

**An Exploration of Policy Activities by Local Health Departments to Improve
Population Health**

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DISSERTATION

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LIST OF ABBREVIATIONS AND NOMENCLATURE

CHA	Community health assessment – regularly and systematically collecting, analyzing, and making available information on the health of a community, including statistics on health status, community health needs, epidemiologic and other studies of health problems, and an analysis of community strengths and resources
EPHS	Essential Public Health Service
HHS	U.S. Department of Health and Human Services
HIA	Health impact assessment
HIP	Health improvement plan – a long-term, systematic effort to address health problems
HiAP	Health in All Policies – a strategy to integrate health considerations into policy analyses and decision-making
IOM	National Academies of Science’s Institute of Medicine
LBOH	Local board of health
LHD	Local health department (also known as local governmental health agency) – an administrative or service unit of local or state government, concerned with health, and carrying some responsibility for the health of a jurisdiction smaller than the state
NACCHO	National Association of County and City Health Officials

LIST OF ABBREVIATIONS AND NOMENCLATURE (continued)

PPACA	Patient Protection and Affordable Care Act of 2010
Personal health services	Generally, individual-focused interventions that detect conditions once they exist (to increase the chance of earlier medical intervention) rather than preventing conditions by influencing socioeconomic factors
Policy activity	An evidence-based activity utilizing external policy levers to evoke change and achieve a goal. Policy is a guide to thinking and action (e.g., directive) for those responsible for making decisions. Activity is a means (direction or roadmap) to mobilize resources (e.g., people, organizations) towards a common goal to achieve a vision.
Population-based services	Services that protect and promote healthy conditions and the health for the entire population
Public health system	Individuals and public and private entities that are engaged in activities that affect the public's health
Services	Programs, policies and practices intended to improve the health of populations
UIC	University of Illinois at Chicago

SUMMARY

There is a growing national recognition that policy strategies to improve population health are needed in the United States. Policy development is a public health core function. This exploratory study comprised a quantitative secondary analysis of data from the National Association of County and City Health Officials' 2010 Profile Questionnaire to determine what characteristics were associated with local health departments participating in policy activities to improve population health. The questionnaire was fielded to a population of 2,565 local health departments in the United States. The questions for the outcome of interest, policy activity directed at the local level of government, were fielded to 625 local health departments, 516 of which responded to the survey. Local health departments that were missing data for any of the study variables were excluded, leaving 337 local health departments for the analyses. The most common policy activity undertaken by local health departments was communicating with a policymaker (69%). The least common policy activity undertaken by local health departments was providing [policy] technical assistance (43%). Characteristics represented by independent variables, selected or created from the questionnaire, were grouped into three domains—local health department characteristics, service area characteristics, and leader characteristics. Descriptive and analytic statistics were computed using SAS survey procedures for complex sampling design. Two multivariable models were developed using either an a priori approach or a domain-driven approach. Governance type (AOR=1.69, $p<.0001$) and population served (AOR=4.31, $p<.0001$) were consistently and significantly associated with more policy active local health departments and were the variables in the final a priori model. Other important variables included: a leader that held a public health degree, the gender of the local health department leader, five occupation categories, the local board of health's policy authority, and three

variables (community health assessment, health improvement planning, and health impact assessment) that are indicative of a high-functioning local health department. Practice improvements are needed with respect to small- and mid-sized populations, governance, and workforce development. Further research is needed on what and how characteristics are associated with policy development as well as how and why local health departments and their leaders are pursuing policy development.

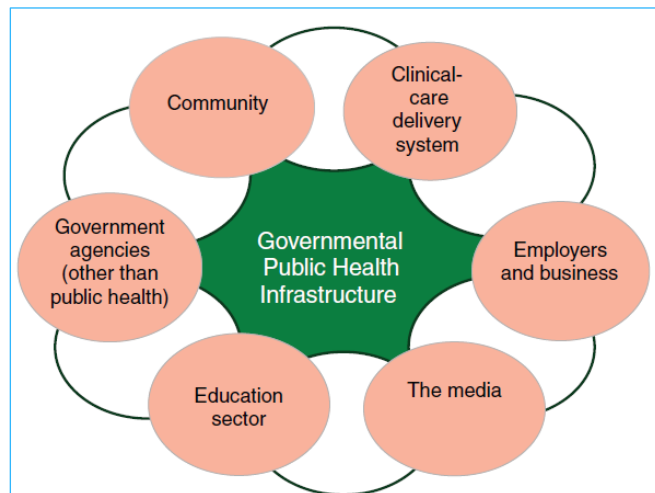
I. INTRODUCTION

A. Background

The United States of America (U.S.) life expectancy grew by approximately 30 years during the 20th Century (HHS, 1999). While estimates vary, approximately two-thirds of that increase was related to public health activities (Institute of Medicine [IOM], 2011; Monroe, 2011). Improvements in living (e.g., nutrition) and working conditions, and prevention and control measures, remarkably decreased incidence and prevalence of infectious diseases; and contributed to increased life expectancy (Ford, Duncan, & Ginter, 2005; IOM, 2011; Monroe, 2011).

The IOM (2011) describes the public health system as “an enterprise—society's collective effort to create conditions for people to be healthy,” (Figure 1). The U.S.

FIGURE 1. The public health system

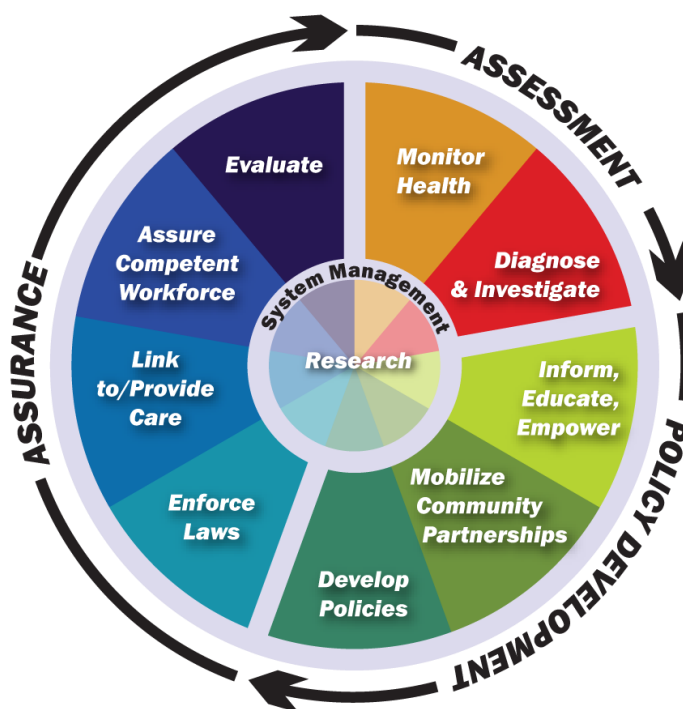


Source: IOM, 2011

Department of Health and Human Services (HHS) defines the public health system more precisely as, “all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction” (HHS, 2013). The public health system components should collectively ensure, evaluate, and continually improve the quality of three core functions—assurance, policy development, and assessment—and ten corresponding Essential Public Health Services (EPHS) in all communities (Figure 2) (HHS, n.d.).

Local health departments (LHD) can play a key role within the public health system. The National Association of County and City Health Officials (NACCHO, 2011) defines a

FIGURE 2. Public health core functions and essential services



Source: HHS, n.d.

LHD as “an administrative or service unit of local or state government, concerned with health, and carrying some responsibility for the health of a jurisdiction smaller than the state.” First, because governments “may create and enforce laws and policies to regulate risks to population health and safety,” LHDs have the legal authority to carry out prevention and mitigation activities (IOM, 2011; Tilson & Berkowitz, 2007). Second, because LHDs are in communities, they are uniquely positioned to collect, analyze and synthesize community health data that, in turn, initiate and drive programs, policies and practices to prevent adverse health effects such as chronic conditions and intentional injuries. LHD connection to the community can also facilitate formal and informal relationship-building with organizations, local policy makers, and citizens.

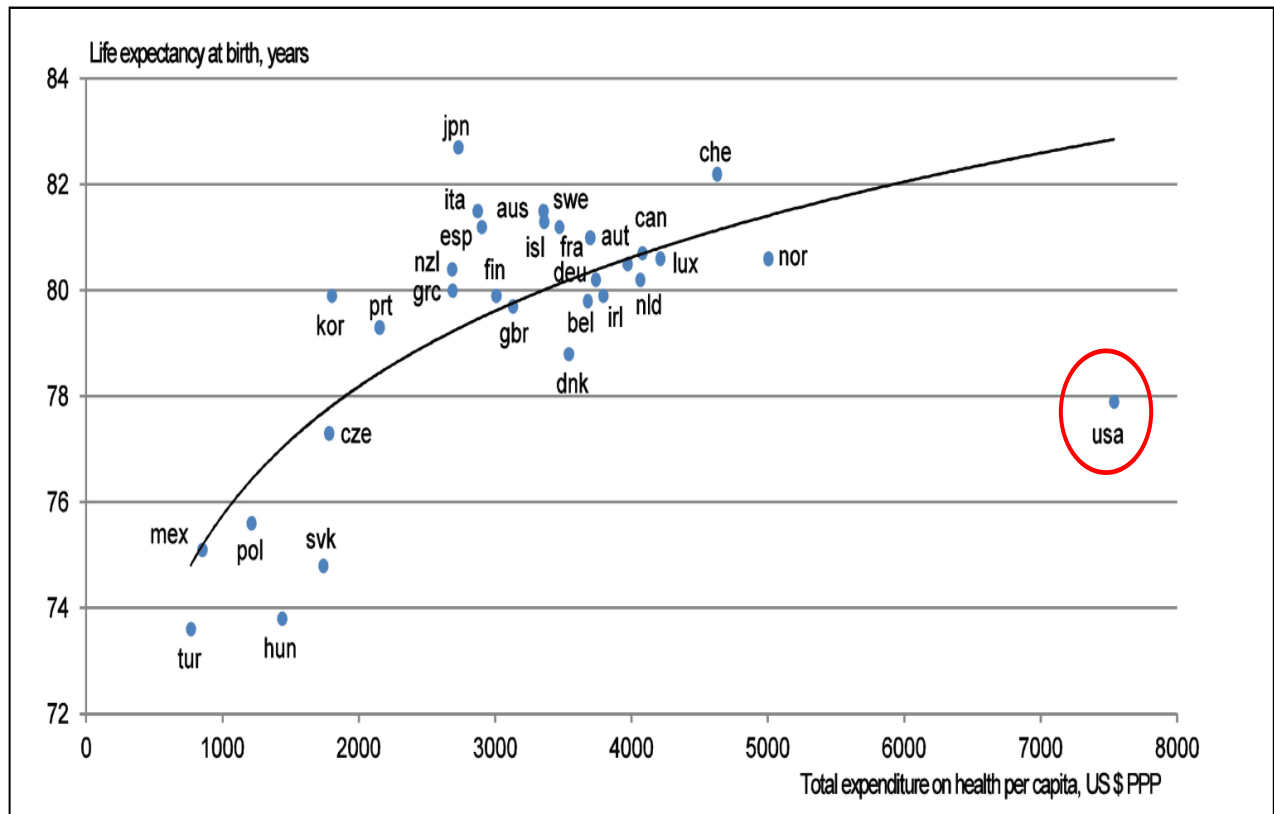
A formal connection with the community can be through a local board of health (LBOH). During a systematic review, Hyde and Shortell (2012) found that 80% of LHDs are governed by a LBOH (that comprise a cross-section of the community); however, LHDs that are a unit of a state health department are less likely (22.2%) to have a LBOH than LHDs that are a unit of a state health department (87.1%). LBOHs are typically described as having a policy-making (54%) or advisory (46%) role, with local jurisdictions in less-populous states more likely to have policy-making boards (Hyde & Shortell, 2012).

The specific responsibilities of any given LHD are shaped by community expectations (including those expressed through a governing board), assessed needs, state statutes, and local ordinances. Nationally, the scope and emphasis of LHDs’ services have shifted over time—among population-based, prevention, and personal clinical services—within the core public health functions. LHDs have collectively focused on both individual-focused clinical services (e.g., cancer screening, sexually transmitted infection treatment) and

population-based prevention services (e.g., clean water, safety belt statutes). The U.S. health improvements made during the 20th Century were, in part, due to LHD service provisions that shifted in response to the health threats and vulnerabilities of the time and within the geopolitical and socioeconomic context of the time (e.g., the evolution of managed care, Maternal and Child Health Block Grant financing) (Miller, Moore, & Richards, 1993; Wall, 1998).

The leading causes of deaths in the U.S. shifted from infectious diseases during the 20th Century to chronic conditions during the 21st Century (Hoyert & Xu, 2012). Many of the chronic conditions are influenced by community, environmental and lifestyle factors. This suggests that an individualistic, biomedical model might not be the most effective or cost-efficient approach to meaningfully improve the population's health.

Largely preventable chronic diseases cause seven out of ten deaths; and consume more than 70% of the U.S. health spending (Rein & Ogden, 2012) (Luo, Sotnikov, Shah, Galuska, & Zhang, 2013). The U.S. is spending more money on medical care per capita than other industrialized countries (Figure 3). Yet, the U.S. experiences lower health status, indicated by mortality, morbidity, and loss of potential productivity (e.g., 24th in life expectancy in 2006) (Braveman, Egerter, & Mockenhaupt, 2011; IOM, 2012; Monroe, 2011). The IOM (2012) reported that, "Research suggests that one-third of all medical expenditures does not lead to improved health outcomes." Since medical expenditures account for nearly all health expenditures, this might represent a significant waste of resources.

FIGURE 3. Life expectancy at birth and health spending per capita, 2008

Source: IOM, 2012

Central to current thinking is how public health leaders and their organizations can make the maximum positive population health impact. How might the U.S. reduce costs yet improve health outcomes? One approach is to increase public health cost-efficient and population-based activities—particularly policy activities (Rein & Ogden, 2012).

B. Statement of the Problem

Policy activities—evidence-based activities that use external policy levers to evoke change and achieve a goal—are increasingly seen as effective approaches for maximizing

positive population health impact. Policy development (arguably, all phases of policy analysis rooted in systems analysis) is one of the core functions of public health. Given the LHD's essential role in the public health system's implementation of the core public health functions, it is important to build and sustain public health system—including workforce—capacity for policy analysis, improve policy impact and quality, and evaluate promising practices to generate evidence based practices for the policy development core function. To do this, researchers and practitioners must understand: 1) how and why LHDs are conducting policy activities; 2) how LHD leaders are managing the organizational or system change necessary to improve their policy development capacity and impact; and 3) how LHD leaders are determining whether their policy activities are effective. However, **public health practice literature does not address policy development as thoroughly or uniformly as it does for the other two core functions—assurance and assessment.**

C. Purpose of the Study

The purpose of this study was to explore factors that might be associated with LHDs conducting policy activities to improve population health in their communities. The overarching study question was: “What factors are associated with LHDs implementing policy activities to improve population health?”

Specific questions included:

1. What LHD organizational characteristics are associated with policy activity?
2. What community (“service area”) characteristics are associated with LHD policy activity?
3. What LHD leader characteristics are associated with policy activity?

D. Significance of the Study

This study contributes to national public health practice by answering a quantitative “what” question that precedes informed quantitative and qualitative “why” and “how” questions. These foundational data and results might be useful for practitioners that are interested in public health systems research, public policy or public administration. The data and results might also inform future research questions and, subsequently, priorities and strategies to improve local policy activities and outcomes.

