Collaboration Between Local Health Departments and Schools and Programs of Public Health

BY KEVIN ALEX KOVACH

B.S., Central Michigan University, 2003
MSc, London School of Hygiene and Tropical Medicine, 2009

DISSERTATION

Submitted as partial fulfillment of the requirements for the degree of Doctor of Public Health in Leadership in the School of Public Health of the University of Illinois at Chicago, Chicago, Illinois.
May 2017

Dissertation Committee

Christina Welter, DrPH, MPH, Community Health Sciences (Chair)
Eve Pinsker, PhD, Community Health Sciences
Steve Seweryn, EdD, MPH, Epidemiology and Biostatistics
D. Patrick Lenihan, PhD, MUPP, Community Health Sciences
C. William Keck, MD, MPH, Council on Linkages Between Academia and Public Health Practice

This dissertation is dedicated to my wife, Kristin, who has supported me through this process, and my children, Desmond and Benjamin, who make me laugh and wonder what is possible.

And to my parents, Alex and Diane, who taught me the value of hard work and provided me a safe place for trying new things in my childhood.

ACKNOWLEDGMENTS

I would like to thank my dissertation committee Christina Welter, Eve Pinsker, Steve Seweryn, Patrick Lenihan, and C. William Keck for supporting me through this process. I would specifically like to acknowledge Christina for her guidance and patience throughout this long process. I would also like to thank Eve and Steve for their assistance with conceptualizing this work and especially for their help with the qualitative portions. I appreciate your help and believe that I learned a great deal along the way. To Patrick, I truly thank you for giving me the opportunity to pursue the Doctor of Public Health Degree. This was a wonderful growth experience and something that I will count as a key event in my life. Finally, I would like to thank Dr. Keck, who I enjoyed discussing public health issues with and whose academic health department concept sparked my interest in this topic. I also want to thank Griselle Torres who assisted me with my qualitative analysis and Lara Lamprecht who listened to and provided feedback on my early ideas for this project. Finally, I want to thank the individuals that participated in this study. It was invigorating to hear your ideas about how your collaboration could advance public health.

KAK

TABLE OF CONTENTS

CHAPTER **PAGE**

I. Introduction 1
- A. Background and Context....3
- B. Statement of the Problem 8
- C. Purpose of the Study....9
- D. Research Questions 9
- E. Implications for Public Health Leadership 10
- F. Summary 11

II. Literature Review and Conceptual Framework 12
- A. Literature Review....12
  1. Degree of Inter-Organizational Collaboration 13
  2. Decision Process For Adopting Innovations in Organizations 17
     a) Benefits of Collaboration 18
     b) Barriers and Facilitators to Collaboration....20
     c) Organizational Characteristics and Collaboration 22
- B. Conceptual Framework....24
- C. Summary 27

III. Study Design and Methodology....28
- A. Phase 1: Analysis of 2008 National Profile of Local Health Departments 35
- B. Phase 2: National Exploratory Survey of Local Health Departments (2015)....40
- C. Phase 3: Group Interviews With Local Health Departments and Schools and Programs of Public Health 46
- D. Quality and Rigor 53
- E. Summary 59

IV. Results....60
- A. What Factors Predict Collaboration Between Local Health Departments and Schools And Programs of Public Health....61
- B. What are the Benefits of Collaboration Between Local Health Departments and Schools or Programs of Public Health – A National Exploratory Survey....74
- C. Benefits, Barriers, and Facilitators of Collaboration Between Local Health Departments and Schools and Programs of Public Health – A Qualitative Exploration 104

V. Discussion.... 135
- A. Summary and Integration of Key Findings.... 135
- B. Limitations.... 157
- C. Implications for Practice 160

TABLE OF CONTENTS (continued)

D. Recommendations 161
E. Implications for Research 166
VI. Conclusion 167
VII. Bibliography 169
Appendices
Appendix A: Original Approval from Office for the Protection of Research Subjects
Appendix B: Amended Approval from Office for the Protection of Research Subjects
Appendix C: 2008 National Profile of Local Health Departments Approval Email From the National Association of City and County Health Officials
Appendix D: 2013 National Profile of Local Health Departments Approval Email From the National Association of City and County Health Officials
Appendix E: 2015 Exploratory Survey of Local Health Departments
Appendix F: 2016 Group Interview Guide
Appendix G: Preliminary Codebook
Appendix H: Final Codebook
Appendix I: Qualitative Data Analysis – Network Views
Appendix J: Chain of Evidence – Findings, Supporting Data, and Recommendations
Appendix H: Curriculum Vitae

LIST OF TABLES

TABLE		PAGE
I.	Research Questions, Data Collection Methods, And Analysis Strategies	31
II.	Empirical Test Of A Model Continuum Of Collaboration	37
III.	Description Of The Variables Included In The Ordinal Logistic Regress Model	38
IV.	Representativeness Of 2015 Survey With The 2013 National Profile Of Local Health Departments	44
V.	Purposeful Sampling Frame For Group Interviews	48
VI.	Group Interview Characteristics	50
	(Manuscript 1) Model Collaboration Continuum Between Local Health Departments And Schools And Programs Of Public Health	72
	(Manuscript 1) Local Health Department Characteristics Associated With The Level Of Collaboration With Schools And Programs Of Public Health	73
	(Manuscripts 2) Indicators Of The Extent And Benefits Of Collaboration Included In The Questionnaire	92
	(Manuscript 2) Extent Of Collaboration Between Local Health Departments And Schools And Programs Of Public Health	93
	(Manuscript 2) Importance Of The 10 Essential Public Health Services And University Resources For Collaboration With Schools And Programs Of Public Health	94
	(Manuscript 2) Effectiveness Of Collaboration With Schools And Programs Of Public Health On The 10 Essential Public Health Services And University Resources	95

LIST OF TABLES (continued)

(Manuscript 2) Themes Emerging From Qualitative Analysis Of Open Ended Questions 96

(Manuscript 3) Characteristics Of The Group Interview Participants 110

(Manuscript 3) Distribution Of Perceived Benefits..... 117

(Manuscript 3) Description Of Perceived Benefits Of Collaboration..... 118

(Manuscript 3) Distribution Of Perceived Barriers And Facilitators 122

(Manuscript 3) Description Of Perceived Barriers And Facilitators..... 123

VII. Continuum Of Collaboration In 2008 And 2015 138

LIST OF FIGURES

FIGURE PAGE

1. Proposed model of the degree of collaboration between local health departments and schools and programs of public health 17
2. Relationship between roger's diffusion of innovations in organizations and the benefits, barriers, and facilitators of collaboration 25
3. Proposed conceptual framework of factors that influence the degree of collaboration between local health departments and schools and programs of public health 27
4. Sequential mixed-methods study design 30
5. Degree of collaboration between local health departments and schools and programs of public health in 2008 and 2015 136
6. Collaborative strategies between local health departments and schools and programs of public health in 2008 and 2015 137
7. Gap between the importance of and effectiveness of indicators of the 10 essential for collaboration between local health departments and schools and programs of public health 148
8. Importance of indicators of the 10 essential public health services stratified by low, medium, and high collaboration 149
9. Effectiveness of indicators of the 10 essential public health services stratified by low, medium, and high collaboration 150
10. Local health department characteristics associated with the degree of collaboration with schools or programs of public health using a continuum of collaboration (n=366) 155
11. Local health department characteristics associated with the degree of collaboration with schools or programs of public health – a sensitivity analysis not using a continuum of collaboration (n=416) 156

LIST OF ABBREVIATIONS OR NOMENCLATURE

LHD: Local Health Department

IOM: Institute of Medicine

ASPPH: Association of Schools and Programs of Public Health

SPPH: Schools and Programs of Public Health

PHAB: Public Health Accreditation Board

AHD: Academic Health Department

CDC: Centers for Disease Control and Prevention

CEPH: Council on Education for Public Health

MPH: Master of Public Health

CHA: Community Health Assessment

CHIP: Community Health Improvement Plan (or Planning)

SUMMARY

Local health departments play an essential role in addressing public health challenges. However, LHDs are also plagued by poor performance signified by infrequent completion of community health assessment, community health improvement plans, strategic planning, and evidence-based practice. Local health departments also face a variety of challenges with regard to the changing nature of public health, such as a transition from communicable to chronic disease, the role of health equity and disparities, emergency preparedness, and continual changes to health care policy, such as the Patient Protection and Affordable Care Act, and its potential repeal and replacement. Likewise, schools and programs of public health face similar challenges educating the future public health workforce, filling gaps in the evidence-base, and working to translate research into practice.

Collaboration between local health departments and schools and programs of public health could be a means to help address these issues and promote innovation and change throughout the public health system. This type of collaboration has been championed by a variety of organizations, most notably the academic health department concept of the Council on Linkages Between Academia and Public Health Practice. However, little is known about the extent of collaboration between local health departments and schools and programs of public health the factors that influence if and how these organizations collaborate. This study set out to explore these factors.

The findings showed that collaboration between local health departments and schools and programs of public health are fairly widespread and likely expanding. The findings also

show that local health department officials and faculty and staff from schools and programs of public health both have very tangible and aspirational reasons for why they collaborate. The most common and most tangible benefit seems to be how the relationship can support student learning activities, such as internships or practicum. This was the most widespread task being carried out and was viewed as relatively beneficial by both local health departments and schools and programs of public health. Another tangible but less common benefit was related to how schools and programs of public health can help improve how local health departments collect, analyze and use data. This helped to improve community health assessment and service delivery. More aspirational goals included revolutionizing community health assessment by collecting robust primary data from the community through surveys and qualitative techniques; working more directly with communities and not just community organizations; translating evidence into practice; and working to close gaps in the evidence-base. However, these aspirational tasks were observed relatively infrequently and were often just ideas for future collaboration.

The findings suggest that there are great opportunities for improving collaboration between local health departments and schools and programs of public health and that this could be a strategy used to promote innovation and change in local public health practice. To improve collaboration, local health departments should develop high-quality internships to entice SPPH into collaboration. While not revolutionary in its own right, schools and programs of public health found this to be of great importance and it can serve as a tangible task to

initiate collaboration. However, local health departments and schools and programs of public health should seek to expand collaboration and should seek out stretch objectives, such as the aspirational benefits described previously. The findings also suggest that strong leadership is essential for collaboration. Strong leadership is needed to develop and communicate a clear vision, create opportunities from problems, build relationships, and champion the cause of collaboration throughout their organizations.

This study adds to work being done by the Council on Linkages Between Academia and Public Health Practice and supports the addition of further research questions in their proposed research agenda for academic health departments. Further study may be needed with regard to: How collaborative relationships between local health departments and schools and programs of public health evolve and is the academic health department the best end state? How do AHDs create, communicate, and execute a vision? Are the benefits of AHDs equitable and how does the degree of equity affect AHD collaboration? And, can a long-distance based AHD model be created?

I. CHAPTER 1: INTRODUCTION

Collaboration between local health departments (LHDs) and academia dates back to the early 20th century, but public health practice and academia have largely remained separate.[1–4] Recently, strong calls have been made for enhancing linkages between practice and academia. The Institute of Medicine (IOM)[4(pp15-17),5(p395),6(p21)], the Council on Linkages between Academia and Public Health Practice[7], and the Association of Schools and Programs of Public Health (ASPPH)[8,9] have all advocated for stronger collaboration between LHDs and academia. This has piqued the interest of both public health practitioners and academicians alike.[10,11] Finally, collaboration between public health practice organizations and academic institutions, such as schools and programs of public health (SPPH), has been codified into the *National Public Health Performance Standards,*[12(p66)] t*he Operational Definition of a Functional Local Health Department,*[13(p9)] and most recently the Public Health Accreditation Board's (PHAB's) *National Voluntary Public Health Accreditation Program,*[14(p211)] all of which help to define the roles and responsibilities of LHDs.

Collaboration between LHDs and SPPH may be of special interest, because of SPPH' responsibility for preparing the public health workforce and building the public health evidence-base, and LHDs' responsibility for providing the 10 essential public health services and applying the public health evidence-base.[8,9] Previous research has provided multiple examples of successful collaboration between LHDs and SPPH, mostly under the guise of the academic health department (AHD).[15–17] However, previous research also suggests that collaboration

between LHDs and SPPH is often limited to only supporting student learning activities, rather than more strategic functions.[18,19]

Efforts to enhance these linkages are also underway. The Council on Linkages Between Academia and Public Health Practice has advanced the concept on an AHD, which aims to improve public health research, teaching and practice by bringing together individuals from public health practice and academia and are modeled after teaching hospitals.[7] In addition, the ASPPH in cooperation with the Centers for Diseases Control and Prevention (CDC) provided up to $100,000 to 14 schools of public health to develop collaborative models with state and local health departments in 2003.[20] The Journal of Public Health Management and Practice has dedicated three issues to this concept since 2000. And public health officials in some states are examining how to enhance linkages between practice and academia.[21] With this in mind, it is clear that collaboration between LHDs and SPPH is thought to be important for enhancing the public health discipline.

However, little information exists about the extent of collaboration, why LHDs and SPPH collaborate, and ultimately how to enhance linkages between LHDs and SPPH. Most of the existing research comes from individual case studies that describe how a small number of LHDs and academic institutions are working together. However, this does not provide insight into the broader public health community. A study recently published[a] found that AHDs were fairly

[a] The author of this dissertation consulted with Dr. Paul Campbell Erwin, the author of the study referred to here, and determined that our studies were complimentary not duplicative because of the difference in our target populations.

common (55%) among SPPH, but this does not show how widespread this practice is among LHDs and does not capture other forms of collaboration, which may be beneficial as well.[22]

This study aimed to address these issues and to reduce the gaps listed above. A three phase sequential mixed methods study design was used to measure the extent of collaboration between LHDs and SPPH in the population of LHDs, and explore factors that influence the degree to which LHDs and SPPH collaborate. First, data from the 2008 National Profile of LHDs was used to measure the extent of collaboration from a historical perspective and to identify LHD characteristics associated with the degree of collaboration.[23] Second, a national cross-sectional survey was sent to all LHDs to provide a current measure of the extent of collaboration and to explore the perceived benefits of collaboration from LHD officials' perspective. Finally, a qualitative study using group interviews with both LHD officials and faculty or staff from SPPH that collaborated with one another was completed to more thoroughly explore the perceived, benefits, barriers, and facilitators to collaboration from a shared perspective. Together, these findings helped inform the phases that followed and were integrated to provide more robust findings. The findings are intended to help inform public health officials, those from both practice and academia, that are engaged in activities aimed at enhancing collaboration between LHDs and SPPH.

A. BACKGROUND AND CONTEXT

The field of public health fills an important niche in the United States' healthcare system by emphasizing population-based primary prevention, which is largely unaddressed by other healthcare disciplines.[24(p537),25,26] In addition, public health interventions were highly successful

in the 20th century and accounted for 25 of the 30 years of life expectancy gained.[27] The public health discipline is essential for addressing the public health issues of the 21st century such as containing healthcare costs, preventing chronic disease, combating emerging infectious diseases, and addressing the social determinants of health.[28(p361),29(p2),30(p10),31,32]

LHDs are an essential piece of the broader public health system and provide a close relationship between public health practitioners and the individuals living in their jurisdictions.[33(p10)] This close relationship provides opportunities for community members to participate in identifying, planning, and implementing interventions, which helps facilitate successful public health action.[34(p30)] LHDs also provide a governmental presence at the local level.[35(p173)] All Americans should be served by LHDs that assure that the core functions of public health and the 10 essential public health services are provided effectively within their jurisdiction.[13]

However, LHDs face many challenges and poor performance is widespread. The IOM affirmed that the public health system was in "disarray" in their 1988 report, *The Future of Public Health,* and reaffirmed this in their 2002 report, *The Future of the Public's Health in the 21st Century.*[4(p19),5(p100)] Turnock and colleagues found that only 19% of LHDs were compliant with a majority of the markers of the core functions of public health in 1994.[36] Many of these same deficiencies remain today. The *2013 National Profile of Local Health Departments* shows that:

- Only 23% of LHD executives have formal public health education.
- Many LHDs lack workforce capacity for core public health functions:

    - 23% of LHDs do not employ emergency preparedness coordinators.
    - 32% of LHDs do not employ health educators.
    - 64% of LHDs do not employ epidemiologists.
    - 67% of LHDs do not employ information technology specialists.
    - 68% of LHDs do not employ public information specialists.
- Many LHDs are not conducting the core public health functions and in the last five years:
    - 30% of LHDs have not conducted a community health assessment (CHA).
    - 44% have not completed a community health improvement plan (CHIP).
    - 57% have not conducted an organizational strategic planning process.
- Few LHDs fully use evidence-based practice. Thirty-eight percent of LHDs did not use *The Community Guide to Preventive Services* at all, and only three percent used it consistently for all relevant programs.[37]

In light of this, public health leaders have worked diligently to develop a national voluntary public health accreditation program in order to improve the quality of state, local, and tribal health departments and ultimately transform public health practice.[38] This program was launched in 2011 and is rooted in continuous quality improvement of the 10 essential public health services.[39] Public health accreditation is intended to improve the nation's health by creating a national network of high performing state, local, and tribal health departments.[40] However, public health accreditation may stretch some LHDs beyond their existing capacity. Research shows that LHDs with lower levels of organizational capacity are becoming disproportionally disengaged from the accreditation process.[41]

In addition, the basic conditions in which LHDs operate is also changing. An epidemiologic transition has occurred, resulting in an older and more diverse population afflicted more with chronic conditions than infectious disease.[42] The events of September 11, 2001 and continued terrorism ushered in an era of public health emergency preparedness.[43] The Patient Protection and Affordable Care Act was made law in 2010 and helped provide health insurance for many previously uninsured Americans, and may also be overturned with the next presidential administration.[44] In addition, LHDs' budgets have been cut and the LHD workforce has shrank.[45–48]

These forces highlight the difficult environment LHDs operate in and raise questions about the role LHDs should play in the 21st century.[49] Many LHDs cannot fully execute the 10 essential public health services now, let alone the more evidence-based and data driven functions laid out for high-achieving governmental public health departments in the 21st century.[49] It is clear that many LHDs need to make organizational changes and increase their organizational capacity. However, LHD capacity is largely a function of the size and tax base of the jurisdiction it serves and is not easily amenable to change.[50] The public health discipline is looking to a variety of strategies to address this issue. One long-rooted strategy has been to promote collaboration with other organizations. Collaboration can help organizations with access to information, resources, and expertise to support joint learning and innovation; support economies of scale and deduplication of effort; and ultimately help organizations to achieve goals that they could not have reached individually.[51–54] Collaboration can also help to improve the entire public health system, which is important because many public health issues do not fall within the purview of individual organizations.[55(p3),56(p4)]

Common types of collaboration in public health include: community health coalitions,[57,58] local emergency planning committees,[59(p280)] and regional collaboratives with neighboring LHDs that support emergency preparedness,[60–62] accreditation,[63–65] and other programmatic and service activities.[66,67] However, it is unclear how these types of collaborations address the specific limitations that many LHDs face with regard to expertise in planning, data collection and analysis, and evidence-based practice. Partnerships between LHDs and academic institutions, specifically SPPH, may be especially beneficial in this regard because SPPH can provide access to academicians with expertise in these disciplines, as well as students that need to learn to apply their public health education in real world settings.

SPPH also have reason to collaborate with LHDs. SPPH have a responsibility to both identify innovative public health practices through research and to ensure that this is translated into practice.[68] However, SPPH have traditionally focused more heavily on research than practice. Linkages with LHDs may increase the speed and improve the fidelity with which innovative practices are incorporated into public health practice.[69] SPPH also need access to a supply of qualified faculty.[68] And as stated by the Council on Education for Public Health (CEPH), "excellence in education is related directly to proficiency in practice."[70(p554)] Public health students need access to practice based settings in order to learn to apply their education in real world settings.[8,9] Linkages with LHDs could address all of these issues.

The published and grey literature has cataloged many of the benefits of collaboration between LHDs and SPPH via a number of case studies. The benefits tend to fall into three categories: (1) improved organizational capacity to provide existing services;[71,72] (2) the development of innovative programs or processes that support the core functions of public

health and the 10 essential public health services;[15,73] and (3) improved teaching and training for public health students and workers.[17,74] Collaboration between LHDs and SPPH may hold a great deal of opportunity for enhancing research, teaching, and practice, and may ultimately lead to improved public health outcomes.

B. STATEMENT OF THE PROBLEM

Despite being a potential strategy for enhancing public health research, teaching, and practice, little is known about the extent of collaboration between LHDs and SPPH and the factors that influence if and how these organizations collaborate. Diffusing strategies like collaboration between LHDs and SPPH are important because high-quality public health solutions that are supported by evidence, community needs and assets, and strategic and innovative thinking are required to address the population health issues the United States faces. LHDs play a crucial role in developing and carrying out these initiatives, but too often, the quality of public health services and the ability of LHDs to innovate and change is called into question. Research shows that diffusion of innovative strategies such as that being discussed here, in other disciplines and industries, is influenced by organizational characteristics, as well as how beneficial or challenging organizations perceive collaboration to be[54,75,76] Understanding what LHD characteristics are associated with collaboration, and how beneficial and challenging collaboration is perceived to be from LHD officials and faculty and staff from SPPH across a spectrum of collaborative relationships is essential to expanding and improving these collaborative relationships in a way that can address public health services and system's needs in a variety of communities.

C. PURPOSE OF THE STUDY

The purpose of this study is to explore factors that influence if and how LHDs and SPPH collaborate. As stated before, a three phase sequential mixed methods study was used. The first phase aimed to identify LHD characteristics associated with collaboration by analyzing data from the *2008 National Profile of Local Health Department* dataset.[23] The second phase aimed to provide a current estimate of the extent of collaboration between LHDs and SPPH and to explore the perceived benefits of collaboration between LHDs and SPPH using a national cross sectional survey of LHDs. And the third phase aimed to gain deeper insight into the perceived benefits, as well as the barriers and facilitators of successful collaboration from the perspective of both LHDs and SPPH using qualitative group interview methods. This will contribute to the literature on public health practice and academic collaboration by examining this phenomenon across the population of LHDs and by examining the benefits, barriers, and facilitators to a variety of collaborative situations – not just AHDs.

D. RESEARCH QUESTIONS

The overarching research question is: **how can collaboration between LHDs and SPPH be improved?** The supporting questions were derived to provide focus for addressing this question and follows along with the conceptual model presented in Chapter 2 and the study design presented in Chapter 3. The supporting research questions are:

1. What is the extent of collaboration between LHDs and SPPH?
2. What are the benefits of collaboration between LHDs and SPPH?

a. What do LHDs and SPPH perceive to be beneficial?

b. To what extent are the benefits being achieved?

c. How do the benefits differ with regard to LHD characteristics?

3. What are the barriers and facilitators to collaboration between LHDs and SPPH?

a. What LHD characteristics are associated with the degree of collaboration with SPPH?

b. What are the perceived barriers and facilitators to collaboration?

c. How do the perceived barriers and facilitators to collaboration differ with regard to LHD characteristics?

E. IMPLICATIONS FOR PUBLIC HEALTH LEADERSHIP

"I never did anything alone. Whatever was accomplished in this country was accomplished collectively." - Golda Meir, fourth Prime Minister of Israel

A myriad of public health issues face the United States, most notably having the highest healthcare expenditures while at the same time having relatively poor health outcomes.[77(p32)] This is unsustainable and is necessitating change in the public health discipline. Collaboration between LHDs and SPPH may be a strategy for bringing about change, especially considering the resource constraints facing the public health discipline at this time. Leadership is ultimately about collaboration – bringing people together with diverse perspectives and complimentary resources so that problems can be understood and acted upon more comprehensively than they could by working alone.[78] The findings from this study are intended to support public health leaders that are working to enhance the extent and quality of collaboration between LHDs and SPPH as a strategy to promote innovation and change in the public health discipline.

F. SUMMARY

This chapter showed that there has been a history of collaboration between LHDs and SPPH and that this continues today. However, the extent and quality of this collaboration is not well understood. Calls have been made to improve collaboration between LHDs and academic institutions, especially SPPH, and there are ongoing efforts to do so. There is also a strong need to improve public health practice at the local level in order to help LHDs achieve public health accreditation, improve performance, and confront changing environmental conditions. SPPH also face challenges recruiting qualified faculty, disseminating findings, and identifying opportunities for their students to apply their education in practice.

Collaboration between LHDs and SPPH may be an important strategy for addressing these issues because it has the power to bring together academic public health expertise with practical public health experience. However, little is known about the extent of collaboration between LHDs and SPPH throughout the nation. Policy entrepreneurs at the local, state and national levels need this information to take advantage of opportunities to expand on and improve collaboration.

II. CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The purpose of this chapter is to integrate the theoretical and public health practice literature into a conceptual framework that explains **why LHDs and SPPH initiate, sustain, and enhance collaborative relationships**. The first section of this chapter provides a review of the literature and is meant to operationalize the primary constructs.[79] First, the literature about different forms of inter-organizational collaboration was reviewed to describe different ways that organizations collaborate. Next, the literature about the diffusion of innovations was reviewed to describe how organizations make decisions to initiate, sustain, and enhance innovative strategies, like collaboration. Finally, the literature about the value of collaboration was reviewed to describe the benefits, barriers, and facilitators of collaboration and how organizations weigh these factors when deciding to initiate, sustain, or enhance collaboration. The second section integrates the concepts described in the literature review and presents a conceptual framework that proposes how the constructs may be related to one another in a way that supports the study's overall design and analysis.[80]

A. LITERATURE REVIEW

The literature about inter-organizational collaboration (multi-organizational structures, collaborating for change, collaborative advantage, critical contingencies of collaboration, bases of value for collaboration, etc.) and diffusion of innovations are reviewed here to describe how and why LHDs and SPPH may collaborate and how innovative strategies like this may spread. This section is broken down into three subsections covering the following topics: (1) degree of

inter-organizational collaboration, (2) the decision process for adopting innovations in organizations, and (3) the value of collaboration.

1. DEGREE OF INTER-ORGANIZATIONAL COLLABORATION

Inter-organizational collaboration has been described as a process where two or more organizations work together to accomplish goals that might be difficult for them to accomplish individually.[56(p1),81–83] A variety of multi-organizational structures exist, such as networks, consortium, coalitions, and alliances, which serve different purposes and are used in different situations.[81] Some authors have suggested that inter-organizational collaboration occurs across a continuum of integration or a continuum of strategicness.[84–86]

Himmelman describes one such model, where organizations collaborate through a range of approaches based on their degree of strategicness.[87] Himmelman describes the following different degrees of collaboration: (1) **Networking** is the least integrated form of inter-organizational relationship and is the easiest to initiate. It is defined as "exchanging information for mutual benefit." (2) **Coordination** is more integrated than networking and is defined as "exchanging information and altering activities for mutual benefit and to achieve a common purpose." (3) **Cooperation** is even more integrated and is defined as "exchanging information, altering activities, and sharing resources for mutual benefit and to achieve a common purpose." And (4) c**ollaboration** is the most integrated and is defined as "exchanging information, altering activities, sharing resources, and enhancing the capacity of one another for mutual benefit and to achieve a common purpose." Each degree of collaboration is potentially beneficial to the organizations involved, but higher-level strategies tend to be more

aspirational and more capable of enhancing organizational capacity, organizational performance, and spurring innovation through the pooling and recombining of knowledge, resources, and expertise of the organizations involved.[51,52] Conversely, higher-level strategies also tend to be riskier and require more effort and resources from the organizations involved.[56(p1),87]

Identifying a continuum of collaboration between LHDs and SPPH may be important because these organizations may be able to enhance their collaboration over time to accomplish ever more strategic goals.[88(p21)] Vangen and Huxham suggest that inter-organizational collaboration can mature or grow as organizations build trust.[89] Other authors have echoed this sentiment and added that the maturation process includes visioning, formalization, and conflict resolution to move towards more integrated and strategic forms of inter-organizational collaboration.[88(pp21-35),90] And other authors suggest that each level of a continuum of collaboration can be treated like a new innovation, and that the innovation decision process in organizations can be used to determine how organizations determine if and how to enhance their collaborative relationships.[91]

A more specific type of continuum of collaboration between LHDs and academic institutions may also exist. A survey of LHDs in Florida in 2007 showed that many LHDs collaborated with academic institutions, but that this was mostly limited to student learning activities (internships or practicum) and that very few supported more strategic initiatives like evaluation or research.[18] Findings from the 2008 National Profile of LHDs also show that a large proportion of LHDs supported student internships (57%) and student practicum (40%), but that considerably fewer LHDs supported faculty placements for LHD practitioners (21%), research

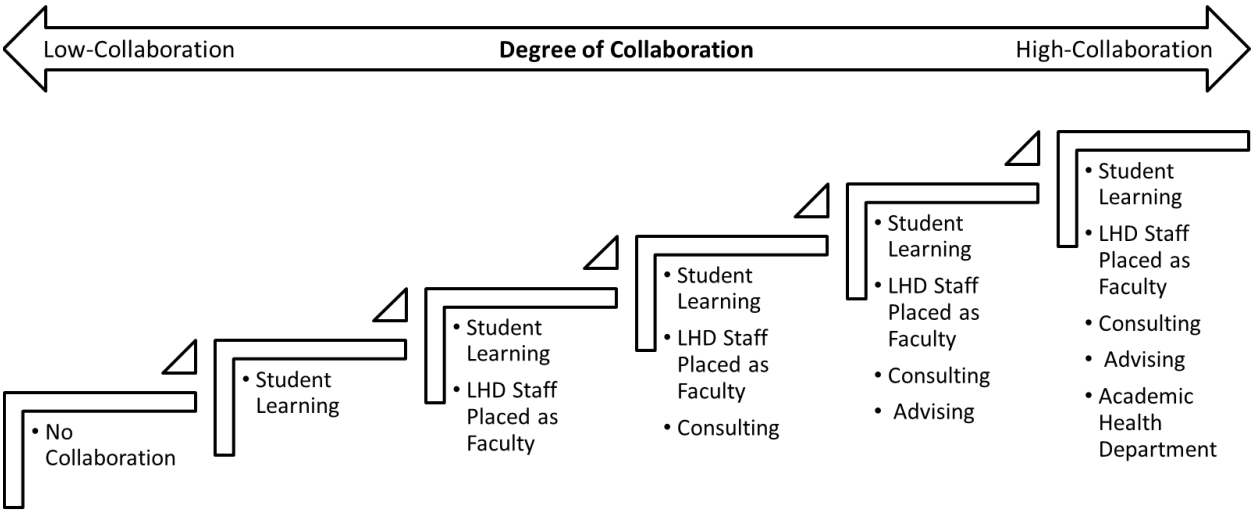
(21%), consulting (17%), or evaluation (15%), and the relationship was used to advise LHDs or SPPH only 14% of the time.[19] In addition, the Council on Linkages Between Academia and Public Health Practice has advanced the concept of an academic health department – "a formal affiliation between an academic institution and a public health practice organization… designed to enhance public health education and training, research, and service."[7] However, the Council on Linkages Between Academia and Public Health Practice has only identified 34 LHDs involved in academic health department relationships as of December 2016.[92] These findings suggest that there may be a general continuum of collaboration describing different degrees of strategicness between LHDs and SPPH collaboration, beginning with student learning activities and growing to include more strategic activities.

