effect it has had on the availability of public health funding, there has been an increased focus on identifying non-monetary factors that could improve a LHD's performance and capacity. However, few studies have focused on how LHDs' organizational characteristics and resources could be used to improve their ability to deliver obesity prevention activities. The purpose of this study was to examine the effect of obesity prevention efforts provided through LHD partnerships with community-based organizations on percentage point change in obesity prevalence between 2008-2010.

Methods: Secondary data analysis was conducted using the 2008 National Profile survey from the National Association of City and County Health Officers and linking it with BRFSS obesity prevalence data from 2008-2010. BRFSS county-level obesity prevalence was regressed onto each of three LHD activities: chronic disease prevention, nutrition education, and physical activity programming, using Ordinary Least Squares regression. Information about LHD activities was obtained from a national sample of local health departments.

Results: The average change in obesity prevalence over the study period was relatively small, which further confirms recent findings that there may be a leveling off of the trend in obesity prevalence. In contrast to the trends in obesity prevalence, this study found that LHD community-based obesity prevention partnerships were not related to changes in obesity

prevalence. Furthermore, the one statistically significant result from LHD obesity prevention partnership efforts did not demonstrate the partnership to have yielded a benefit in terms of reduced obesity prevalence. By contrast, the percent point change in obesity prevalence for men from 2008 to 2009 was associated with nutrition-education programs that did not involve LHDs. None of the other LHD nutrition education programming models, as well as none of the chronic disease prevention or physical activity programming models demonstrated a statistically significant change in obesity prevalence.

Conclusion: Although this study was unable to confirm the hypothesis regarding the benefits of LHD obesity prevention programming efforts conducted in partnership, more than a third of LHDs reported partnering to provide obesity prevention activities. Another third of LHDs were providing obesity programs directly. Among obesity prevention activities, nutrition education-related programming was the most reported activity conducted by LHD and warrants future research. Future research should investigate a more direct assessment of partnership activity with LHD than that which was used here.

6.2 Introduction

6.2.1 Obesity Burden

Obesity is a consistent and persistent public health challenge because of its association with increased risk of chronic diseases, morbidity and mortality (Kumanyika, Obarzanek et al. 2008) and attendant increased costs (Thorpe, Florence et al. 2004). Despite national trends suggesting a leveling off of obesity prevalence within the past few years, one-third of U.S. adults are currently obese and this high prevalence has major public health implications (Flegal, Carroll et al. 2010, Flegal, Carroll et al. 2012). Effective strategies that address modifiable behaviors such as physical activity and daily food choices need to be developed considering they are two

behaviors associated with the causal pathway of obesity and may be a more important determinant of obesity than non-modifiable factors such as one's genes (Marti, Moreno-Aliaga et al. 2004). Recently, researchers, policymakers and practitioners have focused attention on enhancing the role that the local public health system can play in reversing the obesity epidemic (Huberty, Balluff et al. 2010).

6.2.2 Public health systems' role in reducing obesity

Local health departments (LHDs) are charged with improving the health of the residents within their catchment areas through the dissemination of effective programs and services, in addition to the provision of assessment, assurance and policy activities (Beitsch, Brooks et al. 2006). The prevalence of obesity in 2007 varied between counties from 12% to 44% (Centers for Disease Control and Prevention 2009) and the geographic variation in obesity prevalence has been documented in other research (Drewnowski, Rehm et al. 2007, Li, Kelsey et al. 2009). The high rates of obesity prevalence observed in some counties underscore the need to develop an effective response to the epidemic. In 2005, only 56% of LHDs had implemented obesity prevention activities (Turnock 2009, Zhang 2010). Furthermore, Luo and colleagues found that a subset of LHDs reported that they still had not conducted any of the ten essential public health services for obesity in 2008, three years after their initial assessment (Luo, Sotnikov et al.). Although the most recent data indicate that a greater number of LHDs are providing programs and the essential services of public health, the recent economic downturn has caused LHDs to experience shortages in resources in staffing and funding that diminish their effectiveness. These limited resources require LHDs to be creative in their approach to delivering programs and services to all of the communities under their purview, especially racial/ethnic minority comminutes most adversely affected by the obesity epidemic. These limited resources also

require LHDs to be creative in addressing the upstream social determinants of health that affect downstream behavioral risk factors.

6.2.3 Obesity prevention partnerships and coalitions

One strategy that LHDs are using or may be attempting to use to enhance their ability to implement obesity prevention activities is partnering with community based organizations. It has been suggested that chronic disease and obesity prevention efforts can benefit from the formation of partnerships and coalitions (Brownson and Bright 2004). Brownson and colleagues interviewed 517 local health department directors to assess their administrative evidence-based practices, which are ultimately the structure and activities that affect the performance of local health departments and found that they valued community based organization (CBO) partnerships very highly and judged them to be important contributors to department performance (Brownson, Reis et al. 2014). This signals an interest by LHDs in developing CBO partnerships at the local level for the purpose of combating the obesity epidemic. The scientific literature is sparse, however, regarding LHD use of CBO partnerships to reduce undesirable population health outcomes.

6.2.4 Study Purpose

Two recent studies that assessed the effect of LHD obesity prevention programming activities on the prevalence of obesity at the county level used one global measure to capture all obesity prevention efforts provided by the department; results from those studies were inconclusive regarding the effectiveness of the local public health system for improving obesity outcomes (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). Therefore, additional research is needed to understand whether any of the three areas that comprise obesity prevention efforts provided by the local public health system are more effective in reducing the rate of

obesity. Thus this study includes an examination of the chronic disease prevention, nutrition education, and physical activity promotion programs provided by LHDs under the assurance of obesity prevention.

Furthermore, this study extends the current literature regarding the effect of LHD obesity prevention activities on changes in county-level obesity prevalence through an evaluation of LHD community-based partnerships to deliver obesity prevention strategies and the delayed effect of changes in county-level obesity prevalence by gender. Most obesity prevention interventions to date have used cross-sectional data, achieved modest results and have been unable to demonstrate longer-term sustainable results (Orzano and Scott 2004, Yancey, Kumanyika et al. 2004, Kumanyika, Obarzanek et al. 2008). Given the ubiquitous obeseogenic environment and relatively high number of obesity prevention efforts provided in partnership by local health departments, it is likely that the partnerships require a longer duration than examined in prior research in order to observe a substantial change in obesity prevalence.

Despite the fact that successful obesity risk reduction outcomes take time to be realized, previous research has failed to examine the lagged effect of programs and policies on the county-level prevalence of obesity (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). The goal of this study was to examine the effect of obesity prevention efforts provided by LHDs in partnership with community-based organizations on county-level changes in obesity prevalence over time.

6.3 Materials and Methods

6.3.1 LHD Organizational Characteristics

This study utilized LHD organizational level data collected in 2008 from the National Profile of Local Health Departments survey. Funded by the Centers for Disease Control and

Prevention and the Robert Wood Johnson Foundation, the National Association of City and County Health Offices (NACCHO) administers the core questionnaire to all LHDs in the U.S., except Hawaii and Rhode Island in order to compile current, comprehensive and accurate information about city and county local health departments': jurisdiction, governance, funding, LHD top executive, workforce, emergency preparedness, public health activities and services, partnerships, health disparities, community health assessment and planning, and communication among community leaders. A stratified random sampling frame (without replacement) was used to assign LHDs to strata based on the size of the population served within their jurisdiction (National Association of County and City Health Officials (NACCHO) July 2009) (National Association of County and City Health Officials (NACCHO) August 2011). With the exception of the recently available 2013 survey data, the 2008 and 2010 are the most current surveys within the profile series. The profile surveys were first administered in 1989 and in 2005, the profile surveys began being administered in a web-based format. The response rate for the survey data used for this study is above 80%; with 2,332 of 2,794 (83%) local health department respondents completing the survey in 2008 (National Association of County and City Health Officials (NACCHO) August 2011, National Association of County and City Health Officials (NACCHO) July 2009).

The profile survey data have been used in previous studies to examine factors of the local public health system including but not limited to spending of local health departments (Santerre 2009, Mays and Smith 2011), obesity prevention activities (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012), partnerships in health services (Beatty, Harris et al. 2010) and public health performance (Leep, Beitsch et al. 2009, Bhandari, Scutchfield et al. 2010). The NACCHO survey data was combined with the Behavioral Risk Factor Surveillance Systems (BRFSS) in

order to assess the impact of LHD organizational characteristics, resources and infrastructure on the county-level prevalence of obesity. Federal Information Processing Standards (FIPS) codes were used to combine the NACCHO surveys with the BRFSS data files. The FIPS codes are included in the BRFSS data files and correspond to the county where the respondent resides. However the NACCHO data only includes the zip codes for the county health departments' physical location. Therefore, each county health department was matched to its corresponding FIPS codes using a zip code to FIPS matching process, as well as case-by-case inspection for those health departments that did not initially match. This process limited our ability to use data from city health departments or smaller entities such as municipalities or towns because FIPS codes are set at the county level.

6.3.2 County-level Obesity Prevalence Data

Data from the 2008-2010 annual administrations of the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System was used to estimate 1 and 2 year changes in county-level obesity prevalence. In order to address the possibility of reverse causality, this study observed changes in obesity prevalence over time. Limiting the outcome to only one year of BRFSS data would have decreased our ability to assess the exposure-outcome relationship. For example, we would not be able to ascertain if LHD obesity efforts were in response to high levels of obesity within their jurisdiction or if the prevalence of obesity within the jurisdiction was in response to LHD obesity prevention efforts. More than 400,000 adults age 18 or older were interviewed in each of the five years in all 50 states, the District of Columbia, Puerto Rico, Guam and the Virgin Islands. Beginning in 1993, the BRFSS began a nation-wide, cross-sectional, monthly, state-based random telephone survey of the adults. The survey provides state-specific information on the major behavioral risk factors and preventive health practices.