E. Leadership Implications and Relevance

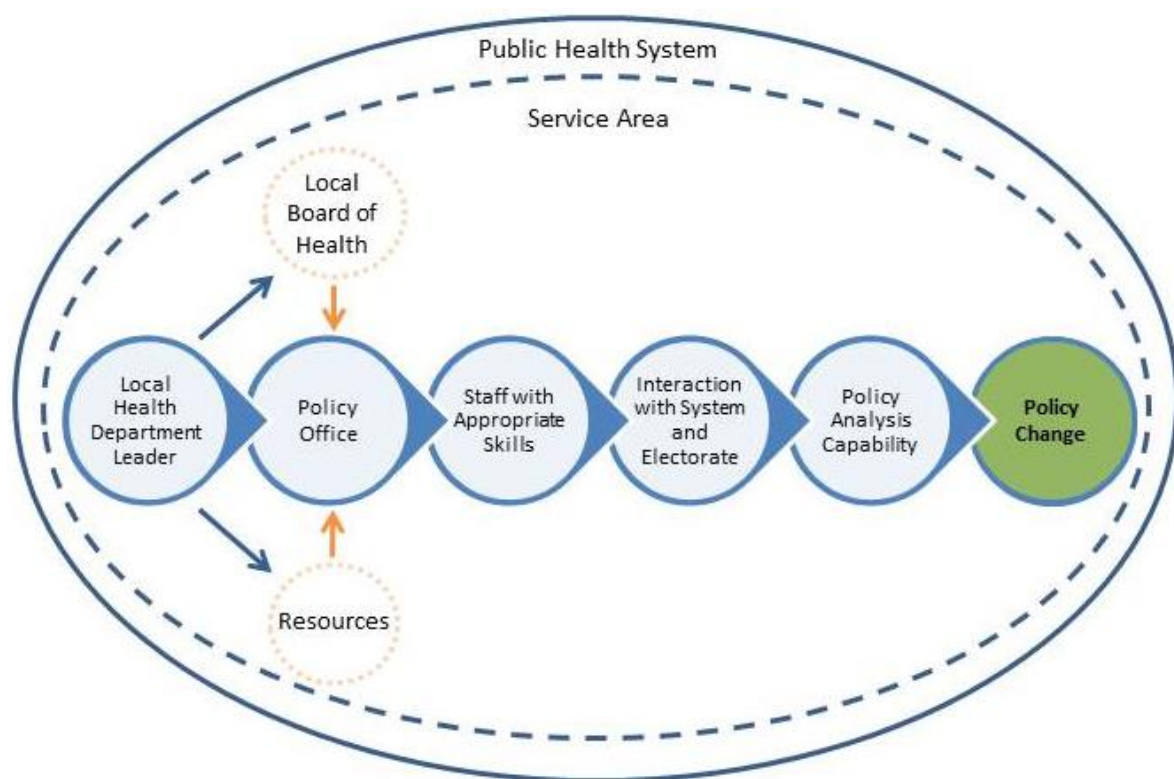
To fully address current conditions affecting population health, public health leaders strive to have their LHDs: 1) strategically utilize effective policies; and 2) play a central and proactive role within a public health system. Leaders could potentially use this study’s results to understand the LHD organizational capacity needed to support optimal policy development within their local public health systems. Greater understanding might enable leaders to prioritize investments and serve as champions within their public health systems and communities for policy approaches to improve population health. It might also be useful background information for practice-based researchers that are interested in examining: how organizational change is being driven and managed within LHDs to improve the policy core function, what factors increase the effectiveness of implementing policy activities, and why LHD leaders that undertake a significant amount of policy work do so.

II. CONCEPTUAL FRAMEWORK AND RELATED LITERATURE

A. Conceptual Framework

The conceptual model for improving population health by using policy to create change is seen in Figure 4. For any given community (i.e., service area) the public health system is functionally responsible for policy development. The public health system can include components that are and are not physically located within the local community. The LHD, a critical component of the public health system, is directed by an executive. An executive that understands the ecological model and systems can articulate the value of policy to address threats to, and leverage opportunities for improving, population health. An executive that is a leader, demonstrating vision and inspiring innovation, might be more likely to develop a policy office. The creation and sustainment of a policy office are affected by many factors, including financial and other resources and the LBOH's support. Resources and LBOH support can also be influenced by an effective leader. An optimally functioning office is dependent upon a staff with the appropriate skills needed to conduct policy analyses. Appropriate skills include both technical skills (e.g., economic evaluation, stakeholder analysis) and social skills. Social skills are necessary to build social capital and sustain bidirectional communications with stakeholders, including the community; and effectively work with the other public health system components. Community and public health system engagement can be done for the purpose of enabling the LHD to conduct a variety of tasks necessary to complete policy analysis process steps such as: problem definition, evaluative criteria establishment, alternatives analysis, or evaluation. Together, these elements—leadership, skilled staff, resources, community and public health system engagement—are

FIGURE 4. Conceptual framework



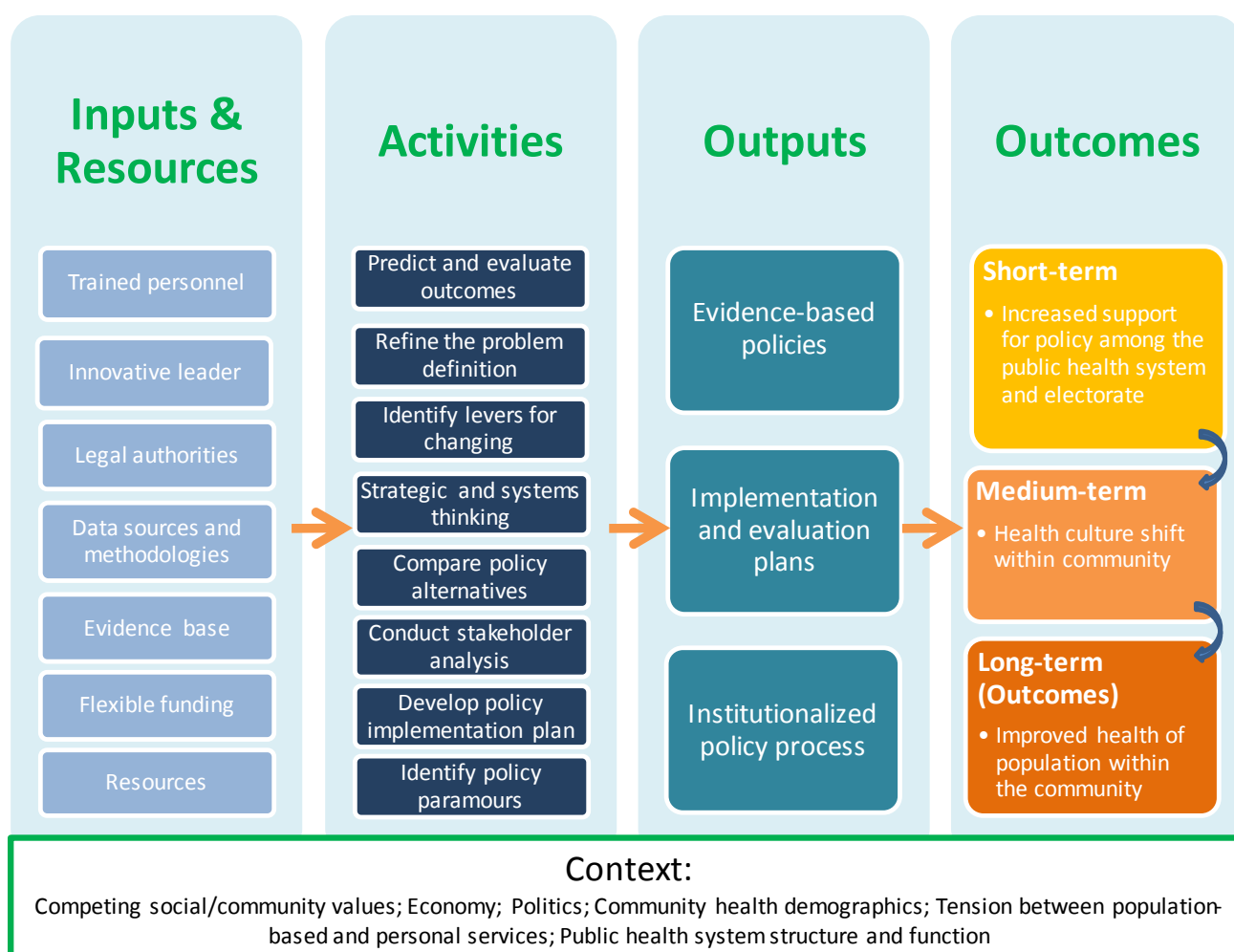
essential for the LHD to have policy analysis capability. Policy analysis capability leads to a greater chance of success in creating policy change that improves population health.

The conceptual model is focused on LHDs and communities. While NACCHO reported percentages of LHD general policy activity, the scope of this study was local policy activities rather than state and Federal policy activities. The study also intended to examine (descriptively and analytically) several characteristics in three conceptual areas: organizational, community (i.e., service area), and leadership. It was possible that multiple characteristics could increase the likelihood of increased policy activity.

B. Logic Model

The logic model clarified the inputs and activities that LHDs might need as the center of the public health system to implement population-based policy activities in their communities (Figure 5). It also included anticipated outputs and outcomes. Because LHDs

FIGURE 5. Logic model



must allocate resources to successfully carry out their functions and have a positive impact on health, the logic model included some potential factors that might be present in the strategic environment. While the public health core function of interest is “policy development,” many policy analysis functions (i.e., not only development) are important for population-based public health investments and are reflected in the logic model. This study focused on the inputs and resources and the activities components of the logic model.

C. Review of Related Literature

The literature review was conducted using PubMed, Scopus, Web of Science and Google Scholar databases. Search terms most frequently used were “[local health agency OR local health department OR local government] AND [policy development OR policy activity OR policy OR core functions].” When a relevant article was found, the titles of articles that cited the article were also reviewed. The *List of Peer Reviewed Publications using NACCHO National Profile of Local Health Departments Data*, found on the NACCHO website, was reviewed to determine whether any of the citations might be relevant for this study. Additionally, the Public Health Services and Systems Research Reference Library was downloaded from the National Coordinating Center for Public Health Services and Systems Research website and relevant articles were reviewed.

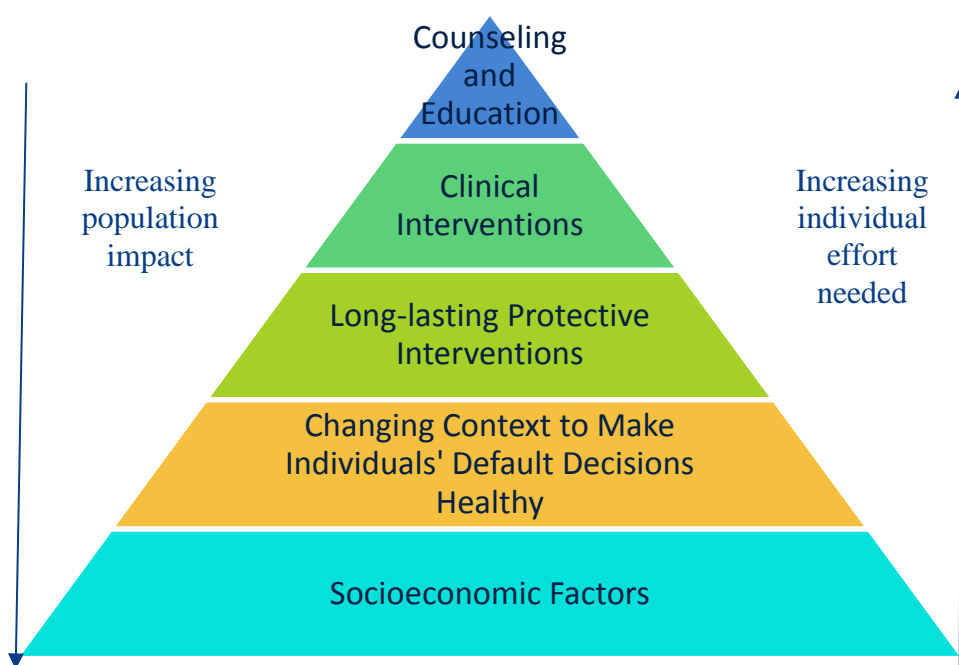
Population-based strategies

Evidence suggests that implementing population-based strategies in the U.S. would help achieve greater health value—both in health outcomes and cost savings (Monroe, 2011). First, other developed countries that differ from the U.S. in areas other than healthcare (e.g., education) have spent less on health and obtained better results (HHS, 1999; IOM, 2012). Second, two-thirds of the increases in U.S. life expectancy during the 20th Century occurred

prior to the major biomedical advances and are attributed to public health activities (e.g., sanitation, food safety) (HHS, 1999). Third, the main causes of today's poor health (e.g., violence, diet) are “not primarily solvable or preventable by clinical care but are amenable to population-based approaches,” (HHS, 1999; IOM, 2012). In short, there is a growing recognition that public health intervention is needed because medical care alone can't improve the Nation's health.

Frieden (2010) proposed a framework—the Health Impact Pyramid—that communicates a range of public health approaches and the value of population-based approaches versus solely individual-based approaches (Figure 6). Frieden and others urge

FIGURE 6. Health impact pyramid



Source: Frieden, 2010

public health practitioners need to focus on social determinants of health and policy activities to increase population impact (Monroe, 2011). Social determinants of health are ‘the conditions in which people learn, live, work and age,’ (Braveman et al., 2011; World Health Organization [WHO], n.d.). They can be thought of as environmental risk factors rather than personal risk factors (e.g., genetics), that influence quality of life and the risk of injury and disease (WHO, n.d.). Public health practitioners could work with communities to change the environmental context in which people live so that healthful choices are possible and easy to make. Social and environmental factors play a large role in influencing healthy behaviors and exposure to modifiable risk factors (e.g., obesity); personal lifestyle is socially conditioned (Woolf, Dekker, Byrne, & Miller, 2011). While clinical interventions and health education have a place, they might have less public health impact because they rely on long-term behavior change of individuals, sometimes without community or cultural reinforcement (Frieden, 2010). The Robert Wood Johnson Commission to Build a Healthier America reinforced the need to focus on the bottom tiers of the Health Impact Pyramid by advising public and private sector policymakers to foster health-promoting environments (Robert Wood Johnson Foundation, 2013; Woolf et al., 2011).

Policy as a population-based strategy

Effective public health policies, used strategically, can improve population health. Each of the ten greatest public health achievements of the 20th Century was influenced by policy change... such as seat belt laws or regulations governing permissible workplace exposures (Bowman et al., 2012; Brownson, Seiler, & Eyler, 2010; Chriqui, O'Connor, & Chaloupka, 2011). Policy intervention strategies have also proven to be effective in tobacco control and environmental health (Luo et al., 2013). With respect to obesity, a remarkable

health challenge of our time, Novak and Brownell (2012) reported that “recent cost-effectiveness analyses of treatment and prevention strategies suggest that policy interventions are the swiftest and most cost-effective way of creating change,” citing food and beverage taxes, new nutrition labeling and changes in marketing to children.

Expanding the evidence base

Like other public health strategies, policies must be evidence-based—utilizing a policy analysis model “or other continuous process that uses the best available qualitative and quantitative evidence” (American Public Health Association [APHA] and Public Health Foundation [PHF], 2012; Brownson et al., 2010). Scutchfield, Mays, & Lurie (2009) wrote that current public health practice needs are out ahead of the public health systems research needed to inform practice. Public health leaders and researchers might develop closer relationships so that research can expediently and robustly: 1) address policy-related questions; and 2) be translated into public health services including policy (Campbell et al., 2009; Jansen, van Oers, Kok, & de Vries, 2010). The authors of the *National Prevention Strategy* (2011) acknowledged the need for evidence-based practice by stating that the National Prevention, Health Promotion, and Public Health Council will work to align policies and programs and use emerging evidence to update policy recommendations.

Practice considerations

Data sources and practical methodologies will be needed to predict potential outcomes of policy alternatives and evaluate actual outcomes of policy implementation. Metrics, including those that might be unfamiliar to some public health leaders (e.g., polling, tax revenue and marketing data), are particularly important “to help decision makers improve, expand or terminate policies,” (Brownson et al., 2010). Brownson, Chriqui, and

Stamatakis (2009) describe a paradox of local policy evidence, “Although much of the effect of public health policy occurs locally, high-quality data are lacking at the local level. A set of consensus policy metrics needs to be developed for local areas as has been done at the national and state levels.” The incorporation of economic metrics is currently not robust and would add value to public health policy work. It could be argued that, as keepers of the public trust, LHD and other leaders should be beholden to include economic evaluation during policy analyses and decision-making. Policy surveillance systems should be developed and institutionalized (Brownson et al., 2009; Brownson et al., 2010). Metrics and policy surveillance contribute to an important feedback loop in the policy analysis process. Additionally, Chriqui et al. (2011) stresses the importance of evaluative thinking to inform policy impact evaluations and contribute to decision maker’s accountability and transparency.

Policy is an area of public health practice that highlights the challenges and opportunities created by the intersection of politics, values and science. Community and individuals’ values are important. Key leadership activities are: engaging the electorate; enabling community action; managing change; and working with policy paramours. Policy activities address social and economic structures of society and can be more controversial, particularly if the public does not perceive policy interventions as falling within the government’s appropriate sphere of action (Dunet, Gase, Oliver, & Schooley, 2012).