A proposed conceptual model for the degree of collaboration between LHDs and SPPH is presented in Figure 1, which integrates the concepts presented in Himmelman's theoretical model with the findings from Livingood, the 2008 National Profile of LHDs, and the academic health department concept. This will serve as a starting point to measure the extent of collaboration between LHDs and SPPH by helping to define what the different degrees of collaboration may be. The different collaborative strategies are described below.

- **Student learning activities** primarily involve collaboration between LHD employees and students and could include activities such as internships, practicum, or volunteer work. This may be considered the least strategic collaborative strategy because, alone, it does not require a large degree of interaction between LHDs and SPPH.

- **LHD staff serve as faculty members for SPPH** may help to build further linkages between LHDs and SPPH because LHD staff members will likely become an employee of both organizations and will likely need to meet specific requirements. Again, this may be a less strategic form of collaboration because, alone, it does not require a large degree of interaction between LHDs and SPPH.
- **Consulting, research and evaluation** projects may be considered a more strategic form of collaboration because it requires a greater degree of interaction between LHDs and SPPH and likely brings LHD staff and SPPH faculty or staff together. However, these projects are likely to be short-term or contractual in nature, and may not consider the full spectrum of LHD and SPPH responsibilities.
- **Advising** relationships may be considered a very strategic form of collaboration because opinions and advise from outside entities can help to promote strategicness, challenge assumptions, and help organizations be more mindful of external threats and opportunities to the organization.
- An **academic health department** refers to a highly collaborative partnership between public health practice organizations and academic institutions that are aimed at improving teaching, research and service. These aims are may be reciprocal in nature between practice and academic organizations and aspirational in their goals.

FIGURE 1: Proposed Model of the Degree of Collaboration Between Local Health Departments and Schools and Programs of Public Health



2. DECISION PROCESS FOR ADOPTING INNOVATIONS IN ORGANIZATIONS

Innovation in organizations refers to a novel approach or change to the status quo.[93] As described previously, inter-organizational collaboration can be viewed as an innovation, especially since organizations tend to work individually more naturally and collaboration could be viewed as a change in the status quo.[56] In addition, each degree of collaboration could be viewed as a separate innovation that organizations would need to determine whether or not to initiate.[91] Organizations make decisions about the innovations that they initiate based on characteristics of both the organization and the innovation. In general, organizations will initiate innovative strategies based on how well it fits their needs and how advantageous it is compared to the difficulty of initiating it.[75,94] After organizations initiate an innovation, they will

continue to judge its usefulness and will modify it accordingly to meet their needs, routinizing it into their organizational culture if it continues to be beneficial, or eliminating its use if it does not remain to be beneficial. Based on the innovation decision model in organizations, described here, factors such as the benefits of collaboration, the barriers and facilitators to collaboration, and organizational characteristics may all influence the decision of LHDs and SPPH to initiate and sustain collaborative relationships with one another. These factors will be described further in the following subsections.

a) BENEFITS OF COLLABORATION

In general, collaboration is valuable when organizations can accomplish more working together than they could individually. Huxham states that the primary reason organizations collaborate is for their self-interests. Organizations collaborate because it can help them accomplish their mission or mandate better than they could individually. In fact, Huxham states that fulfilling organizational self-interests are a prerequisite for entering into collaborative relationships and that organizations should not collaborate unless they are, at least, potentially beneficial.[53(p37),56(pp3, 14)]

Both Oliver and Cropper have written about the value or benefits of collaboration. Oliver used the "critical contingencies of relationship formation" to describe factors that "prompt or motivate" organizations to collaborate and suggests that different motivating factors influence the type of collaborative strategies (i.e., degree of collaboration) that organizations initiate.[76] Similarly, Cropper used the "bases of collaborative value" to describe factors that promote sustainability of collaborative relationships.[54] While focused on slightly

different issues, the factors that Oliver and Cropper identified were fairly similar, and they state that organizations will initiate and sustain collaborative relationships for the following reasons.

- **Productivity**: Collaboration is valuable if it can help organizations accomplish their mission, mandates, or goals better than working alone.
- **Efficiency**: Collaboration is valuable if it can save organizations time or money to produce goods or services.
- **Legitimacy**: Collaboration is valuable if it helps to improve an organization's reputation, image, or prestige in the eyes of their stakeholders.
- **Adaptability**: Collaboration is valuable if it helps organizations cope with uncertainty by helping them solve problems, learn, innovate, or change.
- **Linkages**: Collaboration is valuable if it can help organizations form linkages or improve relationships with other outside organizations.
- **Capacity**: Collaboration is valuable if it can help organizations acquire and organize resources to accomplish their mission, mandates, or goals.

While the need to achieve self-interests through collaboration is important, collaboration may also hold the potential for vastly more important achievements. Huxham refers to this concept as "collaborative advantage," where something "unusually creative" that neither organization could have achieved by working alone.[95] In public health, collaborative advantage may refer to address wicked problems that cannot be addressed by any single organization, such as addressing the social determinants of health and reducing health disparities.[56(p4),96] Achieving these types of high-level benefits may require organizations to have a strong understanding of what they want to get out of the collaboration, what they can

accomplish on their own, what they cannot accomplish without collaborating, and how their shared organizational resources can be combined and reconfigured to produce substantially different and better products and services, something that Huxham refers to as "meta-strategy."[97]

Related to collaboration between LHDs and SPPH, the benefits of collaboration are likely to be judged based on its (potential) effect on the public health system's performance, as measured by the 10 essential public health services, as well as public health outcomes.[15,35(p201),98] Livingood's example of a "community-centered model of the academic health department" may be a good example of collaborative advantage, because their collaboration vastly enhanced the Duval County (Florida) Health Department's capacity for CHA, improved public health performance, and added roughly $40 million to their gross regional product.[15,99]

b) BARRIERS AND FACILITATORS TO COLLABORATION

As stated previously, organizations also weigh the difficulty of carrying out innovative strategies when determining whether or not to initiate or sustain innovations. Collaboration works best when organizations can work together effortlessly to combine their knowledge, resources, and expertise to think and act more comprehensively.[52,100] However, collaboration is often more difficult than working individually. Organizations often find that they put more into collaborating than they get out, or collaboration happens for long periods of time without achieving anything. Huxham refers to this concept as "collaborative inertia," where the rate of output from collaborating is slower than what would be expected from a single

organization.[53,101] A variety of factors can contribute to this inertia, some of the most important are described next.

Trust is an essential component to successful collaborative relationships, and can be defined as, "one party's confidence that the other party in the exchange relationship will fulfill its promises and commitments and will not exploit its vulnerabilities.[89,102,103] Trust is a multidimensional construct, and includes issues like reliability, competence, honesty, fairness, and goodwill.[103(p89),104–106] Trust is related to the level of risk organizations are willing to take on. High levels of trust between organizations can initiate a virtuous cycle, where organizations learn how to work together better over time and take on more and more strategic goals. In contrast, low levels of trust between organizations can initiate a vicious cycle, where organizations limit themselves to less and less strategic goals.[53(p154),103(p89),107,108]

Reciprocity is an issue related to trust, and refers to a fair exchange, or give and take between organizations. It is essential to good collaboration that organizations feel that their needs are being met; that there is equal effort being placed into the collaboration; and that other organizations are not free-riding.[84,101,109]

Communication refers to how messages are shared between organizations. Good communication is described as an essential element of collaboration by Kania and Kramer, because it can help develop trust, develop a common vocabulary, and explain differences in organizational cultures.[110] Therefore, good communication can help to display goodwill, and facilitate problems solving and strategic planning.

Strategy is another important component of collaboration, and can be defined as the degree to which goals for the collaboration are formalized, and the degree to which the process

of collaborating is formalized. Huxham refers to the concept of "shared meta-strategy," which clearly distinguishes between what one organization can do individually, and what can only be accomplished by collaborating.[97] She suggests that shared meta-strategy can help organizations to focus their collaborations on issues that are most important to their collaboration and lessens collaborative inertia; because it helps collaboratives avoid working on issues that their collaboration can benefit relatively little.

c) ORGANIZATIONAL CHARACTERISTICS AND COLLABORATION

As stated previously, organizational characteristics can influence the innovativeness of organizations. Leadership, workforce, size, and interconnectedness all influence organizational innovativeness, and their likelihood of initiating innovative strategies.[75(p411)] Research specific to inter-organizational collaboration provides greater clarity to this assertion and shows that factors such as **geographic proximity**, **organizational capacity, executive characteristics,** and **workforce characteristics** influence inter-organizational collaboration. These factors are described below in greater detail below.

Geographic proximity between organizations and universities has been shown to be positively related to collaboration.[111] Organizations that are nearer to universities may have formed more interpersonal relationships than those that are further away. However, it has also been shown that collaboration can work well from a distance if personal contact and visitation can be supported to build these interpersonal relationships.[112,113] However, the effect of geographic proximity on LHD and SPPH collaboration has not been studied previously.

Organizational capacity is another factor that may influence LHD and SPPH collaboration. Organizational capacity is made up of the resources organizations have that support their missions. Organizations with greater organizational capacity should be more likely to be able to meet their mission, mandate, or achieve their goals.[114] In general, organizational capacity is made up of the organization's human, fiscal and technological resources, as well as their access to information and inter-organizational relationships.[35(p204),114] Organizational capacity is highly complex, however, in public health it is highly correlated with the size of the population served by LHDs.[50,115] LHDs with greater organizational capacity may be more likely to collaborate if they have more slack resources than other LHDs with less organizational capacity.[75(p411)]

The characteristics of **LHD executives** may also play an important role with regard to the degree that LHDs collaborate with SPPH. Executives vary with regard to how readily they seek input and expertise, and offer support to outside organizations.[116] LHD executives will most likely have some role in determining if and how they collaborate, ranging from authorizing the relationship to championing it. LHD executives that are more educated or have formal public health education may perceive there to be greater benefit and less cost to collaborating with SPPH because of their familiarity with academic institutions and thus may be more likely to seek out higher-level collaborative relationships with SPPH.

LHD workforce characteristics may also play an important role with regard to the degree that LHDs collaborate with SPPH. Like LHD executives, LHD workers may also vary with regard to how readily they seek input and expertise, and offer support to outside organizations.[116] LHD workers will also have some role in determining if and how they

collaborate by acting as champions or opponents. LHDs that employ individuals with academic preparation from SPPH or that work in population-based positions such as epidemiology, health education, emergency preparedness, or environmental health may be more likely to collaborate with SPPH. LHD staff that are more educated or have formal public health education may perceive there to be greater benefit and less cost to collaborating with SPPH because of their familiarity with academic institutions and thus may be more likely to seek out higher-level collaborative relationships with SPPH.

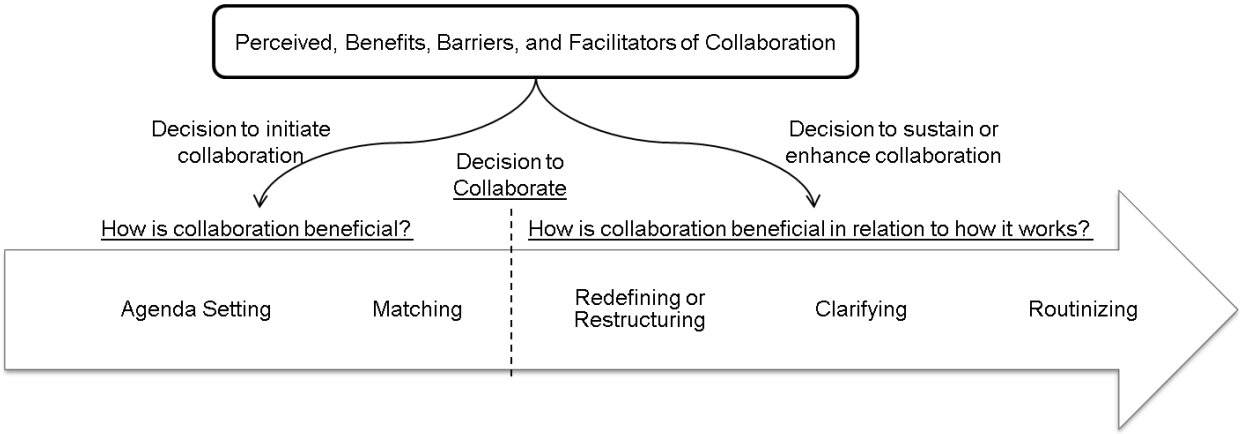
This section reviewed the literature on inter-organizational collaboration and the innovation decision process in organizations. This review showed that organizations collaborate in a variety of ways and that this can be construed as a continuum of collaboration ranging in the degree of strategicness. The innovation decision process was also used as a framework to explain what factors LHDs and SPPH may weigh when determining if and how to collaborate. The primary factors were also shown to relate to how beneficial collaboration could be, how challenging collaboration may be (barriers and facilitators), and organizational characteristics. The next section will integrate these factors into a conceptual framework which shows how they may be related to one another and how they may influence the degree of collaboration between LHDs and SPPH.

B. CONCEPTUAL FRAMEWORK

LHDs and SPPH may determine if and how to collaborate through a process similar to that outlined in the innovation decision process in organizations by Rogers.[75] Using this process as a framework, LHDs and SPPH would first decide whether or not to initiate collaborative

relationships with one another. Both LHDs and SPPH would need to decide if collaboration met their needs or could address a problem that they faced. If they did decide to collaborate, LHDs and SPPH would continue to judge how beneficial their collaboration and over time would refine how they work together to improve how it meets their needs and would routinize collaboration into their organizational culture if it was especially beneficial, or abandon their collaborative relationship if it did not prove to remain beneficial. This process is outlined below in Figure 2.

Figure 2: Relationship Between Roger's Diffusion of Innovations In Organizations and the Benefits, Barriers, and Facilitators of Collaboration[b]



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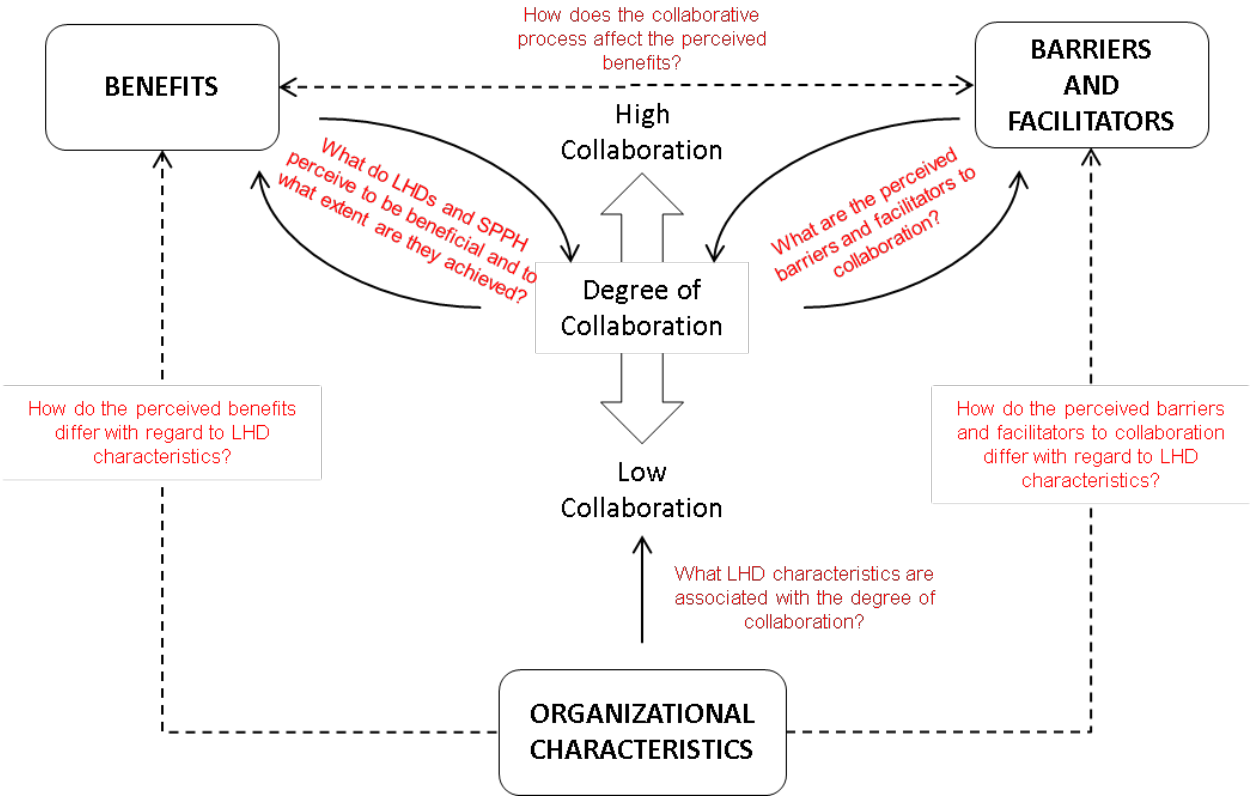
Expanding on this framework, the study's conceptual framework presented here describes what factors may be related to the degree of collaboration between LHDs and SPPH and how they may be related to one another. This framework will be used to explore **how collaboration between LHDs and SPPH can be improved.** A visual representation of this framework is presented in Figure 3.

First, this framework proposes that the degree of collaboration is related to how collaboration is valued by LHDs and SPPH. In general, this model proposes that higher-level collaboration is more valuable than lower-level collaboration; the benefits may be greater, the barriers fewer, or both. However, this model does not propose directionality – the concept that the degree of collaboration produces greater value. Rather, it assumes that the degree of collaboration and the benefits of collaboration are related in a cyclical and reinforcing manner – greater benefits produce the opportunity for higher-levels of collaboration and higher-levels of collaboration provides the opportunity to achieve greater benefits.

Second, this framework also proposes that the degree of collaboration is influenced by LHD characteristics directly and indirectly. LHD characteristics influence the degree of collaboration directly by constraining the opportunities there are for collaborating. However, LHD characteristics may also influence the degree of collaboration indirectly by influencing what is and is not perceived to be beneficial about collaboration, or by influencing the barriers and facilitators to successful collaboration.

Finally, the degree of collaboration may also be influenced by barriers and facilitating factors. LHDs and SPPH that experience fewer barriers or are able to overcome barriers are more likely to achieve higher-levels of collaboration.

Figure 3: Proposed Conceptual Framework for Factors that are Related to the Degree of Collaboration between LHDs and SPPH



C. SUMMARY

The theoretical and public health practice literature was reviewed and integrated in this chapter to develop a conceptual framework for how the degree of collaboration may be related to its benefits, LHD characteristics, and barriers and facilitators. The next chapter will present the study design and methodology that was used to explore this topic and address the research questions.

III. CHAPTER 3: STUDY DESIGN AND METHODOLOGY

This study used a sequential mixed-methods design. This design was chosen because qualitative data was viewed to be essential to answer the research questions, but sufficient information did not exist at the outset to support purposeful sampling.[117] Quantitative findings from phase one and two were used measure the extent of collaboration between LHDs and SPPH throughout the population of LHDs and to identify LHD characteristics associated with varying degrees of collaboration. This data was used to develop a purposeful sampling frame that was used in phase three. Quantitative and qualitative information was collected to explore the benefits, barriers, and facilitators to collaboration across a variety of types of LHD and SPPH collaboratives. Quantitative information was collected to gain a better understanding of these issues across the universe of LHDs, and qualitative methods were used to allow for greater exploration, depth, and clarity, which may help provide better information for decision making.[118(p86),119,120(pp129-132)]

A brief description of the methods used and purpose of the three phases is provided below. A full description of the methods used in each phase is described in the next sections.

- Phase one: Data from the 2008 National Profile of LHDs was analyzed to explore the extent of collaboration and to identify LHD characteristics associated with the degree of collaboration. These findings provided insight the types of LHDs likely to be low or high collaborators. The findings from phase one are presented in the article titled, “What Factors Predict Collaboration Between LHDs and SPPH?”

- Phase two: A cross sectional survey of LHDs that responded to the 2013 National Profile of LHDs was used to measure the current extent of collaboration between LHDs and SPPH and to gain insight about the benefits of collaboration. These findings helped to measure the degree of collaboration for each responding LHD and helped to identify LHDs that were more or less likely to be a high collaborator with SPPH, thus supporting purposeful sampling in phase three. The findings from phase two are presented in the article titled, "What are the Benefits of Collaboration Between LHDs and SPPH – A National Exploratory Survey."
- Phase three: Group interviews were held with LHD officials and SPPH faculty or staff from collaborating organizations to explore the benefits, barriers, and facilitators to their collaboration. These findings helped to provide richer insight into these issues. The findings from phase three are presented in the article titled, "Benefits, Barriers, and Facilitators of Collaboration Between LHDs and SPPH – A Qualitative Exploration."
- Triangulation: The findings from phases one, two and three is summarized and integrated in the final chapter. A series of propositions and recommendations is made based on the findings.

Figure 4 provides a visual representation of the sequential mixed-methods study design, including the primary purpose, general methods, and triangulation strategy for each phase. Table I provides an overview of the research questions, the data collection methods and

analysis strategies that were used to answer each research question. The methods used in each phase are described in greater detail in the following three subsections.

The project was deemed exempt by the institutional review board of the University of Illinois at Chicago and assigned Research Protocol # 2015-0458 (Appendix A). In addition, an amendment to the proposal (Appendix B) was awarded in order to revise the semi-structured interview guide and add a second analyst to assist with qualitative data analysis after phase one was completed.

Figure 4: Sequential Mixed Methods Study Design

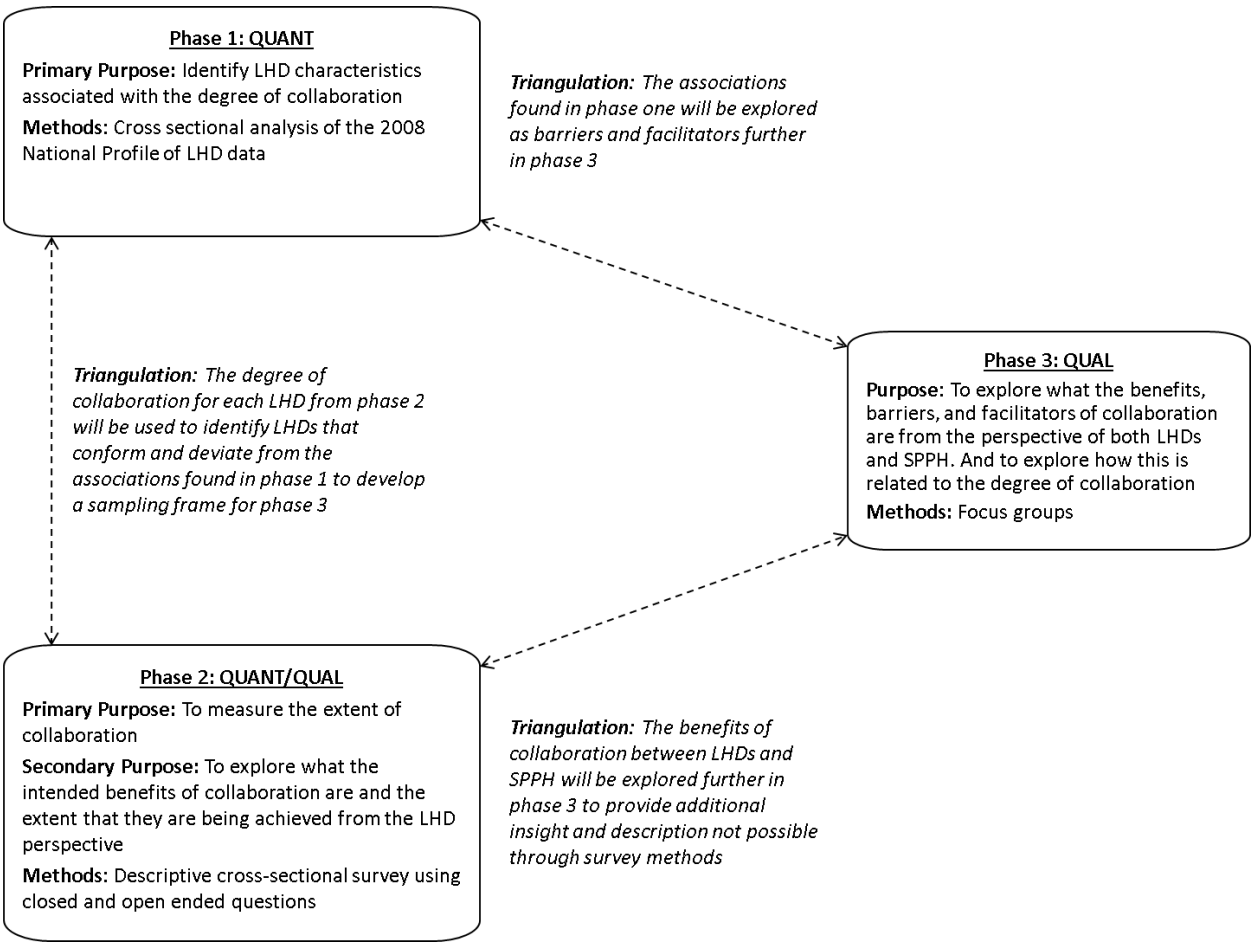


Table I: Research Questions, Data Collection Methods, and Analysis Strategies

RESEARCH QUESTION 1: WHAT IS THE EXTENT OF COLLABORATION BETWEEN LHDS AND SPPH?		
CONSTRUCTS	**DATA COLLECTION METHODS**	**ANALYSIS STRATEGY**
Continuum of Collaboration: A general order of low to high level collaboration. **Extent of Collaboration**: How widespread collaboration with SPPH is among LHDs.	1. Secondary Data from the 2008 National Profile of LHDs. 2. Survey of LHDs in 2015.	**Phase 1: Analysis of 2008 National Profile of LHDs Dataset** 1. LHDs were grouped based on the number of collaborative strategies used (0 – 4). 2. The combination of strategies used within each number was identified and ranked. 3. The most common combination of strategies in each number was selected for the model. 4. The percent of LHDs that follow the model is produced to measure its fit. 5. The percentage of LHDs that fit each degree of collaboration (and those that did not fit) were calculated to measure the model's fit to the data and the extent of collaboration. **Phase 2: National Exploratory Survey of LHDs (2015)** 1. LHDs were grouped based on the number of collaborative strategies used (0 – 6). 2. The combination of strategies used within each number was identified and ranked. 3. The most common combination of strategies in each number was selected for the model. 4. The percent of LHDs that follow the model is produced to measure its fit. 5. The percentage of LHDs that fit each degree of collaboration (and those that did not fit) was calculated to measure the model's fit to the data and the extent of collaboration. **Triangulation** Results from the 2008 National Profile of LHDs and the survey conducted in 2015 were compared to measure the change in the extent of collaboration between LHDs and SPPH.

Table I: Research Questions, Data Collection Methods, and Analysis Strategies (Continued)

RESEARCH QUESTION 2: WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LHDS AND SPPH?		
CONSTRUCTS	**DATA COLLECTION METHODS**	**ANALYSIS STRATEGY**
Self-Interests: Potential or real outcomes of collaboration that motivate LHDs or SPPH to collaborate, irrespective of the other organization's desires. **Collaborative Advantage:** Potential or real outcomes of collaboration that provide a unique or strategic advantage, not likely to be achieved working individually. **Extent of Benefits:** How well collaboration helps LHDs or SPPH meet their needs or achieve their desires.	1. Survey of LHDs in 2015. 2. Qualitative group interviews held with collaborating LHDs and SPPH.	**Phase 2: National Exploratory Survey of LHDs (2015)** 1. Twenty-three indicators of the 10 essential public health services and seven indicators of resources LHDs could potentially acquire were assessed using a Likert type scale. 2. The percent of LHDs that stated an indicator was "important" or "very important" was calculated. This was then stratified by the degree of collaboration. 3. The percent of LHDs that stated an indicator was "important" or "very important" and "effective" or "very effective" was calculated. This was then stratified by the degree of collaboration. 4. Three open ended questions were included and the data was analyzed using qualitative thematic coding. **Phase 3: Focus groups of LHDs and SPPH** 1. Four focus groups were held with 12 LHD and SPPH dyads based on maximum variation sampling. a. Likely to be a high collaborator and <u>is</u> a high collaborator. b. Likely to be a high collaborator and <u>is not</u> a high collaborator. c. Not likely to be a high collaborator and <u>is not</u> a high collaborator. d. Not likely to be a high collaborator and <u>is</u> a high collaborator. 2. Focus group discussions will be recorded and transcribed verbatim. 3. Qualitative thematic coding will be used to analyze the data for intended benefits. An a priori codebook is presented in Appendix G that will be used to code the data. Emergent themes will also be used. **Triangulation** Findings will be compared across different types of LHD and SPPH groups; across LHDs and SPPH; and across survey and group interview data.