The BRFSS consists of 3 parts: 1) core questions, 2) optional modules and 3) state-added questions. More detailed information regarding the survey protocol, sampling design and weights can be found in the BRFSS Data User Guide (Centers for Disease Control and Prevention 2014).

6.3.3 Measures

LHD obesity prevention partnerships

One of the strengths of this study is that it examines three distinct prevention activities intended to combat the obesity epidemic. In 2008, NACCHO asked LHD survey respondents to report on the chronic disease prevention, nutrition education and physical activity promotion program efforts conducted within their catchment area. Each programmatic activity was evaluated separately. LHDs that completed the survey were asked what entity provided each of the 3 programs in their jurisdiction. Respondents were instructed to select as many of the seven response options that were applicable, including: 1) the LHD provided the programming directly, 2) the LHD contracted the program out, 3) the state provided the program, 4) some other local agency provided the program, 5) someone else in jurisdiction provided the program, 6) the program was not provided within the jurisdiction and 7) unknown. The response options were coded as 1=yes or 0=no.

The seven options were combined into a categorical variable with 3 mutually exclusive categories: 1) provided directly by the LHD, 2) LHD partners to provide the activity and 3) the LHD is not involved in the activity. A fourth category, activity not available in the jurisdiction was considered for inclusion; however the category was combined with the category LHD not involved in the activity due to the extremely low number of responses in this category. Less than

3% of LHD respondents stated the activity was not available for all activities in question and ranged from as low as 1.15 % to 2.68%.

As previously stated, the goal of this dissertation is to assess the use LHD community-based partnerships to deliver obesity prevention strategies. However the survey question about partnerships was generic; it did not ask specifically about partnerships with community-based organizations. Despite researchers' lack of ability to assess the effectiveness of partnerships specifically with community-based organizations, public health researchers have suggested LHD collaborations with organizations within disadvantaged, resource constrained, and largely ethnic minority communities that are more knowledgeable and trusted within the community than the LHD to improve population-level health outcomes (Berger, Neuhaus et al. 1996, Mays and Scutchfield 2010, Wei-Skillern 2010, Erwin 2011).

Organizational-level covariates

The Profile survey asked respondents to indicate their jurisdiction type, with five response options available (county, city-county, multi-county, city, township or district or region). Due to the inability to match the NACCHO data of smaller geographic units with the BRFSS data and small cell sizes in the five level jurisdiction type variable, a two-category jurisdiction type variable was created as either county or city-county, city, and multi-county. Survey respondents also reported an estimate of the size of the population that their LHD served. A quartile total population variable was created from the continuous total population variable, with the categories from 2008. The categories included were: less than 26,584, 26,584 to less than 51,095, 51,095 to less than 131,890 and greater than 131,890. Approximately only 6% of LHDs stated they served a population greater than 500,000.

Expenditures per capita were skewed and therefore the data were log transformed to make the data approximate a normal distribution. LHDs reported their revenue sources including from local revenue sources. This study included the percentage of total revenue from local sources. Additionally, LHDs reported whether they provided chronic disease surveillance/epidemiology activities (yes/no), whether a local board of health existed (yes/no), and whether this was the LHD top executive's first time as director (yes/no). The total number of full time employees (FTE) reported by the LHD was categorized into less than 15 FTE, 15 to less than 31, 31 to less than 75 and 75 or greater. The number of FTE employees and total population size were moderately correlated (0.504); therefore both variables were included in the model. Expenditures per capita and the number of FTE employees were highly correlated (0.965) however after expenditures per capita was log transformed the correlation decreased to (0.293). All three variables have been found to affect the performance of the LHD (Bernet 2007, Bhandari, Scutchfield et al. 2010, Mays and Smith 2011, Hyde and Shortell 2012) and therefore all three variables were included in the model to see if they were associated with variations in county level prevalence of obesity.

Macro-level correlates

The change in the percentage of the population in poverty from 2008 to 2010 was included in this study. Also this study included the percent of the population that was minority in 2008.

Change in Obesity Prevalence

The outcome variable for this paper is the county-level change in percent obese within the county. These data were obtained from the BRFSS for the following years: 2008, 2009, and 2010. Among other risk behaviors and preventive practices, the BRFSS survey asks respondents

to report their height and weight in order to calculate their Body Mass Index (BMI). Respondents were considered obese if their body mass index (BMI) was 30 or greater. BMI was calculated as weight in kilograms divided by height in meters squared (weight [kg]/height [m]2) based on self-reported height and weight. Individual respondent data were collapsed and aggregated to the county level in order to obtain the percent of obesity within the county, stratified by gender. The percentage point change in obesity between survey years was calculated for 2008-2009, 2009-2010, and 2008-2010. The 2008-2009 calculation for example was the county-level percentage of obesity in year 2009 minus county-level percentage of obesity in year 2008. The datasets used for this analyses will be referred to as the 2008-2010 (NACCHO 2008 with BRFSS 2008-2010) throughout the remainder of this document.

Previous research has included only a cross-sectional examination of obesity prevention programs provided that year on population level outcomes obtained in the same year (Cousins, Langer et al. 2011, Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). A strength of the present study is the examination of subsequent years of county-level obesity survey data, to gauge the lagged effect of obesity prevention efforts.

6.3.4 Statistical Analysis

For this paper; I examined the main research question regarding the relationship between LHD community-based partnerships for obesity prevention and the percentage point change in obesity within the county by gender, accounting for LHD organizational characteristics and factors in the macro-context (i.e. 2008 NACCHO data assessing change in obesity prevalence from 2008 through 2010 from BRFSS). All analyses were conducted using the NACCHO survey weights to account for nonresponse and complex sampling frame. Initial descriptive statistics were conducted to describe the study sample and to examine the distributions of the primary

outcome and predictor variables. Independent variables were assessed for multicollinearity (e.g. total population size and expenditures per capita) as well as the need for transformations, such as log-transforming expenditures per capita or categorizing continuous variables. Additionally, the following categorical variables were dummy coded for inclusion into the model; LHD partnership activities (3 categories: directly, partnerships or no involvement), number of FTE (<15, 15 to <31, total population size (quartile), and the percent of the population that was ethnic minority (<3.36, 3.36 to <8.20, 8.20 to <20.65, 20.65+) within the LHD's jurisdiction.

Bivariate associations between the percentage point change in obesity prevalence and independent variables were examined. In order to assess factors that decrease county-level obesity rates, ordinary least squares regression models were conducted with the 2008-2010 BRFSS data to estimate the association between the percentage point change in obesity prevalence over time and the three level LHD obesity prevention partnership variable (1) directly provides, 2) partners to provide and 3) no involvement) while controlling for other factors in the model. The effect of each LHD obesity prevention program on the change in obesity prevalence was analyzed separately (i.e. chronic disease prevention, nutrition education and physical activity promotion). The percentage point change in county-level obesity prevalence was modeled as:

$$Y(\%\ \text{Percentage Point Change in County-level Obesity Prevalence}) = \alpha + \beta 1(\text{LHD partnership activity}) + \ldots + \beta x Xx$$

Statistical significance for all analyses was determined at the $p<0.05$ level. Regression results are reported as coefficients and standard errors. All analyses were conducted using STATA 13.1 statistical software (Statacorp, College Station, Texas).

6.4 Results

6.4.1 Sample Demographics

A total of 1,420 LHDs from the 2008 National Profile Survey were included in this study. On average, the LHDs included in the study served a population size of 500,000 people or greater (51%), within county jurisdictions (73%), with expenditures per capita of $60.04, had primarily first time LHD directors (approximately 80%) and the majority had local board of health (77.891%) (Table 6.1). The mean percentage of the population that was obese ranged from 31.4 for men and 28.7 for women (Figure 6.1).

From each year between 2008 and 2010, the county level prevalence of obesity has remained relatively steady, with the exception of the prevalence of obesity for women between 2008 and 2009. Furthermore, slightly more than a third of all LHD obesity prevention activities conducted within LHDs are done within partnerships with other organizations within the public health system (TABLE 6.2). Also LHDs were more involved in nutrition education-related programming than chronic disease prevention and physical activity, and provided approximately 45% of all nutrition activities in partnership with other organizations.

6.4.2 LHD Partnerships

The goal of this study was to examine whether LHDs' community-based obesity prevention partnerships influenced the prevalence of obesity within their jurisdiction. Bivariate analyses were conducted to assess the effect of the main predictor, LHD obesity prevention partnership activity, on the change in gender-specific obesity prevalence over time. The one-year change was predicted by gender for 2008-2009 and 2009-2010 and a two-year change was calculated for 2008-2010. The regression coefficients and standard errors for each model are shown separately by LHD obesity prevention programming area in Tables 6.3-6.6. Although I had hypothesized that partnership activities would have an effect on county-level obesity

prevalence, only LHD nutrition education-related programs were associated with a gender-specific change in obesity prevalence at the bivariate level and the significant finding did not reflect the benefit of partnerships. Compared to LHDs that provide nutrition education-related programming activities directly, LHDs that did not have any involvement in the nutrition education programming activities could expected to see a 0.029 ($p < 0.05$) increase in obesity prevalence from 2008 to 2009 for men. This effect was not replicated for women.

Despite the fact that LHD partnership activities did not detect an association at the bivariate level, multivariate regression analyses were performed to keep this study comparable to existing literature regarding LHD obesity prevention and based on the theoretical framework proposed in this dissertation regarding the utility of partnerships for improving LHD capacity to deliver programs in most communities and to decrease obesity prevalence.