National context for public health policy

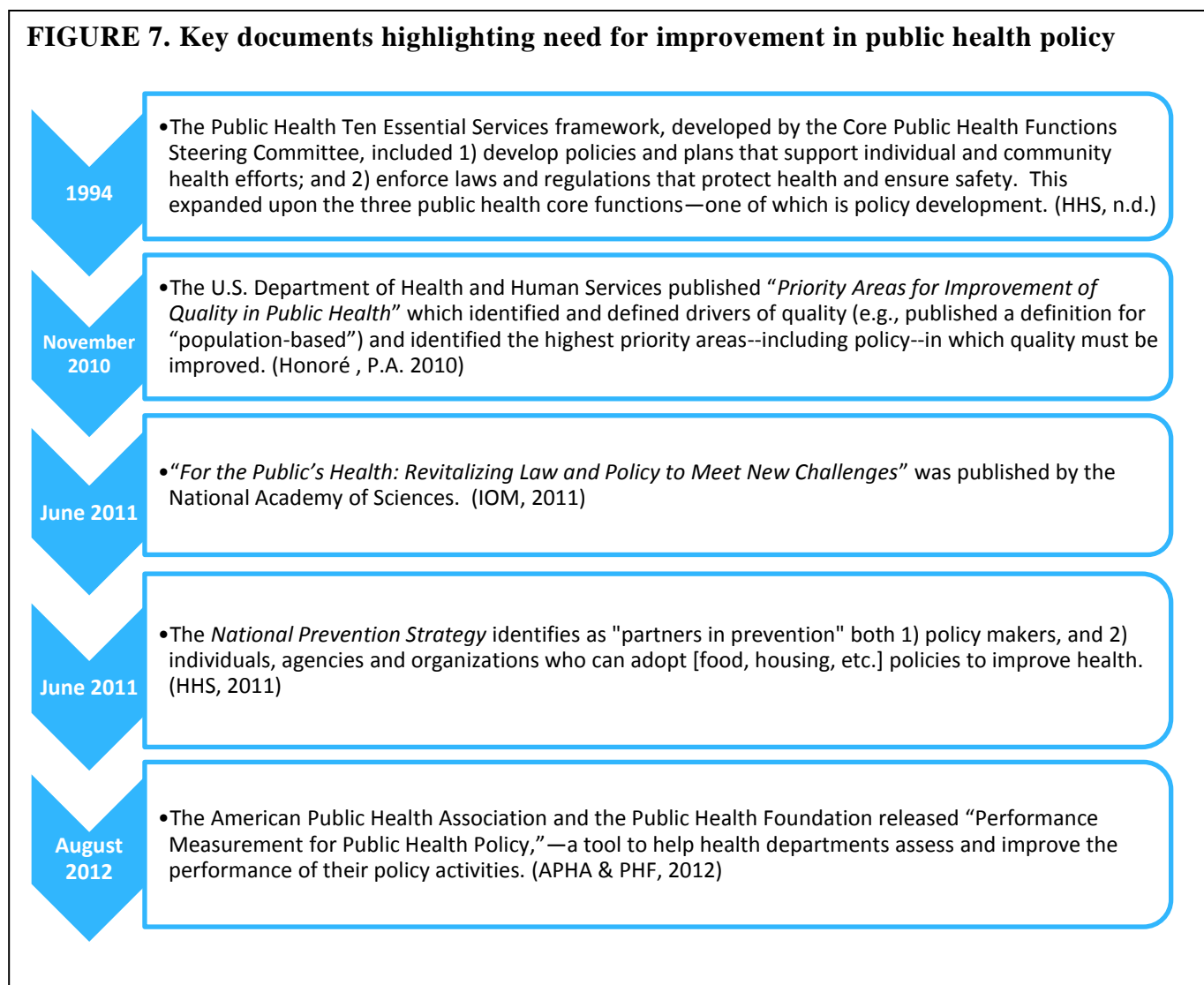
Statute

Codification of the Patient Protection and Affordable Care Act of 2010 (PPACA, P.L. 112-96), as amended by the Health Care and Education Affordability Reconciliation Act of 2010, may create an opportunity for LHDs and the public health system to: strategically organize themselves (considering authorities, assets and strengths); deliberately prioritize investments; and determine roles and responsibilities. While not the focus of PPACA, a few provisions (largely in Title IV) such as the establishment of a Prevention and Public Health Fund to invest in “proven prevention and public health programs” such as through Community Transformation Grants to impact the social, physical, economic, and service environments were included. This indicates that there is some political support or recognition that population-based (including policy) activities are necessary (Davis & Somers, 2011; Frieden, 2010; Rudolph et al., 2010).

“National call”

There has been a national call for improved performance of policy activities. Several key documents have been published in recent years beginning with the Public Health Ten Essential Services Framework (Figure 7), the content of which was previously mentioned. In “*Priority Areas for Improvement of Quality in Public Health*,” policy was selected as a priority area in critical need of improvement to advance U.S. population outcomes (Williams & Redhead, 2010). The selection criteria used to prioritize the candidate priority areas were: the potential for *improvability* of population health processes/outcomes, the potential for standardizing great *practice variability*, and opportunities for *impact* (Honoré & Scott, 2010).

The IOM published a series of three *For the Public's Health* reports, with each report focusing on a major driver of change in the health system—measurement, finance and policy and law (herein referred to “policy”). The policy report described policy as foundational to U.S. public health practice and a driver of population health improvement. Public health leaders, particularly at the community level, are positioned to leverage multi-sector efforts to change the physical, social and economic environments that shape health. Honoré and Scott (2010) wrote, “In recent years the public health community has increasingly demonstrated and recognized the roles that public health policies play in effectuating long-lasting and broad-based population-wide changes.”

FIGURE 7. Key documents highlighting need for improvement in public health policy

To help health departments apply performance measurement to improve the quality of public health policy, APHA and PHF (2012) created a tool, “*Performance Measurement for Public Health Policy*.” The tool presents: 1) a framework for conceptualizing policy goals and activities, and 2) sample measures by major policy change stage (e.g., problem

identification and definition, impact evaluation). It also describes the necessary elements for a robust performance management system:

- “Objective standards of performance with targets or benchmarks to be met,
- “Reliable reporting of measures to intended users of the indicator data, and
- “A program or process to manage change and quality improvement in policies, programs, processes, or infrastructure based on performance standards, measures, and reports,” (IOM, 2011).

Health in All Policies

The socio-ecological model is still relevant and applicable to the policy context. Many societal forces that shape health originate outside of the health sector; therefore, not all health determinants can be controlled by policies within the health sector (APHA & PHF, 2012). The impact of “non-health” policies on health has been well documented (Woolf et al., 2011). The Health in All Policies (HiAP) strategy is a policy strategy that is population-based and intended to have a significant impact on health by incorporating health considerations into the decision-making processes that are outside of the control of “health” such as agriculture, transportation, finance, and education (Ståhl, T., Wismar, M., Ollila, E., Lahtinen, E., & Leppo, K., 2006). The IOM (2011) recommends that local governments create inter-sectoral health councils and engage diverse stakeholders in the planning process to implement a HiAP strategy. Unfortunately, the processes and mechanisms for HiAP are infrequently documented and rarely evaluated for their effectiveness but this might change as more jurisdictions utilize the strategy (The Aspen Institute, 2013). Leaders can look to Europe for some lessons on HiAP implementation and institutionalization.

Economy

During the recent U.S. financial recession, LHDs have been experiencing budget cuts. This contextual element might play out in various ways. Resources to enforce laws, regulations and policies might be limited. If LHDs generate funds from personal services fees, there might be resistance to lessening those services in favor of population-based activities including policy activities. Ståhl, et al. (2006) found that in some instances resources disproportionately go to Essential Service 7 (service provision rather than assurance); and/or establish a programmatic distraction from population-based activities. However, decreased resources might necessitate investments in the activities that provide the greatest possible population impact.

Policy activity at LHDs

LHDs function within a strategic environment, influenced by political, economic, social, and technological forces, as well as population health trends. These factors might be viewed by LHD leaders and governance entities as both challenges and opportunities during strategic planning and management, policy analysis, and decision-making. These factors also apply when LHD leaders are leading organizational or system change to increase policy capacity.

Policy development core function

Hyde and Shortell (2012) conducted a study of state health departments to determine whether all three public health core functions were necessary to realize population health improvement. While the study was not focused on LHDs, the results are interesting from a policy perspective. They found that assessment, assurance and policy development are all necessary conditions (as opposed to only assessment and assurance without strong policy

development) for above-average health improvements. For superior health status improvements, ‘resource availability’ and/or ‘adaptability/proactivity’ were also needed. The prominent conclusion was that lacking the policy development core function significantly inhibits an agency’s ability to improve the health status of the community (Hyde & Shortell, 2012).

It is possible to consider population-based prevention from an ethical perspective. Assuming that no other organization or sector prioritizes population-based and community prevention activities in a given local community, is it the governmental public health agencies’ and leaders’ ethical obligations to do so—particularly for the policy development core function? In some instances, an increase in policy development work might possibly reduce resources available for LHD-provided personal (clinical) services. This might be met with client and public health practitioner resistance. Hyde and Shortell (2012) stated that many LHD leaders and staffs, because of their clinical orientation and the satisfaction they gain from patient contact, do not want to relinquish their roles as care givers. Further, some LHD staffs have asserted that they meet the unique needs of low-income patients better than private providers do so (Wall, 1998). However, if factors that affect a community—including at risk individuals—can be addressed in a cost effective way, increased attention to the policy core function may be warranted.

Recent activities

LHDs have reported engaging in policy activities. In 2010, over 80% of all LHDs reported communicating with legislators and other policymakers regarding proposed legislation, regulations, and ordinances (Figure 8) (NACCHO, 2011). Only 49% of LHDs reported providing policymaking and advocacy technical assistance (NACCHO, 2011). Public testimony and technical assistance were the policy activities least conducted by LHDs in 2010; these findings are consistent with those in 2008. LHDs serving larger populations were more likely to report policy activities than were those serving smaller populations (Harris & Mueller, 2013). LHDs that were units of local government or shared responsibility

FIGURE 8. Percentage of local health departments with policy activities, by size of population served and type of governance

Activity	All LHDs	Size of Population Served		Type of Governance		
		<500,000	500,000+	Local Government	State Health Agency	Shared Governance
Communicated with Legislators, Regulatory Officials, or Other Policymakers Regarding Proposed Legislation, Regulations, or Ordinances	82%	82%	87%	88%	52%	96%
Participated on a Board or Advisory Panel Responsible for Public Health Policy	67%	66%	90%	74%	42%	66%
Prepared Issue Briefs for Policymakers	58%	57%	84%	65%	33%	49%
Gave Public Testimony to Policymakers	53%	52%	79%	59%	29%	50%
Provided Technical Assistance to Legislative, Regulatory, or Advocacy Group for Drafting Proposed Legislation, Regulations, or Ordinances	49%	47%	78%	54%	32%	39%
<i>n ranged from 496 to 505</i>						

Source: NACCHO, 2011

with a state government were more likely to report policy activities than were LHDs that were units of state health agencies (NACCHO, 2011). NACCHO (2011) reported that 56% of LHD respondents indicated that a new local public health ordinance or regulation was adopted in the jurisdiction during the previous two years with tobacco being the most frequent (31%) content area. Because NACCHO did not ask LHDs about their role in securing the adoption ordinance or regulation, how and to what extent LHDs were involved are unknown.

In the U.S., HiAP is often “implemented” at the local level via the use of health impact assessments (HIA). HIA is commonly defined as “a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population,” (Kemmer, Parry, and Palmer (2004). Harris, Harris-Roxas, Wise, and Harris (2010) proposed a typology and understandable descriptions of four forms of HIA observed in current practice: mandated, decision-support, advocacy, and community-led. LHDs serving jurisdictions with 500,000 or more residents were more likely to have participated in HIAs in the past year, with 26% having participated in one to four assessments during the same timeframe (NACCHO, 2011).

While the NACCHO data might shed some light on LHD policy activity, several studies have shown that the vast majority of financial resources are dedicated to the provision of personal services to patients rather than to population-based services including policy. NACCHO (2011) wrote that funding for personal health services ranged from 53% in Washington to 77% in New York. These findings indicate a potential conflict between current efforts to focus public health service delivery on population-health outcomes and

where resources are actually directed. If strategic shifts in the focus of public health funding and service delivery are to be achieved, a better understanding is needed of the considerations and decision analysis processes used to determine public health funding allocations (Hyde & Shortell, 2012).

Obesity is a content area for which there is a growing body of literature about policy activity. Luo et al. (2013) examined, using 2005 and 2008 NACCHO Profile Questionnaire data, LHD delivery of EPHSs for obesity control. They found that, in both years, only roughly one-third of LHDs developed policies and plans and less than four percent of LHDs enforced laws and regulations (EPHSs 5 and 6 respectively) for obesity in both years.

Potential factors associated with LHD policy work

A variety of LHD, community and leadership factors might be associated with LHD policy activity. Potential factors are drawn from several articles on obesity policy, EPHS performance, and public health systems research.

LHD characteristics

Staffing patterns and characteristics have been found to be associated with overall performance. LHDs with larger numbers of staff, and more staff per population served, performed better on most essential public health services (Hyde & Shortell, 2012). Hyde and Shortell (2012) argued that health departments need new organizational and workforce capacities—including workforce skill in areas such as policy change, the capacity to mobilize communities and collect and report data to public officials, and appropriate funding and infrastructure to support policy activities. Schwarte, Samuels, Boyle, Clark, Flores, and Prentice (2010) found that the presence of a dedicated planning office was necessary to indicate a high potential for effective policy development, and concluded that policy

development, utilizing strategic planning, is correlated with better performance and is worth pursuing.

IOM identified finance as one of the drivers of public health change (Hyde & Shortell, 2012). Several studies have examined the performance of public health agencies in relation to funding resources and types. In a single-state study, Honoré and colleagues found that per capita taxes within jurisdictions were significant in six of the ten EPHSs (Honoré, Simoes, Jones, & Moonesinghe, 2004). Higher-performing jurisdictions averaged 38% greater taxes per capita than lower-performing jurisdictions (\$9.60 vs \$6.96). Ogden (2012) stated that grantees prefer block grant funds over categorical funds because block grants generally provide greater flexibility. While Ogden (2012) examined state grantees, it is possible that LHDs share that same preference. Categorical funding streams have resulted in LHDs that are organized by health conditions. This may create barriers and inefficiencies in efforts such as chronic disease prevention programs that must coordinate and integrate nutrition, tobacco, and other programs that are managed throughout the LHD (Ogden, 2012). There might be more flexibility associated with local revenue. NACCHO reported that 26% of annual LHD revenue comes from local sources (Schwarte et al., 2010). Non-governmental funding is another possible consideration. Kaiser Permanente, the Robert Wood Johnson Foundation, W. K. Kellogg Foundation, and other foundations have invested in comprehensive environmental, including policy, approaches to childhood obesity prevention (NACCHO, 2011). Scutchfield et al. (2009) noted that, “Robert Wood Johnson Foundation has made additional funding available for targeted research studies in public health including public health policy and law.” While revenue is important, expenditure per capita has also been associated with LHD obesity policy (Luo et al., 2013).

Community characteristics

Community characteristics might be associated with LHDs' levels of policy activity. One study found that LHDs in urban environments were more likely than those in rural areas to carry out policy activities (Schwarte et al., 2010). A state maternal and child health director conveyed a similar finding in her state and explained that this was true in her state because the rural LHDs had to fill clinical access gaps in healthcare provider shortage areas and, therefore, had less flexibility to do policy work (G. Febbraro, personal communication, June 13, 2013). The difference might not necessarily be "urban versus rural" but the size of the jurisdiction. Harris & Mueller (2013) found, in a systematic review, that "the strongest predictor of performance in multiple studies is the size of the jurisdiction served by a health department." Population size was also associated with EPHS 5 in an obesity focused study, consistent with findings by Turnock, et al. (as cited in Luo et al., 2013) that found that health departments serving a population of more than 50,000 reported better performance in the ten EPHSs. Additionally, it is possible that a community's health or demographic profiles might be associated with policy work if there are certain conditions that lend themselves to policy interventions or for which the community is not as strongly opposed to local government policy intervention. Luo et al. (2013) found that having a board of health decreased the odds of LHDs developing policies and plans for obesity control (EPHS 5); however, they noted that the finding was contradictory to a study by Mays, et al. (as cited in Lou, 2013) that reported having a board of health was associated with better performance of EPHS 5.

Leader characteristics

In relatively new areas of practice (e.g., built environment) for LHDs or for which there are fewer guidelines, leadership is critical. In these instances, Kuehnert (2012) wrote,

transformational or innovative leadership is particularly important. Kuehnert (2012) contrasted transformational leadership (e.g., ‘creating diverse networks of stakeholders, leveraging talents, and building support and trust’) with traditional leadership in LHDs that he described as typically “transactional” (e.g., directing, managing, and empowering staff). Hyde and Shortell (2012) found that LHDs having highly innovative leaders with positive attitudes had greater odds of achieving physical changes to the built environment. Leaders that most prepared their departments for built environment work (by updating staffing, structure, and activity) tripled interagency and cross-sector collaboration (Kuiper, Jackson, Barna, & Satariano, 2012). Leaders of successful departments “consistently established and managed vision; cultivated innovation; empowered and protected staff; directly engaged in processes and with other leaders; and leveraged their professional reputation,” (Kuiper et al., 2012). Kuiper et al. (2012), however, stated that although leadership is often considered to be an important contributor to public health performance, findings across studies are inconsistent with respect to the educational background of local health directors.