Table I: Research Questions, Data Collection Methods, and Analysis Strategies (Continued)

RESEARCH QUESTION 3: WHAT ARE THE BARRIERS AND FACILITATORS TO COLLABORATION BETWEEN LHDS AND SPPH?		
CONSTRUCTS	**DATA COLLECTION METHODS**	**ANALYSIS STRATEGY**
Barriers: Something that prevents or blocks successful collaboration. **Facilitator:** Something that helps make collaboration easier, or helps to address a barrier.	1. Survey of LHDs in 2015. **2.** Qualitative group interviews held with collaborating LHDs and SPPH.	**Phase 2: National Exploratory Survey of LHDs (2015)** 5. Three open ended questions were included and the data was analyzed using qualitative thematic coding. Although the questions were intended to identify benefits of collaboration, factors related to barriers and facilitators was identified. **Phase 3: Focus groups of LHDs and SPPH** 1. Focus groups were held with 12 LHD and SPPH dyads. a. 3 dyads for expected and observed high collaboration b. 3 dyads for expected and observed low collaboration c. 3 dyads for expected high collaboration but observed low collaboration d. 3 dyads for expected low collaboration but observed high collaboration 2. Focus group discussions will be recorded and transcribed verbatim. 3. Qualitative thematic coding will be used to analyze the data for individual-benefits, shared-benefits, and costs as related to the degree of collaboration. An a priori codebook is presented in Appendix G that will be used to code the data. Emergent themes will also be used. **Triangulation** Findings will be compared across different types of LHD and SPPH groups; across LHDs and SPPH; and across survey and group interview data.

Table I: Research Questions, Data Collection Methods, and Analysis Strategies (Continued)

RESEARCH QUESTION 3A: WHAT LHD CHARACTERISTICS ARE ASSOCIATED WITH THE DEGREE OF COLLABORATION WITH SPPH?		
CONSTRUCTS	**DATA COLLECTION METHODS**	**ANALYSIS STRATEGY**
Distance: The number of miles between a LHD and the nearest SPPH measured in a straight line. **LHD Organizational Capacity**: Resources that support organizational functions (population, FTEs, budget). **LHD Executive Preparation**: The qualifications of the LHD executive (age, highest degree, public health education). **LHD Workforce**: The disciplines employed by LHDs (health educators, emergency preparedness coordinators, environmental health specialists, and epidemiologists).	1. Secondary Data from the 2008 National Profile of LHDs.	**Phase 1: Analysis of 2008 National Profile of LHDs Dataset** 1. The variables described to the left were included in an ordinal logistic regression model using the degree of collaboration as the dependent variable. 2. Bivariate analysis for each of the variables described above was conducted in turn. Variables with a p-value greater or equal to 0.25 were excluded from further analysis. 3. The effect of item non-response was assessed for each variable by examining if missing data was distributed evenly throughout the continuum of collaboration. This was done by including a dummy variable coded as 0=missing, 1=not missing for each variable in an ordinal logistic model. Variables with a p-value greater or equal to 0.25 were excluded from further analysis and their correlation with other variables in their class was assessed. 4. Multicolinearity was assessed for using Stata's "corr" and "collin" functions. 5. The remaining variables were included in a multivariate ordinal logistic regression model. 6. The proportional odds assumption was assessed using a Wald test. 7. The model's fit was assessed using a link test. **Triangulation** Findings about LHD characteristics associated with the degree of collaboration found in phase one will be triangulated with data about LHD characteristics and LHD degree of collaboration found in phase two to develop a purposeful sampling frame for phase three.

A. PHASE 1: ANALYSIS OF 2008 NATIONAL PROFILE OF LHDs

Phase one was intended to measure the extent of collaboration between LHDs and SPPH, and to identify LHD characteristics associated with the degree of collaboration with SPPH. The results will provide a historical perspective of the extent of collaboration between LHDs and SPPH and will help to identify LHDs that are more or less likely to have high-level collaboration with SPPH.

Data from the 2008 Profile of LHDs Study (Appendix C) were used because this survey included questions about how LHDs interacted with SPPH.[19] These types of questions have not been repeated since. This set of questions were provided to a sample of 546 LHDs of which 425 LHDs responded (response rate = 78%). Stata's "svy" commands were used to assign sampling weights to take into account NACCHO's stratified random sampling design.

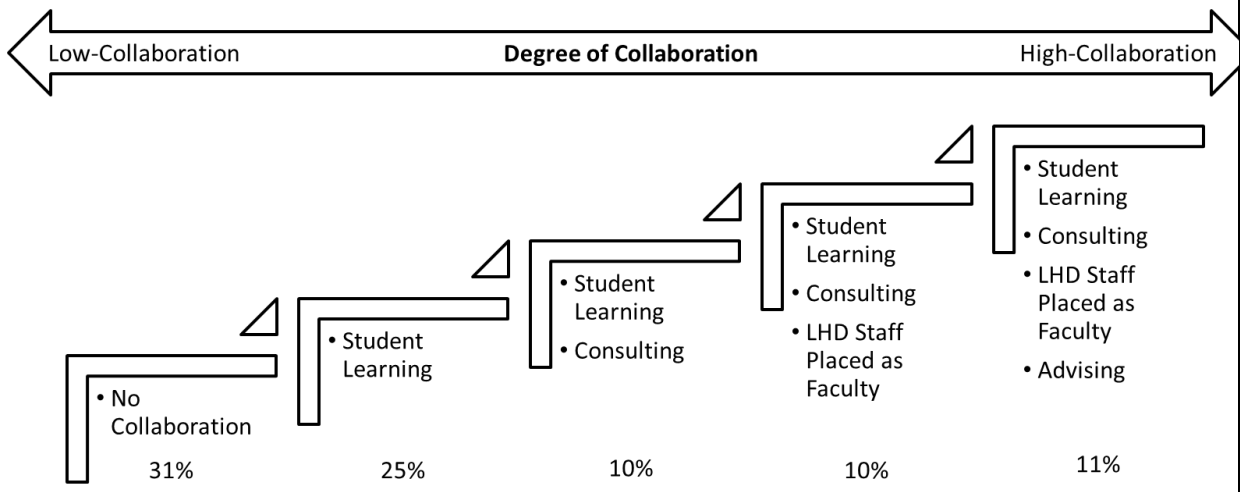
The first step was to determine if there was a common model for the degree of collaboration between LHDs and SPPH. The degree of collaboration was defined as a continuum of strategies that LHDs and SPPH use to work together that range from less to more strategic, with each level adding an additional strategy to the previous level. The Lazarfeld methodology for constructing typologies was used to test this.[121] There are three general steps included in the Lazarfeld methodology. First, a model is developed a priori, based on existing information. This model was described in chapter 2 (Figure 1). Next, empirical data is collected and analyzed to identify all possible configurations. This was done using data from the 2008 National Profile of LHDs study, and categorizing LHDs based on their level of collaboration (how many strategies they used to collaborate with SPPH) and the configuration of these strategies in each level.

Finally, the a priori model was refined based on the empirical data by selecting the most common configuration in each level. The model's fit to the empirical data was assessed by calculating the proportion of LHDs that agreed with the model. This is presented in Table II.

The second step was to determine what LHD characteristics were associated with the degree of collaboration. Four general categories were assessed for: (1) proximity, (2) LHD organizational capacity, (3) LHD executive preparation, and (4) LHD workforce. Ten total variables were included in the study and are described in Table III. An ordinal logistic regression model was developed to assess for the association of the LHD characteristic described in table III with the degree of collaboration. The procedures used were found in Heeringa, West, and Berglund, as well as Katz and are outlined below.[122,123]

- Sampling weights were used to account for the Profile's sampling design using Stata's "svy" survey commands.
- Complete case analysis was used. The effect of item nonresponse for each independent variable was assessed by developing dummy variables coded "0" for missing and "1" for not missing. Each dummy variable was tested to assess if missing data was associated with the degree of collaboration. Variables with a p-value less than 0.05 were excluded from further analysis to reduce bias from item non-response.[123(p88)] The variable "total number of employees" was dropped because missing data was associated with the degree of collaboration. There was a strong positive correlation between "total number of employees" and "population served" ($r^2 = 0.67$) and they may capture similar constructs.

Table II: Empirical Test of the Model for a Continuum of Collaboration



Level	Configuration	Agreement N (%)
0	**No Collaboration***	**131 (31%)**
1	**Student***	**107 (25%)**
	Consulting	8 (2%)
	Faculty	4 (1%)
	Advising	1 (0%)
2	**Student and Consulting***	**42 (10%)**
	Student and Faculty	19 (4%)
	Student and Advising	8 (2%)
	Consulting and Faculty	3 (1%)
	Consulting and Advising	1 (0%)
	Faculty and Advising	1 (0%)
3	**Student, Consulting and Faculty***	**41 (10%)**
	Student, Consulting and Advising	14 (3%)
4	**Student, Consulting, Faculty and Advising***	**45 (11%)**
	Total Agreement	**366 (86%)**

Table III: Description of the Variables Included in the Ordinal Logistic Regression Model

Variables and Definition	Categories	Proposition
DEPENDENT VARIABLE		
Degree of collaboration: A continuum of strategies that ranges from low-level to high-level. Each level adds an additional strategy.	See table II	The degree of collaboration will differ based on the variables listed below.
INDEPENDENT VARIABLES		
Proximity		
Proximity: The number of miles between a LHD and the nearest SPPH measured in a straight line. Addresses acquired from NACCHO and CEPH. Geographic Information Systems (GIS) was used to calculate the distance between the nearest SPPH to each LHD.	1 = ≥ 126 miles 2 = 66 to 125 miles 3 = 31 to 65 miles 4 = ≤ 30 miles	LHDs that are closer to SPPH may have greater interpersonal relationships and are more likely to collaborate.
Capacity		
Population Served: The number of people living in the jurisdiction served by the LHD.	1 <100,000 2 = 100,000 to 499,999 3 ≥500,000	Population served is associated with capacity, which may be associated with collaboration.
Total Number of Employees: The total number of employees working for the LHD in the most recent fiscal year.	Continuous	Total employees is a marker of organizational capacity, which may be associated with collaboration.
Executive		
Executive Age: The age in years of the executive. This is a proxy for the executive's experience.	Continuous	More experienced executives may be more likely to seek outside resources and information.
Executive's Highest Degree: The executive's highest level of education.	1 ≤ Bachelor's 2 = Master's 3 = Doctorate	More educated executives may be more likely to seek outside resources and information.
Formal Public Health Education: The executive's type of education, specifically if it is a formal public health degree.	1 = No MPH/DrPH 2 = MPH/DrPH	Executives with a formal public health education may be more likely to seek resources and information from a SPPH.
Workforce		
• Epidemiologist • Health Educator • Environmental Health Specialist • Emergency Preparedness Coordinator Does the LHD employ at least one individual from the disciplines listed?	0 = no 1 = yes	LHDs with a workforce that includes individuals from disciplines that are population based and related to traditional public health educational concentrations may be more likely to collaborate with SPPH.

- Bivariate analysis was completed for each independent variable using ordinal logistic regression commands. Variables with a p-value greater than 0.25 were excluded from further analysis. “Executive age” was dropped at this point.
- A multivariate ordinal logistic regression model was fit including the remaining independent variables.
- Multicolinearity was assessed for using Stata’s “corr” and “collin” functions and was found not to be an issue based on the following indicators.
    - The greatest bivariate correlation was $r^2 = 0.55$.
    - The greatest variance inflation factor was 1.77.
    - The smallest tolerance was 0.56.
    - The condition number was 11.70.
- The proportional odds assumption was assessed using a Wald test which was found to not be significant (p=0.376) meaning that the proportional odds assumption was not violated.
- The model’s fit was assessed using a link test. If the model is properly fit, additional independent variables should not be able to be found except by chance. This test creates two new variables: _hat and hatsq and refits the model. This test assumes that _hat will be significant because it is the predictive value and that _hatsq will not be significant because if the model is specified properly squared predictions should not have much explanatory power. The model was found to be a good fit: (1) hat: p=0.001, and (2) hatsq: p=0.512.

- A sensitivity analysis was conducted to assess if different findings would occur if only the level of collaboration was used and LHDs that did not fit the model continuum of collaboration were not dropped. The results were similar between the two models.

The findings from this phase are presented in the next chapter, in the manuscript titled, "What Factors Predict Collaboration Between LHDs and SPPH?"

B. PHASE 2: NATIONAL EXPLORATORY SURVEY OF LHDs (2015)

Phase two was intended to provide a current measure of the extent of collaboration between LHDs and SPPH, and to explore what the benefits of collaboration between LHDs and SPPH are and the extent that they are met, as perceived to be by LHD officials. Data came from a cross-sectional survey that was administered to all LHDs that completed the 2013 National Profile of LHDs study (n=2000). The 2013 National Profile of LHDs (Appendix D) was used as the sampling frame because it offered a comprehensive list of LHDs throughout the United States, and because it had information that could be used to index LHDs based on the characteristics found to be associated with the degree of collaboration in phase one. The survey procedures are described below.

1. Questionnaire Development

The survey tool (Appendix E) was informed by a literature review about collaboration in general, university collaboration in general, and collaboration between universities and public health organizations more specifically. The questionnaire addressed the degree of collaboration

and the perceived benefits of collaboration with SPPH. SPPH were defined as academic programs that offered graduate degrees in a public health science and at a minimum offered the Master of Public Health (MPH) degree.

The degree of collaboration was measured using 10 questions, eight were used in the 2008 National Profile of LHDs and were previously validated.[19,23] The questionnaire also asked if there was a formal partnership agreement (contract or memorandum of understanding) and if the LHD participates in an academic health department relationship with a SPPH. A yes or no format was used and questions were combined into the following categories:

- Student Learning Activities
    - My LHD has accepted students as trainees, interns, or volunteers.
    - My LHD has offered students practicum opportunities.
- Consulting, evaluation, or research
    - Faculty or staff from a SPPH have conducted program evaluation with our LHD.
    - Faculty or staff from a SPPH have conducted program evaluation with our LHD.
    - Faculty or staff from a SPPH have participated in a research project with the LHD.
- Advising
    - Faculty or staff from a SPPH have served on a LHD advisory group.
    - LHD staff have served on a SPPH advisory group.
- LHD staff serving as faculty
    - LHD staff have served as faculty for a SPPH (e.g., regular, adjunct, or guest).

- Contract
    - My LHD has a formal written partnership agreement (e.g., memorandum of understanding, affiliation agreement, association agreement) with a SPPH.
- Academic Health Department
    - My LHD participates in an academic health department relationship (a formal affiliation between a public health practice organization and an academic institution designed to enhance public health education, training, research and/or service) with a SPPH.

The benefits of collaboration were assessed using 23 indicators of the 10 essential public health services, which were based on the model standards of the Local Public Health Performance Assessment Tool – this has been validated previously.[12,124,125] Seven indicators of resources that LHDs could potentially acquire by collaborating with SPPH were also included. These were based on the literature review and the research team and their experience in governmental public health. LHD officials were asked to rate "how important" each indicator was to gain by collaborating with SPPH, and "how effective" collaborating with SPPH was at impacting the indicator. These questions were asked using a five point Likert type scale. In addition, three open-ended questions were included to allow LHD officials to respond spontaneously, without the restrictions of the indicators.[126] This allowed for exploration outside of the confines of the close ended questions and for triangulation between quantitative and qualitative data. Respondents that did not collaborate with SPPH skipped this section. The open ended questions were: (1) What is most important to achieve by working with SPPH? (2) What

is most effective about working with SPPH? And (3) how has working with SPPH met your expectations?

2. Pilot Test

The questionnaire was pilot tested on three LHD executives that had collaborated with SPPH in the past. The populations served by these LHDs ranged from 40,000 to 600,000 people. The LHD executives were asked to assess the questionnaire for clarity and comprehensiveness. The only suggestion provided was that the questions used to measure the benefits seemed subjective. However, recommendations were not offered and the literature suggests that concepts like benefits or value may be more subjective than objective, because this is often based on individual's perceptions.[127,128] Minor revisions were made based on the feedback.

3. Survey Sample and Administration

The questionnaire was emailed to the executives of all 2,000 LHDs that completed the 2013 National Profile of LHDs and administered using Qualtrics.[129] Email addresses were identified using contact lists hosted by state health departments or state associations of city and county health officials, or by consulting LHD websites. The survey was fielded from July 14th to October 16th 2015. A $20 Amazon gift card was offered as an incentive to eight randomly selected participants and five email reminders were sent during the survey period to bolster response rates.[130]

4. Response Rate and Representativeness

There were 618 valid responses to the survey (31% response rate). Representativeness was assessed by comparing the respondents to the overall sampling frame. LHD characteristics were similar for each of the variables found to be associated with the degree of collaboration in phase one: (1) population served, (2) proximity, (3) executive's highest degree, and (4) if the LHD employed a health educator. LHDs from the Midwest were overrepresented and LHDs from the South were underrepresented (Table IV).

Table IV: Representativeness of 2015 Survey with the 2013 National Profile of Local Health Departments

Variables	Survey Respondents Percent (95% CI)	2013 National Profile of LHDs Percent (95% CI)
Population		
<100,000	70.9% (67.3% - 74.5%)	74.0% (72.0% - 75.9%)
100,000 to 499,999	23.3% (20.0% - 26.6%)	19.7% (17.9% - 21.4%)
≥500,000	5.8% (4.0% - 7.7%)	6.4% (5.3% - 7.5%)
Distance (miles)		
0 to 30	14.7% (11.9% - 17.5%)	13.2% (11.7% - 14.7%)
31 to 67	17.9% (14.8% - 20.8%)	21.8% (20.0% - 23.6%)
68 to 116	33.7% (29.9% - 37.4%)	31.8% (29.8% - 33.9%)
≥117	33.8% (30.1% - 37.6%)	33.2% (31.1% - 35.2%)
Executive Education		
Bachelor's Degree or Less	40.9% (37.1% - 44.8%)	41.8% (39.6% - 44.0%)
Master's Degree	45.8% (41.9% - 49.7%)	42.9% (40.7% - 45.0%)
Doctorate	13.3% (10.6% - 16.0%)	15.4% (13.8% - 16.9%)
Employ Health Educator (Yes)	73.5% (69.7% - 77.3%)	69.4% (67.2% - 71.7%)
Census Region		
Northeast	14.6% (11.8% - 17.4%)	17.7% (16.0% - 19.4%)
Midwest	49.4% (45.4% - 53.3%)	35.6% (33.5% - 37.6%)
South	22.2% (18.9% - 25.5%)	33.8% (31.7% - 35.8%)
West	13.9% (11.2% - 16.7%)	13.0% (11.5% - 14.5%)

5. Analysis

Stata version 11 was used to analyze quantitative data and Atlas ti version 7.5 was used to analyze qualitative data.[131,132] The extent of collaboration was measured by calculating the number, percent and 95% confidence interval for each collaboration strategy, as well as the number of collaboration strategies used. Low level collaboration was defined as LHDs utilizing one or two strategies. Medium level collaboration was defined as LHDs utilizing three or four strategies. And high level collaboration was defined as LHDs utilizing five or six strategies.

The benefits of collaboration were assessed using questions about how important and how effective LHD officials perceived each of the 30 indicators in order to measure what was important and to what extent collaboration had impacted the indicator. Since, responses were not normally distributed they were transformed into dichotomous variables (important or not important and effective or not effective). The percent of LHDs that perceived indicators to be important was calculated by dividing the number of LHDs stating an indicator was important by the total number of LHDs that answered the question. The percent of LHDs that perceived collaboration to be effective at impacting the indicator was calculated by dividing the number of LHDs stating that an indicator was both important and effective by the number of LHDs stating that an indicator was important.

Differences in the benefits of collaboration between LHDs with low, medium and high level collaboration were measured using predicted probabilities. Predicted probabilities were calculated using a logistic regression model for the effect of the degree of collaboration (low, medium, or high) on the importance and effectiveness of each indicator, adjusting for population size. This was done because population size may be an important confounder.

Stata's post estimation command "predict" was used to predict the probability that low, medium, or high collaborating LHDs would perceive an indicator to be important or effective. A p-value was also calculated for the null hypotheses that there was no difference in the importance or effectiveness among low, medium, and high collaborating LHDs.

The benefits of collaboration were also assessed using a series of open ended questions, which asked: (1) what was most important to achieve by working with SPPH, (2) what was most effective about working with SPPH, and (3) how working with SPPH has met their expectations. Responses ranged from a few words to pages of text. In total, 68 pages of single-spaced text were produced. The analytic process used included the following steps. All responses were read thoroughly by the principal investigator. Then the data was coded using codes derived from the literature review (Appendix G). Next, quotations were assessed for their existence, consistency and mutual exclusivity and the codebook was revised based on this process. Then, the data was recoded using the revised codebook. This process was repeated until the principal investigator perceived that all important themes were captured and placed within appropriate overarching categories. This process culminated in a set of overarching themes, supporting themes, and exemplar quotations. In addition, the number and percent of LHDs with each code was calculated and ranked. The findings from this phase are presented in the next chapter, in the manuscript titled, "What are the Benefits of Collaboration Between LHDs and SPPH – A National Exploratory Survey."

C. PHASE THREE: GROUP INTERVIEWS WITH LHDS AND SPPH FACULTY (2016)

Phase three was intended to provide a deeper exploration of the benefits, barriers and facilitators of collaboration between LHDs and SPPH. Group interviews were held with LHD

officials and SPPH faculty or staff that had collaborated with one another. This phase adds richness and depth to the findings from phases one and two by allowing for greater explanation of the participants' lived experiences and by allowing for interaction between LHD officials and SPPH faculty or staff – something that was not included in phases one and two.[133(p9)]

1. Sampling

The sampling frame (Table V) was developed based on the findings from phases one and two. LHDs were categorized based on their degree of collaboration and their likelihood of collaboration. The degree of collaboration was calculated by providing each LHD with a point for each collaborative strategy that they answered "yes" to. LHDs were assigned to the following groups: high collaboration (5 – 6 points), medium collaboration (3 – 4 points), low collaboration (1 – 2 points), and no collaboration (0 points).

The likelihood of collaboration was calculated by providing each LHD with points for LHD characteristics associated with the degree of collaboration. Four LHD characteristics were found to be associated with the degree of collaboration in phase one. LHDs were assigned one point for each of the following LHD characteristics: (1) distance – 0 – 30 miles; (2) executive with a master's degree; (3) employing a health educator; and (4) serving a population between 100,000 and 499,999 people. Two points were assigned to LHDs that served a population greater or equal to 500,000 people because the measure of effect was much stronger than the other LHD characteristics. Scores ranged from 0 to 5. LHDs were assigned to the following groups: high likelihood (4 - 5 points), medium likelihood (2 – 3 points), and low likelihood (0 - 1 points). The distribution of LHDs that completed phase two based on these characteristics is show in Table V.

Table V: Purposeful Sampling Frame for Group Interviews

		Degree of Collaboration			
		No Collaboration ***Score 0***	**Low Collaboration** ***Score 1 – 2***	**Medium Collaboration** ***Score 3 – 4***	**High Collaboration** ***Score 5 – 6***
Likelihood of Collaboration	**High likelihood** ***Score 4 – 5***	0 (0.0%)	5 (0.8%)	32 (5.2%)	52 (8.4%)
	Medium likelihood ***Score 2 – 3***	33 (5.3%)	82 (13.3%)	93 (15.0%)	58 (9.4%)
	Low likelihood ***Score 0 – 1***	81 (13.1%)	105 (17.0%)	58 (9.4%)	19 (3.1%)

Initially, a maximum variation sampling scheme was intended to be used to elicit perspectives from the widest variety of types of LHD and SPPH collaboratives and to promote theoretical saturation.[134,135] The original goal was to recruit 12 LHD and SPPH collaboratives in total - three from each of the following categories: (1) high collaboration and high likelihood; (2) high collaboration and low likelihood; (3) low collaboration and high likelihood; and (4) low collaboration and low likelihood (colored in orange in Table V). In total, 181 LHDs met this criterion, which included 29.3% of the LHDs that completed phase two.

The sampling criteria were relaxed to include all LHDs except for those that did not collaborate after contacting all LHDs that met the inclusion criteria twice. This was done due to the difficulty recruiting low collaborators to participate and this is described further in the next section.

2. Recruitment

Executives from qualified LHDs were emailed about the group interviews and asked if they would like to participate. All LHDs meeting the initial criteria were contacted twice. At this point, only five LHDs had agreed to participate – none among low collaborators. Because of this, the sampling criteria were relaxed to include all LHDs that had collaborated. Responses to open ended questions from phase two were reviewed to help personalize the recruitment message. This resulted in the recruitment of two additional LHDs from the low collaboration group. Further recruitment proved to be challenging.

LHD executives that wanted to participate in the study were asked who the appropriate participants were for their group (LHD and SPPH both). Initially, the group interviews were intended to be limited to the LHD executive and their primary SPPH contact. However, a majority of LHD executives felt strongly about involving more people and the participant limits were relaxed. The other participants were contacted at this point. All participants were provided a description of the group interview process and a consent form. In total, seven LHDs agreed to participate and could be scheduled for a group interview. Two other LHDs agreed to participate but group interviews could not be scheduled due to conflicts in their schedules.

3. Participants

Eight group interviews were conducted. This included 24 individuals – 14 from LHDs and 10 from SPPH. The number of participants ranged from 2 to 5 per group interview. A description of the characteristics for each group interview is presented in Table VI.

Table VI: Group Interview Characteristics

Group Interview[c]	Participants		LHD Population	Distance in Miles	Degree of Collaboration*	Type of SPPH	Geographic Location
	LHD	SPPH					
1	2	1	≈400,000	≈75	High	SPH	Midwest
2	2	2	≈300,000	>5	High	SPH & Medical School	South
3	3	1	≈1,000,000	>5	High	SPH	South
4	1	1	≈1,000,000	≈100	Low	SPH	South
5	1	1	≈15,000	≈50	Low	MPH Program	Midwest
6	3	2	≈30,000	≈100	High	SPH	Midwest
7	2	1	≈80,000	>5	High	BPH Program	Midwest
8	1	1	≈25,000	≈100	Low	MPH Program	Midwest

4. Group Interview Methods

A semi-structured group interview guide (Appendix F) was created based on the literature review and conceptual framework. Public health practitioners and academicians also provided input and feedback on the interview guide. The questions were designed to elicit information about how the LHD and SPPH collaborated, perceived benefits, perceived barriers and facilitators, and aspirations for better collaboration. Interviews ranged from 60 to 90 minutes.

The telephone was used to conduct group interviews due to the distance between the principle investigator's residence and the widespread location of the LHD and SPPH participants. Participants were asked to call into a toll-free conference call line hosted by uberconference.com. Uberconference.com was used to record the group interviews so that

[c] Group interviews 3 and 4 included the same LHD but different SPPH. Different people participated from the LHD in interview 3 and 4 as well.

they could be transcribed verbatim. This generated 181 pages of single spaced text. Each group interview was facilitated by the principle investigator.

The telephone has been found to be an acceptable method for conducting semi-structured interviews and is commonly used with busy professionals.[136–138] Limitations of using a telephone for interviews includes loss of nonverbal communication and it is generally more difficult to facilitate. The number of participants were limited to six per group and the participants were provided the interview scripts beforehand in order to ease facilitation. Verbal cues, such as "uh huh" were also used to help address the issue of nonverbal communication.[139(p210)] This strategy worked well when the number of participants was four or less. Facilitating larger groups was more difficult.

The telephone was selected instead of web-based communications tools, like Skype or Google Hangouts, because research has shown that participants tend to be more comfortable using the telephone and because these newer communications tools have not been found to improve issues related to nonverbal communication.[140] In addition, the principal investigator felt more comfortable communicating using the telephone and believes that using a web-based communication tool would have only complicated the interview process.

5. Qualitative Data Analysis

Qualitative data analysis took place throughout phase three. The PI was not able to take notes during the group interviews. Rather, he listened to the recordings within the first week of the interview and took notes about general themes and impressions, which helped the PI learn

what themes needed extra time to explore and how questions may be better stated. The PI also transcribed the recordings verbatim at this time, which helped him get familiar with the data.

After five group interviews had been completed, the PI coded their transcripts using a preliminary codebook (Appendix G) based on the introduction and conceptual framework presented earlier in this document. The codes were related to the types of benefits, barriers, and facilitators. New codes were assigned to topics that were not identified in the codebook. In addition, the PI tabulated the codes. Codes that were not used were eliminated and codes that were used infrequently (<1% of all codes) were assessed to determine if they could be merged with similar codes. The codebook was refined at the end of this process to make it align better with the data. This took place in an iterative process and ended with a refined codebook capturing 24 codes in seven families. The PI also believed that data saturation was beginning to occur at this time, because a wide variety of themes had been discussed, with multiple and repeating viewpoints on each issue. Based on this, the PI decided to complete the three remaining group interviews and halt recruitment efforts at this time.

When the remaining group interviews were finished, the PI completed qualitative data analysis process using Atlas.ti. First the PI recoded the transcripts using the revised codebook. New emergent codes were also allowed. After this was complete, the PI printed out all quotations for each code, read through them and took notes about each code and possible relationships between codes. Themes were developed using Atlas.ti's network feature. Codes for each family were imported into Atlas.ti's network feature and their quotations were assigned a more descriptive code, usually using the participant's own words. Co-occuring,

neighboring, and other potentially relevant codes were also imported into the network. This process was used until all relevant quotations were assigned a new code. Relationships between codes were assigned when individual, co-occurring, or neighboring codes were assigned more than one code. The analysis ended with 79 codes for four primary themes (Appendix H), and four networks detailing relationships between codes (Appendix I).

The PI also worked with a second analyst (a former graduate of the UIC DrPH program involved in academic and public health collaboration) to help analyze and make sense of the qualitative data. The second analyst listened to each interview and read through each transcript, taking notes and placing codes throughout. The PI and second analyst had multiple conversations about the project and the PI integrated the second analyst's perceptions into the final manuscript. The second analyst also reviewed a draft of the final manuscript for phase three and provided feedback based on her perceptions. In addition, a draft of the final manuscript was provided to every participant for feedback. Feedback was received from five participants and was generally positive. Two suggestions were provided. One was to make sure to state that small LHDs may have difficulty with some of the recommendations made in the document due to their limited capacity. Another was that the participant had actually tried to use some of the recommendations when he worked with LHDs in the past. The findings from this phase are presented in the next chapter, in the manuscript titled, "Benefits, Barriers, and Facilitators of Collaboration Between LHDs and SPPH – A Qualitative Exploration."