6.4.4 LHD Infrastructure Resources

This study hypothesized that LHD organizational characteristics would have an effect on the programs provided by LHDs and thus impact the change in obesity prevalence between survey years. When examining the effect of one of the main predictors, LHD chronic disease related programming activities on the two-year change in obesity prevalence, we did not find a significant relationship. However, one of the other covariates in the model, jurisdiction type, was associated with changes in the two-year prevalence of obesity. In this model, LHDs within multi-county/city-county jurisdictions were associated with an increase in obesity prevalence (.026) ($p < 0.05$) from 2008 to 2010 for women compared to LHDs in county jurisdiction. A similar trend was observed in the model that assessed the impact of LHD nutrition education-related programming activities on changes in obesity prevalence from 2008 to 2010. In this analysis we found that LHDs with mixed jurisdiction types experienced greater increases in obesity

prevalence than those within county jurisdictions, 0.025 ($p< 0.51$). The main predictor was not significant in this model. Furthermore, with the exception of the relationship observed between jurisdiction type on the two year changes in obesity prevalence, the results of all other models examining the effect of LHD obesity prevention programming activities (i.e. chronic disease, physical activity) on the 1 and 2 year change in obesity prevalence were not significant.

6.5 Discussion

The majority of LHDs are involved with obesity prevention programmatic activities within their jurisdiction in some capacity, either providing activities directly or in partnership. However a sizeable proportion of LHD nutrition education-related programming is done through partnerships with local organizations. These results suggest that different mechanism or factors may influence LHD initiation and participation in local obesity prevention activities.

The goal of this study was to examine the effect of LHD obesity prevention activities conducted in partnership with other organizations in the public health system, presumably community based organizations on county-level changes in obesity prevalence. The multivariate analyses conducted for this study failed to detect an association between LHD obesity prevention partnerships and change in county-level obesity prevalence. This unclear relationship between LHD obesity prevention efforts and change in county-level obesity prevalence has been found in other studies (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). Although there was variation at the county level, the relatively small change in obesity prevalence across the five years examined for this study is likely to diminish our ability to find a significant association with LHD obesity prevention activities.

One significant finding from the multivariate analyses was that LHDs serving whole counties were less likely to see a two-year increase in obesity prevalence between 2008 and 2010 compared to LHDs in mixed jurisdiction types. While this relationship is unclear, these findings suggest that the size/type of the community being served may play a role in the provision of obesity prevention services. Additionally, LHDs serving whole counties may be more likely to have a robust obesity prevention infrastructure, with a greater number of community organizations focused on obesity prevention ready to assist the LHD.

Interpretations of the findings from this study should be made with caution given several limitations. One specific limitation to mention, this study uses secondary data that were not designed to focus on ascertaining LHD partnership activity. The NACCHO surveys are more than likely completed by multiple people within the LHD, some of whom may not be as thoroughly aware of LHD partnership efforts or activities with community-based organizations. Future research on partnership efforts should emulate a recent study that was designed specifically to increase understanding of barriers and facilitators involving obesity prevention activities conducted by the public health system (Stamatakis, Lewis et al. 2014).

Second, because I was interested in capturing LHD obesity prevention partnership activities, I created a categorical variable based initially on seven response options. LHDs were instructed to select all response options that applied. The variables created to capture LHD obesity prevention partnership activities may not have accurately measured activities done in partnership with other organizations. However, the variable is likely to have captured an enumeration of obesity prevention activities within the county but not necessarily whether these activities were truly done in partnership or solo. Previous research by Brownson and colleagues confirmed the value of the importance that LHDs place on partnerships and their desire to form

partnerships in order increase their ability to achieve their organizational mission and program objectives (Brownson, Reis et al. 2014). This value judgment regarding the importance of partnerships to increasing reach and capacity was echoed in the key informant interviews conducted for this dissertation.

Third, what few statistically significant findings were obtained could be an artifact of the multiplicity of hypothesis testing. Furthermore, the null results reflect an average effect. Future research should assess the effectiveness of local health department obesity prevention programs delivered through partnerships with community-based organizations within varied subgroups of the populations such as low income and racial/ethnic minorities' communities. Community-based organizations are typically situated within disadvantaged communities who may be more responsive or sensitive to the community-based partnerships and therefore specific subgroup analyses should be performed in future research.

This is the first study to examine LHD obesity prevention activities in relation to changes in county-level obesity prevalence. The administrative burden associated with establishing subcontracts with community partners is a factor that emerged from the key informant interviews that suggested a potential delayed effect in health outcomes. Informants stated that the contract approval process associated with formal partnerships can take up to a year and that this delay limits the effectiveness of all organizations involved by providing less time to obtain project objectives. As a result, project objectives are often modified to reflect the time allotted to reach projected goals. Future studies should examine with more precision the role that LHD obesity prevention partnerships may have on decreasing county-level obesity prevalence rates and the lagged improvements in obesity prevalence. It is plausible that future studies need to assess a larger lag in effect given the widespread obeseogenic influences that obesity programs must

attenuate. Additionally, a goal of this study was to assess LHD partnerships specifically with community-based organizations, which may have greater familiarity with and enjoy greater community trust from the local community than the LHD (Doyle 2009). Future research should ask specifically about partnerships with community-based organizations. At a minimum, findings from this study demonstrate that most LHDs are focused on obesity prevention within their jurisdictions, with a greater amount of activities conducted particularly in the area of nutrition education. As funding continues to be a challenge for many LHDs, identifying alternative means for delivering nutrition education and other obesity prevention activities are critical to improving population level obesity-related outcomes.

TABLE 6.1: Organizational Characteristics of Local Health Departments: United States, National Profile of Local Health Departments in 2008

	2008	
	n	**% (SD)**
Infrastructure		
Size of population served (2008 Quartile)		
<26584	355	25.0
26584 - <51095	355	25.0
51095 - <131890	355	25.0
131890+	355	25.0
Total number of counties	***1,420***	***100***
Jurisdiction type		
County	1,038	73.1
City/City-County/ Multi-County	382	26.9
Total	***1,420***	***100***
Expenditures per capita		
<$25K	351	26.6
$25K - <$50K	514	39.0
$50K - <$75K	214	16.2
$75K+	240	18.2
Total	***1,319***	***100.00***
Total local revenue sources (mean)	1,115	21.8 (19.614)
Chronic Disease Surveillance/Activities (yes)	597	42.8
Governance		
First Time Director (yes)	1,110	79.6
Local board of health (yes)	1,064	77.9
Workforce		
Total Number of FTE		
<15 Employees	383	27.0
15 to <31 Employees	326	23.0
31 to <75 Employees	325	22.9
75+ Employees	386	27.2
Total	***1,420***	***100***
Change in Percent Poverty (mean)	1,337	1.8 (1.900)

Figure 6.1 County Level Prevalence of Obesity from 2008-2012

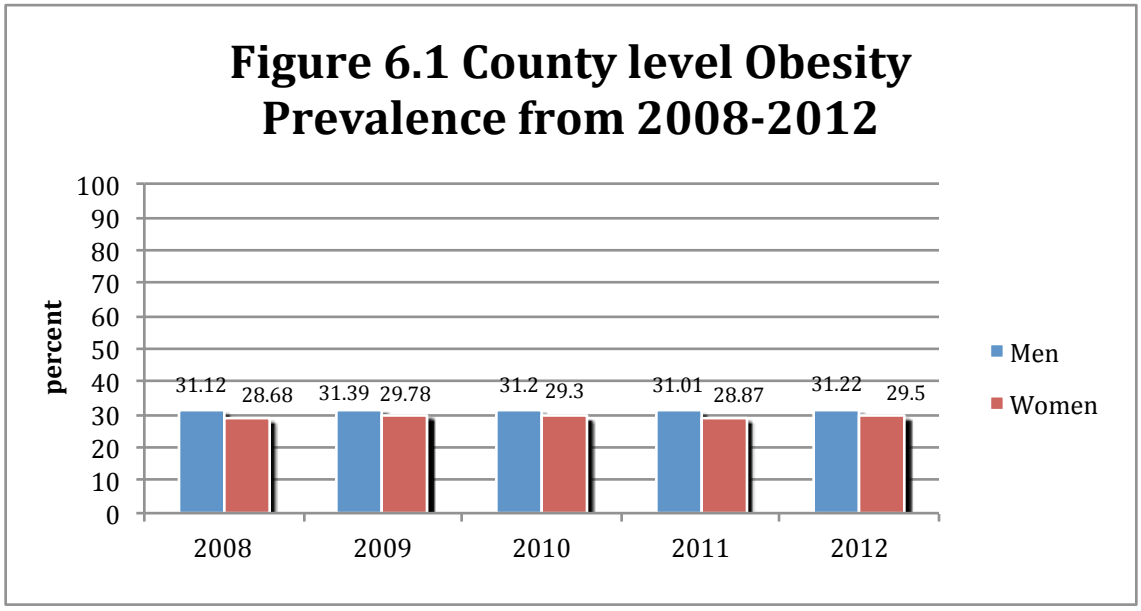


Table 6.2 LHD Obesity Prevention Activities

Table 6.2 LHD Obesity Prevention Activities within a subsample of Local Health Departments from the National Profile Survey, 2008		
	n	**%**
Chronic Disease Programming		
Directly	386	28.5
Partners to provide	487	35.9
No Involvement	484	35.7
Total	**1,357**	
Nutrition Education Programming		
Directly	485	35.2
Partners to provide	617	44.8
No Involvement	276	20.0
Total	**1,378**	
Physical Activity Programming		
Directly	384	28.5
Partners to provide	484	36.0
No Involvement	478	35.5
Total	**1,346**	