Conclusion

In summary, there is a growing desire to utilize population-based strategies “that protect and promote healthy conditions and the health for the entire population.” The population-based strategies that utilize policy as a means to bring about change in population health outcomes are gaining consideration. LHDs are engaged in some policy activities but more could be done. There is evidence to suggest that certain characteristics may be associated with increased or improved policy activity.

III. METHODS

A. Design

An exploratory study design was selected because it is a useful approach for gaining background information and insights on the why, how, and what of a particular topic for future investigation. The goal of this exploratory design was to develop a grounded picture of what level of policy activity is taking place in U.S. LHDs and what community, organizational and leader attributes are present in those LHDs that are policy active. This basic understanding of the LHD policy landscape might inform research questions and, subsequently, potentially lead to priorities for improving local public health policy and outcomes.

B. Setting

The setting of the study was LHDs in the U.S. during calendar year 2010. This study used secondary data collected by NACCHO through its 2010 Profile Questionnaire. The purpose of the NACCHO Profile Questionnaire series is “to advance and support the development of a database for LHDs to describe and understand their structure, function and capacities,” (NACCHO, 2011). NACCHO, for purposes of the Profile Questionnaire, defines a LHD as “an administrative or service unit of local or state government, concerned with health, and carrying some responsibility for the health of a jurisdiction smaller than the state (NACCHO, 2011).

C. Sample

NACCHO used previous questionnaire results, and key informants from state

TABLE I. NACCHO PROFILE QUESTIONNAIRE METHODS

Methodology	The questionnaire was fielded via an e-mail message sent to the top agency executive of every LHD in the study population. The e-mail included a link to a Web-based questionnaire, individualized with preloaded identifying information specific to the LHD. NACCHO staff and a nationwide group of Profile study advocates followed up with non-respondents. Technical support was offered through an e-mail address and telephone hotline.
Questionnaire Design	The questionnaire included a set of core questions (Core) sent to all LHDs in the U.S.; additional supplemental questions were grouped into two modules. LHDs were randomly assigned to receive only the Core or the Core plus one of the two modules. No LHD received two modules.
Study Population	A unit of local or state government, concerned with health, and having some responsibility for the health of a jurisdiction smaller than the state. Hawaii and Rhode Island were excluded from the study because they have no sub-state units.
Sampling	Every LHD in the study population received Core. One of the two sets of supplemental questions or modules was included in the questionnaire for randomly selected LHDs. Stratified random sampling (without replacement) was used to assign LHDs to receive Core only or Core plus one of the two modules, with strata defined by the population size of the jurisdiction served by the LHD.
Survey Weights and National Estimates	Estimation weights for the items from the core questionnaire (sent to all LHDs) were developed to account for dissimilar non-response by size of population served. Because module questions were administered only to a sample of LHDs, the estimation weights used to produce statistics from modules also accounted for sampling. By using estimation weights, the Profile study provides national estimates for all LHDs in the United States.

Source: NACCHO, 2011

associations of local health officials and from state health departments to determine the population size for fielding the questionnaire. The sampling methods used by NACCHO are summarized in Table I. Rhode Island and Hawaii are excluded since the state health

departments operate on behalf of LHDs (NACCHO, 2011). NACCHO used stratified random sampling without replacement to select LHDs to complete either: the core portion of the questionnaire, or the core portion plus one of two modules. The 2010 Profile Questionnaire was fielded to 2,565 LHDs during September through November, 2010. This study's outcome of interest, policy activity, was located in questionnaire module 2; NACCHO sent the core and module 2 to 625 LHDs (NACCHO, 2011). Eighty-three percent of those LHDs responded to the questionnaire, resulting in a sample size of 516 LHDs available for this study. However, 337 LHDs were available for final analyses after excluding LHDs with missing data.

The 2010 de-identified data were obtained from NACCHO in June, 2013. When it was discovered that the de-identified dataset did not include the population sizes served by the LHDs, needed to create study variables, the identified dataset was requested and obtained. The data files were stored on a password protected laptop computer throughout the analysis phase of the study.

D. Analysis Plan

The analysis was designed to answer the overarching study question. The three sub-questions (community characteristics, service area characteristics, and leader characteristics) were used as conceptual domains to guide variable selection and creation. Characteristics were examined individually and, then, collectively among all domains rather than within the three conceptual domains. However, results that were applicable to the conceptual domains, and the sub-questions, were recorded.

The 2010 Profile Questionnaire and codebook were downloaded from the NACCHO website (National Association of County and City Health Officials 2011). Questions and response options from the core and module 2 of the 2010 questionnaire were assessed for both study relevance (e.g., policy, characteristics identified in literature) and utility—such as population size that could be helpful as a denominator when creating new variables. The questions and corresponding NACCHO codes were cataloged in a Microsoft 2010 Excel workbook.

The 2010 data were cleaned using SAS 9.3 (SAS Institute, Cary, NC). An Excel workbook served as a study-specific codebook that included all variables, formats, labels and equations used to create variables, as appropriate. PROC PRINT outputs were used to visually inspect the raw data for errors.

Additional variables were created, using NACCHO codes, to serve as independent variables and the dependent variable. For example, to capture the influence of a LBOH on policy activity, an independent variable “LBOH policy authority” was created by combining responses to “Does your LHD have one or more local boards of health?” and “Check each action that your local board of health has authority to do.” For the latter question, the following policy-related response options were selected for use: 1) “adopt public health regulations;” 2) “advise LHD or elected officials on policies, programs and budgets;” and 3) “set policies, goals and priorities that guide the LHD.” The categories for “LBOH policy authority” were “no LBOH,” “weak board” (a LBOH with any one of the three policy authorities), and “strong board” (a LBOH with any two or all three policy authorities).

Nearly all variables used in the study had to be created or manipulated to have utility for addressing policy study questions.

Four continuous independent variables were created and subsequently categorized: full-time equivalences (FTE) per 100,000 population, total revenue per capita, local revenue per capita, and years of service as the Director. The denominators such as “per capita” were applied so that a similar scale could be used for comparisons among LHDs rather than relying on raw numbers of incidents. The FTEs per 100,000 population for each LHD accounted for all regular full-time, part-time and contractual employees. The numerator for each LHD’s total revenue per capita was calculated by summing the revenue, as reported by the LHDs, for each revenue category (e.g., Federal direct sources, American Reinvestment and Recover Act, patient personal fees). The numerator for each LHD’s local revenue per capita was calculated by summing the revenue, as reported by the LHDs, in the following categories: city/township/town sources, county sources, and non-clinical fees and fines. To calculate the years of service that the LHD Director has served in his or her position, the reported date for which the top executive assumed the position was subtracted from October 15, 2010 (the 2010 questionnaire fielding period midpoint) and then adjusted to a scale of years.

Initial data screening was conducted. PROC SURVEYMEANS was used, with weights, to generate descriptive statistics on the new continuous variables. Because the data were weighted, PROC UNIVARIATE was used only to produce histograms for visual inspection. All four variables were positively skewed. The extreme values for each variable were examined. One observation, \$139.32 per capita, was dropped from the local revenue

per capita variable. The extreme values for FTEs per 100,000 population, total revenue per capita, and years of service seemed plausible.

Because this study was not focused on measuring the change in the dependent variable as a result of incremental increases in the independent variables, the continuous independent variables were categorized. The FTEs per 100,000 population, total revenue per capita and local revenue per capita were categorized by quartiles, similar to some other studies. Since the range of values for each variable was large and skewed, the median and quartiles served as better representations of the data than the mean did. The years of service variable was dichotomized into “less than six years of service” and “greater than or equal to six years of service.” The six year cut-off point was selected as a compromise because it was above a five year cut-off found in a similar community health assessment (CHA) study and slightly below the median length of time for this sample.

The dependent variable for the study was created from the questionnaire’s “Policy-making and Advocacy” question (Table II). The question asked whether the LHD had participated in any of five policy-related activities (i.e., five sub-questions) during the past two years. LHDs could indicate whether it was the local, state and/or Federal government at which the activities were directed. This study only examined those activities directed at local government. A positive response to a sub-question was allocated one point; zeroes were allocated to negative responses. The five scores were summed to create a possible policy score of zero, one, two, three, four, or five for each LHD. Each summed

TABLE II. CREATION OF THE DEPENDENT VARIABLE

Questionnaire question	Sub-question at the local level of government	Response options
Indicate whether your LHD has participated in any of the policy-related activities listed below during the past two years. If yes, check each level of government (local, state, or federal) at which these activities were directed. Participation may be by your LHD's top executive or by other staff.	Prepared issue briefs for policy makers	0 (unchecked)=no 1 (checked)=yes
	Gave public testimony to policy makers	0 (unchecked)=no 1 (checked)=yes
	Participated on a board or advisory panel responsible for public health policy	0 (unchecked)=no 1 (checked)=yes
	Communicated with legislators, regulatory officials, or other policymakers regarding proposed legislation, regulations, or ordinances	0 (unchecked)=no 1 (checked)=yes
	Provided technical assistance to legislative, regulatory or advocacy group for drafting proposed legislation, regulations, or ordinances	0 (unchecked)=no 1 (checked)=yes
	Summed policy score	= 0, 1, 2, 3, 4, or 5 activities
	Categories of policy activity	0-3 = Not or less policy active 4-5 = More policy active

policy score represented the number of policy activities that a given LHD completed within the last two years. The policy scores were used to provide basic descriptive information and then were categorized. Literature suggested that ordinal variables with five or more categories should be treated as continuous variables. However, because the measurement of incremental change from one score to the next (e.g., zero to one, one to two) was not the focus of this study, the policy scores were grouped into fewer categories to generate additional descriptive and analytic statistics. Initially, three categories were used for the dependent variable but they were reduced to two categories after preliminary analysis.

The dependent variable was generally referred to as policy activity level. It should be noted that the questionnaire asked respondents to report neither the number of times the LHD participated in each policy activity nor the intensity of the policy activity. Therefore, the policy activity level does not indicate the frequency or complexity of the policy work. What it does reflect is, for the five policy activities chosen by NACCHO, the scope of policy activity types in which a LHD participated. For example, if a LHD provided technical assistance (and participated in no other policy activity type) seven times over the course of two years, it would receive only one point for the technical assistance. Meanwhile, if another LHD provided technical assistance, communicated with a policy maker, and participated on an advisory panel, each one time, it would receive three points.

Following the creation of the new independent and dependent variables, PROC PRINT was used a second time to check all newly created variables for problems. It was also used to generate a list of text responses for two variables—leader education and occupation—for review. First, one of the multiple choice options for the questions about the top executive's educational background was "other" with the option of writing in the name of the degree. These were reviewed to determine whether a significant number of public health degrees (e.g., PhD in Public Health Policy) were being systematically missed (and, thus, artificially lowering the number of top executives with a public health degree) due to NACCHO only including the Master of Public Health (MPH) and Doctor of Public Health (DrPH) among the multiple choice options. The text responses were not used to increase the number of LHD executives with a public health degree because the number of candidate responses was small and would have required arbitrary selection. For example, several top

executives had degrees in health services administration or healthcare administration but it was unknown whether the curricula included traditional public health courses, whether the degrees were awarded from a public health program, or whether there is consensus that healthcare degrees are a component of “public health degrees.” Therefore, all text responses were treated similarly and not included. Second, NACCHO asked respondents to nominate up to three occupation titles and to provide a brief description of job duties (NACCHO, 2011) for candidate occupations to be considered for inclusion in subsequent questionnaires. The text responses were reviewed for candidate policy-related occupation categories.

Preliminary analyses were completed to understand how the variables would behave, what the cumulative effect of missing data might be, and whether assumptions were valid. First, PROC SURVEYFREQ was used to generate a frequency table for each independent variable. Weighted and unweighted percentages were hand calculated for each independent variable category by dependent variable category. The weighted and unweighted percentages were contrasted to understand how the weights would affect the data. Second, the procedure was used, with weights and population category strata, to generate descriptive statistics for all variables. Tables of independent variable category frequencies by level of policy activity were generated to summarize data in a meaningful way that might reveal patterns. Third, PROC SURVEYLOGISTIC was used to generate bivariate models using ordinal logistic regression. The dependent variable initially had three categories—not policy active, less policy active, and more policy active. Several of the models failed the proportional odds test so the proportional odds assumption was not met for ordinal logistic regression. Fourth,

a small number of bivariate analyses using two independent variables was conducted to determine whether there were associations among them.

As a result of the preliminary data analysis, several actions were taken. The dependent variable was dichotomized and ordinal logistic regression was no longer pursued. Next, the raw HIA variable with the large number of “don’t know” responses was addressed. The “don’t know” responses were coded as missing and coded as “no.” Bivariate results of each approach showed no appreciable differences. Therefore, subsequent analyses used the HIA variable with “don’t know” coded as “no.” It can be assumed that if respondents didn’t know what an HIA was, they might not have participated in an HIA. Further, in 2010, HIAs weren’t as readily discussed within professional fora and thus would not be expected to be common among LHDs. Lastly, a second round of data screening was completed. As part of the screening, PROC CORR, which does not account for complex sampling, was used as an approximate way to check for collinearity. The dataset was then assessed for potential selection bias due to non-response which could lead to spurious results. Missing data were randomly distributed for all variables of interest except: access to legal counsel; local revenue per capita; total revenue per capita; and use of county health rankings. As a result of the analysis these four independent variables were dropped from the study (Table III). One of the key variables of interest, local revenue per capita, was eliminated due to non-random, high percent (31%) missing observations. Similarly, the total revenue per capita data had a high percent of non-random missing observations (35%). The use of county health rankings variable was missing 16% of its observations and they were not missing at random. Access

TABLE III. INDEPENDENT VARIABLES DROPPED FROM STUDY

Study question	Characteristics	Independent variables
What LHD organizational characteristics are associated with policy activity?	Specialized expertise	Access to legal counsel
	Flexible funding	Local revenue per capita
		Total revenue per capita
What LHD leader characteristics are associated with policy activity?	Innovation	Likely use of County Health Rankings information to increase policy maker awareness

to legal counsel was only missing 7% of the observations; however, they were not missing at random. Since only six LHDs that responded to the question did not have access to legal counsel, the observed results might have been significant but could have been a consequence of the very small number of LHDs accounting for differentiation rather than a real effect. The use of county health rankings and access to legal counsel were less important variables from a theoretical perspective. After dropping local revenue per capita, total revenue per capita, use of county health rankings, and access to legal counsel, the other variables were retained. The four variables that were pre-populated by NACCHO prior to questionnaire fielding did not have missing data. The remaining independent variables were missing between 0% and 20% of the observations; however, the observations were randomly missing. There were no differences between the missing and non-missing data for these independent variables so they did not affect the dependent variable (Table IV).

TABLE IV. INDEPENDENT VARIABLES USED IN STUDY

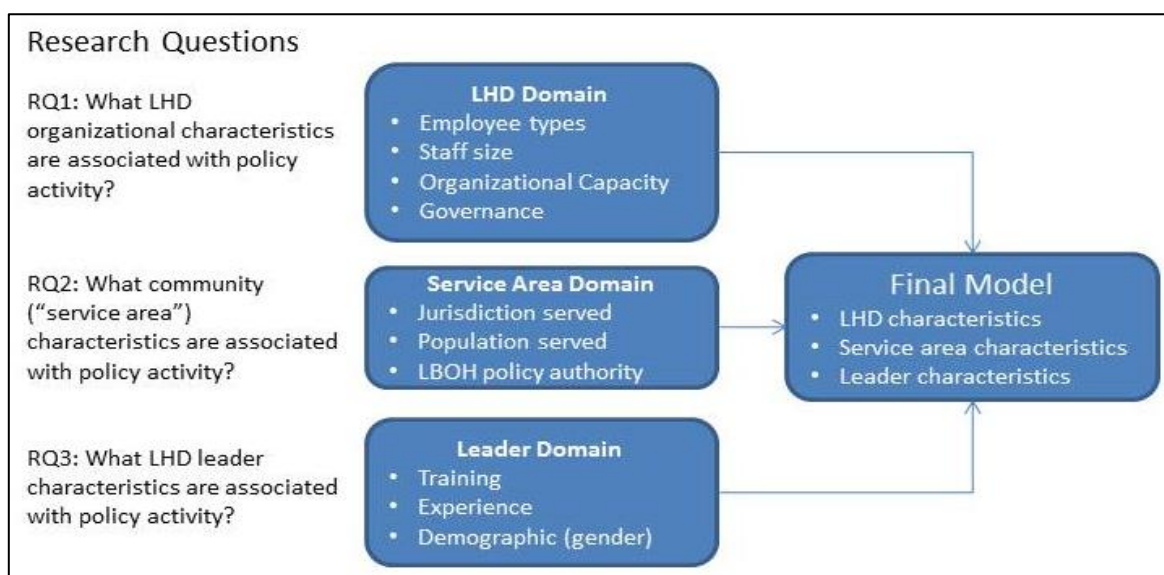
Study sub-question	Characteristics	Independent variables
What LHD organizational characteristics are associated with policy activity?	Relevant skill sets	Employ an epidemiologist Employ a health educator Employ a public health informatics specialist Employ a public information specialist Employ an environmental health worker
	Staff size	FTEs per 100,000 population
	High functioning (organizational capacity)	Completed a CHA Participated in developing an HIP Participated in an HIA
	Governance	Governance (unit of local government only, unit of state government)
What community (“service area”) characteristics are associated with LHD policy activity?	Size of population	Total population served
	Jurisdiction served	Jurisdiction served (single, multiple)
	Local Board of Health (LBOH)	Policy authorities of LBOH
What LHD leader characteristics are associated with policy activity?	Training/background of leader	Top executive has a public health degree Length of service as the top executive First experience as a top executive
	Demographic factors	Gender

Because of the significant missing data challenges, a sensitivity analysis was conducted to test data assumptions. Two methods were compared for creating multivariable models. The first method involved restricting the sample to the 337 LHDs that had complete data. The second method involved using the full dataset of 516 LHDs but only considering the variables that had 10% or fewer observations missing and had a p-value $<.05$ in the bivariate analyses. The restricted dataset was used to produce two multivariable models. The full dataset was then used to produce the same multivariable models but with the rules that only the variables with 10% or fewer missing observations and had a p-value of $<.05$ be considered. The 10% rule method increased the sample size but did not change the substantive conclusions. Therefore the restriction method was used so that the LHDs represented in all descriptive and analytic statistics would be consistent.