D. QUALITY AND RIGOR

Research should be rigorous enough to enable readers to comfortably make decisions based on the findings.[141] This study used multiple techniques to try and enhance its rigor, such as using multiple data sources and both quantitative and qualitative data. The quality of quantitative and qualitative research is judged using different criteria. Curry and Nunez-Smith provide a framework that integrates these different criteria for evaluating the quality of mixed-methods research.[142] This framework and how the study addressed each of the criterion is described below.[d]

- **Veracity** refers to how accurate a study is. It incorporates the concepts of internal validity and credibility from quantitative and qualitative research respectively.
    - **Phase 1: Analysis of the 2008 National Profile of LHDs Dataset**
        - Sampling weights were used to take into account NACCHO's stratified sampling scheme and non-response.
        - Confounding was taken into account using ordinal logistic regression.
        - The potential bias from item non-response was tested for in order to determine if this would influence the results.
    - **Phase 2: National Exploratory Survey of LHDs (2015)**
        - The survey questionnaire was developed using input from multiple people, including the primary investigator and three members of the dissertation committee.
        - The survey questionnaire was reviewed by three LHD executives.

[d] The methods are described in more detail previously and are only referenced in this section.

        - Probabilities were predicted adjusting for confounding by the size of the population served by a LHD.

    - **Phase 3: National Exploratory Group Interviews with LHDs and SPPH (2016)**
        - Eight group interviews were held representing a variety of types of collaborations and a variety of types of LHDs and SPPH.
        - Individuals from both LHDs and SPPH were involved in each focus group allowing for triangulation between the LHD and SPPH perspectives.
    - **Triangulation**: Both quantitative and qualitative data were used. Quantitative data provided information from a large number of LHDs and qualitative information provided more in-depth information from a smaller number of LHDs and SPPH participants.

- **Consistency** refers to the ability to replicate a study. It incorporates the concepts of reliability and dependability from quantitative and qualitative research respectively.
    - **Phase 1: Analysis of the 2008 National Profile of LHDs Dataset**
        - NACCHO pilot tested the 2008 Profile questionnaire on 45 LHDs in May and June of 2008.[19(p4)]
    - **Phase 2: National Exploratory Survey of LHDs (2015)**
        - The survey questionnaire was developed with input from multiple public health officials.

        - The combination of quantitative and qualitative questions allowed for findings from this survey to be corroborated to a degree.
    - **Phase 3: National Exploratory Group Interviews with LHDs and SPPH (2016)**
        - Interview guide was developed with input from multiple public health officials.
        - A second analyst helped to check and corroborate the PI's assumptions and interpretations of the data.
        - Interview participants helped to check and corroborate the PI's assumptions and interpretations of the data by reviewing the final report.
    - **Triangulation**: The sequential nature of the study design allowed for a more data driven purposeful sampling frame to be created and used.
- **Applicability** refers to how findings can be applied in other settings. It incorporates the concepts of generalizability and transferability from quantitative and qualitative research respectively.
    - **Phase 1: Analysis of the 2008 National Profile of LHDs Dataset**
        - The response rate was relatively high (78%).
        - NACCHO describes the survey as the "nation's best and most complete source of data about LHDs in the United States."[19(piii)]
        - Sampling weights were used to adjust for the stratified sampling scheme and non-response.
    - **Phase 2: National Exploratory Survey of LHDs (2015)**

        - The effect of non-response was assessed for by determining if respondents differed from the overall sampling frame on key variables. The survey respondents were similar to the respondents of the 2013 National Profile of LHDs survey (the sampling frame) for key variables.

    - **Phase 3: National Exploratory Group Interviews with LHDs and SPPH (2016)**
        - Eight group interviews were held representing a variety of types of collaborations and a variety of types of LHDs and SPPH.
        - Individuals from both LHDs and SPPH were involved in each focus group allowing for triangulation between the LHD and SPPH perspectives.
    - **Triangulation**: This study offers the strengths of both quantitative and qualitative research. Quantitative findings allow for a stronger case to be made about the extent of collaboration and qualitative findings help to provide more explanation of why factors are benefits, barriers, or facilitators, which may enhance transferability.

- **Neutrality** refers to the degree with which a priori assumptions of the researcher may bias a study. It incorporates the concepts of objectivity and confirmability from quantitative and qualitative research respectively.
    - **Phase 1: Analysis of the 2008 National Profile of LHDs Dataset**
        - Variables were selected and constructed based on a literature review and conceptual framework.

- **Phase 2: National Exploratory Survey of LHDs (2015)**
    - The questionnaire was based on a literature review and conceptual framework.
- **Phase 3: National Exploratory Group Interviews with LHDs and SPPH (2016)**
    - The focus group guide was based on a literature review and conceptual framework.
    - A second analyst was used, allowing for the principal investigator to get feedback on his potential biases.
    - Interview participants were allowed to review a draft of the final manuscript. Five participants provided feedback. This allowed for the principal investigator to get feedback on his potential biases.
- **Triangulation**: Three different data sources were used. This allowed for corroboration and explanation of key issues among the three data sets.

- **Limitations:** The limitations to this study are addressed below. However, these issues are believed to be minor and fall within the grounds of commonly conducted social science.
    - **Phase 1: Analysis of the 2008 National Profile of LHDs Dataset**
        - The data was seven years old at the time of the analysis and the factors associated with the degree of collaboration may have changed due to issues that have emerged since, such as PHAB accreditation, the affordable care act, or the recession in 2008.
        - Potential for reverse causality due to its cross sectional nature.

- **Phase 2: National Exploratory Survey of LHDs (2015)**
    - The response rate was relatively low (31%), which may lead to an overestimate of the extent of collaboration due to self-selection bias.
- **Phase 3: National Exploratory Group Interviews with LHDs and SPPH (2016)**
    - LHDs that were identified as being "low collaborators" were reluctant to participate and only two "low collaborators" were included, none of which were from LHDs with a greater likelihood of collaboration. This limited the extent of theoretical saturation.

E. SUMMARY

The study used a three phase mixed-methods design to explore the research questions. The first phase identified LHDs characteristics associated with collaboration. It also measured the extent of collaboration between LHDs and SPPH in 2008. The second phase provided an updated measure of the extent of collaboration between LHD and SPPH from 2015. It also provided insight into what LHD officials perceived to be the benefits of collaboration with SPPH. The results of phases one and two were used to select a purposeful sample for phase three. The third phase provided a more in-depth exploration of the perceived benefits, barriers and facilitators to collaboration from the perspective of both LHDs and SPPH. This study also takes steps to address criteria for judging the quality of mixed-methods research and the findings were strengthened by triangulating findings between the different data sources.

IV. RESULTS

The results and findings from this study are presented as three manuscripts, each representing a single phase of the study. The findings are summarized, integrated and interpreted further in the first section of the next chapter.

Manuscripts Number One

Submission Date: TBD

Frontiers in Public Health Services and Systems Research

WHAT FACTORS PREDICT COLLABORATION BETWEEN LOCAL HEALTH DEPARTMENTS AND SCHOOLS OR PROGRAMS OF PUBLIC HEALTH?

ABSTRACT

Collaboration between local health departments (LHDs) and schools or programs of public health (SPPH) has been promoted to enhance the quality of public health education, research and service, and improve population health. Himmelman suggests that inter-organizational collaboration takes place across a continuum of strategies and Livingood shows that this may occur between LHDs and SPPH as well. This study examines the characteristics of a collaboration continuum between LHDs and SPPH, as well as LHD characteristics that predict more strategic collaboration using data from the 2008 National Profile of LHDs. A model continuum of collaboration was developed and then LHD characteristics (distance, total population, executive's highest degree, executive's formal public health education, and employment of an environmental health specialist, epidemiologist, health educator and emergency preparedness coordinator) were assessed for their association with the model collaboration continuum using ordinal logistic regression. Eighty-six percent of LHDs in the 2008 Profile dataset collaborated with SPPH through a specific sequence of strategies, beginning with student learning activities; and adding consulting, evaluation, and research; LHD staff serving as faculty; and advising – in that order. Population served, distance, executive's highest degree and employing a health educator were associated with the model collaboration continuum. This study shows that more strategic collaborations occur with large LHDs that are closer to SPPH.

But that employing an executive with a master's degree and a health educator may promote linkages between LHDs and SPPH.

KEY WORDS

academic health department, local health department, schools and programs of public health, collaboration, public health systems research

COVER PAGE FOOTNOTE

I thank the National Association of County and City Health Officials for access to the data central to the analysis.

WHAT FACTORS PREDICT HOW LOCAL HEALTH DEPARTMENTS COLLABORATE WITH SCHOOLS AND PROGRAMS OF PUBLIC HEALTH?

INTRODUCTION

Collaboration between local health departments (LHDs) and schools or programs of public health (SPPH) has been promoted as a way to enhance the quality of public health education, research and service, and ultimately to improve population health.[143] Himmelman suggests that inter-organizational collaboration takes place across a continuum of strategies ranging in their level of strategicness.[87] Findings from Livingood support that this occurs between LHDs and academic institutions, showing that many LHDs and academic institutions collaborate by supporting student learning activities, but few collaborate for more strategic reasons, such as research, evaluation, or capacity building.[18] This study will examine the characteristics of a collaboration continuum between LHDs and SPPH, as well as LHD characteristics that predict higher-level collaboration to understand opportunities for improving collaboration.

METHODS

The National Profile of LHDs Study (Profile) is the largest, most reliable source of data on LHDs. Data from the 2008 Profile were used for this study because it included questions about how LHDs and SPPH collaborated that have not been repeated since.[23] These questions were provided to 546 LHDs; 425 LHDs responded (response rate = 78%). Stata version 11 was used for the analysis. Sampling weights were used to account for the Profile's sampling design.

Characteristics of a collaboration continuum were explored first (Figure 1). The 2008 Profile included eight questions about how LHDs and SPPH collaborate[e], which were combined into four general strategies based on their level of strategicness (student learning activities; LHD staff serve as faculty; consulting, evaluation, and research; and advising). LHDs were categorized based on the number of strategies (0 -4), as well as the combination of individual strategies within each number of strategies. The number and percent of LHDs in each category was calculated. The most common combinations were selected for a model collaboration continuum. The fit of the model was tested by calculating the percent of LHDs that were included.

Next, LHD characteristics were assessed for their association with the collaboration continuum. The collaboration continuum (Figure 1) was used as the dependent variable. Eight independent variables were included in the study.

- **Distance** – Distance between LHDs and the nearest SPPH was included because it may influence collaboration due to social networks and ease of collaborating. Distance was calculated using Arc GIS. SPPHs accredited in 2008 were included.
- **Total population** – Total population served by LHDs is often used as a marker for LHD capacity, which has been shown to be associated with many indicators of LHD performance. LHD capacity may influence collaboration through available resources. Other measures of LHD capacity (number of employees) were excluded due to item nonresponse.

[e] The 2008 National Profile of Local Health Departments questionnaire can be viewed at: http://nacchoprofilestudy.org/wp-content/uploads/2014/01/Profile08CoreplusModules.pdf.

- **Executive's Highest Degree** – Executives with higher levels of education may perceive greater value and may be more comfortable collaborating with SPPH.
- **Executive's Formal Public Health Education** – Executives with formal public health education (Master or Doctor of Public Health) may perceive greater value and may be more comfortable collaborating with SPPH.
- **Workforce characteristics** – LHD employees that work in population-based rather than clinical positions may perceive greater value and may be more comfortable collaborating with SPPH. Four types of employees were included: environmental health specialists, epidemiologists, health educators, and emergency preparedness coordinators.

Ordinal logistic regression was used to test the association between the independent and dependent variables. The following procedures were used. Bivariate analysis was conducted for each independent variable. Variables were excluded from further analysis if the p-value was greater than 0.25. Then, the effect of item non-response was assessed by testing the distribution of missing data for each independent variable. Variables were excluded from further analysis if data was not missing at random. Multicolinearity was tested using Stata's Collin function. There was no evidence for multicolinearity. The proportional odds assumption was tested using a Wald test; it was not violated. And the model was found to be properly fit using a link test.

RESULTS

Figure 1 shows the model collaboration continuum. Eighty-six percent of LHDs in the 2008 Profile dataset collaborated with SPPH through a specific sequence of strategies, beginning with student learning activities; and adding consulting, evaluation, and research; LHD staff serving as faculty; and advising – in that order. The most common deviations occurred when LHD staff was placed as faculty (4%) or advising strategies (3%) were used earlier than expected.

Table 1 shows the results of the bivariate and multivariate ordinal logistic regression model. Of the 356 LHDs adhering to the model collaboration continuum, 317 had complete data for all independent variables and were included in the analysis. Bivariate analysis showed that each of the independent variables were associated with the collaboration continuum except for employing an environmental health specialist. The variables total population, distance, executive's highest degree, and employing a health educator were associated with the model collaboration continuum after adjusting for confounding. The total population served by LHDs was the strongest predictor of collaboration and the strength of association increased significantly as the population increased. The distance between LHDs and the nearest SPPH was also associated with collaboration. LHDs within 30 miles of the nearest SPPH were more likely to collaborate to a higher-level. Executives with a master's and doctorate were more likely to collaborate than those with a bachelor's degree or less, but this was only statistically significant for those with a master's degree. Finally, LHDs that employed a health educator were more likely to collaborate than those that did not.

IMPLICATIONS

The results show that there is a general sequence of strategies that most LHDs and SPPH use to collaborate together. Knowing this, it may be possible to improve the strategicness of LHD and SPPH collaboratives by taking on additional strategies over time. Through this process, it may be possible to grow many of the low-level collaboratives to higher-level collaboratives, even academic health departments over time.

The results also show that LHD characteristics influence the level of collaboration. The strength of association was greatest for population size and the distance between LHDs and SPPH. This is not surprising because LHDs likely need sufficient capacity to collaborate and SPPH may be inclined to collaborate with better performing LHDs. But if these collaborations are intended to enhance public health education, research and service, major opportunities are being lost by missing a full view of public health practice. Strategies for strengthening linkages between SPPH and rural LHDs, such as e-collaboration, should be explored further because these LHDs may benefit the most by working with SPPH, especially to assist with accreditation efforts.

LHDs employing executives with a master's degree and employing health educators were also associated with collaboration. Based on this, linkages between SPPH and small and rural LHDs may be improved by increasing the proportion of executives with a graduate degree or LHDs that employ health educators. Executives with a graduate degree may be more comfortable collaborating with SPPH and may perceive it to be more valuable and health educators are trained in collaborative methods.

This study addressed LHD characteristics that influence collaboration with SPPH. Conversely, future research should address SPPH characteristics for their association with collaboration. Future research should also address why LHDs and SPPH collaborate, and do so among a maximum variety of LHD and SPPH collaboratives to determine if there are differences. This may provide clues for how to improve collaboration between LHDs and SPPH.

SUMMARY BOX:

What is already known about this topic? Collaboration between LHDs and SPPH has been shown to be beneficial to public health research, education, and service.

What is added by this report? This report shows that there is a general sequence of strategies that most LHDs and SPPH use to collaborate together and that LHD characteristics (population size, distance, executive education, and employing a health educator) influence the level of collaboration.

What are the implications for public health practice, policy, and research? SPPH are more likely to collaborate with LHDs that serve larger populations and that are physically closer to SPPH. However, opportunities for enhancing public health teaching, research, and service are being missed by excluding small and rural LHDs. Strategies for enhancing linkages with these types of LHDs should be explored and may hinge on employing executives and workers with graduate degrees whose focus is population-based, such as health educators.

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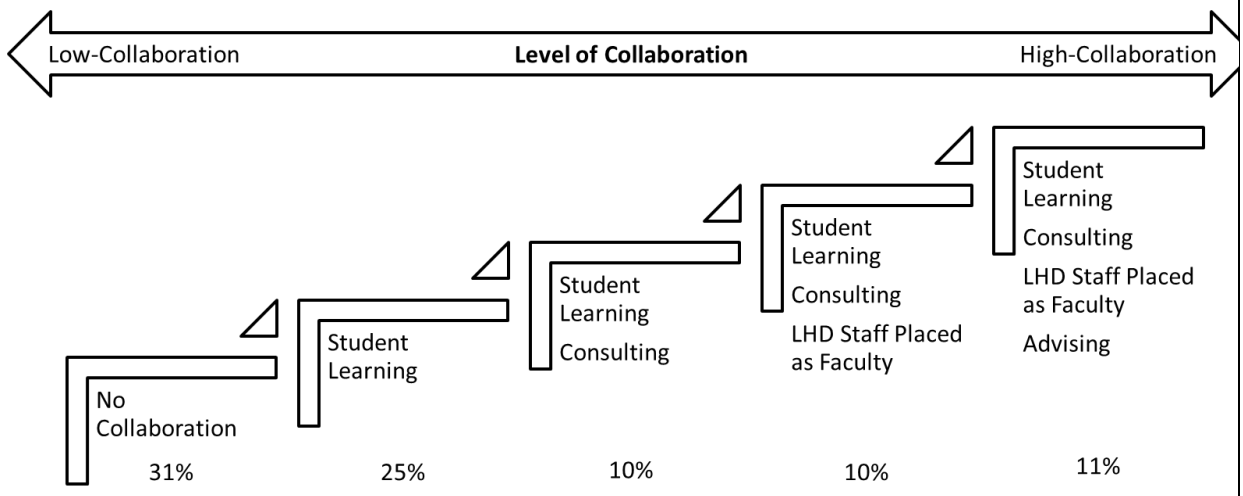
Figure 1: Model collaboration continuum between local health departments and schools and programs of public health



Number of Strategies Used to Collaborate	Combination of Strategies Used to Collaborate	Fit of the Model Collaboration Continuum N (%)
0	**No Interaction***	**131 (31%)**
1	**Student***	**107 (25%)**
	Consulting	8 (2%)
	Faculty	4 (1%)
	Advising	1 (0%)
2	**Student and Consulting***	**42 (10%)**
	Student and Faculty	19 (4%)
	Student and Advising	8 (2%)
	Consulting and Faculty	3 (1%)
	Consulting and Advising	1 (0%)
	Faculty and Advising	1 (0%)
3	**Student, Consulting and Faculty***	**41 (10%)**
	Student, Consulting and Advising	14 (3%)
4	**Student, Consulting, Faculty and Advising***	**45 (11%)**
Fit of Empirical Data with the Model Collaboration Continuum		**366 (86%)**

**Bolded items are the most common combination of collaboration strategies for each number used. These were used to develop the model.*

Table 1: Local health department characteristics associated with the level of collaboration with schools and programs of public health

Independent Variables		**Crude Analysis**			**Adjusted Analysis**	
N=317	OR	95% CI	P-Value	OR	95% CI	P-Value
Distance (miles)						
117+	-	-	-	-	-	-
68 – 116	1.35	0.80 – 2.26	0.256	0.94	0.49 – 1.79	0.844
31 - 67	1.56	0.93 – 2.63	0.094	0.95	0.52 – 1.75	0.877
0 – 30	4.12	2.26 – 7.52	<0.0005	2.55	1.18 – 5.51	0.018
Total Population						
≤99,999	-	-	-	-	-	-
100,000 to 499,999	3.61	2.14 – 6.10	<0.0005	2.34	1.28 – 4.26	0.006
500,000+	33.54	12.62 – 89.11	<0.0005	12.26	3.87 – 38.85	<0.0005
Executive's Highest Degree						
≤Bachelor's	-	-	-	-	-	-
Master's	2.73	1.72 – 4.32	<0.0005	2.21	1.21 – 4.01	0.010
Doctorate	3.98	2.26 – 7.03	<0.0005	1.77	0.79 – 3.95	0.162
Executive Formal PH Education						
No MPH or DrPH	-	-	-	-	-	-
MPH or DrPH	3.09	1.85 – 5.14	<0.0005	1.40	0.77 – 2.56	0.274
Workforce Characteristics						
Employ Environmental Health Specialist	1.84	1.08 – 3.15	0.025	0.86	0.43 – 1.73	0.274
Employ Epidemiologist	3.00	1.87 – 4.81	<0.0005	1.21	0.67 – 2.19	0.521
Employ Health Educator	3.77	2.43 – 5.83	<0.0005	2.11	1.23 – 3.63	0.007
Employ Emergency Preparedness Coordinator	2.64	1.72 – 4.07	<0.0005	1.57	0.89 – 2.76	0.119

Manuscripts Number Two

Submission Date: TBD

Journal of Public Health Management and Practice

WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LOCAL HEALTH DEPARTMENTS AND SCHOOLS OR PROGRAMS OF PUBLIC HEALTH – A NATIONAL EXPLORATORY SURVEY

Kevin A. Kovach MSc, CHES

No funding was received to support this study

Abstract

Background: Collaboration between local health departments (LHDs) and schools and programs of public health (SPPH) can enhance public health teaching, research and practice and strong calls have been made to enhance these linkages. Information about the extent and perceived benefits may be useful to enhance these linkages. However, little information exists about this. This study measured the extent and benefits of collaboration to fill this gap.

Methods: A cross-sectional survey was conducted of all 2,000 LHDs that completed the 2013 National Profile of LHDs. LHD officials were also asked about how they collaborated with SPPH and what they thought was most beneficial about their collaborative relationship using closed-ended and open-ended questions.

Results: A majority of LHDs (81.6%) collaborated with SPPH in some way. Student learning activities (72.8%) and consulting, research, or evaluation support (53.2%) were the most common. In addition, 21.4% of LHDs reported having an academic health department relationship with a SPPH. The most common benefits reported were related to workforce development, data analysis, evaluation, and CHA. In general, LHDs that collaborated to a higher degree reported collaboration to be more beneficial than those the collaborated to a lesser degree.

Conclusion: This study shows that there are great opportunities to enhance collaboration between LHDs and SPPH because most collaborate, but also most could collaborate to a higher degree. Understanding that LHDs perceive collaboration with SPPH to be beneficial because it can help with non-routine tasks, such as those related to accreditation (community health

assessment and improvement planning, strategic planning, evaluation, quality improvement, and workforce development) may be a way to help enhance collaboration between LHDs and SPPH throughout the universe of LHDs.

WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LOCAL HEALTH DEPARTMENTS AND SCHOOLS OR PROGRAMS OF PUBLIC HEALTH – A NATIONAL EXPLORATORY SURVEY

INTRODUCTION

Collaboration between local health departments (LHDs) and academia dates back to the early 20th century, but public health practice and academia have largely worked in isolation.[2–4] Recently strong calls have been made for enhancing these linkages and collaboration with academic institutions has been codified into public health practice standards, such as The Operational Definition of a Functional Local Health Department and the Public Health Accreditation Board's accreditation standards.[13,14] Also, calls for evidence-based public health have necessitated the use of a more scientific approach to practice.[144,145] With this in mind, it is clear that collaboration is thought to be important for enhancing public health practice, education and research.[4,6–9,11,146]

Collaboration between LHDs and Schools or Programs of Public Health (SPPH) may be of special interest, because SPPH focus on population health.[8,9] Case studies have provided multiple examples of successful collaboration between LHDs and SPPH, mostly under the guise of the academic health department (AHD).[15,17,71–74] However, little information exists about the extent of collaboration between LHDs and SPPH and the reasons why they collaborate. This study aims to explore these issues using a national survey of LHD officials.

For the purpose of this study, collaboration is defined as an inter-organizational relationship between a LHD and a SPPH.[56] Himmelman suggests that collaboration takes place across a continuum of strategies ranging in their level of strategicness.[87] This is supported by findings

from Livingood and Kovach. Livingood found that many LHDs and academic institutions collaborate by supporting student learning activities, but few collaborate for more strategic reasons.[18] Kovach (Unpublished, 2016) found that LHDs and SPPH collaborate through a common sequence of activities beginning with student learning activities, and adding consulting, evaluation or research, LHD staff serving as faculty, and advisory relationships – in that order.

Understanding how to expand collaboration between LHDs and SPPH is worth considering since collaboration has been shown to be able to enhance public health practice, teaching and research, and because public health officials are already embarking on expansion initiatives.[7,21,71,147] Rogers diffusion of innovations theory shows how expansion may occur and suggests that characteristics of organizations (LHDs and SPPH) and innovations (collaboration) influence the likelihood of adoption.[75] Research also suggests that organizations collaborate when they perceive it will be beneficial.[54,76] Previous research has addressed LHD characteristics associated with collaboration (Kovach, Unpublished, 2016). However, there is sparse data about the benefits of collaboration between LHDs and SPPH. The current study had two objectives: (1) to measure the extent of collaboration between LHDs and SPPH, and (2) to explore what the benefits of collaboration are perceived to be by LHD officials.

METHODS

Questionnaire Development

The project was deemed exempt by the institutional review board of the University of Illinois at Chicago (Research Protocol # 2015-0458). The questionnaire addressed the degree of

collaboration and the perceived benefits of collaboration with SPPH. The degree of collaboration was measured using 10 questions that assessed strategies LHDs used to collaborate with SPPH. A yes or no format was used and questions were combined into categories based on their level of strategicness as shown in Figure 1.

The benefits of collaboration were assessed using 23 indicators of the 10 essential public health services and seven indicators of resources LHDs could potentially acquire by collaborating with SPPH (Figure 1). LHD officials were asked to rate "how important" indicators were to gain by collaborating with SPPH, and "how effective" collaborating with SPPH were at impacting indicators. This allowed for a gap analysis between perceived importance and perceived impact. A five-point Likert type scale was used. In addition, three open-ended questions were included (Figure 1). This allowed LHD officials to respond spontaneously and to allow for exploration outside the confines of the close ended questions.[126] This also allowed for triangulation between the quantitative and qualitative data. Respondents from LHDs that did not collaborate skipped this section.

The quality of the questionnaire was addressed in multiple ways. First, many questions came directly or were modified from previously validated surveys.[12,124,125,148] Second, the research team reviewed and revised the questionnaire based on their experience working in local public health. Finally, the questionnaire was pilot tested on three LHD executives with varying experience, education and who's LHDs served varying populations. LHD executives assessed the questionnaire for clarity and comprehensiveness. Relatively few suggestions were offered and minor revisions were made.

Survey Sample and Administration

The questionnaire was emailed to the executives of all 2,000 LHDs that completed the 2013 National Profile of LHDs and administered using Qualtrics.[129] Email addresses were identified using contact lists hosted by state health departments or state associations of city and county health officials or by consulting LHD websites. The survey was fielded from July 14th to October 16th 2015. A $20 Amazon gift card was offered as an incentive to eight randomly selected participants. Five e-mail reminders were sent during the survey period.

Response Rate and Representativeness

There were 618 valid responses (31% response rate). Representativeness was assessed by comparing the respondents to the overall sampling frame for LHD characteristics found to be associated with the degree of collaboration in a previous study (Kovach, Unpublished, 2016). There were no statistically significant differences between the respondents and the overall sampling frame for: mean population served; mean distance in miles to the nearest SPPH; percent of LHDs with an executive with a master's degree; and percent of LHDs that employed a health educator. Representativeness was also assessed for by geographic location and LHDs from the Midwest were overrepresented and LHDs from the South were underrepresented.

Analysis

Stata version 11 was used to analyze quantitative data and Atlas ti version 7.5 was used to analyze qualitative data.[131,132] The extent of collaboration was measured by calculating the number, percent and 95% confidence interval for each strategy LHDs used to collaborate with

SPPH (Figure 1) and the total number of strategies used. Results are presented in Table 1. Low level collaboration was defined as LHDs utilizing one or two strategies. Medium level collaboration was defined as LHDs utilizing three or four strategies. And high level collaboration was defined as LHDs utilizing five or six strategies.

As stated before, the benefits of collaboration were assessed using questions about how important and how effective LHD officials perceived each of the 30 indicators to allow for a gap analysis between perceived importance and perceived effect. Since, responses were not normally distributed they were transformed into dichotomous variables. The percent of LHDs that perceived indicators to be important was calculated by dividing the number of LHDs stating an indicator was important by the total number of LHDs. The percent of LHDs that perceived collaboration to be effective was calculated by dividing the number of LHDs stating that an indicator was both important and effective by the number of LHDs stating that an indicator was important.

Differences in the benefits of collaboration between LHDs with low, medium and high level collaboration were measured using predicted probabilities. A logistic regression model for the effect of the degree of collaboration (low, medium, or high) on the importance and effectiveness of each indicator was calculated, adjusting for population size. Stata's post estimation command "predict" was used to predict the probability that low, medium, or high collaborating LHDs would perceive an indicator to be important or effective. A p-value was also calculated for the null hypotheses that there was no difference in the importance or effectiveness among low, medium, and high collaborating LHDs (Table 2 and 3).

The benefits of collaboration were also assessed using three open ended questions (Figure 1). This produced 68 pages of single-spaced text. All responses were read thoroughly by the principal investigator. Then the data was coded using codes derived from the literature review. Next, quotations were assessed for their existence, consistency and mutual exclusivity and the codebook was revised based on this process. Then, the data was recoded using the revised codebook. This process was repeated until the principal investigator perceived that all important themes were captured and placed within appropriate overarching categories. This process culminated in a set of overarching themes, supporting themes, and exemplar quotations. In addition, the number and percent of LHDs with each code was calculated (Table 4).

RESULTS

Extent of Collaboration

Table 1 shows that 81.6% of LHDs collaborated with a SPPH using at least one collaborative strategy. A majority of LHDs supported student learning activities (72.8%) and received consulting, research, or evaluation services from SPPH (53.2%). Fewer LHDs participated in an advisory capacity (41.9%), provided LHD staff to serve as a faculty member (37.5%), or had a contract with an SPPH (37.5%). Only 21.4% of LHDs reported an AHD relationship.