Table 6.3- Bivariate Associations of the Structure of Local Health Department Obesity Prevention Programming Activities on County-level Change in Obesity Prevalence, by Gender (Standard Errors in parentheses)

	2008 LHD data					
	2008-2009		2009-2010		2008-2010	
	Men	Women	Men	Women	Men	Women
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Chronic Disease Programming (Directly Referent)						
Partners to provide	-.005 (.010)	.001 (.009)	-.000 (.011)	.007 (.009)	-.003 (.012)	.006 (.010)
No Involvement	-.010 (.013)	.009 (.011)	.006 (.013)	.000 (.011)	-.005 (.014)	.009 (.012)
Nutrition Education Programming (Directly Referent)						
Partners to provide	.004 (.004)	.000 (.008)	.000 (.010)	-.002 (.008)	-.003 (.010)	-.004 (.009)
No Involvement	-.029* (.041)	.007 (.013)	.011 (.014)	-.022 (.013)	-.026 (.015)	-.016 (.012)
Physical Activity Programming (Directly Referent)						
Partners to provide	.003 (.010)	-.009 (.009)	-.000 (.010)	.002 (.009)	.002 (.011)	-.005 (.010)
No Involvement	-.017 (.013)	.007 (.011)	.017 (.013)	.005 (011)	-.000 (.014)	.016 (.011)

*p < .05. **p < .01. Note: 2008 through 2010 data, LHDs that stated no activity in jurisdiction were combined with the no involvement category.

Note. CD = Chronic Disease Prevention; PA = Physical Activity Promotion; Nutrition = Nutrition Education

Note: The sample size changes between programming activities and survey years: **2009- 2008**-(CD Men n=1,178 & Women, n=1,230), (Nutrition Men n=1,199 & Women n=1,252) (PA Men n=1,171 & Women n=1,222), **2009-2010**-(CD Men n=1,167 & Women n=1,225), (Nutrition Men n=1,191 & Women n=1,249) (PA men n=1,163 & women=1,218) **2008-2010**- (CD men =1,180 & women =1,230) (Nutrition men=1,201 & women 1,254) (PA men=1,173 & women=1,224)

Table 6.4- Multivariate Associations between Local Health Department Organizational Characteristics and Chronic Disease Programming in 2008-2010 with Changes County-level Obesity Prevalence, by Gender (standard errors in parentheses)

	2008 LHD data					
	2008-2009		2009-2010		2008-2010	
	Men	Women	Men	Women	Men	Women
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Partnership Activity (directly referent)						
Partners to provide	-.009 (.014)	.004 (.012)	.016 (.014)	-.002 (.012)	.002 (.015)	-.002 (.013)
No Involvement	-001 (.016)	.006 (.015)	.016 (.017)	-.009 (.015)	.007 (.018)	-.004 (.014)
Population size (<26584 referent)						
26584 - <51095	.009 (.019)	.014 (.017)	.003 (.018)	-.008 (.016)	.011 (.019)	.003 (.018)
51095 - <131890	.022 (.023)	.007 (.019)	.007 (.021)	-.015 (.021)	.034 (.023)	-.006 (.022)
131890+	.014 (.029)	.012 (.024)	.019 (.029)	-.023 (.027)	.037 (.030)	-.008 (.027)
Jurisdiction type	.006 (.015)	.020 (.013)	-.002 (.015)	.010 (.013)	.001 (.016)	.026* (.013)
Expenditures per capita, log	.011 (.013)	.002 (.012)	.003 (.012)	-.004 (.012)	.012 (.013)	-.002 (.012)
Local revenue sources	.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)
Chronic disease surveillance (yes/no)	.010 (.012)	-.004 (.010)	-.008 (.012)	-.005 (.010)	.004 (.012)	-.007 (.010)
First time LHD Director	-.008 (.013)	-.006 (.013)	-.004 (.014)	-.014 (.012)	-.019 (.014)	-.014 (.012)
Local board of health	-.005 (.028)	.004 (.026)	.013 (.029)	-.000 (.024)	.004 (.030)	.002 (.024)
Number of FTE (<15 employees referent)						
15 to <31 Employees	-.013 (.020)	-.027 (.019)	-.008 (.019)	.019 (.018)	-.031 (.021)	-.008 (.018)
31 to <75 Employees	-.013 (.024)	-.019 (.021)	-.019 (.025)	.006 (.021)	-.038 (.026)	-.015 (.022)
75+ Employees	-.017 (.032)	-.033 (.028)	-.024 (.035)	.022 (.030)	-.048 (.034)	-.013 (.027)
Percent population nonwhite (<3.36% referent)						
3.36 to <8.20%	.009 (.017)	-.007 (.016)	.016 (.017)	.006 (.015)	.024 (.018)	-.010 (.015)
8.20 – <20.65%	.012 (.020)	-.012 (.019)	.008 (.021)	.015 (.019)	.031 (.022)	-.000 (.019)
<20.65%	.035 (.026)	-.005 (.025)	-.016 (.028)	.002 (.024)	.032 (.029)	-.007 (.024)
Percent poverty	.001 (.051)	.002 (.003)	-.000 (.003)	-.002 (.002)	-.000 (.003)	-.000 (.003)
Adjusted R^2	0.046	0.048	0.043	0.067	0.039	0.094
F	(18,810) =0.39	(18,859)=0.50	(18, 804)=0.37	(18, 854)=0.45	(18, 816)=0.43	(18, 861)= 0.5
p-value	0.989	0.960	0.992	0.976	0.982	0.9436

*p < .05. **p < .01. Note: 2008 through 2010 data, LHDs that stated no activity in jurisdiction were combined with the no involvement category.

Note. CD = Chronic Disease Prevention; PA = Physical Activity Promotion; Nutrition = Nutrition Education

2008-2009 (CD Men=828 & Women=877) **2009-2010** (CD Men=822 & Women=872) **2008-2010** (CD Men=834 & Women=879)

Table 6.5- Multivariate Associations between Local Health Department Organizational Characteristics and Nutrition Education Programming in 2008-2010 with Changes in County-level Obesity Prevalence, by Gender (standard errors in parentheses)

	2008 LHD Data					
	2008-2009		2009-2010		2008-2010	
	Men	Women	Men	Women	Men	Women
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Partnership Activity (directly referent)						
Partners to provide	.009 (.012)	-.003 (.011)	.001 (.012)	-.000 (.011)	-.002 (.013)	-.003 (.011)
No Involvement	-.031 (.017)	.002 (.018)	.005 (.018)	-.013 (.016)	-.034 (.019)	-.009 (.015)
Population size (<26584 referent group						
26584 - <51095	.006 (.019)	.016 (.017)	.009 (.018)	-.007 (.016)	.017 (.018)	.004 (.017)
51095 - <131890	.020 (.022)	.007 (.019)	.009 (.021)	-.014 (.021)	.035 (.023)	-.004 (.021)
131890+	.009 (.022)	.012 (.024)	.025 (.029)	-.024 (.027)	.038 (.030)	-.008 (.000)
Jurisdiction type	.009 (.015)	.023 (.013)	-.004 (.015)	.006 (.013)	.000 (.016)	.025* (.013)
Expenditures per capita, log	.009 (.013)	.002 (.012)	.004 (.012)	-.005 (.015)	.011 (.013)	-.003 (.012)
Local revenue sources	.000 (.000)	.000 (.000)	-.000 (.000)	.004 (.025)	-.000 (.000)	.000 (.000)
Chronic disease surveillance (yes/no)	.001 (.011)	-.004 (.009)	-.007 (.012)	-.008 (.010)	-.004 (.012)	-.009 (.010)
First time LHD Director	-.010 (.013)	-.009 (.012)	-.001 (.013)	-.008 (.012)	-.019 (.013)	-.011 (.012)
Local board of health	-.005 (.029)	.002 (.026)	.012 (.029)	.004 (.025)	.004 (.031)	.003 (.024)
Number of FTE (<15 employees referent)						
15 to <31 Employees	-.014 (.020)	-.024 (.019)	-.005 (.019)	.012 (.018)	-.026 (.021)	-.012 (.018)
31 to <75 Employees	-.015 (.024)	-.015 (.022)	-.017 (.025)	.001 (.021)	-.035 (.027)	-.017 (.022)
75+ Employees	-.022 (.033)	-.030 (.028)	-.022 (.036)	.018 (.031)	-.048 (.035)	-.013 (.028)
Percent population nonwhite (<3.36% referent)						
3.36 to <8.20%	.008 (.017)	-.008 (.016)	.019 (.017)	.005 (.015)	.025 (.018)	-.012 (.015)
8.20 – <20.65%	.010 (.021)	-.013 (.019)	.010 (.021)	.014 (.018)	.030 (.022)	-.002 (.019)
<20.65%	.027 (.026)	-.005 (.024)	-.012 (.029)	-.004 (.024)	.029 (.029)	-.011 (.024)
Percent poverty	.001 (.003)	.003 (.003)	-.000 (.003)	-.003 (.002)	.000 (.003)	-.000 (.003)
Adjusted R^2	0.052	0.046	0.041	0.055	0.043	0.090
F	(18,822)= 0.61	(18, 872)= 0.56	(18,819)= 0.31	(18, 868)= 0.45	(18,828)= 0.56	(18,875)= 0.53
p-value	0.890	0.9226	0.998	0.978	0.930	0.946

*p < .05. **p < .01. Note: 2008 through 2010 data, LHDs that stated no activity in jurisdiction were combined with the no involvement category.
Note. CD = Chronic Disease Prevention; PA = Physical Activity Promotion; Nutrition = Nutrition Education
2008-2009 (Nut Men=840 & Women=890) **2009-2010** (Nut Men=837 & Women=886) **2008-2010** (Nut Men=846 & Women=893)