The final analyses were conducted using weighted data for the 337 LHDs that had complete data. The descriptive statistics, general counts and percentages, were generated using the SURVEYFREQ and SURVEYMEANS procedures. Bivariate analyses were performed using the PROC SURVEYLOGISTIC procedure. Statistical significance of associations was measured with the Wald chi square test for independence. With one exception, Cochran's rule (that each cell has at least five observations) was met. Two approaches were used to develop a multivariable model. The first was an a priori approach using investigator selected variables. Manual backward selection was used to simplify the model beginning with: HIA, environmental health worker, gender, public health degree, governance, population, and LBOH policy authority. Once the desired model was obtained, forward selection was used to understand the potential individual contributions of a small

number of variables. The alternative approach was a domain approach (Figure 9). Manual backward selection was used to obtain the significant variables for each domain—LHD, service area, and leader. The variables for each final domain-specific model were then combined and manual backward selection was used to determine the best possible domain model. The a priori model and the domain model were then compared.

FIGURE 9. Domain modeling approach



E. Validity Considerations

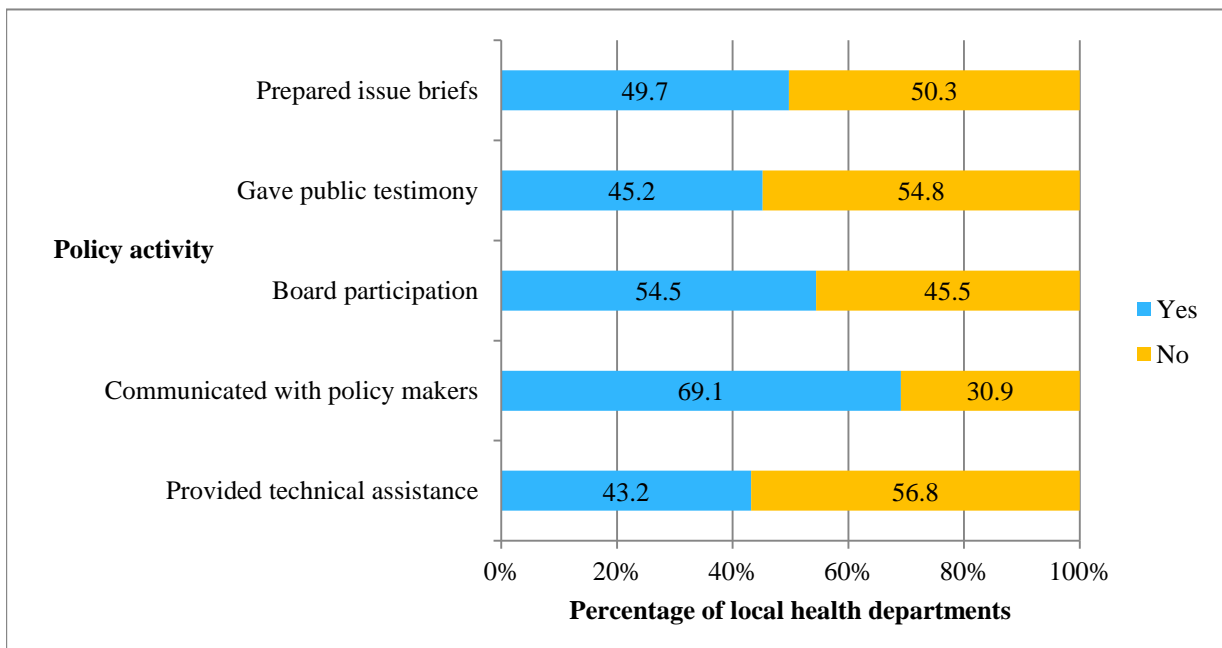
The data have several limitations. First, the questionnaire was an organizational survey and self-administered. NACCHO neither verified who (e.g., local health official, a team of junior analysts) completed the questionnaire nor validated the responses. Therefore, the representativeness and accuracy of the information among LHDs are unknown. Also, if the respondent didn't have the knowledge to answer a question, there might be unit and item non-responses. Second, the questionnaire lacked detailed descriptions and definitions of terms. As a result, interpretations of the questions could have varied considerably, leading to measurement error. Third, NACCHO's definition of LHD does not dictate that the organization must be responsible for carrying out the core public health functions including this study's function of interest—policy development (B. Turnock, personal communication, August 5, 2013). Consequently, it is possible that LHDs that would not be expected to undertake policy activities responded to the questionnaire and artificially reduced the level of policy activity occurring within the jurisdiction. Also, because NACCHO's definition of LHD uses structural parameters that tend to capture the main health agency within a community, public health policy activities that are conducted by peer health-related agencies in the governmental and non-governmental sectors are not captured in the questionnaire (NACCHO, 2011). In short, under-coverage might be problematic because the sampling frame included only LHDs, and not all components of the local public health system that collectively are responsible for the policy development core function.

IV. RESULTS

A. Weighted Frequencies and Distribution of Policy Activities

The proportion of LHDs participating in policy activities is presented in Figure 10. The most frequently reported policy activity was communicating with legislators, regulatory officials, or other policymakers regarding proposed legislation, regulations, or ordinances (242 or 69.1% of LHDs). However, each locally-directed policy activity had over 40% of LHDs report having participated in the policy activity during that two-year period. Providing

FIGURE 10. Selected policy activities performed by local health departments

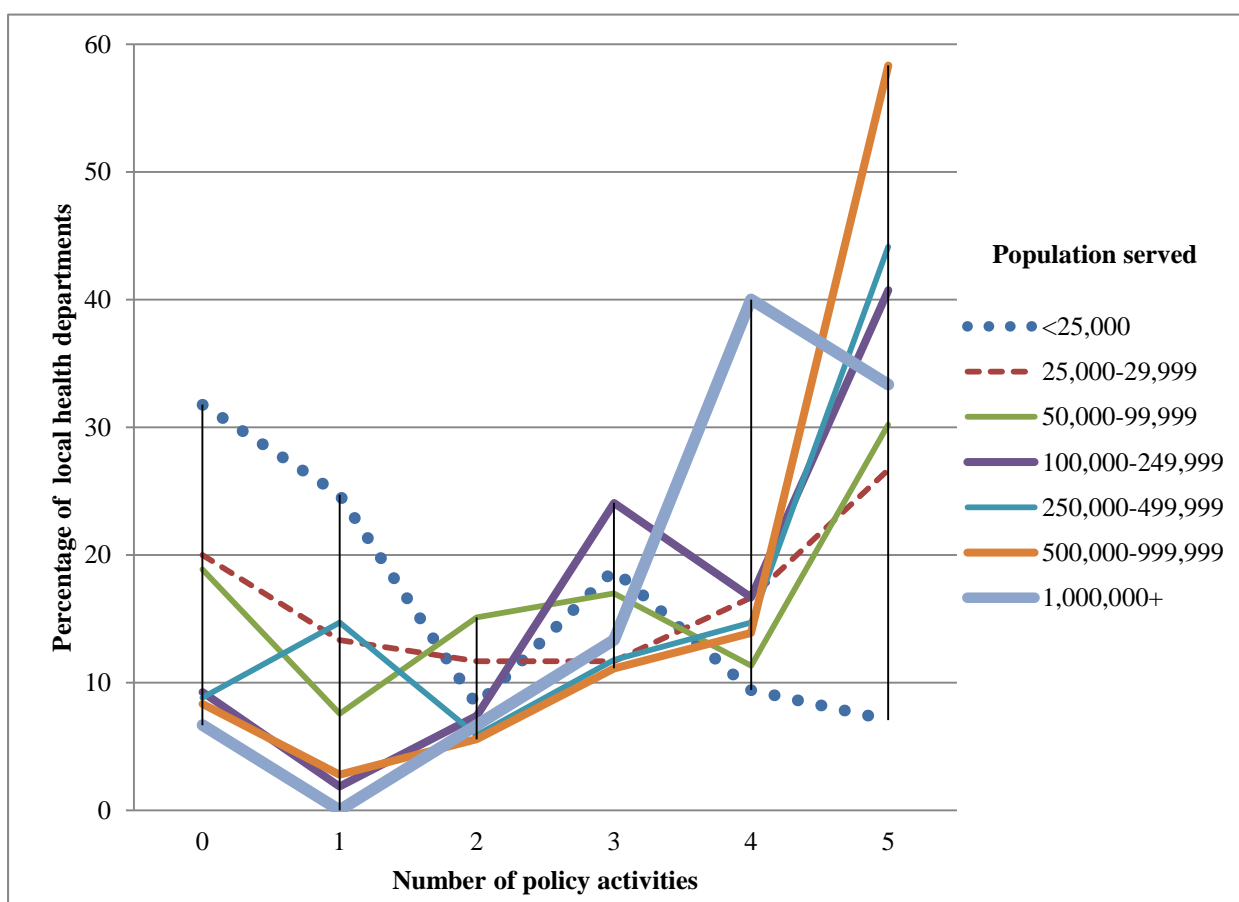


technical assistance to a legislative, regulatory, or advocacy group for drafting proposed legislation, regulations, or ordinances during the past two years at the local level was the least common activity with only 165 LHDs (43.2%) reporting having done so. However, for most of the policy activities, there is a substantial number of LHDs that did not participate in that activity during the past two years.

Overall, 61 LHDs (21.1%) participated in no policy activities, 40 LHDs (14.2%) participated in one policy activity, 31 LHDs (9.6%) participated in two policy activities, 55 LHDs (16.9%) participated in three policy activities, 49 LHDs (13.4%) participated in four policy activities, and 101 LHDs (24.8%) participated in five policy activities during the two years prior to the questionnaire fielding. However, when total policy activity participation was examined by population, general trends emerged. Figure 11 illustrates the percentage of LHDs within each population stratum that participated in each total number of policy activities—ranging from zero to five. Each colored line represents 100% of the LHDs within one population stratum. For each total number of policy activities completed, the height of the line indicates the percentage of LHDs within that stratum that completed that number. Of the 85 LHDs serving a population of 25,000 or fewer people, 31.8% completed no policy activities, 24.7% completed one policy activity, 8.2% completed two policy activities, 18.8% completed three policy activities, 9.4% completed four policy activities and 7.1% completed all five policy activities. Of the 15 LHDs serving a population of one million or more people have 6.7% completed zero policy activities, 6.7% completed two policy activities, 13.3% completed three policy activities, 40% completed four policy activities, and 33.3% completed five policy activities. Contrasting the two lines, there is a visual negative trend for the LHDs

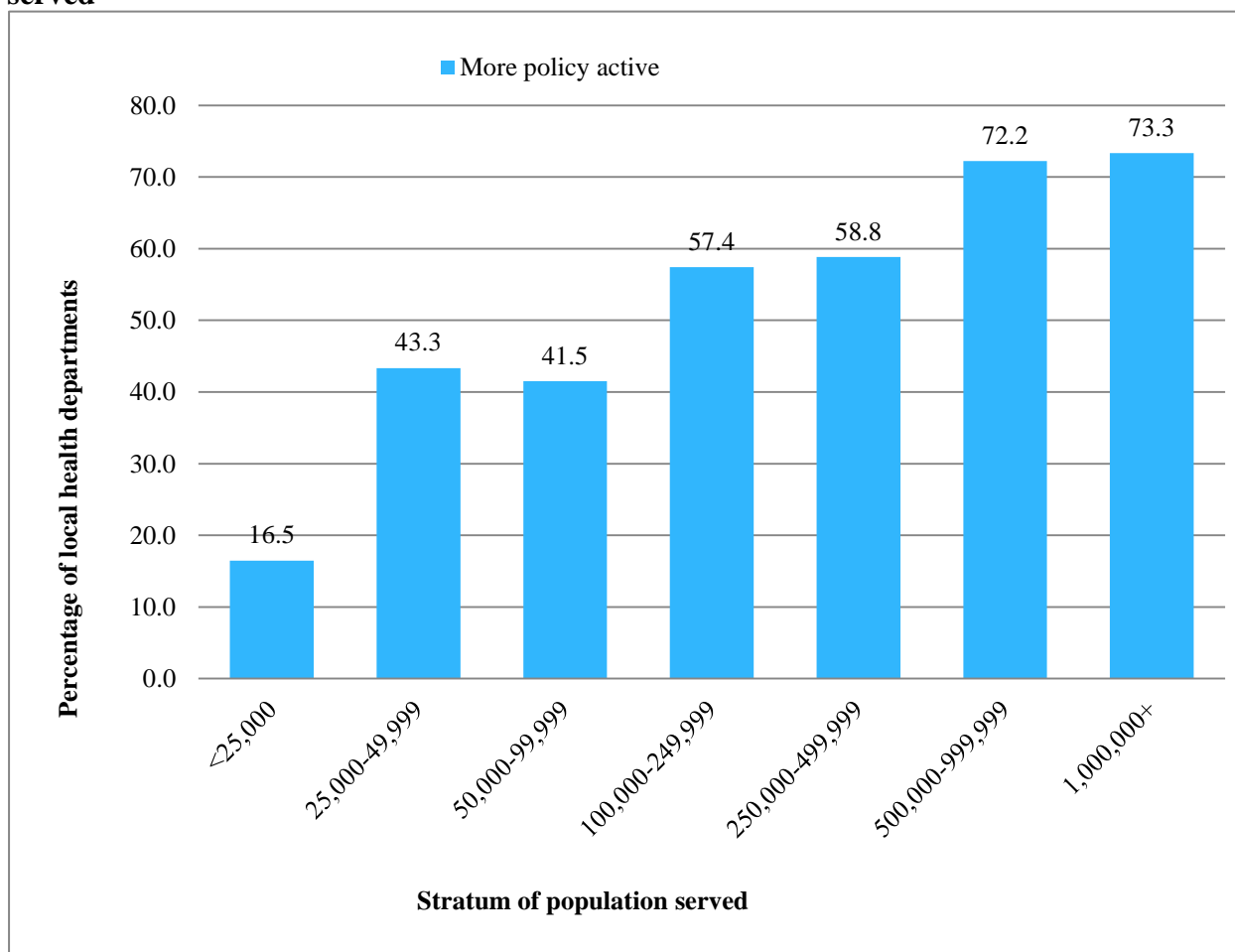
serving the smallest populations from low scores for policy activity to high scores for policy activity while LHDs serving the largest populations have a positive trend toward high scores for policy activity. LHDs that served populations ranging from 500,000 to 999,999 people had the largest percentage (58.3%) that completed all five policy activities. The greatest differences among population strata occur at both ends of the range—zero policy activities and five policy activities.