Benefits of Collaboration

Quantitative analysis of the benefits of collaboration. Indicators perceived to be important by LHDs were analyzed first. Table 3 depicts the proportion of LHD officials that stated each indicator was important, as well as the predicted probability of this from LHDs with low,

medium, and high levels of collaboration, adjusted for by population size. On average, more LHD officials perceived indicators within the systems management category to be important than any other category. Similarly, fewer LHD officials perceived indicators within the assessment category to be important than any other category. In general, indicators that were most important tended to be related to workforce development, resources, and data analysis or evaluation. Indicators that were least important tended to be related to more routine public health services, such as infectious disease investigation, emergency preparedness, or personal health services. Overall, LHDs with higher levels of collaboration had higher predicted probabilities for perceiving indicators to be important. Predicted probabilities were statistically significantly different at the 0.05 level for 16 out of the 30 indicators.

Indicators perceived to be effective by LHDs were analyzed next. Table 3 depicts the proportion of LHD officials that stated each indicator was effective, among those that stated an indicator was important. The predicted probability of this from LHDs with low, medium, and high levels of collaboration, adjusted for by population size is also presented. Again, on average more LHD officials perceived indicators within the systems management category to be effective than any other category and fewer LHD officials perceived indicators within the assessment category to be effective. In general, indicators that were perceived to be important by the greatest proportion of LHDs were also perceived to be effective by the greatest proportion of LHDs. However, this trend was not followed for evaluating population-based services, developing innovative practices, and assessing the delivery of the 10 essential public health services. Overall, LHDs with higher levels of collaboration had higher predicted probabilities for

perceiving indicators to be effective. Predicted probabilities were statistically significantly different at the 0.05 level for 14 of the 30 indicators.

Qualitative thematic analysis of the benefits of collaboration. Six overall themes about the benefits of collaboration emerged from the open ended and are described below and in Table 4.

Collaboration can enhance the public health workforce

A common theme was that collaboration was a means to enhance the public health workforce. This could occur through two primary mechanisms. First, collaboration was a means to enhance the public health workforce pipeline by providing students with practical experience and an opportunity to transition from an academic to practice setting. This was important because of a perceived disconnect between academic public health training and the realities of public health practice. In addition, LHD officials stated that this was an opportunity to persuade students to consider a career in local public health. Collaboration also was a means to enhance the existing workforce through a variety of training opportunities, such as webinars, in-service training, institutes and even developing a LHD workforce development plan.

Collaboration can enhance LHD capacity

Another common theme was that collaboration could enhance LHD capacity. Collaboration was thought to affect capacity in three primary ways. First, students could complete special tasks that existing staff did not have time for. However, most of these projects were small and time limited due to academic timelines. Second, SPPH could provide LHDs with special expertise through students and faculty. Epidemiology, data analysis and evaluation were commonly cited

examples.

A smaller number of LHD officials mentioned that collaboration could enhance the capacity of the broader public health system – not just their individual LHD. One LHD official described how a group of LHD officials and academicians secured grant funding from the Health Resources and Services Administration to build capacity among all rural LHDs in the state for health literacy and health communications. Another LHD official stated that they were involved in a statewide workgroup to improve linkages between LHDs and academia throughout the state. These types of system-wide benefits may be examples of strategic and aspirational goals that should be aimed for through collaboration between LHDs and SPPH.

Collaboration is focused on non-routine tasks

Collaboration was most commonly said to focus on accreditation requirements (community health assessment, community health improvement planning, and strategic planning), research, evaluation, grant writing, evidence-based practice, and innovation. Routine services, such as personal health services or investigating infectious diseases were rarely mentioned.

Expectations of Collaboration

Many LHD officials said that their expectations about collaboration were met. Most LHD officials spoke about this in terms about how they were pleased with the quality of students that they worked with. A smaller number of LHD officials spoke about this in terms of the overall relationship between the LHD and SPPH, including how they worked with faculty and staff or how they shared resources.

Some LHD officials said that while they were pleased with their collaborative efforts, they

hoped to be able to do more in the future. In general, LHD officials wanted to move from a collaborative relationship focused on student learning activities to one that involved the full SPPH more strategically.

Other LHD officials said that their expectations were not met because they were dissatisfied with the quality of the students placed in their organization or because faculty and staff from the SPPH were not engaged to a high enough degree.

Finally, some LHD officials simply said that they did not have expectations for the collaborative relationship and could not make judgements about how their expectations were met.

Barriers and Facilitators

Many LHD officials alluded to factors that may promote or inhibit collaboration. The physical distance between LHDs and SPPH was a primary barrier. LHDs that are too far away from SPPH had difficulties collaborating with SPPH due to problems with face-to-face communication, as well as brining students to and housing students in remote locations. Paid internships were thought to be a way to persuade students to come to remote locations but acquiring the financial resources to do this was thought to be difficult.

Another barrier was differences in the organizational culture of LHDs and SPPH. Differences in academic and practice timelines limited what LHDs and SPPH could accomplish because students were often restricted to projects that they could complete within a semester. Some LHD officials said that these types of small projects were beneficial, but others said that they were not beneficial because they could not be sustained after the student left. It was suggested that this issue could be addressed by developing mechanisms for yearlong and continuous

student support for projects that were tied to one another. Other LHD officials said that differences in organizational cultures inhibited collaboration with SPPH faculty and staff. LHD officials thought that this issue could be overcome by identifying LHD staff that are alumni of an SPPH or have worked in an academic setting previously, or conversely identifying SPPH faculty with practice experience. This may facilitate common ground and make it more likely that that LHDs and SPPH would understand one another's missions and constraints.

Another barrier was the level of student preparation and faculty support for internships. While bright and enthusiastic students were viewed favorably by LHD officials, students that required excessive supervision were difficult for LHD staff to manage. This made collaboration, "more trouble than it is worth," as more than one LHD official described. In addition, some LHD officials did not think that SPPH provided enough support to manage and guide student internships.

Finally, some LHD officials felt that SPPH were only interested in having their students' internship requirements met and were not truly interested in collaborating with the LHD in ways that would benefit the LHD.

DISCUSSION

Collaboration between LHDs and SPPH may be an important way to promote innovation in public health practice, teaching and research and may help address existing and emerging public health problems.[5,6,143] While calls for improving linkages between public health practice and academia have been made, these linkages have not been enumerated since 2008.[149] In addition, factors that can promote collaboration have not been studied among large numbers

of LHDs. This study measured the extent and benefits of collaboration between LHDs and SPPH as perceived by LHD officials using a nationally representative survey.

This survey showed that a large proportion of LHDs collaborate with SPPH and that this takes place across a continuum of strategies. This indicates that there are opportunities for improving collaboration between LHDs and SPPH so that more strategic benefits emerge. This survey identified a growth in the extent of collaboration. More LHD collaborated with SPPH and to a higher degree than what was found in 2008 (Kovach, Unpublished, 2016). This growth may be in response to environmental changes faced by LHDs. For example, the recession of 2008 has resulted in a reduced local public health workforce and at the same time PHAB's National Public Health Accreditation Program has placed stress on LHDs to increase their capacity and differentiate their skillsets.[41,45] This survey shows that LHDs collaborate with SPPH both to supplement the number of LHD staff and to gain access to expertise outside of their staff's skillset. While the growth in collaboration is an important finding, the study may be prone to self-selection bias, which may have resulted in an overestimate of the extent of collaboration.[150]

This study also found that LHD officials thought that collaborating with SPPH was beneficial for a wide variety of reasons, but that the most common benefits were for accomplishing non-routine tasks. Tasks related to public health accreditation such as community health assessment and improvement, community partnerships, and population-based health promotion, and evaluation were all ranked relatively highly among close ended questions and mentioned frequently in open-ended questions. Working with students and conducting

research were also ranked relatively highly, which shows that LHDs and SPPH may have shared interests. However, more information is necessary to understand what SPPH perceive to be important about collaborating with LHDs. Most LHDs spoke about collaboration in an organizational sense, but a small number did mention how collaboration could be done more systematically throughout the public health system. This may be a means for accomplishing large scale change and improvements.

A variety of factors were found to influence how effective collaboration was perceived. First, higher-level collaboratives were perceived to be more beneficial than lower-level collaboratives. LHD officials engaged in high-level collaboratives were more likely to perceive indicators to be important and effective than their counterparts in lower-level collaboratives. Future research should examine both how to enact new collaborative relationships and how to enhance existing collaborative relationships.

Distance was another factor that influenced collaboration, corroborating findings from previous research. LHD officials thought that it was more difficult to communicate with SPPH that were far away and they also thought it was difficult to host students from far away locations. LHDs interested in utilizing collaboration with SPPH as a means to enhance practice may need to provide paid internships or stipends to help students cover their living expenses. LHDs could also work to promote the public health profession to high-school and undergraduate students that live in their jurisdiction.

Differences in organizational cultures may also influence collaboration. Some LHD officials perceived SPPH faculty and staff to be “out of touch” with the realities of local public health

practice. These individuals are probably less likely to collaborate with SPPH. However, this issue may be eased by identifying boundary spanners within LHDs and SPPH. LHD officials with formal public health education or experience working in a SPPH seemed to perceive collaboration to be more beneficial. In addition, LHD officials also spoke highly of SPPH that employed individuals with a public health practice background.

In conclusion, collaboration between LHDs and SPPH appears to be a promising strategy for enhancing LHD performance and may be able to promote innovation and change in the public health system. While, high-level collaboration was more likely to be beneficial, benefits were reported throughout the continuum of collaboration and by a variety of LHD types. Systematic efforts may be warranted to expand collaboration between LHDs and SPPH. Special focus may be warranted for LHDs serving small populations since these organizations tend to perform less effectively and also tend to be less likely to collaborate with SPPH.

Figure 1: Indicators of the extent and benefits of collaboration included in the questionnaire

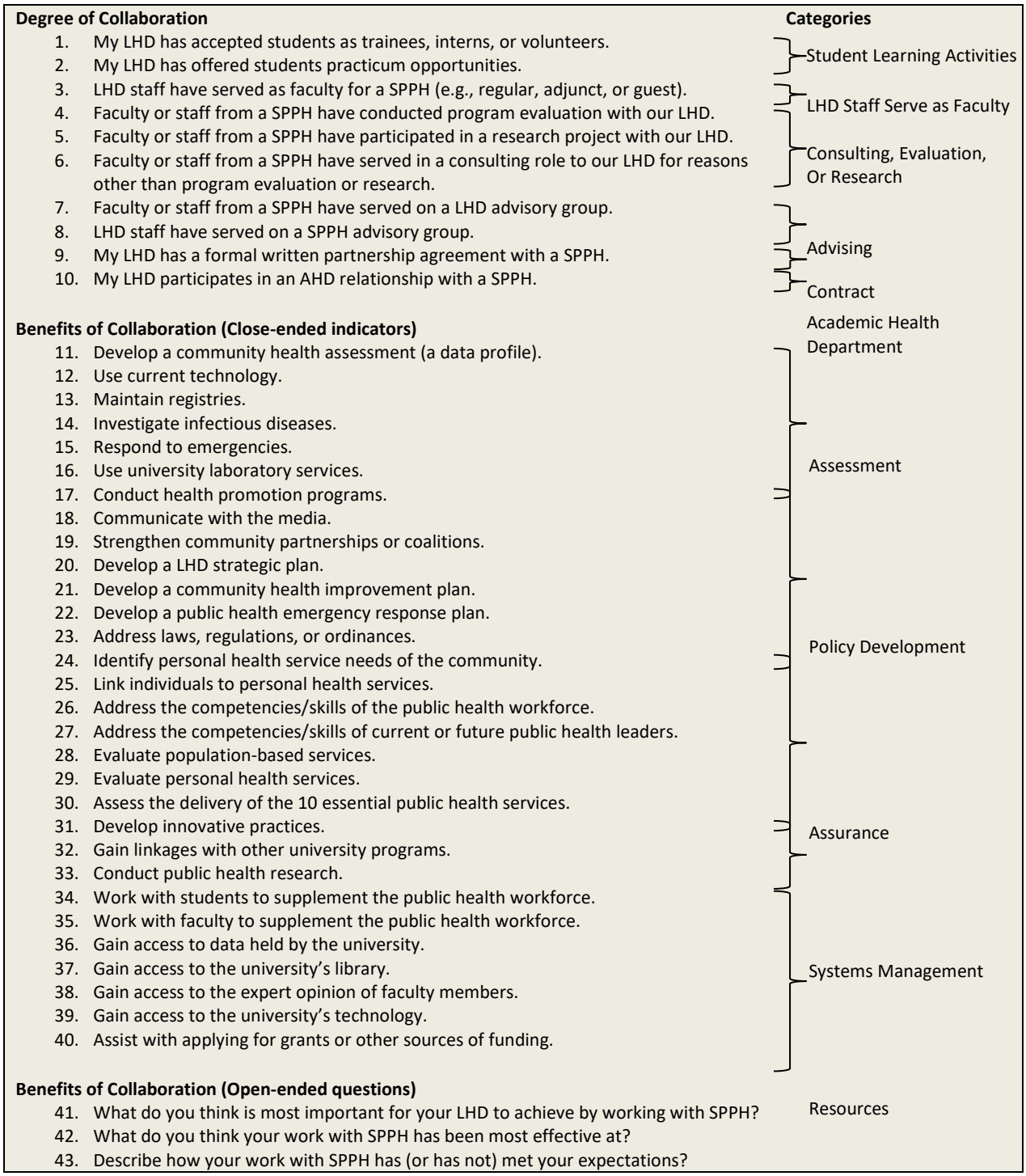


Table 1: Extent of collaboration between local health departments and schools and programs of public health

Individual Collaborative Strategies	N	Percent (95% CI)
No Interaction	114	18.4% (15.4% - 21.5%)
Student Learning Activities	450	72.8% (69.3% - 76.3%)
Consulting, evaluation, or research	329	53.2% (49.3% - 57.2%)
Advising	259	41.9% (38.0% - 45.8%)
LHD Staff Serve as Faculty	232	37.5% (33.7% - 41.4%)
Contract	232	37.5% (33.7% - 41.4%)
Academic Health Department	132	21.4% (18.1% - 24.6%)
Number of Collaborative Strategies	**N**	**Percent (95% CI)**
0	114	18.4% (15.4% - 21.5%)
1	104	16.8% (13.9% - 19.8%)
2	88	14.2% (11.5% - 17.0%)
3	87	14.1% (11.3% - 16.8%)
4	96	15.5% (12.7% - 18.4%)
5	65	10.5% (8.1% - 12.9%)
6	64	10.4% (7.9% - 12.8%)

Table 2: Importance of the 10 essential public health services and university resources for collaboration with schools and programs of public health

Category (n=357)	Indicator	Total		Level of Collaboration			
				Low	Medium	High	
		Percent	Rank	Percent*	Percent*	Percent*	P-Value
Assessment Avg. = 55.7%	Develop a Community Health Assessment	81.9%	3	72.5%	83.3%	86.4%	0.03
	Assistance Using Technology	70.4%	16	61.4%	70.0%	75.8%	0.12
	Maintain Registries	41.7%	29	39.4%	38.8%	43.5%	0.61
	Investigate Infectious Diseases	51.4%	24	48.6%	44.0%	58.1%	0.01
	Respond to Emergencies	59.8%	20	49.6%	56.9%	63.8%	0.17
	Use the University's Laboratory Services	29.0%	30	25.4%	27.8%	28.4%	0.77
Policy Development Avg. = 65.6%	Conduct Health Promotion Programs	79.8%	7	71.1%	83.2%	80.7%	0.12
	Communicate with the Media	45.2%	28	39.7%	43.2%	45.8%	0.21
	Strengthen Community Partnerships	81.3%	5	70.4%	83.2%	84.9%	0.03
	Develop a Strategic Plan	64.5%	19	55.5%	67.3%	63.2%	0.12
	Develop a Community Health Improvement Plan	79.1%	8	70.3%	79.5%	82.2%	0.16
	Develop Emergency Preparedness Plan	55.8%	22	45.5%	52.6%	61.4%	0.10
	Address Laws	53.3%	23	44.0%	49.7%	64.2%	0.02
Assurance Avg. 69.0%	Assess Personal Health Services	67.6%	18	60.2%	67.9%	67.9%	0.55
	Link Individuals to Personal Health Services	47.0%	27	43.1%	46.9%	47.8%	0.21
	Address Public Health Workforce Competencies	78.8%	9	70.2%	77.2%	84.1%	0.001
	Address Public Health Leadership Competencies	81.6%	4	74.7%	78.7%	87.3%	0.003
	Evaluate Population-Based Services	84.4%	2	73.0%	87.5%	87.7%	0.004
	Evaluate Personal Health Services	51.1%	25	45.7%	47.9%	54.9%	0.44
	Assess Delivery of 10 Essential Public Health Services	72.3%	15	61.8%	72.3%	81.8%	0.01
Systems Management Avg. = 77.3%	Develop Innovative Practices	80.4%	6	72.1%	76.6%	88.8%	0.01
	Gain Linkages w/ Other University Programs	72.6%	14	59.4%	72.2%	82.6%	0.002
	Conduct Public Health Research	78.8%	9	66.2%	79.4%	85.3%	<0.001
Resources Avg. = 70.0%	Students Supplement Workforce	87.2%	1	79.8%	87.4%	90.4%	0.03
	Faculty Supplement Workforce	74.5%	13	59.1%	74.3%	86.4%	<0.001
	Gain Access to Data held by the University	68.5%	17	58.5%	67.6%	75.2%	0.05
	Gain Access to University's Library	58.3%	21	48.4%	54.6%	64.8%	0.01
	Gain Access to Faculty Expert Opinion	76.3%	11	65.2%	76.5%	80.9%	0.002
	Gain Access to the University's Technology	49.5%	26	44.8%	46.4%	51.6%	0.77
	Assistance w/ Applying to Grants or Funding	76.0%	12	70.0%	71.8%	86.7%	0.01

** Percent for low, medium and high level of collaboration was calculating using Stata's "predict" command after a logistic regression model controlling for population size.*

Table 3: Effectiveness of collaboration with schools and programs of public health on the 10 essential public health services and university resources

			Total		Level of Collaboration			
					Low	Medium	High	
Category	Indicator	N	Percent	Rank	Percent*	Percent*	Percent*	P-Value
Assessment Avg. = 62.8%	Develop a Community Health Assessment	284	72.2%	7	61.6%	74.1%	80.3%	0.05
	Assistance Using Technology	243	58.0%	26	45.8%	67.7%	59.2%	0.006
	Maintain Registries	140	60.7%	21	63.3%	64.9%	53.1%	0.66
	Investigate Infectious Diseases	173	64.2%	17	56.3%	65.0%	72.1%	0.23
	Respond to Emergencies	198	66.7%	12	58.2%	71.6%	68.4%	0.44
	Use the University's Laboratory Services	94	55.3%	29	48.2%	64.9%	50.0%	0.49
Policy Development Avg. = 66.5%	Conduct Health Promotion Programs	272	72.8%	6	62.2%	74.8%	81.3%	0.04
	Communicate with the Media	148	58.8%	25	52.2%	62.1%	61.3%	0.75
	Strengthen Community Partnerships	280	79.3%	1	67.1%	84.3%	84.9%	0.01
	Develop a Strategic Plan	216	62.0%	20	57.5%	63.5%	64.7%	0.56
	Develop a Community Health Improvement Plan	270	67.0%	11	53.8%	72.8%	73.3%	0.02
	Develop Emergency Preparedness Plan	184	65.2%	15	61.4%	67.5%	65.9%	0.69
	Address Laws	180	60.6%	23	54.0%	60.6%	65.5%	0.66
Assurance Avg. = 63.4%	Assess Personal Health Services	229	64.6%	16	58.6%	69.4%	64.9%	0.49
	Link Individuals to Personal Health Services	159	59.1%	24	47.7%	62.5%	66.1%	0.21
	Address Public Health Workforce Competencies	270	70.7%	8	59.2%	72.9%	78.5%	0.04
	Address Public Health Leadership Competencies	280	73.9%	4	65.6%	76.5%	80.9%	0.11
	Evaluate Population-Based Services	290	63.1%	18	56.5%	62.7%	70.0%	0.32
	Evaluate Personal Health Services	171	55.0%	30	49.1%	51.6%	64.7%	0.34
	Assess Delivery of 10 Essential Public Health Services	248	57.3%	27	59.2%	52.6%	61.4%	0.63
Systems Management Avg. = 68.0%	Develop Innovative Practices	275	60.7%	21	53.6%	59.3%	69.7%	0.14
	Gain Linkages w/ Other University Programs	247	70.4%	9	52.2%	77.3%	77.8%	0.002
	Conduct Public Health Research	266	72.9%	5	62.0%	76.0%	80.0%	0.04
Resources Avg. = 67.4%	Students Supplement Workforce	298	79.2%	2	67.4%	83.7%	85.3%	0.01
	Faculty Supplement Workforce	254	67.3%	10	51.7%	70.4%	78.0%	0.002
	Gain Access to Data held by the University	232	65.5%	14	60.0%	71.4%	65.3%	0.08
	Gain Access to University's Library	193	62.2%	19	48.8%	67.7%	70.7%	0.02
	Gain Access to Faculty Expert Opinion	257	74.3%	3	61.3%	78.7%	81.7%	0.02
	Gain Access to the University's Technology	163	57.1%	28	51.1%	59.3%	61.6%	0.14
	Assistance w/ Applying to Grants or Funding	261	65.9%	13	58.1%	65.2%	75.3%	0.01

**Percent for low, medium and high level of collaboration was calculating using Stata's "predict" command after a logistic regression model controlling for population size.*

Table 4: Themes emerging from qualitative analysis of open ended questions

Overall Themes	Supporting Themes	n (%)	Quotations
Enhance the public health workforce	Future public health workforce	183 (57.4%)	"Our collaborations create opportunities for [students] to learn more about public health and the skills needed to become valuable assets within the public health sector."
	Persuade students to work for LHDs	34 (10.7%)	• "Ignite a passion for [local] public health" • "Excite the next generation about… [local] public health."
	Develop current workforce	73 (22.9%)	"Working with schools or programs of public health provides an opportunity to obtain new innovative ideas and improve the LHD staffs' knowledge base."
Enhance LHD Capacity	Supplement number of LHD staff	72 (22.6%)	"It has been good to be able to have someone focus on the work... We are juggling so many balls it is hard to do everything to the level we desire."
	Short-term Projects	29 (9.1%)	"The main initial benefit is the fulfillment of short-term projects… The scope is broad, but tends to be time limited."
	Access special expertise	29 (9.1%)	"We have used the expert help of interns in developing our community health assessment and analyzing the data. We do not have an epidemiologist on staff and the students were instrumental in helping with this aspect."
	System-wide enhancement possible	3 (0.9%)	"I am very concerned that [public health practice competes with academia] to find funding. Ideally we can both join to provide a united front… I believe that the [SPPH]… would make a really good partner in our efforts to increase funding for public health… [For example] five of us wrote a HRSA… grant… which was funded for three years. The grant trained all rural LHD staff in health literacy, purchased… software for each LHD, in addition to providing technical assistance to LHDs and their community partners."
Collaboration is focused on non-routine tasks	Accreditation (CHA, CHIP, Strategic Plan)	81 (25.4%)	"We were able to complete our community health assessment, community health improvement plan and are about to complete our strategic plan with the help of our university partner. Without them, this would have been a difficult task."
	Research	65 (20.4%)	"Working with [SPPH] has… provided valuable research and evaluation methods we do not have in our county."
	Evaluation	39 (12.2%)	"We work with [SPPH] on many evaluation projects and students in their evaluation classes frequently come to our department to help us evaluate our programs."
	Financial resources	24 (7.5%)	"We also are able to build more competitive grant proposals by partnering with schools on program development."
	Evidence-based practice	22 (6.9%)	"Having a closer relationship with the University in terms of updates on evidence-based programs, access to the online university library… would be a great value, particularly in a small tine without close access to a university library."
	Innovation and change	16 (5.0%)	"We have used [SPPH] to facilitate an internal discussion about [a] merger of our three health departments. They have been excellent as a neutral party to facilitate discussion."

Table 4: Themes emerging from qualitative analysis of open ended questions (continued)

Overall Themes	Supporting Themes	n (%)	Quotations
Expectations	Expectations met	91 (28.5%)	"Our work with the [SPPH] continues to exceed our expectations... The caliber of students that have worked in our department has been very impressive, and the collaborative efforts with the school… leaders and researchers… has contributed to our department reaching its mission"
	Desire to do more	50 (15.7%)	• "Hosting students has been a favorable experience, but we want to go beyond just hosting students." • "There is an active workgroup… [in the state] that is exploring various models of AHDs and ways to strengthen relationships between public health practice and academia"
	Expectations not met	33 (10.3%)	"There is not day-to-day interaction with our local colleges of public health. Even the local one is not active in our home town, [in our] community-based committees on which we are addressing the social determinants of health."
	Too early for expectations	20 (6.3%)	"Prior to this survey I didn't have many expectations"
Barriers	Distance	34 (10.7%)	"Our interaction is fairly minimal as all the schools are at least two hours away and students are not very interested in travelling or teleworking, unfortunately. They tend to gravitate towards the big city health departments."
	Cultural differences	34 (10.7%)	"Most academia has no idea what it is like to actually practice public health in the real world."
	Students preparation	17 (5.3%)	"Many interns lack an understanding of the local public health infrastructure and local health department operations."
	One-sided collaboration	14 (4.4%)	"Schools are really not interested in real world activity. They have requirements for field experience for their students but that is as far as it goes. They are not really interested in working with us in meaningful [ways]."
	Student availability	10 (3.1%)	"We would like to know how to compete for student placement. We are a small local health department."
	Too difficult	22 (6.9%)	"I don't think they appreciate the labor and costs incurred by the health department to provide quality practicum experiences."
	Sustainability	6 (1.9%)	"[We] do get small projects done… however; they have little lasting value because we do not have the [capacity] to sustain them. It would be nicer to have a steady stream of help."
Facilitators	Enthusiasm	15 (4.7%)	"Students are very enthused and pass their enthusiasm to our staff."
	Pre-existing Connection	12 (3.8%)	"I am a graduate of the university and have also worked at the university. Many of my staff are also graduates of the university. Because we have gone through the programs and have worked with many of the faculty… we have made several connections and have relationships with the various departments."
	Focused Projects	10 (3.1%)	"I have assigned small projects with measurable and achievable goals. The projects have been realistic and task-oriented."

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Manuscripts Number Three

Submission Date: TBD

Public Health Reports

BENEFITS, BARRIERS, AND FACILITATORS OF COLLABORATION BETWEEN LOCAL HEALTH DEPARTMENTS AND SCHOOLS OR PROGRAMS OF PUBLIC HEALTH – A QUALITATIVE EXPLORATION

Kevin A. Kovach MSc, CHES

No funding was received to support this study

Abstract

Background: Collaboration between local health departments (LHDs) and schools and programs of public health (SPPH) can enhance public health teaching, research and practice and strong calls have been made to enhance these linkages. Information about the perceived benefits, barriers, and facilitators from the perspectives of both LHD officials and SPPH faculty and staff may be useful to enhance these linkages. However, little information exists about this.

Methods: Qualitative group interviews were held with eight LHD and SPPH groups that collaborated with one another. A variety of types of LHD and SPPH groups were included, ranging across factors including the degree of collaboration, proximity between LHD and SPPH, and the size of the population served by the LHD. Interviews were transcribed verbatim and thematic analysis was conducted using Atlast.ti.

Results: Findings showed that the most common benefits of collaboration between LHDs and SPPH was related to students education. Collaboration benefited local public health practice to a lesser degree, and almost no benefits to research were discussed. Some strategic benefits were discussed, including improvements to primary data collection for community health assessment, the use of technology to make data more actionable and improve service delivery, and leadership and assistance with community health coalitions. The primary barriers and facilitators to collaboration were related to proximity, LHD characteristics, such as capacity, and the degree of planning supporting the process and strategy of the collaboration.

Conclusion: This study shows that collaboration between LHDs and SPPH can be an important strategy for addressing public health services and system's needs. This study suggests that

there is a clear opportunity for LHD and SPPH collaboration to produce far-reaching and profound changes that help advance public health practice by making it more strategic, data-driven, and evidence-based. However, only the most robust and strategic collaborations tend to produce these types of changes with any regularity. Many factors seemed to impact the robustness of collaboration between LHDs and SPPH. However, leadership that could help develop a shared vision and turn this vision into a formal agenda for the LHD and SPPH seemed to be the key factor that helped to elevate collaboration between LHDs and SPPH into something that was truly innovative and truly valuable to the broader public health discipline. Therefore, LHDs and SPPH should work to develop a shared vision and formal agenda, even though at times it may not seem necessary, or that the constraints to doing so are too great.

BENEFITS, BARRIERS, AND FACILITATORS OF COLLABORATION BETWEEN LOCAL HEALTH DEPARTMENTS AND SCHOOLS OR PROGRAMS OF PUBLIC HEALTH – A QUALITATIVE EXPLORATION

STUDY RATIONALE AND BACKGROUND

In recent years, calls for stronger collaboration between local health departments (LHDs) and schools or programs of public health (SPPH) have been made to enhance public health teaching, practice, and research by integrating more closely academia's responsibilities for preparing the public health workforce and building the evidence-base and LHDs' responsibility for providing the 10 essential public health services and applying the evidence-base.[4,5,7,8] This has been reinforced through initiatives such as public health accreditation standards[14] and the academic health department (AHD) concept which is analogous to the more common teaching hospital.[7] This type of collaboration may be vital for addressing emerging issues, such as the need to more robustly integrate public health education with practice,[8,9] build practice-based evidence,[151,152] and improve evidence-based and overall practice.[153–155] Successful collaboration between LHDs and SPPH has been documented through several individual case studies.[15,17,71–74] However, these studies are limited because they tended to focus more on how, rather than why, LHDs and SPPH collaborated and the specifics of an individual case more than cross cutting themes. This study aims to address these issues by exploring the perceived benefits, barriers, and facilitators to collaboration from both LHD and SPPH perspectives across a variety of types of LHD and SPPH collaboration.

For the purpose of this study, collaboration is defined as an inter-organizational relationship between a LHD and a SPPH (an academic institution offering bachelor's, master's, or doctoral degrees in public health disciplines). Himmelman suggests that organizations collaborate throughout a continuum of strategies ranging in their level of strategicness.[87] Research suggests that a similar type of continuum of collaboration exists between LHDs and SPPH, with many LHDs supporting student learning activities, but fewer supporting more strategic activities, such as consulting, evaluation, research, or advising.[18,19] The question then is why do some LHDs and SPPH have closer and more strategic relationships than others?