Table 6.6- Multivariate Associations between Local Health Department Organizational Characteristics and Physical Activity Programming in 2008-2010 with Changes in County-level Obesity Prevalence, by Gender (standard errors in parentheses)						
	2008 LHD Data					
	2008-2009		2009-2010		2008-2010	
	Men	Women	Men	Women	Men	Women
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Partnership Activity (directly referent)						
Partners to provide	.000 (.013)	-.007 (.011)	.012 (.013)	-.001 (.011)	.005 (.014)	-.006 (.012)
No Involvement	-.015 (.015)	.005 (.014)	.008 (.016)	.008 (.013)	-.009 (.017)	.021 (.014)
Population size, Quartile (<26584 referent)						
26584 - <51095	.005 (.019)	.015 (.017)	.014 (.018)	-.003 (.016)	.017 (.019)	.007 (.018)
51095 - <131890	.019 (.022)	.008 (.019)	.009 (.021)	-.014 (.021)	.034 (.023)	-.002 (.022)
131890+	.009 (.029)	.018 (.024)	.022 (.030)	-.026 (.027)	.034 (.030)	-.004 (.026)
Jurisdiction type	.005 (.015)	.020 (.013)	-.005 (.016)	.007 (.013)	-.004 (.016)	.024 (.013)
Expenditures per capita, log	.011 (.013)	.002 (.012)	.003 (.012)	-.004 (.012)	.012 (.013)	-.001 (.012)
Local revenue sources	-.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)
Chronic disease surveillance (yes/no)	.004 (.011)	-.003 (.009)	-.016 (.012)	-.004 (.010)	-.006 (.012)	-.004 (.010)
First time LHD Director	-.009 (.013)	-.011 (.013)	.004 (.013)	-.010 (.012)	-.013 (.014)	-.014 (.012)
Local board of health	-.007 (.030)	.003 (.027)	.013 (.030)	.002 (.025)	.005 (.031)	.003 (.024)
Number of FTE (<15 employees referent)						
15 to <31 Employees	-.006 (.021)	-.024 (.019)	-.001 (.020)	.014 (.019)	-.018 (.022)	-.011 (.019)
31 to <75 Employees	-.011 (.024)	-.019 (.021)	-006 (.025)	.009 (.022)	-.024 (.026)	-.014 (.022)
75+ Employees	-.012 (.032)	-.037 (.027)	-.013 (.036)	.027 (.030)	-.032 (.034)	-.013 (.027)
Percent population nonwhite (<3.36% referent)						
3.36 to <8.20%	.004 (.017)	-.005 (.017)	.019 (.017)	.007 (.016)	.022 (.019)	-.007 (.016)
8.20 – <20.65%	.010 (.021)	-.009 (.019)	.008 (.021)	.016 (.019)	.029 (.022)	.003 (.019)
<20.65%	.028 (.026)	-.003 (.024)	-.014 (.028)	-.001 (.024)	.028 (.030)	-.007 (.024)
Percent poverty	.001 (.003)	.002 (.003)	-.000 (.003)	-.002 (.002)	-.001 (.003)	.000 (.003)
Adjusted R^2	0.051	0.042	0.042	0.058	0.039	0.096
F	(18,805)= 0.40	(18,852)= 0.48	(18,800)= 0.41	(18,848)= 0.36	(18,810)= 0.37	(18,855)=0.72
p-value	0.988	0.968	0.986	0.993	0.992	0.795

*p < .05. **p < .01. Note: 2008 through 2010 data, LHDs that stated no activity in jurisdiction were combined with the no involvement category.
Note. CD = Chronic Disease Prevention; PA = Physical Activity Promotion; Nutrition = Nutrition Education
2008-2009 (PA Men=823 & Women=870) **2009-2010** (PA Men=818 & Women=866) **2008-2010** (PA Men=828 & Women=873)

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Appendix 6.1

The Direct Effect of LHD Obesity Prevention Programming on County-level Variations in Obesity

Overview

Due the limited response options provided in the 2010 National Profile Survey, I was unable to assess the influence of local health department obesity prevention partnerships in 2010 on the percentage point change in county-level obesity prevalence. Therefore, this appendix includes the results of analyses of the direct effect of local health departments' obesity prevention programming activities on obesity prevalence within their jurisdiction. Previous cross-sectional research studies have found mixed results regarding the LHDs direct provision of obesity prevention on county-level obesity prevalence. This study makes a significant contribution to the field of obesity prevention by examining the changes in obesity prevalence over time.

Materials and Methods

LHD Organizational Characteristics

This study utilized LHD organizational level data collected in 2010 from the National Profile of Local Health Departments survey. The response rate for survey data used for this study is above 80%; with 2,107 of 2,565 (82%) local health department respondents completing the survey in 2010 (National Association of County and City Health Officials (NACCHO) August 2011, National Association of County and City Health Officials (NACCHO) July 2009). The NACCHO survey data was combined with the Behavioral Risk Factor Surveillance Systems (BRFSS) in order to assess the impact of LHD organizational characteristics, resources and infrastructure on the county-level

prevalence of obesity. Federal Information Processing Standards (FIPS) codes were used to combine the NACCHO surveys with the BRFSS data files. The FIPS codes are in included in the BRFSS data files and correspond to the county where the respondent resides. However the NACCHO data only includes the zip codes for the county health departments' physical location. Therefore, each county health department was matched to their corresponding FIPS codes using a zip code to FIPS matching process, as well as case-by-case inspection for those health departments that did not initially match. This process limited our ability to use data from city health departments or smaller entities such as municipalities or towns because FIPS codes are set at the county level.

County-level Obesity Prevalence Data

Data from the 2010-2012 annual administrations of the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System was used to estimate 1 and 2 year changes in county-level obesity prevalence. Similarly to Chapter 6, assessing the change over time attempts to rule out reverse causality.

Measures

LHD obesity prevention partnerships

The response options for the questions regarding which organization in the jurisdiction delivered the population-based health promotion programs changed between 2008 and 2010, with only three response options available in 2010. A dichotomous LHD obesity prevention programming activity variable was created from the three response options in 2010. The response options were 1) provided directly (which included contracted) and 2) did not provide directly.

Organizational-level covariates

The Profile survey asked respondents to indicate their jurisdiction type, with five response options available (county, city-county, multi-county, city, township or district or region). In 2010, multi-city was also included as a type of jurisdiction. Due to the inability to match the NACCHO data of smaller geographic units with the BRFSS data and small cell sizes in the five level jurisdiction type variable, a two-category jurisdiction type variable was created as either county or city-county, city, and multi-county. Survey respondents also reported an estimate of the size of the population that their LHD served. A quartile total population variable was created from the continuous total population variable, with the categories from 2010. The categories included less than 26,584, 26,584 to less than 51,095, 51,095 to less than 131,890 and greater than 131,890. Approximately only 6% of LHDs stated they served a population greater than 500,000.

Expenditures per capita were skewed and therefore the data were log transformed to make the data approximate a normal distribution. LHDs reported their revenue sources including from local revenue sources. This study included the percentage of total revenue from local sources. Additionally, LHDs reported whether they provided chronic disease surveillance/epidemiology activities (yes/no), whether a local board of health existed (yes/no), and whether this was the LHD top executive's first time as director (yes/no). The total number of full time employees (FTE) reported by the LHD was categorized into less than 15 FTE, 15 to less than 31, 31 to less than 75 and 75 or greater.

Macro-level correlates

The change in the percentage of the population in poverty from 2010 to 2012 was included in this study. Survey respondents were not asked to report the percent of the populations within racial and ethnic groups in 2010.

Change in Obesity Prevalence

The outcome variable for this paper is the county-level change in percent obese within the county. These data were obtained from the BRFSS for the following years: 2010, 2011, and 2012. Among other risk behaviors and preventive practices, the BRFSS survey asks respondents to report their height and weight in order to calculate their Body Mass Index (BMI). Respondents were considered obese if their body mass index (BMI) was 30 or greater. BMI was calculated as weight in kilograms divided by height in meters squared (weight [kg]/height [m]2) based on self-reported height and weight. Individual respondent data were collapsed and aggregated to the county level in order to obtain the percent of obesity within the county, stratified by gender. The percentage point change of county-level obesity prevalence was calculated for 2010-2011, 2011-2012 and 2010-2012.

Statistical Analysis

The analyses performed in this appendix were ancillary to the original research question regarding the provision of obesity prevention programs by LHD through the use of partnerships. However this appendix briefly reviews the direct provision of LHD obesity prevention programs on the percentage point change in obesity prevalence over time within the county, accounting for LHD organizational characteristics and factors in the macro-context. All analyses were conducted using the NACCHO survey weights to account for nonresponse and complex sampling frame. Initial descriptive statistics were conducted to describe the study sample and to examine the distributions of the primary outcome and predictor variables. Independent variables were assessed for multicollinearity (e.g. total population size and expenditures per capita) as well as the

need for transformations, such as log-transforming or categorizing continuous variables. The total number of FTE was correlated with the total population size variable at r = 0.624 ($p < 0.001$) in 2010, thus the total number of FTE was removed from the model.

Bivariate associations between the change in obesity prevalence and independent variables were examined. In order to assess factors that decrease county-level obesity rates, ordinary least squares regression models were conducted with the 2010-2012 data to estimate the association between the percentage point change in obesity prevalence over time and the three level LHD obesity prevention partnership variable while controlling for other factors in the model. The effect of each LHD obesity prevention activity has on the change in obesity was analyzed separately (i.e. chronic disease prevention, nutrition education and physical activity promotion). The percent change in obesity prevalence was modeled as:

$$Y(\%\text{ Percentage Point Change in County-level Obesity Prevalence}) = \alpha + \beta 1(\text{LHD provides the activity directly}) + \ldots + \beta x Xx$$

Statistical significance for all analyses was determined at the $p<0.05$ level. Regression results are reported as coefficients and standard errors. All analyses were conducted using STATA 13.1 statistical software (Statacorp, College Station, Texas).