FIGURE 11. Percentage of local health departments that completed each number of policy activities by population size served



The LHDs were grouped into two categories based on the number of policy activities they had completed. LHDs that completed zero, one, two or three policy activities were grouped into the “not or less policy active” group. LHDs that completed four or five policy activities were grouped into the “more policy active” group. LHDs that served populations of 25,000 or fewer people had the greatest differentiation among policy groups (83.5% in the not or less policy active group versus 16.5% in the more policy active group) (Figure 12). A step-wise pattern emerged among the other six population strata. For example, 43.3% and

FIGURE 10. Percentage of more policy active local health departments by population served

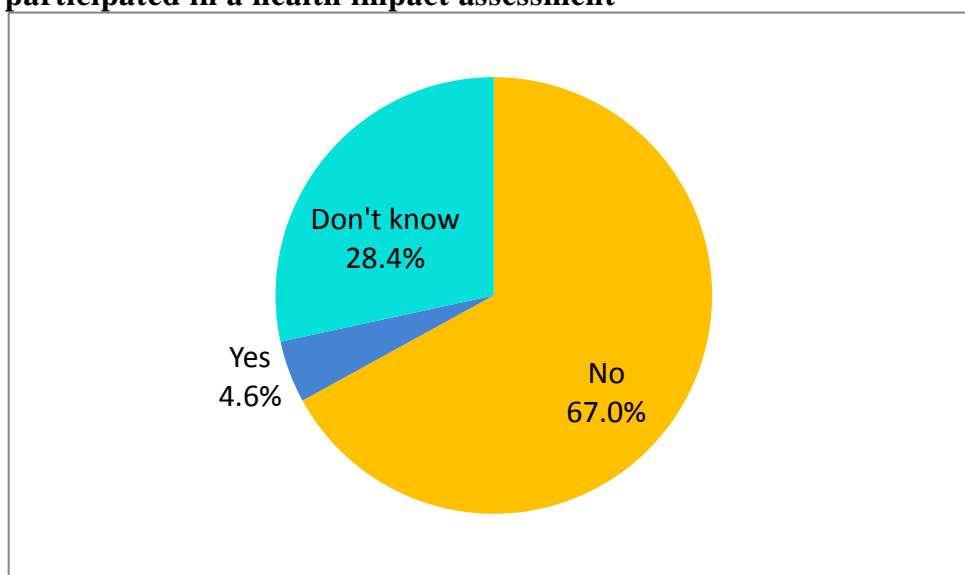


41.2% of LHDs serving populations of 25,000-49,999 and 50,000-99,999 respectively, were more policy active. A similar stepwise pattern was seen among strata with populations of 100,000-249,999 and 250,000-999,999 (57.4% and 58.8% respectively were more policy active) and 500,000-999,999 and 1,000,000⁺ population strata (72.2% and 73.3% respectively were more policy active).

B. Weighted Frequencies of HIA

Only a small proportion of LHDs reported, in 2010, having ever participated in an HIA. Prior to categorizing the “don’t know” responses as “no” responses, the raw data frequencies for the HIA participation question were reviewed (Figure 13). Twenty-four LHDs (4.6%) had ever participated in an HIA, while 218 LHDs (67%) had not ever done so.

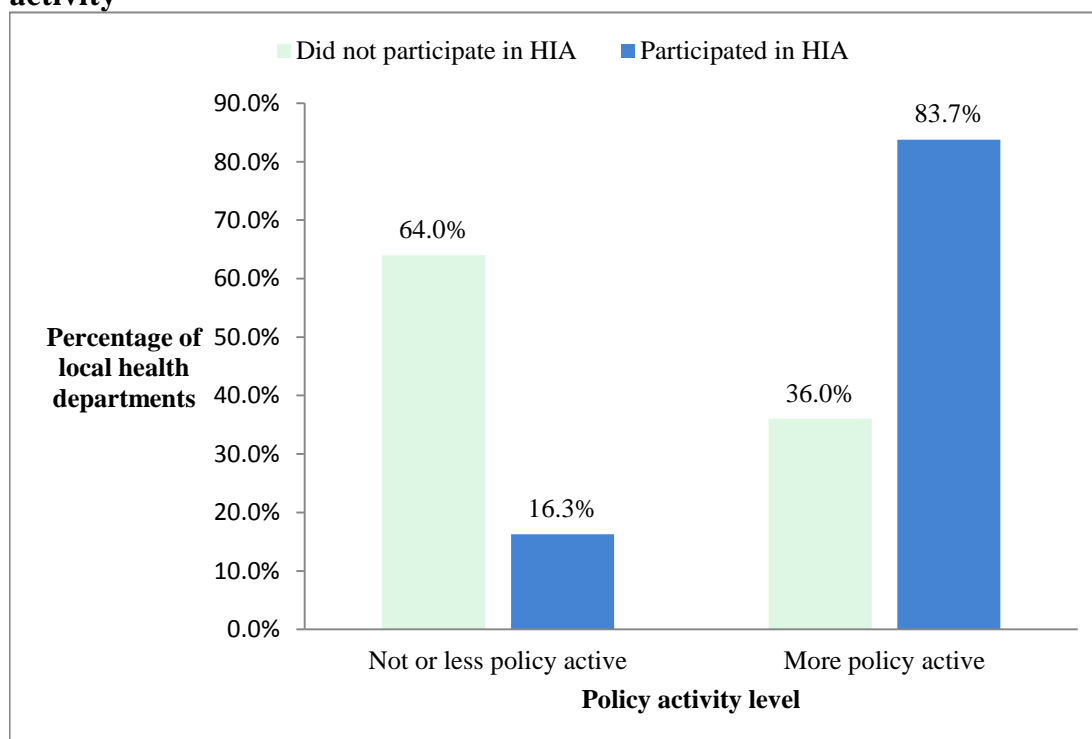
FIGURE 13. Raw percentage of local health departments that have participated in a health impact assessment



Ninety-five respondents (28.4%) reported that they did not know whether their agency had ever participated in an HIA.

There were differences in policy activeness (as measured in this study) between LHDs that had ever participated in an HIA and those that had not participated in an HIA. Figure 14 illustrates the comparison using the HIA study variable (i.e., “don’t know” responses were treated as “no” responses). Roughly two-thirds (64.0%) of the 313 LHDs that had never participated in an HIA were in the not or less policy active category. The remaining 36.0% were in the more policy active category. That contrasts with the distribution among policy activity in LHDs that have participated in an HIA. Of the 24

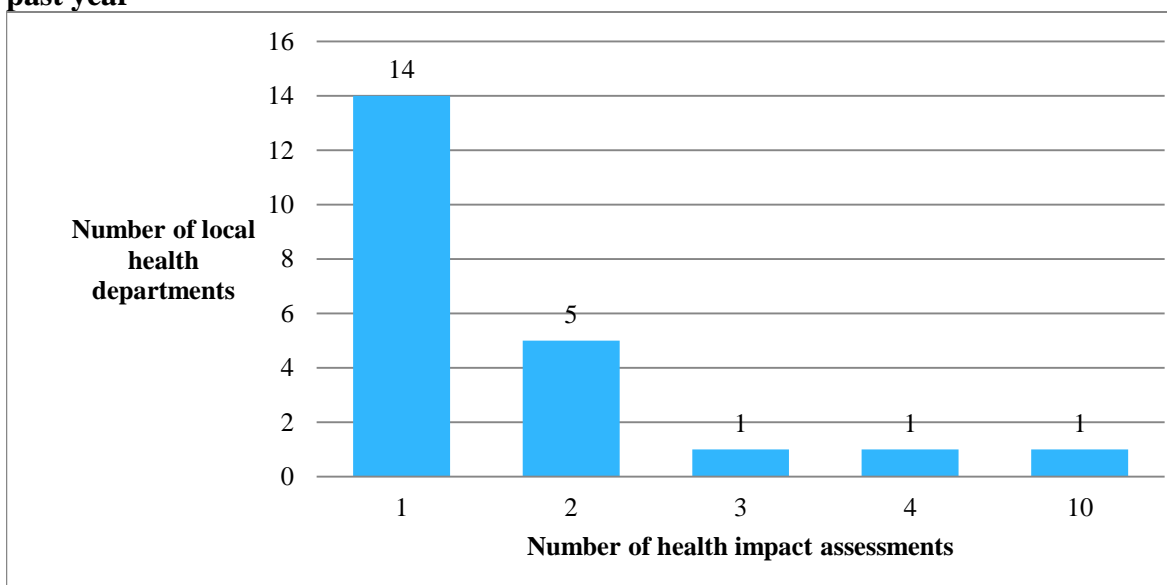
FIGURE 14. Distribution of local health department health impact assessment by policy activity



LHDs that reported having participated in an HIA, 20 LHDs (83.7%) were more policy active. Only four LHDs (16.3%) were not or less policy active.

The 24 LHDs that reported having ever participated in an HIA were asked to provide the number of HIAs that their organization had “conducted or been a part of in the past year” (Figure 15). Only 22 of the LHDs provided data. Fourteen LHDs (70.7%) conducted or were a part of one HIA in the past year. Five LHDs (17.1%) conducted or were a part of two HIAs in the past year. One LHD conducted or was a part of three, four or ten HIAs in the past year.

FIGURE 15. Health impact assessment conducted by local health departments during the past year



C. Bivariate Weighted Frequency and Logistic Regression Results for LHD

Characteristics

The LHD characteristic of staff size was represented by converting the continuous variable, number of FTEs, into an ordinal categorical variable, FTEs per 100,000 population. The results of the SURVEYMEANS procedure are in Table V. Reflecting the skewness of the data, the fourth quartile had the largest range—nearly 15 times that of the third quartile. The fourth quartile ranged from 90 FTEs per 100,000 population to 477.4 FTEs per 100,000 population.

TABLE V. DESCRIPTIVE STATISTICS FOR FULL TIME EQUIVALENTS PER 100,000 POPULATION

Variable	Percentile		Estimate	95% Confidence Limits	
FTEs per 100,000 population	0%	Minimum	2.3	.	.
	25%	Q1	32.7	28.8	36.5
	50%	Median	59.3	53.5	65.1
	75%	Q3	90.1	75.7	104.5
	100%	Maximum	477.4	.	.

Table VI illustrates the results of the PROC SURVEYFREQ—weighted percentages of each LHD predictor variable by policy activity group. It also includes the following from PROC SURVEYLOGISTIC: the p-values from the maximum likelihood estimate Wald chi square test, the odds ratios, and the 95% confidence

intervals for the odds ratios. The p-values that were statistically significant at the .05 level are in bolded font.

TABLE VI. BIVARIATE WEIGHTED FREQUENCIES AND LOGISTIC REGRESSION RESULTS FOR LHD CHARACTERISTICS

Independent (Predictor) Variable	Policy Activity				Odds Ratio (95% CI)	Wald chi square P value (<.05)
	Low		High			
Have an epidemiologist						
Yes	53	12.7%	79	15.7 %	2.7 (1.7-4.3)	<.0001
No (ref)	134	49.1%	71	22.4%		
Have a health educator						
Yes	106	31.1%	116	27.3%	2.5 (1.5-4.0)	0.0004
No (ref)	81	30.7%	34	10.9%		
Have a public health informatics specialist						
Yes	24	6.4%	47	8.6%	2.5 (1.4-4.5)	0.0016
No (ref)	163	55.4%	103	29.6%		
Have a public information specialist						
Yes	37	9.9%	62	11.4%	2.2 (1.3-3.7)	0.0019
No (ref)	150	51.9%	88	26.8%		
Have an environmental health worker						
Yes	136	43.7%	134	33.1%	2.7 (1.4-5.1)	0.0025
No (ref)	51	18.2%	16	5.1%		
FTEs per 100,000 population						
Quartile 4	48	17.8%	27	8.0%	0.7 (0.3-1.3)	0.26
Quartile 3	50	16.9%	39	10.2%	0.9 (0.5-1.7)	0.77
Quartile 2	44	13.3%	47	10.8%	1.2 (0.6-2.3)	0.55
Quartile 1 (ref)	45	13.8%	37	9.2%		
Completed a CHA						
Yes	134	43.4%	132	33.1%	2.8 (1.5-5.2)	0.0011
No (ref)	53	18.4%	18	5.0%		
Developed a HIP						
Yes	98	32.1%	100	25.5%	1.9 (1.2-3.0)	0.0096
No (ref)	89	29.7%	50	16.7%		
Participated in an HIA						
Yes	4	0.7%	20	3.8%	9.1 (2.9-28.7)	0.0001
No (ref)	183	61.1%	130	34.4%		
Governance						
Solely local government	115	39.5%	127	32.7%	3.4 (1.9-6.0)	<.0001
State government influence (ref)	72	22.3%	23	5.5%		

Workforce

In general, more LHDs had a health educator and an environmental health worker than did not have those occupation categories. The opposite was true for an epidemiologist, a public health informatics specialist and a public information specialist; for each of those occupation categories, the largest percent of LHDs did not have that occupation category and were not or less policy active. For example, nearly 50% of LHDs in this sample did not have an epidemiologist; and were not or less policy active. Presence of an environmental health worker had the largest percentage (33.1%) of more policy active LHDs. Each of the occupation categories was significantly associated being more policy active.

The frequencies of LHDs were relatively proportionately distributed among FTE per 100,000 population quartiles and policy activity categories. Staff size, as measured in this study, did not seem to matter; FTEs per 100,000 population was not significantly associated with being more policy active.

Many respondents suggested additional occupation categories and job duty descriptions for consideration in future questionnaires. A review of the text responses—to identify those that would support the policy development core function and/or HIA—revealed that six LHDs in the NACCHO sample suggested that “public health planner” or “health planner” should be included. One LHD suggested the inclusion of “policy analyst.” An additional LHD used the category “Project/Program Coordinator” but described the duties as including policy development and implementation. The job duties, as described by the LHDs, contained some similarities in the following areas:

- Policy analysis (e.g., “monitor, analyze and develop legislation and policies,” “develop policy recommendations,” “issue advocacy,” “policy development and implementation”)
- Population-based focus (e.g., “...for the purpose of strengthening communities, health department programs, the local public health agency, or the broader public health system,” “...policies and programs on a population and systems basis”)
- Collaboration (e.g., “collaborate with land use and transportation planners”)
- Leadership (e.g., “convene stakeholders,” “bring community agencies together,” and “trains and coaches staff in planning methodologies”)
- Technical skills (e.g., assessment and planning, qualitative and [implied] quantitative data collection and management, assistance provision to staff on planning, evaluation, grant writing, and research activities including focus group, survey, methodologies).

Organizational capacity

Community health assessment and health improvement planning were used as indicators of high functioning LHDs. HIA was an important variable for this study because of its use in policy analysis. Because HIA requires strategic and analytic capacity, it was conceptually grouped with the CHA and HIP variables. This group was referred to as the “organizational capacity” variables.

Community health assessment was most common planning activity. Two hundred sixty-six LHDs (76.5%) reported that a CHA was completed for the jurisdiction. The other 71 LHDs (23.5%) reported that a CHA was not completed for the jurisdiction. CHA was

significantly associated with being more policy active. LHDs that had a CHA completed for the jurisdiction were nearly three times more likely to be more policy active than those have haven't.

Fewer LHDs participated in the development of an HIP than had a CHA completed for the jurisdiction, but still more than half did so. One hundred ninety-eight LHDs (57.6%) participated in the development of an HIP for their community. Of those, 183 LHDs (93.5%) used the results of a CHA to develop the HIP; 14 LHDs (6.5%) did not do so. One LHD did not respond to the question of CHA use for its health improvement planning. One-hundred thirty-nine LHDs (42.4%) did not participate in the development of an HIP. Participating in the development of an HIP was significantly associated with being more policy active. LHDs that participated in the development of an HIP were twice as likely to be more policy active.

Participation in an HIA was the least common of the organizational capacity activities (examined by this study) among LHDs. The largest group for this variable was LHDs that had not ever participated in an HIA and were not or less policy active in the past two years. Only 24 LHDs had ever completed an HIA; however, 20 (83%) of these LHDs were more policy active. LHDs that participated in an HIA were nine times more likely than those that did not participate in an HIA to be more policy active.

Governance

NACCHO classified governance of the LHD in three categories: unit of state government, unit of local government, and unit of both state and local government. In this analysis, the unit of state government and unit of both state and local government categories

were combined so that the comparison was between LHDs that were solely a unit of local government and those that were wholly or partially influenced by state government. Over two-thirds of the 337 LHDs (72.2%) used in this sample were solely units of local government. Of the LHDs that were influenced by state government, most were not or less policy active in the past two years. Local governance was significantly associated with more policy activity; LHDs that were units of local government were over three and one-half times more likely to be more policy active than those LHDs that were influenced by state government.

D. Bivariate Weighted Frequency and Logistic Regression Results for Service Area Characteristics

Table VII illustrates the results of the SURVEYFREQ procedure—weighted percentages of each service area predictor variable by policy activity group. It also includes the following from the SURVEYLOGISTIC procedure: the p-values from the maximum likelihood estimate Wald chi square test, the odds ratios, and the 95% confidence intervals for the odds ratios. The p-values that were statistically significant at the .05 level are in bolded font.

Jurisdiction Served

Two hundred sixty-four LHDs (80.9%) in the study sample serve a single city or county. Seventy-three LHDs (19.1%) serve multiple jurisdictions (i.e., were multi-city or multi-county LHDs). Unlike the LHDs that serve single jurisdictions, LHDs that serve multiple jurisdictions are more similarly distributed among the not or less policy active and the more policy active categories. The odds of LHDs that serve a single jurisdiction are less

than LHDs that serve multiple jurisdictions of being more policy active. However, there was not a statistically significant association.