The literature provides a variety of reasons for why organizations collaborate. In general, organizations collaborate when they believe they can accomplish more together than individually and when they believe that the benefits outweigh the costs.[75,101] More specifically, organizations may establish and sustain collaborative relationships to: accomplish their goals; reduce the cost or time to complete tasks; improve their reputation or prestige; cope with uncertainty; establish new linkages; or acquire and organize resources.[54,76] Barriers and facilitators to collaboration include the degree of shared interests and reciprocity,[109,156] productivity versus inertia,[97,157] and trust.[89] Organizational characteristics, such as capacity, proximity, and executive and workforce characteristics may also be influential.[111,116]

METHODS

Eight qualitative group interviews were held with collaborating LHDs and SPPH. Each group included at least one LHD official and one SPPH faculty or staff member. Groups were selected

so that their characteristics differed (Table 1). The University of Illinois at Chicago's institutional review board deemed the study exempt.

Table 1: Characteristics of the Group Interview Participants

Group Interview	Participants		LHD Population	Distance in Miles	Degree of Collaboration*	Type of SPPH	Geographic Location
	LHD	SPPH					
1	2	1	≈400,000	≈75	High	SPH	Midwest
2	2	2	≈300,000	>5	High	SPH & Medical School	South
3†	3	1	≈1,000,000	>5	High	SPH	South
4†	1	1	≈1,000,000	≈100	Low	SPH	South
5	1	1	≈15,000	≈50	Low	MPH Program	Midwest
6	3	2	≈30,000	≈100	High	SPH	Midwest
7	2	1	≈80,000	>5	High	BPH Program	Midwest
8	1	1	≈25,000	≈100	Low	MPH Program	Midwest

**Degree of collaboration was identified in a survey asking LHDs about their collaboration with SPPH. High collaborating LHDs said that they participated in four of four collaborative activities and low collaborators said that they participated in one of four collaborative activities.*

†*Groups Interviews 3 and 4 included the same LHD but different SPPH. Different people also participated.*

Groups were recruited by contacting executives from eligible LHDs to determine their willingness to participate and who from their LHD and the collaborating SPPH should participate. Participants were sent consent forms describing the study. Recruitment was stopped when a variety of groups were enrolled, when recruitment became excessively difficult, and when themes began to repeat.

Interview questions were based on a literature review of inter-organizational collaboration in general and between public health practice organizations and academia.[7,54,76,97,101,158] Public health practitioners and academicians also provided input. The questions were designed to elicit information about how the LHD and SPPH collaborated, perceived benefits, perceived barriers and facilitators, and aspirations for better collaboration. Interviews ranged from 60 to

90 minutes. Interviews were conducted over the phone due to distance and were recorded and transcribed verbatim, generating 181 pages of text.

DATA ANALYSIS

The transcripts were analyzed using Atlas.ti.[132] A preliminary codebook based on the literature review was used to code for types of benefits, barriers, and facilitators. New codes were assigned to topics not identified in the codebook. The codebook was refined at the end of this process to align it better with the data. Transcripts were coded a second time using the refined codebook, which captured 25 codes for seven families.

Themes were developed using Atlas.ti's network feature to assign more detailed codes to quotations and to identify relationships between codes. Codes for each family were imported into Atlas.ti's network feature and their quotations were assigned a more descriptive code usually using the participant's words. Co-occurring, neighboring, and other potentially relevant codes were also imported into the network and underwent this process until all relevant quotations were assigned a new code. Relationships between codes were assigned when individual, co-occurring, or neighboring codes were assigned more than one code. The analysis ended with 79 codes for four primary themes, which are described in the next section.

Findings were validated in two ways. A second analyst with experience working in both LHDs and SPPH provided insight on the transcripts and final report. The findings were also sent to the participants for their feedback.

FINDINGS

Themes that emerged were focused on educational, practice, and research benefits, as well as barriers and facilitators. Themes are described below. Tables describing the distribution of themes among groups and tables explaining the themes with participant quotations are also provided.

Educational Benefits

How collaboration supported students' education was the most commonly discussed topic and was, in general, the first thing that participants brought up. This was true for both low and high collaborators and LHD and SPPH participants. Some participants suggested that working with students may be a foundational piece of collaboration, saying *"[student learning activities] are one of the key things that have come out of these collaborations,"* or *"I think you have to have a very tangible, specific work task… [Student learning activities] would be a tangible activity that I think could go a long way and add value."*

Collaboration helped improve education in two primary ways. First, SPPHs discussed how students gained a new perspective through their internships, which helped them to understand topics that are difficult to teach in a practical way in the classroom, such as community engagement. Faculty members said things like, *"now she gets it,"* or *"when students come back from these opportunities, they are changed for the better."* Participants also thought that internships helped bring students into local public health by: increasing interest, networking, and improving students' marketability. Second, faculty thought that collaboration made them better teachers by giving them a better perspective of public health practice. Two faculty

members made the following comments: *"Honestly I was learning as much as they were getting from me without a doubt. So, that significantly influenced what I teach and how I teach,"* and *"I also teach. So, the more I can work with the LHD… the more I can find out what the real world is doing and the better off I think I am as an instructor."*

Practice Benefits

There was much less discussion about how collaboration could improve public health practice and high collaborators were more likely to discuss this topic and provide real life examples. Nevertheless, a variety of practice benefits emerged.

The most frequently discussed benefit to practice was helping to improve how LHDs collect, analyze, or use data. SPPH helped LHDs with this for community health assessment (CHA), strategic planning, and service delivery. Examples of this took place across a spectrum, some being relatively minor and others being revolutionary. Group two's collaboration was one of those that helped promote more revolutionary changes. The LHD executive said how she felt was "*that the partnership has really helped [the LHD] move towards doing the [CHA] the right way, which is the survey and the dialogue,"* juxtaposing this against her previous experiences with CHA, where they "worked with other agencies," but did not collect primary data or work directly with residents. LHD staff also added that they would not have been able to accomplish this without the universities' help, saying, *"we needed 30 people to [conduct the door to door survey]. If it was just the LHD staff, we wouldn't have been able to do it."* Group seven also provided a good example, discussing how they were able to integrate technology with existing information systems to help the LHD identify restaurants in their community affected by power

outages to prioritize inspections – improving service delivery. This was something that they were proud of, saying *"we were ahead of the curve."*

SPPH were also commonly engaged with the LHD in the leadership of their community's coalitions, such as those related to community health improvement planning (CHIP), emergency preparedness, or specific health promotion topics. LHD participants thought that this was important because the SPPH helped them use a more evidence-based approach and provided expertise for evaluation. However, this was almost exclusively limited to local collaboration.

While mentioned less often, collaboration could help with LHD's strategic planning. Group one discussed how the Master of Public Health (MPH) program director helped to facilitate internal focus groups. She said, *"We wanted to get feedback from staff about how to improve our health department. The director of the MPH program facilitated our internal focus groups. If I had to do it, I'm not sure how honest and open people would have been."* Similarly, group two received the assistance of an organizational psychologist to help with leadership development. Related to this they said, *"There's some really tangible gifts that we've gotten from [our academic partners] that I don't think we would have gotten if we didn't have this relationship."*

Collaboration can also help LHDs to be more evidence-based. Many of the LHD participants discussed how they needed SPPH to help them keep "*up-to-date*" with regard to current best practices. However, few went into great detail with regard to if and how this was happening. One of the faculty members from group two discussed how it was important to him to help the LHD be more evidence-based, saying, *"I feel like the bedrock assumption that we're going to do things by strong evidence-based kinds of practices. I think [the LHD executive's] commitment to*

that… and our ability to help her with that has been hugely important. I think that's the surest pathway to use limited resources well." Group eight provided even more clarity around why this is important. The LHD executive said that they need to use evidence-based practices, but do not always know how, saying *"Every grant that we write or every project we do needs to be evidence-based… Then we find a program. Well, it's been done in New York City. Is that going to work [here]? I think we could work together on that in the future."* The faculty member reacted to that enthusiastically, saying *"I think a seminar with LHDs could be helpful… to help them interpret the evidence-base. She asked if a program was effective in New York, but can she assume it's effective [here]? Well, I have a way to answer that!"* LHD participants also thought that being more evidence-based in combination with having visible support from the SPPH, an entity outside of local government, helped to enhance their credibility with elected officials.

Finally, some LHD participants discussed how collaboration helped to challenge them and their colleagues' assumptions about public health practice. The LHD executive in group eight captured this, saying, *"LHDs are very nurse driven here. So talking about accreditation and the 10 essential public health services – that's not something they are used to. That's really valuable."* The faculty member agreed and said "*They definitely changed up, going from a direct service related health department to more of a population based health department*."

Research Benefits

There was almost no meaningful discussion about how collaboration could improve research. Most comments were very general in nature, such as "*we pitch practice-based research ideas to the university*," or "t*he opportunity for us to experience public health at the practice level*

informs and expands what we're doing research on." A faculty member in group six discussed how LHDs could help link SPPH to the community, when discussing a yet to be funded National Institutes of Health grant. He said that LHDs were "*crucial in building relationships*" with the health care entities needed to be involved in the study. He also said that LHDs were able help "*recruit people for focus groups for preliminary data*." Group eight also discussed why collaboration focused on research would be beneficial to them. The LHD executive discussed how they believe that their work could contribute to the evidence-base, but that they don't know how to do this. She said, "*Certainly we would need [faculty member's] help… to do a research project. But what I'm getting at is, that the stuff we are doing every day, that's probably evidence-based. But we don't know how to make it [evidence-based]. How do we get it on the CDC's website – I have no idea."* The faculty member responded emphatically, saying, *"How do I benefit from collaborating with them? Well, if you look at the Community Guide, you will find it is very limited… Why is that? Because it's being done every day, but nobody is doing it in a way that they can actually evaluate it, and report the new level of evidence that they found. So when was the last time that something was done here in [their state] in a way that it could be published and become part of the evidence? That's the kind of thing that I want to be able to do and to continue to do."*

Table 2: Distribution of Perceived Benefits

THEMES	GROUPS							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Educational Benefits								
Student learning activities are foundational*				X	X	X		X
Internships change students for the better	X	X	X	X		X	X	
Improves education	X							X
Practice Benefits								
Enhances data collection, analysis and use which improves service delivery and CHA	X	X	X		X		X	
Leadership for CHA/CHIP and coalitions	X	X	X				X	
SPPH can help LHDs with strategic planning	X	X						X
Improved evidence-based practice	X	X	X				X	X
Changes LHD perceptions								X
Enhanced LHD credibility			X		X		X	
Research Benefits								
Facilitates research in the community						X		
Collaboration can help to close gaps in the evidence-base	X		X					X

**Checked if statement was made to this affect, or if no other types of collaboration were discussed.*

Table 3: Description of Perceived Benefits of Collaboration

THEMES	EXPLANATION	QUOTATIONS
Educational Benefits		
Student learning activities are foundational	• Meets a long term tangible need for SPPH • Valued by LHDs	*"I think you have to have a tangible work task… I could see bringing students to your LHD to spend a day with you… That would be a tangible activity that I think could go a long way and add value." – SPPH, Group 8* *"I would say that the student learning opportunities that have come from this collaboration have been fantastic! I think that is one of the key things that have come out of these collaborations." – SPPH, Group 6*
Internships change students for the better	• New perspectives • Increased interest • More marketable	*"I can certainly say I'm satisfied [with our collaboration]. Students that come back from these types of opportunities are changed for the better and they have a deeper understanding of what it means to practice public health." – SPPH, Group 4* *"A lot of [students] realize that [local public health] is where they want to be. They see that they're able to contribute… and see how what they will do on a day to day basis can make a difference." – SPPH, Group 1*
Improves education	• New perspectives • Aligns education with practice	*"Honestly I was learning as much as they were getting from me without a doubt. So, that significantly influenced what I teach and how I teach it." – SPPH, Group 8* *"I also teach. So, the more I can work with the LHD… the more I can find out what the real world is doing and the better off I think I am as an instructor." – SPPH, Group 1*
Practice Benefits		
Enhances data collection, analysis and use which improves service delivery and CHA	• Revolutionizes • Adds capacity • Use technology	*"I believe that the partnership has really helped us move towards doing [CHA] the right way, which is the survey and the dialogue. We have worked with other agencies. Well now we're working with the people" – LHD, Group 2* *"If we didn't have these students to… go door to door we probably would have to scale down what we were doing… If it was just the health department staff we wouldn't have been able to do it." – LHD, Group 2* *"We did a mapping program that's actually pretty unique… [The LHD] could see what restaurants were affected by a power outage and prioritize them for food establishment inspections… We were ahead of the curve." – SPPH, Group 7*
Leadership for CHA/CHIP and coalitions	• Evidence-based • Evaluation • Leadership • Resources	*"It's been really exciting because as we identify needs for the development of the community advisory council, we have [University 1] and [University 2] stepping up to help provide resources and training so that this group will have the leadership skills and facilitation skills to help with the CHIP." – LHD, Group 2* *"[The SPPH] sits on our CHIP's steering committee. They help bring in the research foundation and help ensure we use sound best practices. In addition, we contract with them to evaluate our CHIP. – LHD, Group 1*
SPPH can help LHDs with strategic planning	• Facilitate	*"We wanted to get feedback from staff about how to improve our health department. The director of the MPH program facilitated our internal focus groups. If I had to do it, I'm not sure how honest and open people would have been." – LHD, Group 1* *"We received the assistance of an organizational psychologist that works in the College of Medicine. They were able to work with us and our community advisory council. That was very helpful." – LHD, Group 2*

Improved evidence-based practice	• Stay current • Interpret	*"Every grant that we write or every project we do needs to be evidence-based… Then we find a program. Well, it's been done in New York City. Is that going to work [here}? I think we could work together on that in the future." – LHD, Group 8* *"I think a seminar with LHDs could be helpful… to help them interpret the evidence-base. She asked if a program was effective in New York, but can she assume it's effective [here]? Well, I have a way to answer that." – SPPH, Group 8*
Changes LHD perceptions	• New perspectives	*"LHDs are very nurse driven here. So talking about accreditation and the 10 essential public health services – that's not something they are used to. That's really valuable. They have moved to thinking more about the data and the non-nursing related pieces of [public health]." – LHD, Group 8* *"They definitely changed up, going from a direct service related health department to more of a population based health department." – SPPH, Group 8*
Enhanced LHD credibility	• Perceived as more evidence-based • Supportive voice	*"Saying that you are working with the SPH… really goes a long way with our elected officials… That can really impact policy and funding." – LHD, Group 2* *"One of the things that we do when we write grant applications is to demonstrate our relationship with the SPH… to show the capacity for research and evaluation that they bring. So that builds our credibility." LHD, Group 2*
Research Benefits		
Facilitates research in the community	• Links SPPH to community	*"Then another piece is research. We have worked with several different LHDs on an NIH grant…The LHDs have played a crucial role in building relationships with critical access hospitals and clinics that would be intervention sites for the proposed study. They have laid the foundation for that relationship." – SPPH, Group 6*
Collaboration can help to close gaps in the evidence-base	• Better evaluation • More frequent evaluation • Evaluation in new places	*"If you look at the Community Guide, you will find it's very limited… Why is that? Because it's being done every day, but nobody is doing it in a way that they can actually evaluate it… So when was the last time that something was done here in a way that that it could be published and become part of the evidence…? That's the kind of thing that I want to be able to do and continue to do." – SPPH, Group 8* *"I'd like to see us have some answers to some of the practice-based [research] questions… I'd love for us to be able to answer some of those questions together." – LHD, Group 1*

Barriers and Facilitators

Participants discussed a variety of factors that influenced their desire to collaborate and the likelihood that collaboration would be successful. These issues were mostly related to proximity, organizational characteristics, and strategy or process.

Collaboration was strongest with LHDs and SPPH in the same community. These types of collaborations tended to include more types of tasks and more people compared to the per-project nature of non-local collaboration. Long distances made it difficult to host students due to the cost and availability of housing and issues commuting. Participants also discussed how students were reluctant to intern with LHDs in remote communities because they do not have the same amenities as metropolitan areas. Related to this, the LHD executive from group eight said, *"We would love to [host students] but nobody wants to live here." T*he faculty member also stated that the SPPH and their students are not engaged enough with rural LHDs, saying, "*Even if you're a remote county with few people, you are just as worthy of receiving public health services,"* but he also said, *"students get so accustomed to living in a city… with the things that they feel comfortable with… they are reluctant to go there."* In addition, the SPPH were more likely to be involved in their local CHA and CHIP or other coalitions, which created another avenue for local collaboration that did not exist for non-local collaboration.

Certain organizational characteristics also helped to facilitate collaboration. Collaboration was easier when there were champions to reach out to the other organization, solve problems, engage others in their organization, and work to build trust. Champions knew the other organization's needs and had a passion for collaborating. Champions tended to include alumni,

health educators, and faculty with previous practice experience. Organizational culture also played an important role by setting expectations and, to some extent, overcoming the need for formal agreements. Organizational culture set a visible commitment to collaboration, and was reinforced by sharing resources. Higher performing LHDs were also viewed more favorably. One faculty member stated, *"I hate to say this out loud, but there are some LHDs who are not as forward thinking… I want [students] to go somewhere they'll be challenged and can see how things are done well."*

Finally, a more systematic process was viewed as beneficial. Having a "*focal point*" for collaboration helped improve communication by coordinating contact. Faculty trusted LHDs with a formal and systematic process for onboarding students more because they thought this signaled that students would receive a better experience. An overall collaborative strategy was also important to help translate their aspirations into "*pragmatic and tangible*" tasks. This helped set expectations and clarify goals. However, only two groups discussed having this type of strategy.

Table 4: Distribution of Perceived Barriers and Facilitators

THEMES	GROUPS							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Issues with Proximity								
Need for non-local collaboration*	X			X	X	X		X
More difficult to host non-local students	X			X	X	X		X
More difficult for overall collaboration				X	X	X		X
Organizational Characteristics								
Champions to facilitate collaboration	X	X	X	X				
Organizational culture sets tone		X					X	
Preference for high-performing LHD	X			X	X			X
Process and Strategy								
Systematic process for students	X	X		X				
Overall strategy		X					X	

** Checked if statement was made to this affect, or if the LHD and SPPH were involved in a non-local collaboration.*

Table 2: Description of Perceived Barriers and Facilitators

THEMES	EXPLANATION	QUOTATIONS
Proximity		
Need for non-local collaboration	• Geographic equity • Need for formal public health education • Not enough internships	*"Even if you're a remote county with few people, you are just as worthy of receiving public health services." – SPPH, Group 8* *"None of the counties in my area – nobody had an MPH. So having [the SPPH] help guide us. That's been valuable to me." – LHD, Group 8*
More difficult to host non-local students	• Commuting • Housing costs • Reluctance	*"We would love to [host students] but nobody wants to live here. That's the honest truth." – LHD, Group 8* *"Well, I just wish [the LHD] was a tad closer. But we do have quality students that don't have transportation and for them to drive an hour and a half is more than they can do." – SPPH, Group 1*
More difficult for overall collaboration	• Community coalitions • Inter-organizational collaboration	*"[The SPH] is not in one of the four counties that [this LHD serves]. But we're working with the LHD in our community on the CHA/CHIP." – SPPH, Group 6* *"[The academic health department model] is probably not realistic with us in [name of city] because of the distance." – SPPH, Group 8*
Organizational Characteristics		
Champions to facilitate collaboration	• Connect • Solve problems • Build trust	*"You have to have someone who is deeply and passionately committed to the future of our workforce and someone who's got that ability to build relationships quickly with academicians." – LHD, Group 1* *"We can figure out most of the barriers, most of the bureaucracy when we decide we want to work together." – LHD, Group 2*
Organizational culture sets tone	• Sets expectations • Shows commitment • Reinforced as resources are shared	*"I think the commitment has built this expectation, this culture of collaboration. It's expected that we will collaborate, we will help in any way that we can." – LHD, Group 2* *"Whether we have a piece of paper signed or not we are going to work together, so it doesn't depend on having an MOU." – LHD, Group 7* *"There's such a culture in [the LHD] of commitment to education. So, somebody who appreciates the academic partner can really be a[valuable] partner." – SPPH, Group 1*
Preference for high-performing LHD	• Forward thinking • Involved in accreditation • Experienced staff	*"What's different about [the LHD]. They have been on the cutting edge… planning models, and accreditation… I hate to have to say this out loud, but there are some LHDs who are not as forward thinking." – SPPH, Group 1* *"We have other guest lectures, but they don't have the experience that [LHD executive] has… I feel like she's my go to person." – SPPH, Group 7*

Process and Strategy		
Systematic process for students	• One point of contact • Formal orientation to LHD	*"The other thing that I like a lot is the system that they have for taking our students in and walking them through a structured orientation process. They're not just getting stuck in the corner. They get a better experience." – SPPH, Group 1* *"When [students] go to [LHD name]… I know there won't be a lot of questions about what are they really going to be doing there." – SPPH, Group 4*
Overall strategy	• Sets expectations • Guides process • Makes aspirational goals more tangible	*"We have a work plan that's a specific set of activities and expectations that each of us has – that we'll all contribute. So that takes it from the realm of just sort of aspirational, which is what we were, to something more pragmatic and tangible." – SPPH, Group 2* *"It is kind of hard for us to do [formal planning]… We have time to set strategies when we go HELP! It's not like either one of us has a lot of time to sit around and think. – SPPH, Group 7*

DISCUSSION

This study found that collaboration was beneficial for both LHDs and SPPH. SPPH benefited mostly by having LHDs provide student learning activities and to a lesser degree collaboration provided them with new perspectives which improved how they taught. LHDs could also help them lay the groundwork for research in the LHD's community. On the other hand, LHDs benefited mostly from improved data collection, analysis, or use. LHDs also commonly benefited from having SPPH participate in their CHIP or other coalitions. This support provided an evidence-based perspective and capacity for evaluation. However, this was almost uniformly limited to local collaboration. To a lesser degree, LHDs said their collaboration helped them with strategic planning, improved evidence-based practice, enhanced their credibility, and even changed their perspectives about accreditation and public health practice.

While these benefits were all certainly valued by the participants of this study, much of this collaboration was unlikely to be strategic or robust enough to address major public health system's needs, including, accreditation, practice transformation, developing the evidence-base, and using evidence-based practice – the promise that collaboration claims to hold. However, the study also suggests that more strategic benefits are desired by LHD officials and academicians, signifying a path forward.

This study did identify some high level benefits. Group two showed that collaboration could revolutionize LHD's CHA and CHIP process by collecting robust primary data and developing a community advisory council –capturing the community's voice in ways that they had not done so in the past. Group seven showed that collaboration could make routine data more

actionable using current technology, facilitating quicker response to potential public health threats. And group eight showed how developing collaboration around closing gaps in the evidence-base and translating the evidence-base into local action would be valued by both LHDs and SPPH.

These examples suggest that collaboration between LHDs and SPPH can address public health system's needs but this is generally limited to high level collaboration. However, there are also barriers to collaboration. Proximity was the most prominent barrier. LHDs and SPPH in the same community were much more likely to participate in multiple tasks. Non-local collaboration tended to be on a per-project basis. This limits the potential for collaboration to address major public health system's needs because small LHDs in rural communities tend to have the greatest need for improving the 10 essential public health services and are the least engaged in accreditation.[46,50,159] Similarly, some SPPH desired to work with higher performing LHDs. While not surprising, it may limit how well collaboration can be used to improve low performing LHDs and build a national network of high-achieving LHDs.[40,49] Finally, strong interpersonal relationships and an overall collaborative strategy appeared to be essential for achieving high level benefits. Strong interpersonal relationships ensured that the LHD and SPPH worked together closely enough and long enough for benefits to emerge. In contrast to this, a collaborative strategy helped make collaboration more tangible and less aspirational, helping to bring about benefits more quickly. Visionary leadership that can see the possibilities, identify shared interests, and can turn this into a formal agenda for the LHD and SPPH, seemed to be the key factor that helps to elevate collaboration between LHDs and SPPH into something that is truly innovative and truly valuable to the broader public health discipline.

The following recommendations are made to LHDs and SPPH wanting to collaborate, based on the findings and literature review, and within the context of the public health system's needs.

1. LHDs should develop high quality internships to entice SPPH and provide a tangible task for collaboration. Internships should be aligned with strategic needs to maximize utility.
2. SPPH should engage with LHDs in other ways than student learning activities. Alone, these are relatively one-sided and not likely to address public health system's needs.
3. LHDs and SPPH should identify champions to facilitate collaboration. Champions should act as a point of contact, work to understand each other's needs, and connect one another with other aspects of their organization. Alumni and faculty with practice based experience may make the best champions.
4. LHDs and SPPH should develop a strategy for their collaborative relationship to build a shared vision, assign responsibilities, and hold one another accountable. This may help to ensure that both organizations get what they need to sustain collaboration.
5. LHDs and SPPH should identify a stretch objective to address major public health system's needs, such as accreditation and practice transformation, evidence-based practice, or contributing to the evidence-base.
6. SPPH should not dismiss collaborating with LHDs outside of their community. These LHDs, many of them small or rural, may offer different types of benefits. However, different types of models and incentives may be necessary to support collaboration. For example, collaborating based on emergency preparedness regions may help to increase the opportunity for long-term collaboration by providing more people to work with.

Limitations

The purpose of this study was to explore the benefits, barriers, and facilitators to collaboration across a wide variety of LHDs and SPPH. The study was relatively successful in that regard. However, more examples of high-level and strategic benefits may have been identified if the study focused solely on high-level collaboration. In addition, five large LHDs residing in the same community as the SPPH were identified that were low collaborators – different than what was expected. These LHDs would prime to help identify barriers to collaboration, but were hesitant to participate and were not included in the study. Finally, this study was limited to data obtained from group interviews with a small number of people in each group. The full range of perspectives may have been missed because of this, and statements were not corroborated by documentation. With that said, the value that individuals place on collaboration is likely to be based mostly on perception, making the corroborating evidence less essential.

References

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V. DISCUSSION

The purpose of this chapter is threefold. First, it aims to summarize, integrate and interpret the findings presented in the previous chapter. This was done because the three manuscripts detail each phase of the study, but do not integrate the findings. Next the limitations of the study will be outlined. Finally, implications for public health practice and public health research will be addressed. The key findings for each research question are presented in the next section and a chain of evidence that links the recommendations, key findings, and supporting data is presented in Appendix J.

A. SUMMARY, INTEGRATION, AND INTERPRETATION OF THE FINDINGS

Research Question 1: What is the extent of collaboration between LHDs and SPPH?

The first question aimed to assess if there was a certain sequence of activities through which LHDs and SPPH tended to collaborate from less to more robust, and how widespread this collaboration was throughout the population of LHDs. This question was included to measure the opportunity for enhancing collaboration between LHDs and SPPH.

The findings show that collaboration between LHDs and SPPH is relatively widespread and that it has grown between 2008 and 2015. Collaboration of any kind grew by 17.3% (69.2% to 81.2%) and collaboration using all four strategies (student learning activities; consulting, research and evaluation; adjunct faculty; and advising) grew by 125.5% (10.6% to 23.9%) from 2008 to 2015 (Figure 5). Also, every type of collaborative strategy increased between 2008 and 2015 (Figure 6). In addition, 21.4% of LHDs indicated that they were an AHD. **This data suggests that the concepts of collaboration and the academic health department has taken root and**

resonates with many LHDs and SPPH. However, it also suggests that there are opportunities for expanding and enhancing collaboration because nearly 20% of LHDs have not forged any collaborative relationships with SPPH and nearly 75% of LHDs have not embarked on a robust portfolio of collaborative strategies, rather tending to focus on a single collaborative strategy, most commonly student learning activities. There seems to be an opportunity for establishing more robust and strategic collaborations by engaging in more consulting, research, evaluation, and advising, and by enlisting LHD staff as faculty more often (Figures 5 and 6).