Results

A total of 1,378 LHDs in 2010 from the National Profile Survey were included in this study. The demographics of the LHD respondents in 2010 were similar to 2008, on average serving population size greater than 500,000 residents, from county jurisdictions, with average expenditures per capita of 58.58 at least half of the sample in both years had 31 FTEs or more and with a local board of health. The two notable differences were the

number of LHDs that were located within counties compared to the city, city-county, multi-county jurisdiction category type (Table A6.1). Additionally, there was a difference between survey years in change in the percentage of the population in poverty from year 1 to year 3 for the counties examined in this study. In 2008, there was an average increase in the percent in poverty of 1.80 from 2008 to 2010, although a much smaller increase was observed from 2010 to 2012 (0.46). From each year between 2010 and 2012, the county level prevalence of obesity has remained relatively steady, with the exception of the prevalence of obesity for women between 2010 and 2011.

LHD Direct Provision of Obesity Programs

The second objective of this study was to assess the direct provision of LHD obesity prevention programming activities on the 1 and 2-year change in obesity prevalence. Bivariate analyses were conducted to assess the effect of the main predictor, LHD direct provision of obesity prevention programming activities on the change in gender-specific obesity prevalence over time. Although, I hypothesized that LHD obesity prevention programming activities would have an effect on obesity, none of the LHD programming activities showed an association with gender-specific change in obesity at the bivariate level. However, multiviariate analyses were still performed to permit comparability with existing literature regarding obesity prevention and based on the theoretical framework proposed in this dissertation. Tables A6.3 -A6.6

Discussion

The results from the models assessing the direct provision obesity prevention activities by LHD are similar to the partnership models, none of the obesity prevention programs were associated with the percentage point change in county-level obesity. The output is displayed in Tables 6.1 to 6.6. Stamatakis and colleagues also did not find an effect between LHD obesity prevention activities and county level obesity (Stamatakis, Leatherdale et al. 2012). This study used self-reported data from BRFSS. Future studies may want to utilize objective measures of obesity and examine whether the you receive the same results.

TABLE A6.1: Organizational Characteristics of Local Health Departments: United States, National Profile of Local Health Departments in 2008 and 2010

	2010	
	n	**%**
Infrastructure		
Size of population served (2008 Quartile)		
<26584	343	24.9
26584 - <51095	322	23.4
51095 - <131890	317	23.0
131890+	396	28.7
Total number of counties	***1,378***	***100***
Jurisdiction type		
County	1,220	88.5
City/City-County/ Multi-County	158	11.5
Total	***1,378***	***100***
Expenditures per capita		
<$25K	251	21.7
$25K - <$50K	439	37.9
$50K - <$75K	206	17.8
$75K+	261	22.6
Total	***1,157***	***100.00***
Total local revenue sources (mean)	934	23.2
Chronic Disease Surveillance/Activities (yes)	595	44.5
Governance		
First Time Director (yes)	1,055	77.2
Local board of health (yes)	1,010	73.6
Workforce		
Total Number of FTE		
<15 Employees	324	23.5
15 to <31 Employees	307	22.3
31 to <75 Employees	316	22.9
75+ Employees	431	31.3
Total	***1,378***	***100***
Change in Percent Poverty (mean)	1,378 (SD)	0.5

Table A6.2 LHD Obesity Prevention Activities within a subsample of Local Health Departments from the National Profile Survey, 2010		
	n	%
Chronic Disease Programming		
Directly	822	61.9
Partners to provide	--	--
No Involvement	505	38.1
Total	1,327	
Nutrition Education Programming		
Directly	1,082	80.5
Partners to provide	--	--
No Involvement	262	19.5
Total	1,344	
Physical Activity Programming		
Directly	827	62.2
Partners to provide	--	--
No Involvement	502	37.8
Total	1,329	

Table A6.3- Bivariate Associations of Local Health Department Direct Provision of Obesity Prevention Programming Activities on Percentage Point Change in Obesity Prevalence from 2010 to 2012, by Gender (Standard Errors in parentheses)

	2010 LHD data					
	2010-2011		2011-2012		2010-2012	
	Men	Women	Men	Women	Men	Women
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Chronic Disease Programming						
Directly	**-.000 (.011)**	**.000 (.010)**	**.002 (.011)**	**.004 (.009)**	**-.002 (.011)**	**.007 (.010)**
No Involvement						
Nutrition Education Programming						
Directly	**.008 (.014)**	**-.000 (.013)**	**-.017 (.014)**	**-.005 (.011)**	**-.007 (.014)**	**-.000 (.013)**
Physical Activity Programming						
Directly	**.010 (.011)**	**.003 (.010)**	**.000 (.010)**	**-.008 (.009)**	**.004 (.011)**	**-.007 (.010)**

Table A6.4- Multivariate Associations between Local Health Department Organizational Characteristics and Chronic Disease Programming in 2010-2012 with Percentage Point Change in Obesity Prevalence, by Gender (standard errors in parentheses)

	2010 LHD data					
	2010-2011		2011-2012		2010-2012	
	Men	Women	Men	Women	Men	Women
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Partnership Activity						
Directly	-.000 (.012)	.002 (.011)	-.002 (.012)	.009 (.009)	-.004 (.013)	.015 (.011)
Population size (<26584 referent group						
26584 - <51095	.020 (.017)	.004 (.015)	-.004 (.016)	.004 (.014)	.022 (.017)	.007 (.015)
51095 - <131890	.004 (.019)	.007 (.015)	-.006 (.017)	.001 (.013)	.005 (.018)	.004 (.016)
131890+	.004 (.021)	-.005 (.017)	-.000 (.019)	.005 (.014)	.012 (.020)	-.004 (.017)
Jurisdiction type	.041 (.023)	-.019 (.019)	-.010 (.023)	-.010 (.017)	.031 (.025)	-.026 (.019)
Expenditures per capita, log	-.003 (.011)	.005 (.009)	-.003 (.011)	-.010 (.009)	-.008 (.011)	-.004 (.010)
Chronic disease surveillance (yes/no)	.000 (.011)	.000 (.010)	-.004 (.009)	-.007 (.009)	-.017 (.011)	-.003 (.009)
First time LHD Director (yes/no)	.015 (.012)	.001 (.011)	-.015 (.011)	-.006 (.009)	-.006 (.011)	.005 (.010)
Local board of health (yes/no)	-.011 (.025)	.010 (.021)	-.022 (.026)	-.014 (.021)	-.024 (.027)	-.014 (.022)
Percent poverty	-.002 (.003)	.000 (.002)	.003 (.003)	.001 (.002)	.001 (.003)	.002 (.002)
Adjusted R^2	0.035	0.021	0.034	0.044	.039	0.045
F	(10,978)= 1.08	(10,1000)= 0.30	(10,995)= 0.47	(10,1002)= 0.73	(10,978)= 1.09	(10,1002)= 0.63
p-value	0.375	0.981	0.913	0.692	0.364	0.791

Table A6.5- Multivariate Associations between Local Health Department Organizational Characteristics and Nutrition Education Programming in 2010-2012 with Percentage Point Change in Obesity Prevalence, by Gender (standard errors in parentheses)

	2010-2011		2011-2012		2010-2012	
	Men	Women	Men	Women	Men	Women
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Partnership Activity						
Directly	.018 (.015)	.002 (.014)	-.025 (.015)	-.007 (.012)	-.004 (.016)	.015 (.010)
Population size (<26584 referent group						
26584 - <51095	.023 (.017)	.007 (.015)	-.005 (.016)	.003 (.014)	.022 (.017)	.007 (.015)
51095 - <131890	.006 (.018)	.009 (.015)	-.004 (.017)	.001 (.013)	.006 (.018)	.004 (.016)
131890+	.005 (.020)	-.003 (.016)	.002 (.019)	.005 (.014)	.012 (.020)	-.004 (.017)
Jurisdiction type	.041 (.023)	-.018 (.018)	-.010 (.023)	-.009 (.016)	.031 (.025)	-.026 (.019)
Expenditures per capita, log	-.004 (.011)	.005 (.009)	-.002 (.011)	-.009 (.009)	-.008 (.011)	-.004 (.010)
Chronic disease surveillance (yes/no)	-.002 (.011)	.000 (.002)	-.002 (.010)	-.003 (.009)	-.017 (.010)	-.003 (.009)
First time LHD Director (yes/no)	.017 (.012)	-.000 (.011)	-.016 (.011)	-.007 (.009)	-.007 (.011)	.005 (.010)
Local board of health (yes/no)	-.011 (.025)	.008 (.020)	-.025 (.026)	-.014 (.021)	-.024 (.027)	-.014 (.022)
Percent poverty					.001 (.003)	.002 (.002)
Adjusted R^2	0.036	0.022	0.036	0.044	0.039	0.045
F	(10,987)= 1.28	(10,1009)= 0.31	(10,1005)= 0.75	(10, 1011) = 0.52	(10,987)= 1.09	(10,1002)= 0.63
p-value	0.235	0.980	0.679	0.874	0.367	0.791

Table A6.6- Multivariate Associations between Local Health Department Organizational Characteristics and Physical Activity Programming in 2010-2012 with Percentage Point Change in Obesity Prevalence, by Gender (standard errors in parentheses)