TABLE VII. BIVARIATE WEIGHTED FREQUENCIES AND LOGISTIC REGRESSION RESULTS FOR SERVICE AREA CHARACTERISTICS

Independent (Predictor) Variable	Policy Activity				Odds ratio (95% CI)	Wald chi square P value (<.05)
	Low		High			
Jurisdiction served						
Single jurisdiction	146	51.1%	118	29.8%	0.7 (0.4-1.3)	0.30
Multiple jurisdictions (ref)	41	10.7%	32	8.4%		
Population served						
1,000,000+	4	0.5%	11	1.5%	13.9 (3.7-52.4)	<.0001
500,000-999,999	10	1.3%	26	3.4%	13.2 (5.1-33.8)	<.0001
250,000-499,999	14	2.4%	20	3.5%	7.2 (2.9-17.9)	<.0001
100,000-249,999	23	6.1%	31	8.2%	6.8 (3.1-15.2)	<.0001
50,000-99,999	31	9.1%	22	6.5%	3.6 (1.6-8.0)	0.0017
25,000-49,999	34	12.1%	26	9.2%	3.9 (1.8-8.4)	0.0006
<25,000 (ref)	71	30.3%	14	6.0%		
LBOH policy authority						
Strong LBOH	106	35.6%	102	27.7%	2.1 (1.3-3.7)	0.0055
Weak LBOH	19	6.7%	15	3.4%	1.4 (0.6-3.4)	0.43
No LBOH (ref)	62	19.5%	33	7.1%		

Population Served

Population served was significantly associated with policy activity for each population stratum. LHDs that serve fewer than 25,000 people had the greatest differentiation among policy activity groups. Within the <25,000 population stratum, 71 LHDs (83%) were in the not or less policy active group and 14 (16.5%) were in the more policy active group. As population size increased, policy activity generally increased. The 100,000-249,999 population stratum was the threshold at which the majority of LHDs shifted from being not or less policy active to more policy active within each stratum. The 500,000-999,999 and 1,000,000+ population strata were nearly tied as the stratum with the greatest proportion of LHDs (72.2% and 73.3%, respectively) being in the more policy active group. Figures 11 and 12 provided more detailed strata information.

LBOH Policy Authority

Two hundred eight LHDs (63.3%) had a strong LBOH with respect to policy authority. Ninety-five LHDs (26.6%) had no LBOH. Together, LHDs with a strong LBOH or no LBOH accounted for 89.9% of the LHDs in this study, indicating that it might be more common to have no LBOH policy authorities (i.e., no LBOH) or have strong LBOH policy authorities (as measured in this study) than to have a LBOH with few policy authorities. Thirty-four LHDs (10.1%) had a weak LBOH with respect to policy authority. The greatest difference between policy groups is seen in the LHDs without a LBOH—nearly two-thirds were not or less policy active in the past two years. Having a LBOH with strong policy authority are significantly more likely than those with no LBOH to be more policy active; they were twice as likely to be more policy active.

E. Bivariate Weighted Frequency and Logistic Regression Results for Leader Characteristics

Table VIII illustrates the results of the SURVEYFREQ procedure—weighted percentages of each leader, referred to as the “top executive” in the questionnaire, predictor variable by policy activity group. It also includes the p-values from the maximum likelihood estimate Wald chi square test, the odds ratios, and the 95% confidence intervals for the odds ratios from the SURVEYLOGISTIC procedures. The p-values that were statistically significant at the .05 level are in bolded font.

TABLE VIII. BIVARIATE WEIGHTED FREQUENCIES AND LOGISTIC REGRESSION RESULTS FOR LEADER CHARACTERISTICS

Independent (Predictor) Variable	Policy Activity				Odds ratio (95% CI)	Wald chi square P value ($<.05$)
	Low		High			
Top executive holds a public health degree						
Yes	36	10.0%	54	12.5%	2.5 (1.5-4.3)	0.0006
No (ref)	151	51.9%	96	25.7%		
Years of service as the top executive						
≥ 6 years	98	34.0%	71	18.9%	0.8 (0.5-1.3)	0.33
< 6 years (ref)	89	27.8%	79	19.3%		
Top executive's first time as an executive of an LHD						
Yes	146	49.8%	113	29.0%	0.8 (0.5-1.3)	0.31
No (ref)	41	12.0%	37	9.2%		
Gender of top executive						
Female	112	38.5%	63	17.1%	0.5 (0.3-0.8)	0.0027
Male (ref)	75	23.3%	87	21.1%		

Education

Having a public health-educated top executive was significantly associated with being more policy active. LHDs whose top executive held one or more public health degrees were roughly two and one-half times more likely than LHDs whose top executive did not hold a public health degree to be more policy active. However, 247 LHDs (77.6%) did not have a top executive that had earned one or more public health degrees (MPH or DrPH). The majority of those LHDs were not or less policy active.

Experience

Neither variable that represented the experience of the LHD top executive was significant. With respect to years of service, the largest group of LHDs (34.0%) was the one that both had a top executive that had six or more years of experience in their top executive position and were not or less policy active. Overall, roughly half of all LHDs had a top executive that had less than six years of experience in their current position or had six or more years of experience in their current position.

Two hundred fifty-nine LHDs (78.8%) were led by a top executive for which this was their first top executive experience (i.e., they had no previous experience as a top executive elsewhere prior to their current position). Further, nearly half (49.8%) of the LHDs both were led by a top executive for which this was their first experience; and were not or less policy active. Similar to years of experience, previous experience as a top executive was not associated with being more policy active.

Gender

The gender of the top executive—specifically male—was found to be significantly associated with more policy activity. The odds of a LHD being more policy active when led by a male top executive are almost twice those as when led by a female top executive. A greater proportion of LHDs led by a female top executive were not or less policy active as opposed to more policy active. Contrasted with the LHDs led by a female top executive, those led by a male top executive were more evenly distributed as not or less policy active and as more policy active. Males led slightly less than half of the LHDs (44.4%).

F. Multivariable Logistic Regression Models

Two approaches, “domain” and “a priori,” were used to develop multivariable models. All multivariable models used a 95% confidence interval. The domains approach included two steps. The first step resulted in three preliminary multivariable logistic regression models, each assessing for the effect of a domain of variables (based on the study sub-questions) on policy activity. Overall, comparing the R^2 from the three preliminary domain models, the leader characteristics variables seemed to be less important than the LHD and service areas characteristics models.

The first preliminary domain model presents the LHD characteristics that significantly contributed to LHDs being more policy active (Table IX). Of the occupation categories variables, having an epidemiologist and having an environmental health worker remained significant. Having ever participated in an HIA was also significant. The HIA variable had the largest adjusted odds ratio (6.3) of all LHD characteristic variables; however, the confidence interval was wide, indicating less precision. Being a unit of local

government was also significant and had an adjusted odds ratio of 4.2. The R^2 for the LHD characteristic domain model was 0.5558.

TABLE IX. MULTIVARIABLE LOGISTIC REGRESSION MODEL ASSESSING THE EFFECT OF LOCAL HEALTH DEPARTMENT (LHD) DOMAIN CHARACTERISTICS ON POLICY ACTIVITY

Variable	Adjusted OR	95% CI	P-value from X^2
Epidemiologist	2.3	1.4, 4.0	0.0018
Environmental health worker	2.6	1.3, 5.1	0.0072
HIA	6.3	1.9, 21.2	0.0031
Governance	4.2	2.3, 7.7	<.0001
n=337; Model Wald $X^2 = 45.57$, df=4, p<.0001 $R^2=0.5558$			

TABLE X. MULTIVARIABLE LOGISTIC REGRESSION MODEL ASSESSING FOR THE EFFECT OF THE SERVICE AREA DOMAIN CHARACTERISTICS ON POLICY ACTIVITY

Variable	Adjusted OR	95% CI	P-value from X^2
Population served	1.7	1.4, 1.9	<.0001
LBOH policy authority	1.7	1.3, 2.3	0.0005
n=337; Model Wald $X^2 = 52.10$, df=2, p<.0001 $R^2=0.5400$			

The results of the second preliminary domain model are presented in Table X. The model assessed the effect of the service area domain of variables on policy activity. Both

population served and LBOH policy authority remained significant. They also had nearly identical adjusted odds ratios. The R^2 for the service area domain model was 0.5400.

The results of the third preliminary domain model are presented in Table XI. The model assessed the effect of the leader domain of variables on policy activity. Having a top executive that holds a public health degree and having a top executive who is male remained significant. The gender variable had a small confidence interval. The R^2 is low (0.2552), indicating that these variables did not account for much of the variance in policy activity.

TABLE XI. MULTIVARIABLE LOGISTIC REGRESSION MODEL ASSESSING FOR THE EFFECT OF THE LEADER DOMAIN CHARACTERISTICS ON POLICY ACTIVITY

Variable	Adjusted OR	95% CI	P-value from X^2
Public health degree	2.4	1.4, 4.2	0.0012
Gender	0.5	0.3, 0.8	0.0051
n=337; Model Wald $X^2 = 52.10$, df=2, p<.0001 $R^2=0.2552$			

The variables from each of the three preliminary domain models were included as potential variables for the final domain-driven multivariable model. The subsequent model is presented as Model 1 in Table XII. Four variables remained in the model—population served, governance, HIA, and gender. Serving a larger population, being a unit of local government, having participated in an HIA, and having a male top executive are all

associated with a LHD being more policy active. HIA had the highest adjusted odds ratio (4.9). Roughly 66% of the variance is explained by these four variables. The R^2 was 0.6614.

The a priori approach led to Model 2. Model 2 comprises population served and governance (Table XII). The R^2 was 0.6100. The R^2 increased to approximately 0.6400 when any one of several variables was independently added to the model. The variables included a top executive with a public health degree ($R^2 = 0.6358$), having participated in an HIA ($R^2 = 0.6354$), the gender of the top executive ($R^2 = 0.6338$), and having an environmental health worker ($R^2 = 0.6385$).

TABLE XII. COMPARISON OF MULTIVARIABLE LOGISTIC REGRESSION MODELS

Model 1 – Domain model				Model 2 – A priori model			
Variable	Adjusted OR	95% CI	P-value from X^2	Variable	Adjusted OR	95% CI	P-value from X^2
Population served	1.6	1.3, 1.8	<.0001	Population served	1.7	1.4, 2.0	<.0001
Governance	4.4	2.2, 8.6	<.0001	Governance	4.3	2.2, 8.4	<.0001
HIA	4.9	1.3, 17.8	0.0160				
Gender	0.6	0.3, 0.9	0.0268				
n=337 Model Wald $X^2 = 47.07$, df=4, p <.0001 $R^2 = 0.6614$				n=337 Model Wald $X^2 = 48.59$, df=2, p<.0001 $R^2=0.6100$			

Regardless of which multivariable model was used, both population served and governance were significant variables. Model 2, the more desirable and parsimonious

multivariable model, that used the a priori approach comprised only these two variables. The two variables explained the majority of the variance between the not or less policy active and the more policy active LHDs.

V. DISCUSSION

A. General Discussion

Policy development is a core function for public health systems, within which LHDs play an important role. However, half of the LHDs in this study participated in three or fewer policy activities directed at local government over a two-year period, including one-fifth that did not participate in any policy activities. This leaves an opportunity for improvement. Several characteristics were associated with LHDs being more policy active. The most important characteristics were population size served and governance type; however, other statistically significant factors included public health training, male top executive, LBOH with strong policy authorities, HIA, and selected occupation categories. These findings have implications for public health practice, leadership, and research.

In general, fewer LHDs tended to participate in the policy activities that implied a higher degree of analysis, synthesis, complexity, or commitment. For example, “communicated with legislators, regulatory officials, or other policymakers regarding proposed legislation, regulations, or ordinance” was vague and could have included an informal discussion. Similarly, “participated on a board or advisory panel responsible for public health policy” did not include a level of effort so meeting attendance alone could have sufficed. Contrarily, for a LHD to assert that it “provided technical assistance to legislative, regulatory or advocacy group for drafting proposed legislation, regulations, or ordinances,” it would have had (and be recognized by other professionals as having) the resident technical ability across several policy analysis steps to truly provide assistance. With a relatively low (or inadvertently omitted) threshold for some of the policy activities, a greater percentage of

LHDs participating in the activities over a two-year period would have been expected. More information is needed about the LHD level of effort required, policy analysis methods used, organizational and system processes employed, and leadership and decisions involved to participate in these and other policy activities. A better understanding of the context within which LHDs participate in policy activities would be valuable for quality improvement initiatives.

Key findings

Population served and governance were the most important characteristics associated with more policy activity. These two variables accounted for 61% of the variance in policy activity in the preferred, more parsimonious model (a priori model or Model 2) in multivariable logistic regression analysis. LHDs that served a larger population or were locally governed were more likely to be more policy active. Adding one or two of the other investigator-chosen variables (environmental health worker, HIA, gender and public health degree) would have gained slightly more explanatory power but did not warrant the additional model complexity. The domain approach (Model 1) might have artificially increased the importance of HIA and gender since they did not seem to account for a substantial portion of the variance between LHDs that were not or less policy active and LHDs that were more policy active.

LHDs that served a larger population were significantly more likely to be more policy active—and this was true of every consecutive population size stratum that represented a larger population. LHDs that served 1,000,000⁺ population were 14 times more likely than LHDs that served <25,000 population to be more policy active. The size of a population

would not be expected to directly affect technical capability; however, it might be a proxy for, or a contributor to, another element found in the study's conceptual model or logic model. First, LHDs that serve larger populations might have larger workforces and it is conceivable that larger workforces might have dedicated policy analysts or other workers that have appropriate skillsets. Staff size as measured in this study, FTEs per 100,000 population, was not significantly associated with LHDs being more policy active. However, a different measure of staff size might have been significant. Second, LHDs that serve large populations might have flexible funding or access to key resources that support policy analysis work. Third, another characteristic in the service area that the larger population represents might be a factor. Possibilities include the demographic composition of the population, the political environment, and the electorate's active participation in policy and political processes. The actual effect of population size on policy activities warrants further study.

Governance was an important and statistically significant variable. LHDs that were a unit of local government were 3.4 times more likely to be more policy active than those that were state influenced. A potential reason might be that, for locally governed LHDs, more governmental decision-makers are local (rather than at a state capital) and invested in what happens in the community. Alternatively, perhaps the LHD leaders have stronger relationships with other local government leaders and can leverage those relationships for policy analysis or other activities such as implementing a HiAP strategy. While local revenue per capita had to be eliminated as a variable, another consideration could be that the locally-governed LHDs have more local revenue that can be used for locally-focused policy initiatives and workers. In this study, only policy activities that were directed at the local

level of government were used in the dependent variable. The governance results might have been different if state- and Federally-focused policy activities were included.

Other significant findings

The LHD top executive having a public health degree, rather than their executive experience, was significantly associated with LHDs being more policy active. It can be inferred that solely time served as an executive might not enable LHD executives to successfully lead a policy active LHD or to undertake policy analyses and related activities by one's self. Because no data for further understanding this variable can be extracted from the questionnaire, hypothetical rationale might help explain why having a public health degree was important. First, related to a key finding, LHDs that serve larger populations might also hire more public health-trained top executives. Second, it could be that degree course- and field-work included: policy and environmental approaches to health behavioral change, policy analysis, economic evaluation, public policy, public health law, and/or significant analytic work or systems and complexity thinking. Third, individuals that pursue public health degrees might be naturally interested in policy analysis or inclined towards leadership that inspires policy innovation. Regardless of the reason, there seems to be value in public health training for LHD leaders. To maintain scope, this study did not consider other degree types (e.g., doctoral), which could potentially influence policy activities.

LHDs that had a male top executive were more likely than those that had a female top executive to be more policy active. It might not be the case that gender itself makes a difference but it might be a proxy for, or related to, another factor. For example, it is possible that LHDs that serve large populations tend to be led by men and LHDs that serve

large populations are more likely to be more policy active. It is possible that more female leaders come from nursing and other clinical backgrounds that do not have public health or policy training. Since LHDs led by females are only one-half as likely as those led by males to be more policy active, yet females led more than half of the LHDs, this represents a potential vulnerability in LHDs' policy development function.

LHDs that had a LBOH with strong policy authorities were twice as likely as LHDs with no LBOH to be more policy active. This finding, similar to the key finding about governance, seems to suggest that proximity to the community is important. That might be by direct engagement with a LBOH or by leveraging a population served or a LBOH that is policy-oriented. Had the LBOH policy authority variable been created differently, such as reserving the “strong LBOH” category for only those LHDs whose LBOH possesses all three policy authorities, causing more LHDs to be in the “weak LBOH” category, the results might have been different.