Figure 5: Degree of Collaboration Between Local Health Departments and Schools and Programs of Public Health in 2008 and 2015

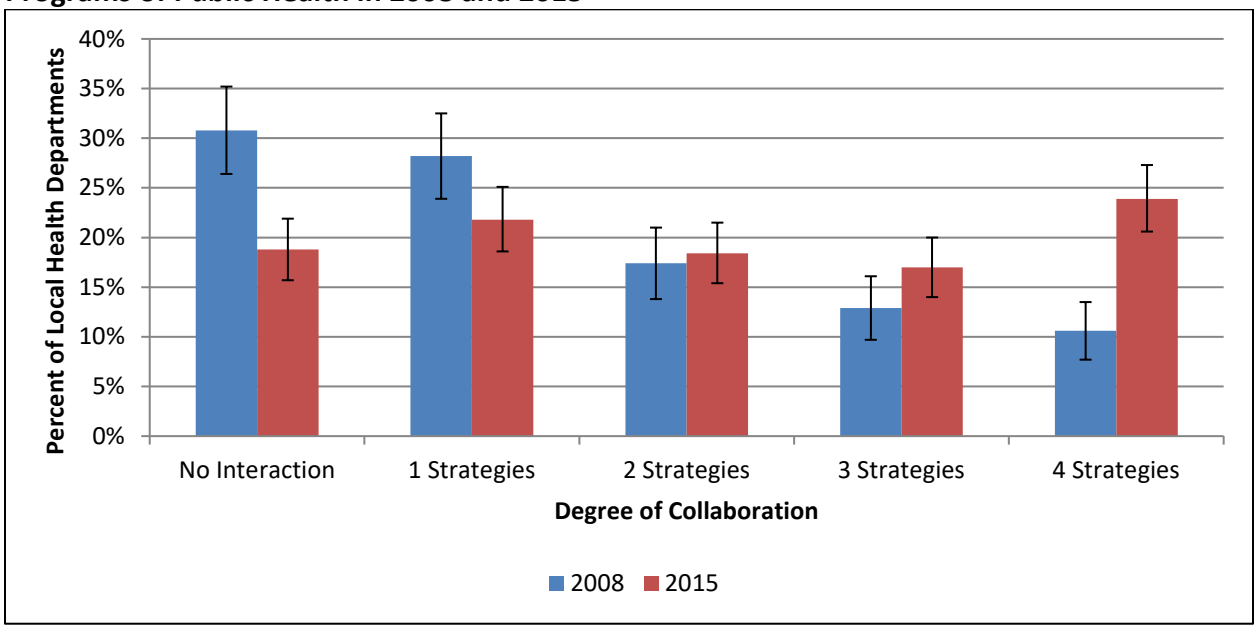
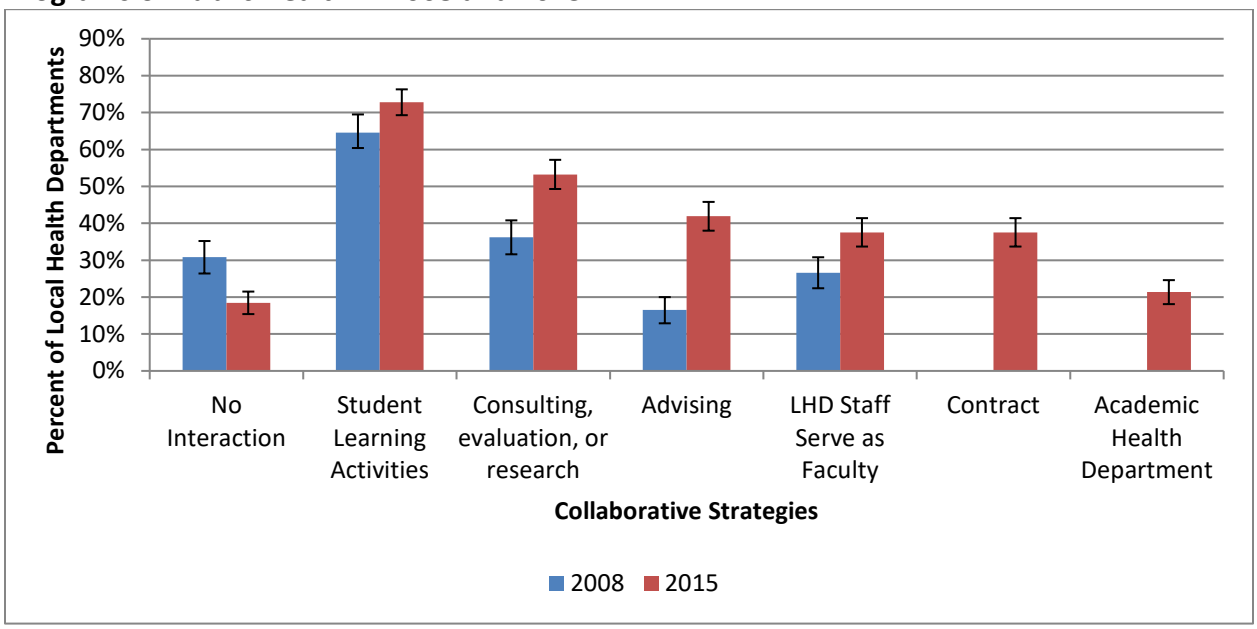


Figure 6: Collaborative Strategies Between Local Health Departments and Schools and Programs of Public Health in 2008 and 2015



The findings also suggest that LHDs and SPPH do tend to collaborate through a certain sequence of activities, with lower level collaborations tending to support only student learning activities, and collaborations becoming more robust by adding consulting, evaluation and research; adjunct faculty; and advising – in that order. However, this sequence was not found among all LHDs and the fit of the model decreased from 2008 (86% fit) to 2015 (73% fit) (Table VII). **This data suggests that student learning activities are a foundational component of collaboration between LHDs and SPPH since it is a part of almost every collaboration (94% in 2008 and 90% in 2015).** LHDs aiming to forge relationships with SPPH may first need to identify opportunities for student learning activities in order to entice SPPH into collaborating with them. Collaborative relationships could be grown over-time by taking on short-term projects

(consulting, evaluation, research, or adjunct faculty) that would allow LHDs and SPPH to build trust and learn what one another needs to remain invested in the collaboration. Finally, LHDs and SPPH could forge more strategic relationships where they advise one another on strategic initiatives and forge an AHD.

Table VII: Continuum of Collaboration in 2008 and 2015

Number of Strategies Used to Collaborate	Combination of Strategies Used to Collaborate	2008 National Profile of LHDs N (%)	2015 Survey of LHDs N (%)
0	**No Interaction**	**131 (31%)**	**116 (19%)**
1	**Student**	107 (25%)	98 (16%)
	Consulting	8 (2%)	28 (5%)
	Faculty	4 (1%)	3 (0%)
	Advising	1 (0%)	6 (1%)
2	**Student and Consulting**	**42 (10%)**	**60 (10%)**
	Student and Faculty	19 (4%)	21 (3%)
	Student and Advising	8 (2%)	22 (4%)
	Consulting and Faculty	3 (1%)	2 (0%)
	Consulting and Advising	1 (0%)	7 (1%)
	Faculty and Advising	1 (0%)	2 (0%)
3	**Student, Consulting and Faculty**	**41 (10%)**	**31 (5%)**
	Student, Consulting and Advising	14 (3%)	49 (8%)
	Student, Faculty, and Advising	0 (0%)	21 (3%)
	Consulting, Faculty, and Advising	0 (0%)	4 (1%)
4	**Student, Consulting, Faculty and Advising**	**45 (11%)**	**148 (24%)**
	Fit of Empirical Data with the Model Collaboration Continuum	366 (86%)	453 (73%)

Research Question 2: What are the benefits of collaboration between LHDs and SPPH?

The second question aimed to explore the perceived benefits of collaboration between LHDs and SPPH; how this differed between LHDs and SPPH; and how this differed by LHD characteristics. The term benefit is used to refer both to things that motivate LHDs and SPPH to

collaborate (self-interests) and things that LHDs and SPPH would not be able to accomplish without collaborating (collaborative advantage). This question was included in the study because the literature and conceptual framework suggest that LHDs and SPPH would weigh the benefits when determining whether or not to collaborate with one another.[54,75,76] This question was intended to gain a better understanding about why LHDs and SPPH collaborate; to what extent they are achieving their goals; and what aspirations they have for further collaboration.

This study identified a variety of benefits that emerged from LHD and SPPH collaboration. However, the findings suggest that the most prominent benefits are those related to student education. Benefits to public health practice (improved data collection, analysis and use; CHA and CHIP; improved evidence-based practice; and improving service delivery by making data more actionable) and research (contributing to the evidence-base and closing gaps in the evidence-base) were also identified, but to a much lesser extent and often as possibilities, rather than work that was being carried out. The findings also suggest that there is great opportunity for collaborative advantage from LHD and SPPH collaboration, such as that focused on accreditation, public health practice transformation, and the use of and contribution to the public health evidence-base. However, these types of high-level strategic benefits were identified infrequently and were often described as aspirations as opposed to realities of collaboration. The findings are described separately below by the benefits to education, practice, and research.

Benefits to Education

The most frequent benefits of collaboration between LHDs and SPPH were perceived to be related to student education. As stated previously, LHDs most commonly supported internships

or practicum for students. To a lesser degree, LHDs also supported education through in-class presentations and providing staff for adjunct faculty positions (Figure 6). **Data from phases two and three of this study also support the claim made previously that student learning activities are a foundational component of collaboration between LHDs and SPPH because they meet a continual need of SPPH and because LHDs value working with students.**

SPPH participants discussed the need for LHDs and SPPH to work on tangible projects for collaboration to work and that supporting student learning activities met this need. In addition, some SPPH participants said that student learning activities were the most important aspect of their collaboration. By working with LHDs, students received a "real world" perspective which helped to round out and complete their education in a way that cannot be replicated in the classroom. SPPH participants also discussed that working with LHDs helped provide them with a "real world" perspective and that this helped them to change how they taught, so that it was more aligned with the realities of public health practice. Some SPPH participants also discussed how it was beneficial when LHD officials presented to their students in class. **Therefore, the data suggest that collaboration between LHDs and SPPH is beneficial because it helps to bridge the divide between the classroom and practice setting, thus improving public health education.**

LHD participants also valued working with students. The greatest number of LHDs stated that working with students to supplement the LHD workforce was important (87.2%) and that collaboration was effective at promoting this (69.1%) (Figure 7). LHD participants stated that they valued working with students because it helped to bolster their LHD's capacity by helping them to complete tasks that they did not have personnel to assign; it helped to bring in new expertise; and they were fulfilled by helping to build the future public health workforce. **This**

suggests that LHDs also value working with students because it helps improve LHDs' capacity and is personally gratifying, which makes them more likely to continue working together.

However, some issues were identified with regard to the effectiveness of collaboration at improving student education and bolstering LHD capacity by working with students. Some LHD officials stated that students can only work on short-term projects and that when the students leave, the LHD does not have the capacity to sustain their work. In addition, some students are not prepared to work in LHDs, which adds a burden to the LHDs without a reward. The following recommendations were given about how LHDs could improve how they work with students. First, LHDs could develop a portfolio of student projects that are linked to one another, so that when one student leaves, the next can pick up where they left off – increasing the scope of student projects and potentially making them more strategic. LHDs could also request information about the expertise and interests of students enrolled in the SPPH's degree programs, so to better align projects with student's needs. **This shows how LHDs can make student's projects more strategic by dividing out tasks from a larger project, planning their sequence, and by using student data to improve project fit with student's strengths and needs.**

Another issue was how difficult it was perceived for LHD officials to receive adjunct faculty status and teach coursework. One SPPH participant stated that her SPPH was missing an opportunity to help enhance their course offerings by using the community's combined expertise. She discussed how most of their adjunct faculty were given adjunct status simply to act as a preceptor for student's practicum and that there were bureaucratic barriers for LHD officials to teach coursework. This theme is also supported by the fact LHD staff serving as

adjunct faculty was the least common type of collaborative strategy identified in 2015 (37.5%) (Figure 6).

Educational benefits also differed based on the degree of collaboration. Findings from the 2015 survey showed that there were statistically significant differences between high, medium, and low collaborating LHDs and SPPH with regard to how important they thought working with students to supplement the LHD's workforce was (p=0.03) and that collaboration was effective at this (p=0.01) (Figures 8 and 9). High collaborators tended to have a more robust approach to student learning activities, involving more students and more staff to act as champions or even official coordinators. High collaborators also tended to use a more systematic approach to onboard students, which indicated to SPPH which LHDs would provide a better learning experience and were good to work with.

Together, these findings suggest that student learning activities are a foundational component of LHD and SPPH collaboration and that LHDs that wish to form robust and strategic linkages with SPPH should develop strong student learning programs that are linked to their strategic priorities and well planned using data about SPPH students.

Benefits to Public Health Practice

Collaboration between LHDs and SPPH was perceived to benefit local public health practice, but less frequently than student's education. More than 75% of LHDs that responded to the survey conducted in phase 2 of this study stated that the following indicators of the 10 essential public health services were important to achieve through collaboration with SPPH: (1) evaluating population-based services (84.4%), (2) developing a CHA (81.9%), (3) addressing public health leadership competencies (81.6%), (4) strengthening community partnerships

(81.3%), (5) developing innovative practices (80.4%), (6) conducting health promotion programs (79.8%), (7) developing a CHIP (79.1%), (8) addressing public health workforce competencies (78.8%), (9) gaining access to faculty expert opinion (76.3%), and (10) having assistance applying for grants or funding (76.0%) (Figure 7). Qualitative data gathered from the survey and group interviews supports and adds to this, suggesting that LHDs benefit from collaborating with SPPH primarily by increasing their capacity allowing them to work on projects that they could not complete with their staff alone; access expertise that their staff does not have, especially related to data collection, analysis, and the use of technology; and through leadership and assistance with community-based initiatives, such as CHA and CHIP.

The findings show that working with students is one of the major ways that collaboration helps to improve public health practice. By working with students, LHDs can focus on projects their personnel do not have time to. In support of this, one LHD official said "It has been good to be able to have someone focus on the work… We are juggling so many balls it is hard to do everything to that level." Students were also viewed as a source of expertise that LHD staff do not have. Another LHD official said, "We have used the expert help of interns in developing our CHA and analyzing the data. We do not have an epidemiologist on staff and the students were instrumental in helping with this aspect," suggesting that LHDs can fill gaps in their skillset by working with SPPH. Data collection, analysis, and use of analytical technology seem to be one of the primary skillsets that LHDs get from SPPH.

While working with students was viewed as beneficial, collaboration was more robust and more strategic when faculty was engaged. This helped elevate the type of benefits being worked towards and achieved. The survey findings support this claim, showing that there are

statistically significant differences between low, medium, and high collaborators for each of the indicators of the 10 essential public health services listed previously, except for evaluating population-based services (p=0.32), addressing public health leadership competencies (p=0.11), and developing innovative practices (p=0.14) (Figures 8 and 9).

CHA and CHIP is a good example of how faculty involvement helped enhance the innovativeness and value of what LHD and SPPH collaboration produced. For example, when only students were primarily involved, assistance with CHA was usually limited to the production of a community health profile. While this may benefit some LHDs without the capacity to produce these types of profiles, it is not especially strategic or innovative. In comparison, one LHD was able to revolutionize their CHA by working with two SPPH and two medical schools in their community. By collaborating with these academic programs, they were able to collect more robust primary data through a community survey and community dialog sessions. The faculty helped make this a reality by helping to create a vision for CHA and by providing training and facilitation skills that would not be available if the LHD only worked with students. The LHD executive said that this helped them do the CHA "the right way," and that the academic institutions help instill "leadership and facilitation skills" in their community advisory council that were necessary to achieve this higher-level of CHA. Another LHD staff member added that they would not have been able to do this without the assistance from the academic institutions. This is important, because a more engaged community can help to elicit more practical or pragmatic information and may also help to identify and enlist more community assets than which would be possible when only consulting secondary public health

data (vital statistics, Behavioral Risk Factor Surveillance System, etc.), thus making CHIPs more likely to be effective.

Another example of more revolutionary benefits that elevated LHD practice occurred when a LHD working with a SPPH linked data about power outages with GIS technology. This made the data more actionable so that they could quickly identify and prioritize restaurant inspections for those that experienced a power outage, potentially reducing the incidence of foodborne illness outbreaks.

While there appears to be a desire to promote innovation and revolutionize public health practice through collaboration, it also appears that relatively little is being accomplished in this regard. Developing innovative practices was ranked relatively high (80.4%) in terms of its importance to achieve through collaboration, but relatively low in terms of collaboration's effectiveness (60.7%) (Figure 7). Improving evidence-based practice was discussed by many participants as important to work towards through collaboration, but discussion on this topic tended to be limited to how they could access information about evidence-based practices, such as getting access to a library or journal articles. One of the LHD and SPPH groups that were interviewed did discuss a more robust approach to improving evidence-based practice, by working to help LHDs interpret the evidence-base and translate evidence-based practices into their own community. This was something that the LHD official said she would need help with because it is not one of her skills and because the information is confusing because most of the research was done in communities different from hers. The faculty member responded to this favorably, saying that this was something he focused on in his work, but that he did not always get a chance to use it in "real life" practice. He said that this would be something that he would

value working with the LHD on, however, this was not something that they were currently doing, or had planned to do at the time of the interview.

Some participants also discussed how collaboration could promote change in LHDs by helping to facilitate strategic planning and also simply by talking about public health in different ways and challenging LHD officials' assumptions. However, strategic planning was not ranked as highly important (64.5%) or effective (40.0%) by LHD participants in the 2015 survey.

Collaboration was also shown to help improve LHD credibility by providing a supportive voice and by becoming more evidence-based. LHD officials said that this improved credibility was important when applying for grants, because they could show that they would be capable of conducting a robust evaluation. LHD officials also underscored the importance of having a supportive voice from an organization that does not work for the legislative body, for whom many LHDs answer to. This was beneficial when working to advance public health policies or when trying to justify spending on public health infrastructure.

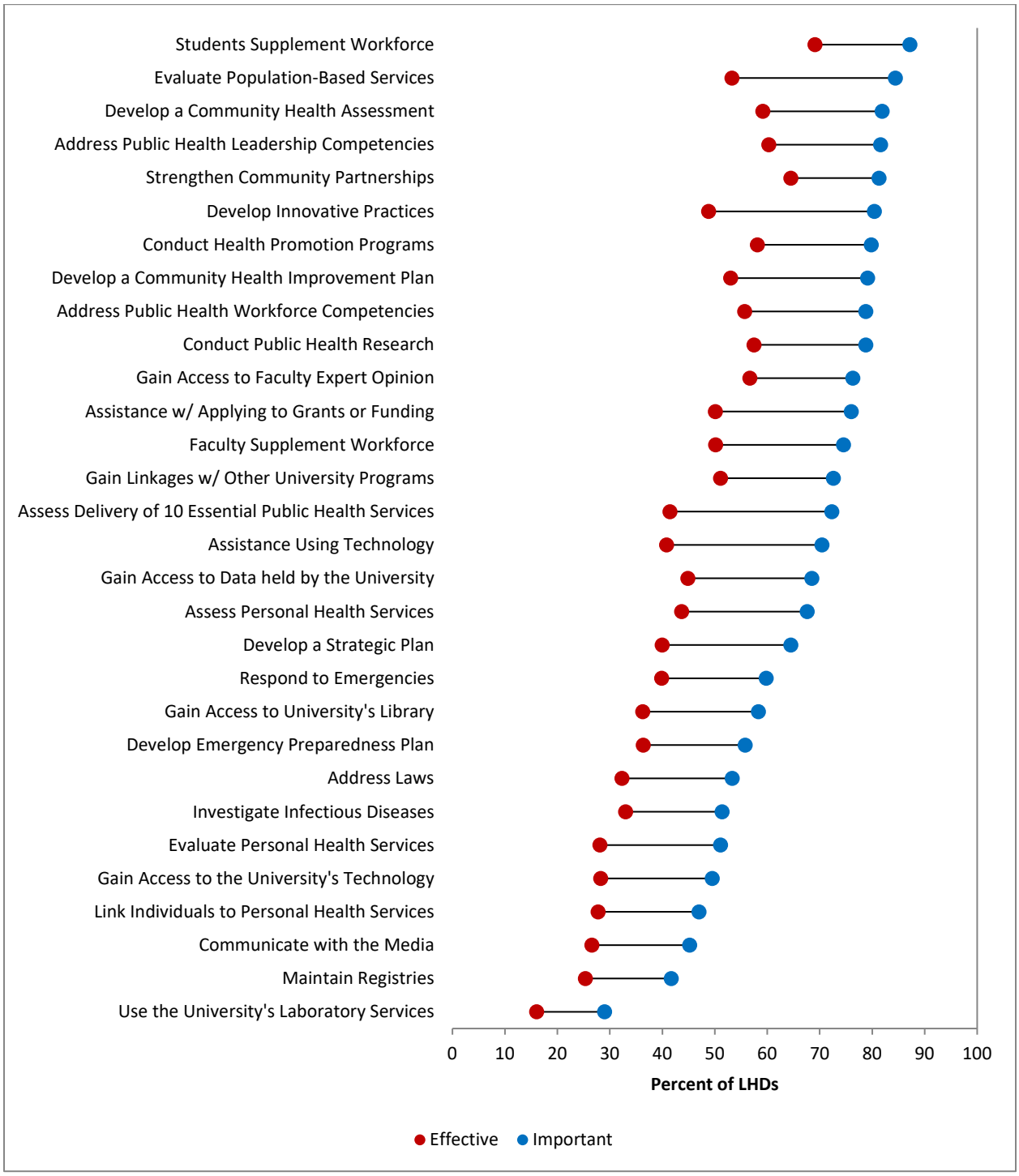
Together, these findings suggest that collaboration can provide a variety of important and even revolutionary benefits for local public health practice. However, these types of high-level, strategic, or innovative benefits do not appear to be the norm and are more likely to be accomplished through more robust collaboration, marked by a high-level of faculty engagement and visionary leadership. The findings also show that there are opportunities to engage faculty members in collaboration for reasons other than supporting student learning activities. These activities will differ based on the faculty member's interests and needs. LHDs should work to identify faculty champions to engage with and that align with the LHD's strategic needs and priorities.

Benefits to Research

Collaboration between LHDs and SPPH appeared to hold promise for public health research, but little appeared to be being accomplished in this regard. Promoting public health research was ranked as relatively important (78.8%) by LHDs but fairly ineffective (57.4%) (Figure 7). Qualitative data also suggest that research opportunities are not being realized through collaboration. Four of the eight groups interviewed in phase three discussed research. However, only one discussed an actual research project. The others discussed research in limited terms, such as helping faculty members formulate practice-based research questions. One group discussed how their collaboration could be enhanced to help close gaps in the evidence-base. This was viewed as something that both the LHD and SPPH participant would value and there was some excitement about this idea from both partners. However, this was not something that they were currently working on. There did not appear to be evidence of LHDs and SPPH having a shared research agenda. In addition, the survey suggests that the perceived importance ($p<0.01$) and effectiveness ($p=0.04$) of collaboration for research differed by high, medium, and low collaborators. However, qualitative data did not necessarily support this claim because ongoing tangible research was discussed very little among all participants.

The findings suggest that collaboration between LHDs and SPPH is generally not advancing public health research. However, the findings also suggest developing a research agenda may help to entice faculty members, especially those that conduct practice-based research, to collaborate, which may help strengthen collaborative relationships.

Figure 7: Gap Between the Importance of and Effectiveness of Indicators of the 10 Essential Public Health Services for Collaboration Between LHDs and SPPH[f]



[f] Ranked from most to least important.

Figure 8: Importance of Indicators of the 10 Essential Public Health Services Stratified by Low, Medium, and High Collaboration[g]

[g] Ranked from most to least important

* indicates a statistically significant difference ($p \leq 0.05$) between low, medium, and high collaboration

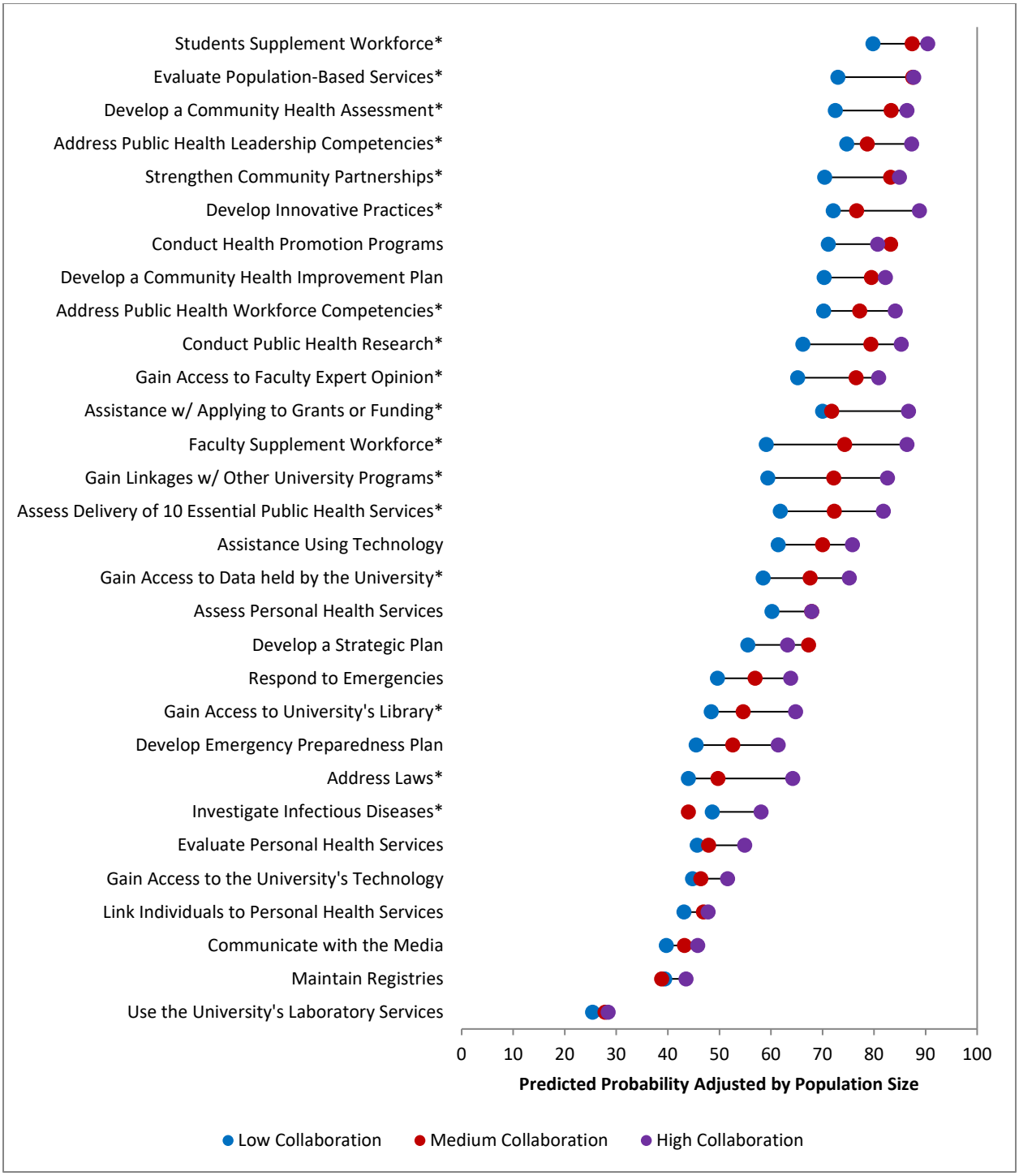
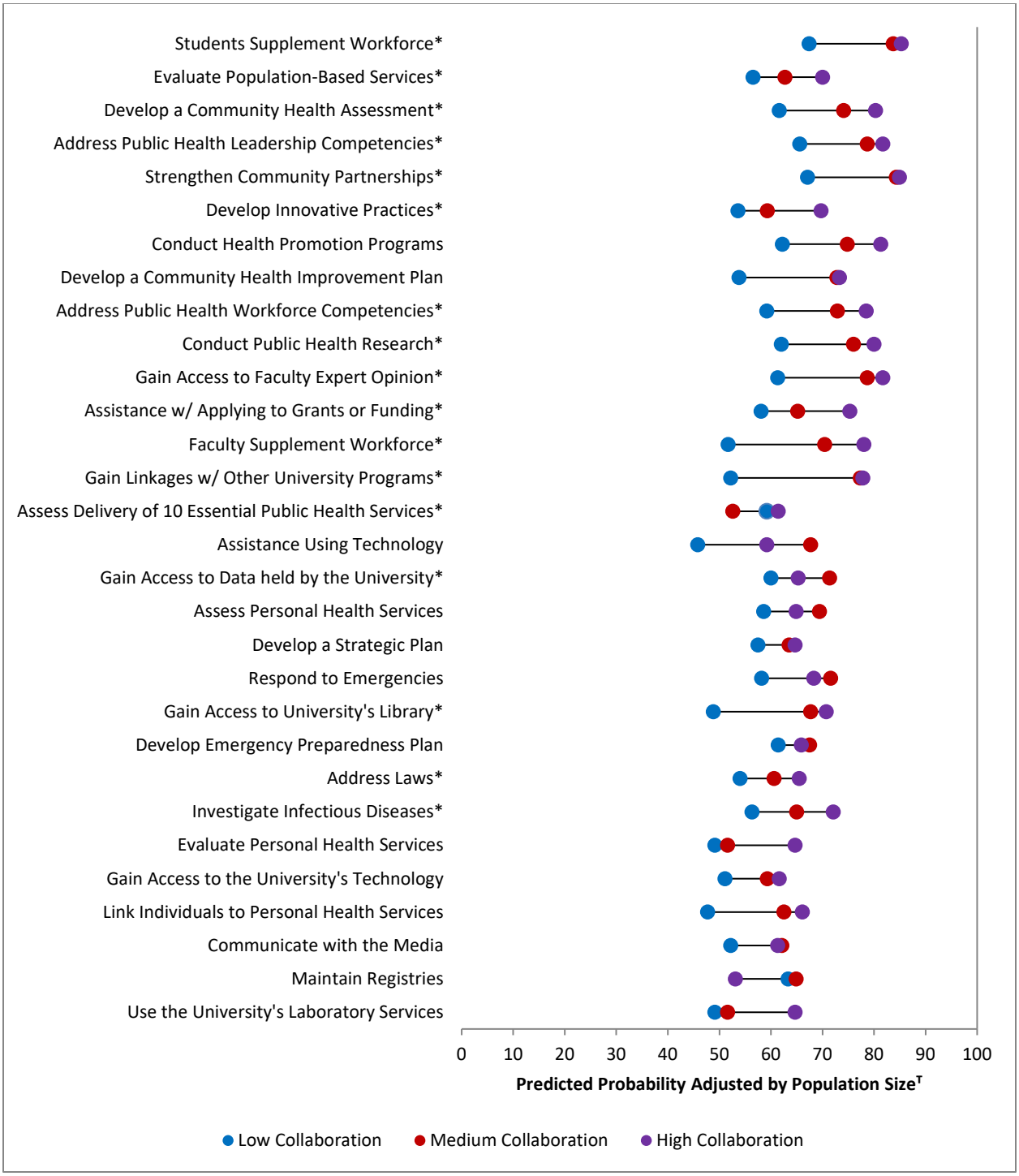


Figure 9: Effectiveness of Indicators of the 10 Essential Public Health Stratified by Low, Medium, and High Collaboration[h]

[h] Ranked from most to least important

* Indicates a statistically significant difference ($p \leq 0.05$) between low, medium, and high collaboration.



Research Question 3: What are the barriers and facilitators to collaboration between LHDs and SPPH?

[T] Predicted probability is based on the number of LHDs that stated an indicator was important. N differs for each.

The final question aimed to explore factors that made collaboration more or less difficult. This question was included in the study because the relative ease of the process of collaborating is also a part of the equation that individuals and organizations weigh when determining whether or not to collaborate. In general, the easier it is to collaborate, the more likely organizations will be to collaborate, if the benefits are equal. The findings show that the most common barriers and facilitators are related to proximity; LHD capacity; executive and workforce characteristics; relationships and trust; and the degree the process and goals are formalized.