	2010-2011		2011-2012		2010-2012	
	Men	Women	Men	Women	Men	Women
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Partnership Activity						
Directly	.016 (.012)	.005 (.011)	.000 (.011)	-.006 (.010)	.012 (.012)	-.004 (.010)
Population size (<26584 referent group						
26584 - <51095	.022 (.017)	.007 (.015)	-.003 (.016)	.003 (.014)	0.222 (.017)	.008 (.015)
51095 - <131890	.008 (.018)	.009 (.015)	-.007 (.017)	-.000 (.013)	.005 (.018)	.005 (.015)
131890+	.005 (.020)	-.003 (.017)	-.002 (.019)	.004 (.014)	.009 (.020)	-.001 (.016)
Jurisdiction type	.033 (.023)	-.020 (.019)	-.005 (.023)	-.007 (.017)	.030 (.025)	-.024 (.020)
Expenditures per capita, log	-.004 (.011)	.004 (.009)	-.005 (.011)	-.009 (.009)	-.010 (.011)	-.003 (.009)
Chronic disease surveillance (yes/no)	-.004 (.011)	.000 (.009)	-.003 (.003)	-.004 (.009)	-.020 (.010)	.001 (.009)
First time LHD Director (yes/no)	.016 (.012)	.000 (.011)	-.014 (.011)	-.008 (.009)	-.007 (.011)	.002 (.010)
Local board of health (yes/no)	-.009 (.025)	.004 (.021)	-.026 (.026)	-.014 (.021)	-.023 (.027)	-.020 (.022)
Percent poverty	-.002 (.003)	.001 (.002)	.003 (.003)	.000 (.002)	.001 (.003)	.003 (.002)
Adjusted R^2	0.035	0.023	0.034	0.045	0.039	0.043
F	(10,980)=1.28	(10,1001)= 0.32	(10, 998)= 0.48	(10,1003)=0.51	(10,980)=1.25	(10,1004)= 0.56
p-value	0.235	0.976	0.903	0.882	0.25	0.848

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CHAPTER 7

Discussion and Conclusion of Dissertation Findings

7.1 Discussion

This dissertation examined population-based programmatic efforts conducted by local health departments to combat the obesity epidemic through the initiation and participation in partnerships with other organizations within the local public health system. This research focused on the establishment of partnerships with community-based organizations that may be situated inside racial/ethnic minority communities, which are most adversely affected by the obesity epidemic. This study used primarily secondary data analysis, complemented by a few key stakeholder interviews for contextual purposes to conduct two studies: 1) whether LHD organizational characteristics such as infrastructure, resources, and workforce influence LHD obesity prevention partnerships and 2) whether these LHD obesity prevention partnerships decrease county-level obesity prevalence. This chapter summarizes findings from the two studies conducted for this dissertation, augmented with relevant findings from key informant interviews. This chapter also details limitations, strengths and future directions and provides recommendations for the preceptor organization, the Los Angeles County Department of Public Health. These recommendations are intended to increase the effectiveness of its obesity prevention activities.

7.2 Factors contributing to local level obesity prevention partnerships

Partnerships between members of the local public health system, including nonprofit organizations, government agencies, managed care organizations and universities should be considered as ways to improve the capacity and reach of the organizations involved (Mays, McHugh et al. 2006). The results of this dissertation show that a high proportion of LHDs are providing obesity prevention programs, with an average of 4% or less reporting no obesity prevention activity in 2008. LHDs provided chronic disease prevention and nutrition education programs slightly more frequently than physical activity programs. The relatively high proportion of LHDs that provide obesity prevention programs could be a natural response to the obesity epidemic. Although the obesity epidemic may be leveling off, the obesity epidemic still finds a third of the U.S. adult population remains obese (Flegal, Carroll et al. 2012). The two organizational characteristics associated with LHD decisions to initiate partnerships for obesity prevention were the size of the population served and whether there was oversight by a local board of health. However, the factors relevant to LHD partnering for obesity prevention differed depending on the type of obesity prevention activities were undertaken (chronic disease, physical activity and nutrition activities).

Findings from this dissertation also show that the probability of partnering to provide all three types of obesity prevention activities increased with the size of the population served. Population size was also related to the direct provision of obesity prevention activities, which may suggest a greater concentration or focus on obesity based on community need. Researchers have suggested that larger LHDs, which are primarily located in larger jurisdictions, may perform better than smaller LHDs due to

less centralized control from the state and the ability to be creative with public health solutions (Mays, McHugh et al. 2004). This is also relevant to the finding that LHDs in multi-counties and city-county jurisdiction types were also less likely to partner to provide chronic disease and nutrition education-related programs, respectively. Additionally, larger LHD and health departments situated in larger jurisdictions likely benefit from economies of scale that improve their ability to provide obesity prevention activities.

The presence of a local board of health was positively related to partnering with local organizations to provide chronic disease and nutrition education-related obesity prevention activities. However future research needs to assess the structure of the local board of health and whether the governing power of the board affects whether LHDs partner with local organizations to provide obesity prevention strategies. Having similar efforts that support and sustain efforts such as chronic disease surveillance was inversely related to partnering to provide activities. LHDs that provided chronic disease surveillance and epidemiology services were less likely to partner with local organizations to provide chronic disease or nutrition. It is likely that limited funding and competing demands within the LHD prevent them from focusing attention and efforts on both activities.

An unexpected finding that arose from examining the effect of LHD organizational characteristics on the structure of LHD obesity prevention activities (Chapter 5) was that increases in resources, both expenditures per capita and local revenue sources decreased the likelihood that the LHD would have no involvement in providing obesity prevention programs. For example, the relative risk ratio of LHDs

providing physical activity promotion programs directly relative to LHD not providing physical activity programs would be expected to increase by a factor of .501 (.082) and .984 (.005) respectively, if LHD expenditures per capita and local revenue sources increased. The relationship observed with respect to expenditure per capita can also be seen for chronic disease prevention and physical activity programs. Although this finding isn't alarming, I expected to see similar associations between increased resources and improvements in obesity prevention partnership activity. This finding suggests that LHDs with greater resources have the ability and means to implement more obesity prevention strategies. The Community Transformation Grants (CTG) provided to LHDs in 2011 provided a unique opportunity to examine the effect of increased funding on obesity prevention programs delivered both directly and in partnership inasmuch as the CTG required that a substantial proportion of the grant be spent on subcontracts to community partners.

7.3 Effectiveness of Local health department obesity prevention partnerships

This dissertation found that the majority of LHDs are involved with obesity prevention activities within their jurisdiction in some capacity, either providing activities directly or in partnership with local organizations. Furthermore, LHDs are more likely to partner with local organizations when providing nutrition education-related activities. These results suggest that different mechanisms or factors may influence LHD initiation and participation in local obesity prevention activities. Considering that women are typically more interested in diets and responsible for the purchasing and preparation of food within the home environment (Bowman 2005, Satia, Galanko et al. 2005), future

research should examine whether nutrition prevention programs are more likely to improve the dietary habits and obesity outcomes of women relative to men.

One of the main objectives in this dissertation was to examine the effect of LHD community-based partnerships on changes in obesity prevalence affecting the populations that they serve. The multivariate analyses conducted for this study failed to detect an association between LHD obesity prevention partnerships and county-level obesity prevalence. However, other studies examining the effects of LHD obesity prevention efforts on county-level obesity observed similar results (Chen, Roy et al. 2012, Stamatakis, Leatherdale et al. 2012). The average change in obesity prevalence between survey years examined in this study was relatively small which also likely to reduces our ability to find a significant association with LHD obesity prevention activities.

LHDs responsible for whole counties were less likely to see a two-year increase in obesity prevalence between 2008 and 2010, as well as 2010 and 2012 compared to LHDs with mixed jurisdiction types. These findings suggest that the size/type of the community being served may play a role in the provision of obesity prevention services. Results from previous explorations confirm the impact of the size of the population being served on LHD performance. It is plausible that county LHDs benefit from less control from the state regarding what health promotion / disease prevention strategies to implement, having a greater number of community organizations focused on obesity prevention within their catchment area and the increased interest of these organizations in partnering with a full-service LHD.

7.4 Recommendations for Los Angeles County Department of Public Health

The Los Angeles County Department of Public Health currently provides an array of programs and services from multiple domains of the social ecological model to combat the extensive obeseogenic environment in which its 10 million residents reside. These activities are provided directly by the local health department as well as in a collaborative fashion with a diverse set of community stakeholders. Organizations or entities that the LAC DPH currently partners with to implement obesity prevention activities include cities, schools, faith-based organizations, universities and community based organizations or nonprofits. Several significant factors that influence the ability of the LAC DPH to initiate community-based partnerships to deliver obesity prevention strategies were identified from the secondary data analyses and key informant interviews conducted with multiple directors from the LAC DPH that are responsible for delivering chronic disease prevention efforts within the county. The following recommendations are suggested for improving Los Angeles County Department of Public Health partnership efforts:

Recommendation #1- Continue to identify unique partners

Secondary data analyses were unable to confirm that partnerships with community-based organizations decrease county-level prevalence estimates of obesity, however given the limited funding and staffing of LHDs, they should continue utilizing partnerships with community based organizations to increase capacity and reach, especially to effect change in the most adversely affected communities. It will be helpful to the Los Angeles County Department of Public Health to identify how to build and maintain effective chronic disease programs within the limited budgets currently available. Furthermore, all key informants interviewed valued the use of partnerships to

deliver chronic disease prevention activities. However some organizations or entities were considered to be more effective partners because of their broad approach and ability to affect more upstream causes of obesity or adopt policies that address the more upstream causes of the obesity epidemic.