All three organizational capacity variables—CHA, HIP and HIA—were statistically significant; however HIA was the strongest variable. LHDs that participated in an HIA were nine times more likely to be more policy active. It was much more common for a LHD to report that a CHA was completed for its jurisdiction or that it participated in the development of an HIP than it was to report that it had ever participated in an HIA. Participation in an HIA was uncommon; only 24 LHDs had done so. HIAs are one way that LHDs are implementing the HiAP strategy; therefore, one would have expected the number to have been higher. There might be several reasons for the differences in frequencies. The differences might reflect the socialization and use of “Mobilizing for Action through

Planning and Partnerships” and other processes, frameworks, tools and programs that have advanced the concepts of strategic planning, quality improvement, and assessment. Fewer policy analysis tools exist—particularly for executives and workers that have not had public health or policy training. The results could reflect real HIA participation (i.e., very few LHDs are participating in HIAs), but might also reflect underreporting. LHDs might have participated in an HIA without the LHD executives (or other questionnaire respondent): realizing that it did so; or, recognizing a particular activity as an HIA—particularly without a definition provided in the questionnaire. The questionnaire was fielded in 2010 when HiAP and HIAs were not commonly discussed. Perhaps communities, LBOHs, and governing officials do not understand the value and application of HIA for local health issues.

All five occupation categories (epidemiologist, health educator, public health informatics specialist, public information specialist, and environmental health worker) were significantly associated with LHDs being more policy active. Rationale used in the selection of the categories for the study might be supported by this result. Studies have linked presence of an epidemiologist with CHA which was in the same “organizational capacity” conceptual group as HIA. A health educator might be used to educate others about policies or implement policies designed to change behavior. A public health informatics specialist could potentially be necessary for the data needed for policy analysis. A public information specialist might be useful for advocacy, communicating ideas to stakeholders, or working with the media. An environmental health worker might indicate the presence of an environmental program. Environmental programs tend to have regulatory work associated with them. Additionally, they might generate revenue via non-clinical fees and fines that

could potentially be used for policy work. The occupation categories of “public health planner” and “policy analyst” and job duties suggested by respondents for future questionnaires reflect the need for relevant policy skill sets and possibly public health training—including leadership.

B. Limitations

This was an exploratory study. Therefore, definitive conclusions cannot be made about the findings. The secondary data used in this study were the result of a study design that was not intended to answer policy-related research questions but, rather, to obtain general information about the structure and function of LHDs. Although the results are descriptive in nature, they contribute to our limited knowledge of policy activities directed at the local level of government by using the most comprehensive LHD dataset available. They also can provide a basis for more focused qualitative study and questions.

While the Profile Questionnaire policy question asked whether or not a LHD participated in a policy activity, it did not ask about the participation frequency and intensity. A LHD that might have publicly testified seven times over the two-year period is counted the same as a LHD that testified once during that same timeframe. Therefore, “more policy active” really refers to the diversity of activities and not the quantity, quality, or effectiveness of the activities. Interpretations of the data must be drawn with that in mind.

The results might not truly reflect current public health policy activity levels or characteristics that might be associated with policy activity because of the data were collected three years ago. NACCHO’s public availability of the 2013 Profile Questionnaire dataset was delayed so it was not used in this study. Changes in policy activity might have

occurred in the three years since the 2010 fielding of the Profile Questionnaire. Further, several key documents calling for increased public health policy activity were published during or after 2010, so it cannot be inferred that this study's results reflect a response to the national call to policy action.

This study focused on policy activities directed at the local level of government and, thus, did not encompass all policy activity among LHDs. Exploration of LHDs' state-focused policy activities might provide additional insight not only into the true level of policy activity but also to some of the characteristics associated with state policy activities. Perhaps LHDs that are units of state government would obtain higher policy scores if policy activities directed at the state level of government were considered.

The data used in this study were collected using an organizational questionnaire. When administering organizational surveys, it is not always clear whether the most informed person completed the survey. As organizational size increases, the task of completing questionnaires is sometimes delegated to lower level workers who are not always in the best position to provide accurate information. While the questionnaire was sent directly to the top executive of every LHD, NACCHO did not verify who completed the questionnaire.

Missing data were a significant challenge, particularly since the missing observations among variables were not concentrated among the same respondents. The missing data would have, in some instances, introduced selection bias. Restricting the final dataset to 337 LHDs was advantageous because it: did not change the substantive conclusions compared to the larger dataset; minimized selection bias through extensive data screening; and, allowed the same LHDs to be used when analyzing each variable. This allowed for better

understanding and comparisons particularly among the frequencies and bivariate logistic regression models.

C. Implications for Practice

This study has implications for public health practice and leadership given the potential effectiveness of policy development as a tool for impacting population health. Policy development is already a public health system core function; and now, national accreditation requires LHDs to meet the public health accreditation measures and standards that address policy functions and products. The implications drawn from the study's main findings focus on opportunities for improvement related to population size served, governance, and workforce development.

Population served

Population size served was positively associated with more local policy activity in communities. However, 36.3% of the LHDs in this study serve populations of less than 25,000 people. If policy is an important lever to have a meaningful impact on the health across the Nation, public health leaders can think about ways to improve policy development capacity in small- and mid-sized jurisdictions. Regionalization of the policy development core function might be an option for leaders to share or cross-train workers in an effort to enhance or supplement policy development capacity for their jurisdiction. A joint project with peers might be possible.

Governance

LHDs that were wholly units of local government were more likely to be policy active, so the "local government" aspect of the LHD should not be underestimated. Local

public health policy might be influenced by the jurisdictional administrator, a commissioner's court, or city council even more than by a LBOH. LHD leaders might focus on relationship-building within their government structure. Peer department directors might be occasionally overlooked such as those in transportation, agriculture and education (e.g., county-based Cooperative Extension), urban and rural development, or public safety that could be very helpful and necessary for public health policy development. Issues of mutual interest might be identified and collaboratively addressed while providing opportunities for both staffs to obtain policy-related skills and interact with policy partners. This type of interdisciplinary collaboration can be particularly important for LHDs that are interested in implementing the HiAP strategy. Effective leaders have the ability to influence policy levers (e.g., incentives, guidance, capacity building, services) to bring about change even if those levers do not reside within the LHD. Local leaders that are involved in national organizations might consider using NACCHO as a potential convener of other groups (e.g., National Conference of Mayors, National Association of Counties) for a collaborative effort to raise awareness of public health policy needs.

Workforce

Executives that had a public health degree were significantly associated with more policy active LHDs. Executives without public health training, particularly women who might be more likely to have a clinical nursing background, can benefit from mentoring, leadership development opportunities, and an orientation to the public health core functions.

LHDs can strengthen efforts to attract and hire executives that have public health training or a policy background. Larger LHDs can assess their current workforce for the

presence of specific skill sets and hire to fill key policy needs. Smaller LHDs with less capacity or fewer hiring options could offer targeted trainings to augment skills of current staff. Regardless of LHD size, LHDs that have a limited ability to conduct policy analyses or participate in policy activities can encourage other system components (e.g., local hospital, physician provider group) that have, or can have, a greater policy role.

Not all executives and workers are able to obtain a public health degree. However, they might take advantage of public health trainings that are physically and financially accessible. Courses that have policy analysis modules and trainings that are based on policy-related competencies might be particularly advantageous. “Brown bag lunches” or other opportunities might be made available to workers from the LHD and other components of the public health system. For leaders that have an inclination toward innovation, quality improvement, and practice-based research might consider creating an academic health department. Policy analysis capacity could be an initial area of focus for the academic health department, particularly if there aren’t extant processes for systematic policy analysis. Mentoring relationships among high policy performing LHDs and low policy performing LHDs can also be established.

State health departments and other organizations can play a role in developing the LHD workforce by assessing LHD policy development and targeting LHDs that need improvement. Policy trainings or orientations for Board members might strengthen LBOH policy involvement. LHDs can better collaborate with LBOHs that have strong policy authority. HIA awareness and training needed by most LHDs, regardless of population

served or LHD size. State health departments or other organizations might be in a position to facilitate improvement in these three areas among several LHDs in an efficient way.

In this study, the occupation categories served as proxies for skill sets. However, the occupation categories could be viewed from another perspective. There are times when a LHD worker with certain connections (due to their work) or greater competence than the top executive might hold greater influence with a LBOH and other policy stakeholders and decision-makers. A top executive that is a strong leader can mentor and develop these workers to further improve LHD policy analysis capacity.

D. Implications for Research

This exploratory study has utility for future research. The implications for research are drawn from the study's methods, main findings, and limitations. The research implications focus on next steps based on this study's focus on characteristics, improvements to the Profile Questionnaire, and lines of inquiry for further qualitative and quantitative exploratory and descriptive studies.

Next steps

Additional characteristics could be explored such as service provision and local revenue. Assessing the relationship of service provision and policy work could provide information that contrasts LHDs. Are those LHDs that provide personal services rather than focus on population health strategies more or less likely to have a robust policy development capability? As policy work increases do LHDs provide more or fewer personal services? A study that could obtain accurate and timely information on local revenue would help supplement this study. Local revenue was hypothesized as being more flexible and, thus,

allowable for use on policy activities. Therefore, it is still a variable of interest. For more complete data on local revenue, a financial data source other than the Profile Questionnaire might be more helpful.

Researchers might also build upon the results of this study by conducting case studies of LHDs that are not or less policy active and that are more policy active (i.e., low policy performers and high policy performers). Qualitative data that might explain what the real and perceived barriers and facilitators to policy activity are would add richness to this study's findings. This study could also be used to generate the selection criteria, based on variables of interest, for determining which LHDs to study.

Future researchers might consider exploring the ordinal aspect of the policy activity dependent variable. Due to the additive construction of the dependent variable, the values can be ranked—three activities are more than one activity. While a few of the preliminary bivariate models in this study failed the proportional odds test, not all of them did so.

Researchers could analyze trends in policy activity over time using future Profile surveys. The 2013 data could be used to determine whether there has been an increase in policy activity since 2010 that corresponds with the increased national focus on policy development as a way to improve population health. While extreme changes in the relationships among policy activity and various characteristics from 2010 to 2013 might not be expected, it is possible that there have been changes because the public health context continually changes. Potential contextual changes might include: revenue during a continued economic recession; a growing understanding, training, and use of HIAs to inform policy

analyses; or more linkages and interdependencies between the public health system and medical professions, particularly when medical professionals understand community health.

Profile Questionnaire

This study highlighted potential areas for improvement in the Profile Questionnaire. These include improvements to the independent variables. First, the inclusion of more definitions would also give researchers more confidence that the data are real representations of reality rather than guesses. HIA participation is an important activity for policy analysis therefore it should be defined to reduce the number of “don’t know” responses. Clarification on NACCHO’s definitions of CHA and HIP might also be helpful. The current definitions that are provided to respondents are verbs, implying processes; however, the questions imply that CHA and HIP are products. Second, the inclusion of “policy analyst,” “strategic planner,” or a related occupation category could provide information on policy-specific skill sets. The job duties suggested by 2010 respondents could be reviewed to obtain ideas for the key job functions.

There are several changes that could improve the quality of the policy data. First, defining “policy” would ensure that respondents are reporting on the same thing type of activity and would help researchers interpret the results. Is the focus on internal LHD policies, local ordinances, executive orders, or system inter-organizational policies? Is the policy implementation formal (e.g., statute, directive) or informal (e.g., internal memorandum)? Second, including questions about policy analysis functions beyond advocacy would give researchers more information to infer the true level of capacity within LHDs across many steps of policy analysis processes. Questions about essential abilities or

functions for policy analysis (e.g., economic evaluation) could be asked in addition to the five sub-questions about interaction with others (e.g., communicating with policy makers, serving on a board). Third, asking respondents to quantify the occurrence of each policy activity would provide information about the intensity of policy activity at LHDs. Lastly, aligning policy questions more closely with accreditation measures or the nine aims in *Priority Areas for the Improvement of Quality in Public Health* would enable both practitioners and researchers to assess whether improvements are made over time.

Future exploratory and descriptive studies

This study answered a “what” question but there are significant “how” or “why” questions to be answered. Little is known about policy analysis processes within LHDs—whether systematic policy analysis processes (which lend themselves to quality improvement) are used, or whether policy ideas originating from programmatic workers are proposed and pursued without further analysis. The same is true for other public health system components. Understanding how the policy development core function is performed among U.S. communities is necessary for improving the quality of the function. Insight into the barriers, facilitators, motivations, rationale, and authorities for policy work can help explain why some LHDs and other system components do or don’t participate in policy activities.

An end goal for public health policy as a population-based strategy is to improve population health. Researchers could design studies to assess the quantity and quality of policy interventions and whether they have had an impact on health outcomes are essential. Potential initial lines of inquiry could include asking how LHD are currently evaluating their

policy activities or asking what the intended and unintended effects of a policy for a specific health issue have been.

VI. CONCLUSION

The Nation is facing threats to its public health that can be more effectively and efficiently addressed by employing the public health core function of policy development. Policy development has not been as thoroughly explored and emphasized in practice as the assurance and assessment core functions. Understanding what factors are associated with policy development might serve as a platform from which both practitioners and researchers can determine how those factors effect policy development, how and why policy development work is conducted, and what policies lead to true change and population health. This study concluded that elements of policy active LHDs reflect their local nature. These elements included: having local engagement through a LBOH with strong policy authority; being a unit of local government; serving a large local population; participating in HIAs; and having a LHD leader that is male and/or holds a public health degree that implies community focused training. Further study is needed to determine: how practitioners and leaders might leverage these characteristics to enhance their abilities to improve population health; and how researchers can contribute to practice-based research with a focus on translation for policy ends.

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Education:

1991-1996	University of Minnesota St. Paul, Minnesota	B.S. Family Social Science, 1996
1997-1999	University of Minnesota Minneapolis, Minnesota	M.P.H. Community Health Education, 1999

Professional Experience:

06/2008-present	Division of Policy and Strategic Planning, Office of Policy and Planning, Office of the Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services, Washington, D.C. <i>Policy Analyst/Team Lead</i>
10/2011–04/2012	Health Services Research Branch, Domestic Social Policy Division, Congressional Research Service, Washington, D.C. (Detail) <i>Analyst in Health Policy</i>
01/2003–06/2008	Office of State and Local Preparedness, and Immediate Office, Office of the Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services, Washington, D.C. <i>Program Analyst</i>
09/2002–12/2002	Program for Health and Higher Education, Association of American Colleges and Universities, Washington, D.C. <i>Interim Associate Director</i>
09/1999–9/2002	Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, Atlanta, GA <i>Public Health Prevention Specialist</i>
08/2000-9/2002	Division of Sexually Transmitted Diseases, District of Columbia Department of Health, Washington, D.C. (Rotation)
03/2000–8/2000	Public Health Practice Program Office, Division of Public Health Systems, Assessment and Surveillance Branch, Atlanta, GA (Rotation)

09/1999–3/2000	National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Office of Program and Policy Information, Atlanta, GA (Rotation)
04/1999–9/1999	Bloomington Health Division, Bloomington, MN <i>Public Health Assistant</i>
06/1998–2/1999	Research Department, Minnesota House of Representatives, St. Paul, MN <i>Research Assistant</i>

Honors and Awards:

- 2013 Assistant Secretary for Preparedness and Response's Spotlight Award, U.S. Department of Health and Human Services
- 2009 Annenberg Leadership Institute Fellow, Partnership for Public Service
- 2002 Secretary's Award for Distinguished Service, U.S. Department of Health and Human Services
- 2002 Center for HIV, STD and TB Prevention Plaque, U.S. Department of Health and Human Services/Centers for Disease Control and Prevention
- 1999 Division of Epidemiology Student Research Award, School of Public Health, University of Minnesota
- 1996 Natalie Gallagher Scholarship recipient, College of Human Ecology, University of Minnesota
- 1995 Phi Upsilon Omicron Honor Society, University of Minnesota

Select Presentations:

1. Kaplowitz, Lisa, Kosmos, Christine, Lamprecht, Lara, Tosatto, Robert, & Wolfe, Herbert. Galvanizing STLT, Private Sector, Non-governmental, Communities and Individuals to Optimize Implementation and Evaluation of the 2014 National Health Security Strategy. Public Health Preparedness Summit, Atlanta, GA, March 2014.

2. Lamprecht, Lara S. & Raub, William F. Results of a National Review of State Government Pandemic Influenza Operating Plans. American Public Health Association Annual Meeting, Philadelphia, PA, November 2009.
3. Lamprecht, Lara S. Telehealth: Its Applications for Public Health Emergencies and Disaster Medical Responses. American Public Health Association Annual Meeting, Philadelphia, PA, November 2009.
4. Lamprecht, Lara S. Applications of Telehealth for Public Health Emergency and Disaster Medical Responses. National Credentialing Forum, Phoenix, AZ, February 2009.
5. Lamprecht, Lara S. & Raub, William F. Your Federal Government in Action: Active Policy Development to Protect You from Pandemic Influenza. American Public Health Association Annual Meeting, Washington, DC, November 2007.
6. Lamprecht, Lara S. Cities Readiness Initiative. U.S. Department of Health and Human Services (for delegation from The People's Republic of China). September 2007.