The findings from study 1 (Chapter 5) regarding the ability to form partnerships relative to the size of population served suggest that the Los Angeles County Department of Public Health should have adequate opportunities to form partnerships with members of the local public health system to improve the health of the 10 million residents in their jurisdiction. For a large county like Los Angeles, identifying and recruiting the largest number of potential community partners may involve the formation of coalitions, a set of dedicated organizations interested in focusing on reducing the burden of obesity in Los Angeles County. As with other types of community-based health promotion programs, coalitions developed with a common agenda and with trustworthy and reliable members can be effective at different stages of project implementation and enhance the variety of approaches available to address a specified challenge (Brownson and Bright 2004).

Prior research conducted by eight local public health departments and community-based organizations have supported the use of partnerships to implement a community-driven environmental and policy approach to obesity risk reduction (Schwarte, Samuels et al. 2010). This experience highlights the benefits of and support for forming partnerships for obesity prevention. Thus, DPH should organize obesity prevention coalitions or convene a set of community partners that they can readily access to implement obesity prevention activities.

Recommendation #2- Identify ways to decrease administrative burden

One of the barriers most commonly reported by the stakeholders from the Los Angeles County of Department of Public Health interviewed was the administrative process of establishing official contracts. The lengthy time requirements of this process were viewed as a major hindrance to achieving the objectives and activities potentially deliverable through community partnerships. This major hindrance was seen as seriously decreasing the LAC DPH's ability to achieve population-level health changes outcomes. A recommendation to the department is to work with the administrative office and the Board of Supervisors to develop forms or procedures that could decrease the time it takes for the LAC DPH to establish formal partnerships. This may include developing a database or system for previous community collaborators that can expedite the contract review process.

Recommendation #3- Educate Community-based organizations on processes of LHD

Among the factors identified that influence the DPH's ability to form partnerships with community-based organizations is community-based organizations' lack of knowledge and understanding of the DPH's organizational and grant processes. It was suggested that a more thorough understanding of the processes of the DPH would lead to more effective partnerships and improve transparency. Thus a recommendation to DPH is to develop a fact sheet or hold an annual meeting regarding the grant process within DPH that can be used to educate community-based organizations interested in partnering with DPH on obesity prevention activities.

7.5 Limitations of study

The findings of this study should be considered in light of some limitations.

Study sample and generalizability of results

One limitation of this study is the use of self-reported LHD obesity prevention program activity. The NACCHO survey was mailed out to Directors of LHDs and asked whether they partnered with state, local agency, CBO or other organizations within their jurisdiction. At present, the validity of this information has yet to be substantiated. However the current data provide our first understanding of LHD capacity to partner with other organizations to implement obesity control strategies and policies. Additional research is needed on the validity of this information and on other organizations within the local public health system that LHDs may partner with to provide prevention efforts. The NACCHO survey used in this study did not include a set of specific questions about LHD obesity prevention partnerships activities in 2010 and the 2008 survey was limited to 3 to 4 types of organizations within the local public health system.

Originally, this dissertation planned to also assess the LHD role in the adoption of obesity prevention policies. Due to survey design limitations, this dissertation was unable to assess the effectiveness of LHDs to improve the obesity prevention policies. However, the key informants interviewed stated that they regularly partnered with organizations that can influence chronic disease and obesity outcomes. LHDs' ability to address the social determinants of health will likely be most effective through the adoption of obesity prevention policies within their jurisdiction (Yancey, Fielding et al. 2007). Therefore, there is a need to understand factors that improve a LHD's ability to influence policy. The 2013 National Profile Survey includes questions regarding LHD partnerships with community organizations as well as policy and advocacy activities. The current report suggests that many LHD partnering experiences can be categorized nine different ways, with the majority of chronic disease program partnerships involving networking (30%),

collaborations (20%), and coordinating activities (17%) (National Association of County and City Health Officials (NACCHO) January 2014). Future studies should assess the effect of policy activities and partnerships to assess their impact on obesity prevalence using the most current data on LHD characteristics.

LHDs of geographic regions smaller than a county were excluded from this study; thus study results are not generalizable to these LHDs. Previous literature has shown that LHDs in rural areas have limited capacity to generate local public health activities, because of limited funding. Through economies of scale, LHDs with a population size of 50,000 are able to spend 30.7 percent less on a per capita basis than LHDs with 10,000 people (Santerre 2009). Furthermore, the smaller centralized LHDs may not have observed an effect because they have less decision-making authority as to what health promotion programs should be implemented than larger LHDs.

Omitted variables

Ultimately, unobserved and other latent factors not included in this study influence LHDs' ability to partner to provide obesity prevention strategies designed to generate population change. A limitation of this study was the inability to assess multiple domains of obesity preventions, such as policy adoption. Researchers have suggested that in order to reverse the obesity epidemic, the local public health system needs to focus efforts on addressing the upstream, social determinants of disease (Yancey, Fielding et al. 2007). Further research needs to examine the impact of policy adoption on county-level changes in obesity prevalence.

Negative Effect of Testing Hypotheses Multiple Times

Each of three LHD obesity prevention program areas (i.e. chronic disease prevention, nutrition-education and physical activity promotion) was examined within each of the models. Apriori hypotheses were developed for this dissertation. However, conducting the same hypothesis testing multiple times increases the probability of type I error, so caution needs to be exercised with respect to interpreting the findings that were "statistically significant."

7.6 Suggestions for future research

Future research needs to identify which of these three areas; physical activity, nutrition or chronic disease prevention are most effective to bringing about obesity risk reduction within local communities. More than likely, it will involve a synergistic approach, with a combination of partnership activity in all three areas and on multiple levels. However, research should identify whether some programs delivered through community-based partnerships are more effective than others. The null results observed in the second study examining the effectiveness of LHD obesity prevention partnerships on decreasing obesity prevalence were consistent throughout all models conducted. However it is plausible that the results are due, in part, to the low variability in percentage point changes in obesity prevalence for the period examined. For example, the mean percentage point change in obesity for men from 2008 to 2009 was 0.006 (.139) and 0.005 (.144) from 2009-2010 for men, with ranges from -0.35 to 0.36 and -0.41 and 0.39 respectively.

Future research should assess the fidelity of local health department obesity prevention programs delivered through partnerships. Although the aggregate effect in change in obesity prevalence is relatively small, the range observed in the percent point

change in obesity prevalence suggests that there is a need to assess the relative success of LHD obesity prevention partnership efforts under certain circumstances and within varied subgroups of the populations such as low income and racial/ethnic minorities communities. Evidence has suggested that the impact of preventive strategies can vary according to socioeconomic status. For example, racial/ethnic minorities and low-income individuals may face a considerable number of additional structural barriers to healthier lifestyle choices such as limited financial resources (Blakely, Lochner et al. 2002, Monsivais, Aggarwal et al. 2012) or negative neighborhood environmental factors (Abercrombie, Sallis et al. 2008, Cohen, Han et al. 2012). Sallis and colleagues found that high and low income individuals benefited from living in highly walkable neighborhoods (Sallis, Saelens et al. 2009), which highlight the benefit of improving the social determinants of health and supports examining the effect of LHD obesity prevention efforts within subpopulations of the jurisdictions they serve.

Lastly, additional research is needed regarding the rationale for community partnerships and the types of partnerships that are most effective. This study focused on community-based organizations, however there could potentially be other organizations that LHDs could partner with to more effectively reduce the burden of the obesity epidemic. Results from the key informant interviews influenced perceptions regarding the utility of partnerships with community-based organizations. I still believe they are fundamental to LHDs' ability to deliver obesity prevention efforts and disseminate effective behavioral strategies in adversely affected communities. However, a few of the informants also highlighted strengths of partnerships with other organizations in the local public health system. For example, informant #3 stated that partnering with cities or

schools that have the ability to adopt formal policies is of interest to her. The type of organization involved in the LHD obesity prevention partnerships may be more dependent on the strategy, whether the LHD is implementing a program or advocating for a policy.

Furthermore, the quality of partnerships is an aspect of community partnership activity that was largely missing from this dissertation. This dissertation attempted to assess quality through a distal examination of the partnerships' ability to produce expected outcomes. Additional formative research should be conducted with key stakeholders, similar to the key informant interviews conducted for this dissertation, that could increase our understanding of what constituted partnership quality and how this understanding contributed to increased productivity.

7.7 Conclusions

A substantial number of American adults are obese and thus represent a significant public health challenge. Results suggest that local health departments are focused on identifying factors that contribute to the obesity epidemic and attempting to develop effective solutions to reduce the prevalence of obesity and its associated negative health effects.

This study was effective in identifying LHD organizational characteristics that influence their ability to form partnerships, among them population size and the presence of a local board of health. Although it was hypothesized that LHD obesity prevention partnership efforts would decrease county level prevalence, the lack of a significant relationship to obesity prevalence observed in this study is similar to findings in other recent studies regarding LHD direct provision of obesity prevention programs

(Stamatakis, Leatherdale et al. 2012). However, this study attempted to assess the benefit of more upstream efforts to effect changes in local level health outcomes. Previous research has demonstrated the benefit of a public health systems approach at the state level (Kim and Kawachi 2006). The state-level effect observed could be due to states' ability to implement more comprehensive programs and policies with a higher level of autonomy than local health departments have to address upstream approaches to obesity prevention such as taxation and policy level interventions.

Researchers suggest that community-based organizations or nonprofit organizations can capitalize on their unique ability to advocate for change, utilize their unique positions and ease of access to community members, and form coalitions with similar organizations that influence physical activity policies and environmental change (Doyle 2009). Given that LHDs are the core foundation of the local public health system, it is reasonable to expect them to collaborate with organizations in the communities they serve to implement population-based obesity risk reduction programs.

7.8 References

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