Proximity

Proximity was one of the primary barriers to collaboration. An analysis of the 2008 National Profile of LHDs data showed LHDs and SPPH closer to one another were more likely to collaborate than those further away (Figures 10 and 11). LHDs and SPPH that were closer to one another were more likely to collaborate because it was easier to host students and there were more opportunities for collaborating together in community initiatives. Students faced difficulty commuting or affording to move to LHDs further away from campus. In addition, participants mentioned reluctance among students to move to smaller and more remote communities, due to a lack of community amenities (coffee shops, nightlife, etc.). In addition, LHD officials and SPPH faculty may have built up a better relationship when they are in the same community. However, this was not universally true, and relationships were also established by participating in statewide initiatives, such as their state public health association.

While proximity was a major barrier, participants also discussed the importance of working with LHDs further from the SPPH. One reason given for this was that there are simply

not enough local internship positions. Therefore, SPPH need to form relationships with LHDs further from campus to ensure that all of their students can complete their degree requirements. Related to this, some faculty participants discussed how LHDs in smaller and more remote communities provide a different lens on public health practice than LHDs in larger and more metropolitan communities, and that this could be beneficial for some students. Finally, one faculty participant discussed the idea of "geographic equity" being central to public health. He went on to say that regardless of how many people live in a community or how remote a community is, they deserve to receive quality public health services, and because of this it was important for SPPH to engage with LHDs in these communities more fully.

LHD Capacity

LHD capacity was another major barrier to collaboration. An analysis of the 2008 National Profile of LHDs data showed that as LHD capacity increases (as measured by the number of people living in the LHD's community) the likelihood of collaboration increases (Figures 10 and 11). Qualitative data suggest that LHDs with greater capacity are more likely to be able to assign staff to manage collaborative activities, such as managing interns or acting as a focal point for communicating with SPPH. In addition, some SPPH indicated a preference for working with higher performing LHDs, which tend to be the LHDs with greater capacity and those serving larger communities.

Executive and Workforce Characteristics

The characteristics of the LHD workforce, including the executive, also effected collaboration. An analysis of the 2008 National Profile of LHDs data showed that LHD executive's with a master's degree and LHDs employing health educators were more likely to collaborate. LHD staff that had preexisting connections, such as alumni, were viewed as good champions for collaboration, because they tended to value the SPPH and because they had an understanding of the SPPH's needs. These champions were important, because they helped to solve problems and connect other parts of the LHD to the collaborative efforts. It also appeared that the division responsible for health education or health promotion tended to be more involved in the collaborative efforts with SPPH. In addition, LHD executives that are visionary and strategic thinkers seemed to be more likely to be involved in the most robust collaborations with SPPH.

Trust and Relationships

A small number of LHD participants discussed that academia did not understand the realities of local public health practice and that academia does not really want to collaborate in a meaningful way, other than to fulfil their student's requirements. This was troublesome, because providing good student learning activities does require labor and costs from LHDs. Strong inter-personal relationships between individuals working for LHDs and SPPH were also important. Collaboratives with stronger inter-personal relationships (friendships) tended to have higher-level collaboration, marked by more frequent and robust interaction.

Process and Goals

Higher-level collaborators that were interviewed tended to have a more formalized process for how they collaborated. SPPH liked when LHDs had a formal orientation and onboarding process for their students, because this showcased that students would not "get stuck in the corner," and they would get a better experience. In addition, the highest level collaborators, those working towards the most strategic and innovative issues tended to have a more formalized meeting structure and agenda. Having a formal agenda helped to make their collaborative work "more pragmatic and tangible," and not just "aspirational."

The overall findings suggest that collaboration between LHDs and SPPH can be a strategy for improving public health performance. However, strategies need to be devised to help build relationships between individuals working in public health practice and individuals working in academic public health. This is important for helping promote equity in the quality of public health services provided in different communities, because the primary barriers are directly related to factors that drive performance, especially LHD capacity. In addition, strategies need to be developed to promote a more formalized collaborative process and goals, because this is what helps to support innovative outcomes.

Figure 10: LHD Characteristics Associated With the Degree of Collaboration With SPPH – Continuum of Collaboration (n=366)

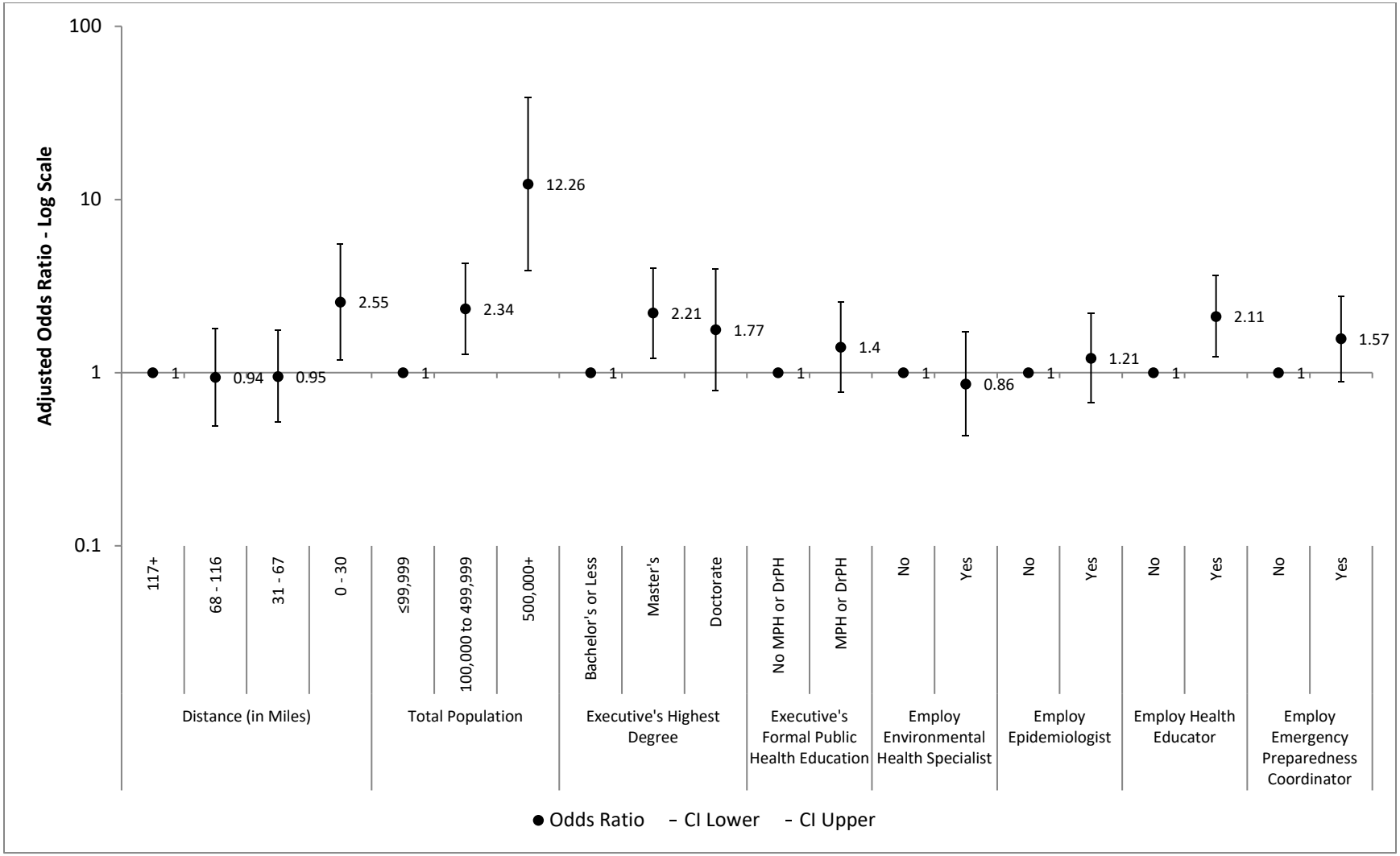
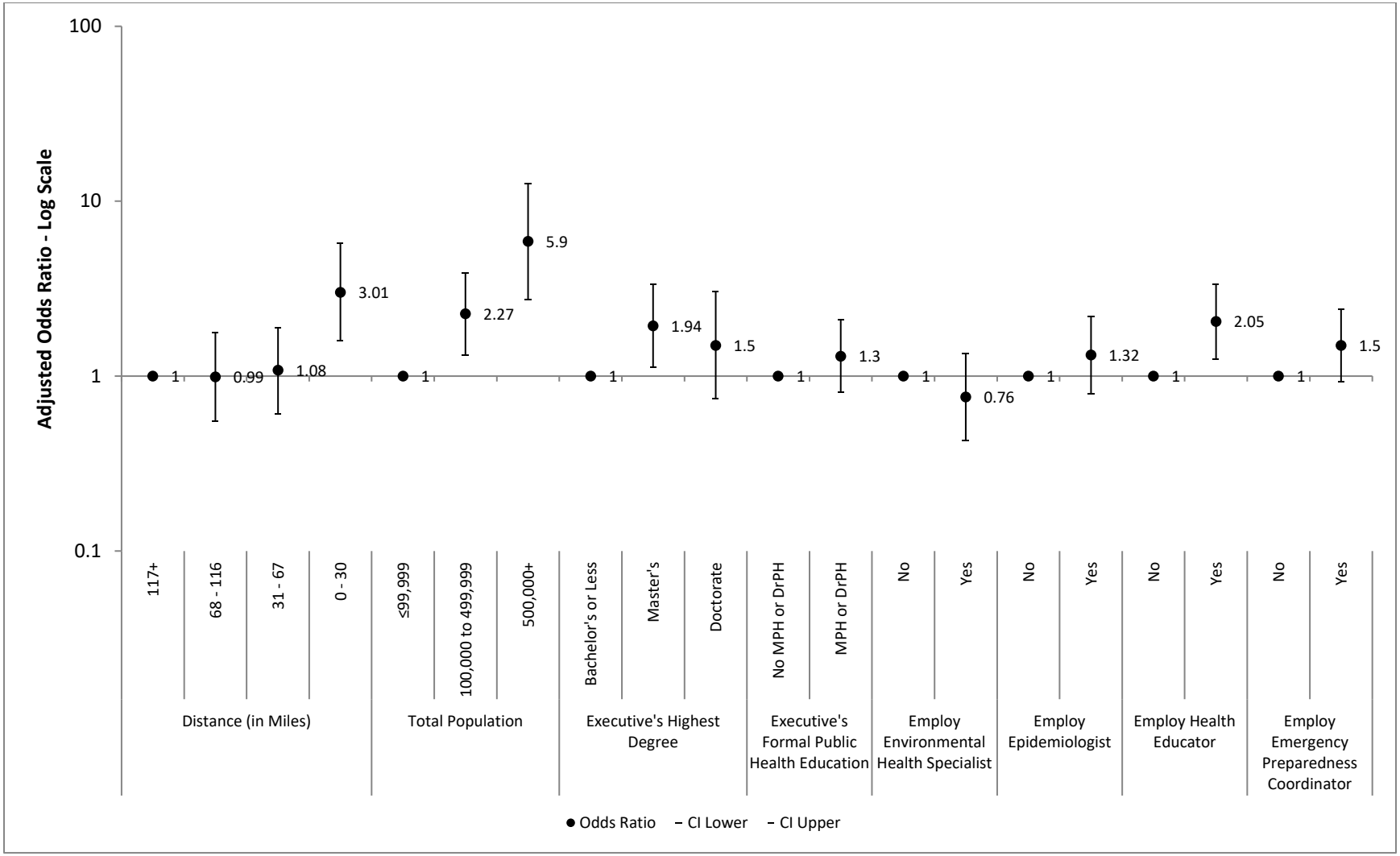


Figure 11: LHD Characteristics Associated With the Degree of Collaboration With SPPH – Not Based on A Continuum (n=416)



B. LIMITATIONS

Cross-Sectional Nature of the Study

Each phase of the study used a cross-sectional approach. Data collected in a cross-sectional manner is prone to a number of biases. An important bias in this study is that the temporal relationship between independent and dependent variables in phase one is unknown, which limits the ability of the study to causally link the associated factors with the degree of collaboration. However, the proximity and population size cannot be influenced by the degree of collaboration. Although, executive education and workforce characteristics could be influenced by the degree of collaboration if higher-level collaborations helped executives access degree programs and helped LHDs to hire health educators or staff from more population-based disciplines. However, qualitative data, especially from the group interviews did support these findings and helped provide explanation of how these factors influenced the degree of collaboration.

Response Rate

The response rate for the 2008 National Profile of LHDs was relatively high (78%), but the response rate for the National Exploratory Survey of LHDs held in 2015 was relatively low (33%). Therefore, both surveys are prone to self-selection bias, meaning that LHDs with higher degrees of collaboration may be more likely to have responded to the survey than LHDs with no or little collaboration. However, the risk of bias is greater in the 2015 survey because of the lower response rate, as well as the fact that the 2008 National Profile of LHDs survey asked about many more issues, and low collaborators may have been less likely to disregard the 2008 National Profile survey because they may have found the other topics to be relevant to them

and because this was conducted by the National Association of City and County Health Officials. This bias could have affected the assertion that collaboration had grown between 2008 and 2015 if fewer non-collaborators responded to the 2015 survey as compared to the 2008 survey. However, the LHD characteristics were fairly similar between the 2013 National Profile of LHDs survey and respondents to the 2015 survey, which suggests that the sample is representative of the broader population of LHDs.

Recruitment

The qualitative group interviews with LHDs and SPPH faculty also had issues with recruitment. This study intended to use a maximum variation purposeful sampling scheme to identify a diverse set of LHD and SPPH groups. However, two issues arose. First, it was difficult to recruit low collaborators, probably because they did not feel that this study was relevant to them. This was stated by a few LHD executives in response to the recruitment email. Second, there did not always appear to be a clear distinction between high-collaborators and even LHDs that identified themselves as AHDs and their lower collaborating peers, except on the extreme ends. This may have limited the findings to more average benefits, and limited the ability of the study to identify robust forms of collaboration that are revolutionizing public health education, research, and practice. However, this was also an intended part of the study and could also be viewed as a strength, because so much of the existing research already focuses on these higher-level collaboratives.

Survey Questions

While the 2008 National Profile of LHDs survey was pilot tested and the National Exploratory Survey of LHDs held in 2015 was reviewed by LHD officials, it is difficult to know

exactly what the questions are measuring. For example, questions related to the types of collaborative strategies used by LHDs and SPPH (internships, practicum, consulting, advising, research, evaluation, etc.) were used to assess the degree of collaboration, assuming if a LHD stated that they were involved with more collaborative activities, they had a higher degree of collaboration. However, this may not always be the case. For example, some LHDs and SPPH could work together very robustly around research, but not do anything with regard to students or advising. This would appear they were low collaborators in the survey, when they would actually be higher collaborators. However, findings from the qualitative group interviews do appear to support the assumption that measuring the degree of collaboration using the questions included in the 2008 National Profile of LHDs survey was appropriate, at least on the extreme ends because low-level collaborators were more often to be involved in one-time projects, where high-collaborators more often had ongoing relationships and multiple projects, even if these projects were not pushing the boundaries of public health practice.

Novice Qualitative Researcher

The principle investigator was relatively new to qualitative research techniques and this dissertation served as his first foray into this type of research. In addition, he needed to learn how to use Atlas.ti while conducting this study. While the principle investigator believes that he grew his qualitative research expertise a great deal through this process, the nature of using this as a learning opportunity did present issues. First, it simply took him a long time to do the qualitative data analysis, which may have made it more difficult to work with the second analyst. Second, he may have spent too much time with theoretically based codes on the front end, rather than coding using a more descriptive or in vivo type of approach. It appeared to

speed up and clarify the analytical process when he moved to using a more descriptive and in vivo type of coding near the end of analysis. While this probably did not affect the final results of the study, it did reduce the speed through which a findings report could be developed and presented back to participants and the second analyst for review.

C. IMPLICATIONS FOR PRACTICE

This study in conjunction with other published literature shows that collaboration between LHDs and SPPH can be used to enhance public health education, practice and research.[15,16] This study also shows that collaboration between LHDs and SPPH is relatively widespread among the population of LHDs. However, the findings suggest that many of these collaboratives, even the higher-level ones, are not producing strategic, innovative, or revolutionary benefits. Conversely, this study does suggest that there are opportunities for improvement, as LHD officials and SPPH faculty and staff names a variety of key strategic initiatives that they would both be motivated to collaborate together on, such as advanced CHA, making data more actionable, improved use of evidence-based practice, as well as researching to close gaps in the evidence-base.

Strong leadership, while not discussed specifically in the study, was a theme underlying most of the key findings. No single person discussed leadership, so there were not quotes to cite. However, it was clear that the highest performing collaborations were those with the most visionary leaders. More specifically, the LHD and SPPH collaboratives that produced the most strategic and innovative outcomes were those that put the work in to identify a vision and formalize an agenda for their collaboration. This helped to clarify what they were working towards and to hold one another accountable for their responsibilities. While this may seem

like common sense, Huxham and Vangen state that many organizations fail to do this, suggesting that this is a fairly difficult task because collaborating organizations collaborate for different reasons. They go on to say that a collaborative agenda is essential, but that it needs to balance specificity with openness. It needs to be specific enough to support action and produce benefits, and open enough so that organizations can benefit from it how they need.[53(p238)]

In addition, it appeared that good collaboration could halt great collaboration. For example, when there were good inter-personal relationships between organizations, the need for a formal agenda seemed to go unrecognized. This appeared to have been because the LHD and SPPH were relatively satisfied with their joint work, or because their friendship made it more difficult to distinguish between professional collaboration and personal collaboration – professional being based on the organization's mission and personal being based on individual feelings. When one LHD and SPPH was asked directly about this topic, they suggested that a more formal agenda was desired, and suggested that it may be something they would work on after the interview.

D. RECOMMENDATIONS

The findings raise the following questions. How should individuals lead collaborative efforts between LHDs and SPPH? What should LHDs and SPPH do to enhance their collaboration? And, what can the public health system do to enhance practice and academic collaboration? Recommendations are provided for each below.

How Should Individuals Lead Collaborative Efforts Between LHDs and SPPH?

Strong leadership in collaborative settings is essential, but also difficult. The nature of collaboration is challenging and requires individuals to be able to balance tensions between

different leadership styles and promote shared leadership from both organizations and from all levels.[53,160,161] With this in mind and based on the findings, it is recommended that individuals leading collaborative efforts between LHDs and SPPH:

1. Develop a practice, research, and educational agenda to articulate the vision for collaboration. Leaders may need to balance the use of democratic and autocratic leadership styles. A democratic style is needed in order to develop a shared vision so that the LHD or SPPH do not exit the relationship, but an autocratic style may be needed to ensure that an agenda is created and that it includes innovative elements.
2. Seek to find the possibilities even when faced with a variety of problems. Leaders will need to be able to articulate their needs and resources, and be able to anticipate the needs and resources of the collaborating organizations. Leaders will also need to be able to frame potential problems as potential solutions, such as framing a long-distance collaboration as helping facilitate "geographic equity." Good facilitation skills and a keen understanding of issues facing the public health discipline are important.
3. Build and nurture relationships between the LHD and SPPH, but do not succumb to them. Good inter-personal relationships are needed for successful collaboration because they help solve problems and increase risk tolerance of organizations. But, good relationships may mask the need for a formal process and goals. Collaborative leaders need to be able to build relationships and hold people accountable.
4. Develop leadership from both organizations and at multiple levels. Executives can help authorize collaboration and help build a culture where collaboration is expected. But,

staff are often the ones with the close relationships, that act as champions, that solve problems at their level, and that try to get others in the organization involved.

What should LHDs and SPPH do to enhance their collaborations?

This study suggests that collaboration between LHDs and SPPH can grow in a stepwise manner and that certain functions of the collaborative act as foundational pieces through which more robust collaboration can be built. Based on this, it is recommended that collaborating LHDs and SPPH do the following:

1. LHDs should develop high quality internships to entice SPPH into collaboration. Internships provide a tangible task for the initial focus for collaboration, and this study showed that both LHDs and SPPH valued this experience. To make internships better, LHDs should tie projects to their strategic plan; develop more robust segmented projects, so that multiple students can work on it over time; use a systematic onboarding process; and provide students with LHD mentors.
2. SPPH should reciprocate LHDs by working with them for reasons other than student learning activities. Alone, student learning activities tend to cost LHDs more than they receive. This is unlikely to be sustainable or to produce strategic and innovative outcomes.
3. LHDs and SPPH should identify champions for collaboration. Champions should act as a point of contact, work to understand each other's needs, and connect other parts of their organizations. Alumni and faculty with practice-based experience may make the best champions because they have a built in level of understanding.

4. As stated previously, LHDs and SPPH should develop a collaborative agenda to identify a shared vision, assign responsibilities, and hold one another accountable. This can help clarify goals and ensure that both organizations get what they need to sustain their involvement. An agenda may also help to ensure that collaboration focuses on long-term objectives, rather than a per-project or arm's length basis.
5. LHDs and SPPH should identify a stretch objective in their collaborative agenda that addresses a public health services and system's need. Collaboration can breed truly innovative outcomes (accreditation, practice transformation, evidence-based practice, closing gaps in the evidence-base, etc.) that would not be possible without combining LHDs and SPPH knowledge, resources, and skills. However, LHDs and SPPH may not embark on this innovative work unless it is formally captured in an agreement.
6. SPPH should collaborate with LHDs that are outside of their community and that serve smaller communities. Small LHDs that serve rural communities can offer students and faculty a different perspective on public health practice, which may be able to lead to different types of benefit than if only collaborating with larger and more metropolitan LHDs. In addition, working with small and remote LHDs may help to enhance the "geographic equity" of public health performance. However, different models of collaboration may be needed, such as regional AHDs. And different modes of internships may be needed, such as those where students work from a distance using innovative telecommunications technology, or strategic placement of students studying via distance learning technology.

What can the public health system do to enhance practice and academic collaboration?

This study suggests that much of the collaboration between LHDs and SPPH tends to occur in an organic manner and is not the result of purposeful efforts. However, some of the barriers to higher-level collaboration, such as time and needing a tangible task could be addressed through purposeful efforts of organizations willing to champion or fund the expansion and improvement of collaborative relationships between LHDs and SPPH. Based on this, it is recommended that accrediting bodies and funding organizations do the following:

1. Accrediting bodies such as the Public Health Accreditation Board and the Council on Education for Public Health should promote collaboration as a criterion for accreditation. While it may not be possible to require all LHDs to collaborate with collegiate level academic institutions, a stronger recommendation could be made to promote these linkages.
2. The CDC, Robert Wood Johnson Foundation, Kresge Foundation, and other organizations that have traditionally funded public health initiatives could develop a grant program that aims to advance collaboration between LHDs and SPPH. The AHD workgroup and the Council on Linkages Between Academia and Public Health Practice has done much to advance this movement. However, dedicated funding could help establish new relationships in regions where public health performance is low and where little academic and practice collaboration exists. Funding could also help to support new models of collaboration, such as AHDs that are distance-based, regional, or even a state network model.[21] And funding could help establish collaboratives mature

into high-functioning collaboratives that push the boundaries of public health education, practice, and research.

a. IMPLICATIONS FOR RESEARCH

This study's primary implications to research are related to the proposed research agenda for the academic health department.[162] Based on this study, the following questions may warrant consideration.

- Does collaboration between public health practice organizations and academic organizations evolve through a continuum of collaboration? Is the AHD the natural end state? How does this process occur? And how can the larger public health system support maturation?
- How do AHDs develop and communicate their vision? Does this vision focus on strategic change and other objectives that could not be accomplished working individually? How do we move beyond operational partnerships that work on a per-project basis.
- Are the benefits of the AHD equitable? How does the equity of benefits affect the performance of the AHD?
- How can AHDs be developed between organizations that do not reside in the same community? How do these types of AHDs differ from local AHDs?
- Do AHDs promote innovation or change? If yes, how so? If no, why not?

VI. Conclusion

This study set out to explore the extent, benefits, barriers and facilitators to collaboration between LHDs and SPPH. Rooted in this purpose is the assumption that collaboration between LHDs and SPPH is an effective strategy for advancing public health teaching, research and practice, and that more LHDs should adopt this strategy and that collaboration should be improved and be more strategic and innovative.

The findings from this project showed that collaboration between LHDs and SPPH is relatively widespread and is likely expanding. However, the study also suggests that, too often, collaboration is not robust enough or strategic enough to produce unique value. Most collaboration tended to be rooted in its support for student learning activities. This was true even among many of the high-level collaborators. This is problematic, because when student learning activities dominate collaboration, the value to local public health practice and research is relatively modest and often short lived. However, this study also showed that collaboration can help to revolutionize public health practice and research. Examples and ideas were discussed that would improve CHA, CHIP, community engagement, evidence-based practice, and to help close gaps in the evidence-base.

This study also showed that a number of factors, such as proximity, LHD capacity, executive and workforce characteristics, reciprocity, and organizational culture, affected the likelihood that LHDs and SPPH would form high-level collaborations. However, none of these factors appeared to be unsurmountable to strong leaders. In fact, strong leadership was essential for promoting the most strategic and innovative collaboration, even when all the factors were in their favor. Leaders can promote strategic and innovative collaboration by

helping to build and articulate a vision, seeing opportunity when others see problems, building relationships and trust, and promoting leadership at all levels of the organizations.

While these suggestions seem obvious, they were only utilized infrequently. Having a clear and articulate vision for the collaboration and being able to see what opportunities were possible seemed to be the most important factor. Many participants had difficulty articulating why they were collaborating and what they could achieve together, even if all of the obstacles were removed. This study helps add to the literature about what is possible through collaboration, what the collaborative advantage may be. This type of information may help public health and academic leaders create their own visions of better collaboration, which in turn could help to spread and improve collaboration throughout the LHD and SPPH populations.

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Appendix A
Original Approval from Office for the Protection of Research Subjects

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Granted

May 6, 2015

Kevin Kovach, MSc, BS
Public Health
1235 W. 70th Street
Kansas City, MO 64113
Phone: (734) 347-5745

RE: Research Protocol # 2015-0458
"Collaboration between Local Health Departments and Schools and Programs of Public Health"

Sponsors: None

a. Phase I will involve the analysis of de-identified secondary data from 425 local health department executives. Analysis of this data does not represent human subjects research and does not require IRB approval or an exemption determination.

b.

c. Dear Mr. Kovach:

Your Claim of Exemption was reviewed on May 4, 2015 and it was determined that your research protocol meets the criteria for exemption as defined in the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects [(45 CFR 46.101(b)]. You may now begin your research.

Exemption Period:	**May 4, 2014 – May 4, 2017**
Performance Site:	UIC
Subject Population:	Adult (18+ years) subjects only
Number of Subjects:	1036

The specific exemption category under 45 CFR 46.101(b) is:
(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects'

responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

2. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script. When appropriate, the following information must be provided to all research subjects participating in exempt studies:
   d. The researchers affiliation; UIC, JBVMAC or other institutions,
   e. The purpose of the research,
   f. The extent of the subject's involvement and an explanation of the procedures to be followed,
   g. Whether the information being collected will be used for any purposes other than the proposed research,
   h. A description of the procedures to protect the privacy of subjects and the confidentiality of the research information and data,
   f. Description of any reasonable foreseeable risks,
   g. Description of anticipated benefit,
   h. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
   i. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
   j. A statement that the UIC IRB/OPRS or JBVMAC Patient Advocate Office is available if there are questions about subject's rights, which includes the appropriate phone numbers.

Appendix A
Original Approval from Office for the Protection of Research Subjects

Please be sure to:

→Use your research protocol number (listed above) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne, B.S., C.I.P.
Assistant Director
Office for the Protection of Research Subjects

cc: Paul Brandt-Rauf, Public Health, M/C 923
Christina Welter, Public Health, M/C 923

Appendix B
Amended Approval from Office for the Protection of Research Subjects

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Determination
Amendment to Research Protocol – Exempt Review
UIC Amendment #2

February 15, 2016

Kevin Kovach, MSc, BS
Public Health
1235 W. 70th Street
Kansas City, MO 64113
Phone: (734) 347-5745

RE: Protocol # 2015-0458
"Collaboration between Local Health Departments and Schools and Programs of Public Health"

Please have Christina Welter complete Investigator Continuing Education. Her most recent Investigator Training Period appears to have expired on July 23, 2015.

Dear Mr. Kovach:

The OPRS staff/members of Institutional Review Board (IRB) #7 have reviewed and approved this amendment to your research, and have determined that your amended research continues to meet the criteria for exemption as defined in the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects [(45 CFR 46.101(b)].

The specific exemption category under 45 CFR 46.101(b) is:
(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You may now implement the amendment in your research.

Please note the following information about your approved amendment:
Exemption Period: **February 15, 2016 – February 15, 2019**
Amendment Approval Date: February 15, 2016

Appendix B
Amended Approval from Office for the Protection of Research Subjects

Amendment:

Summary: UIC Amendment #2 dated February 2, 2016 and submitted to OPRS on February 3, 2016 is an investigator-initiated amendment. This study includes many phases. Previously enrolled subjects completed a survey. The survey phase is complete. The changes proposed with this amendment are related to the next phase which uses focus groups. Recruitment for this phase has not yet begun. The amendment includes:

1) Revisions of the focus group participants. Now only one individual from each organization will be recruited to each focus group.
2) Revised recruitment messages.
3) Revised Focus Group Participant Recruitment Letter and Informed Consent Document.
4) Revised focus group guide.
5) Addition of the following co-investigator: Griselle Torres, DrPH, MPH, MSW.

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

5. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

6. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

7. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

8. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script. When appropriate, the following information must be provided to all research subjects participating in exempt studies:
   i. The researchers affiliation; UIC, JB VAMC or other institutions,
   j. The purpose of the research,
   k. The extent of the subject's involvement and an explanation of the procedures to be followed,
   l. Whether the information being collected will be used for any purposes other than the proposed research,
   m. A description of the procedures to protect the privacy of subjects and the

confidentiality of the research information and data,
f. Description of any reasonable foreseeable risks,
k. Description of anticipated benefit,
l. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
m. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
n. A statement that the UIC IRB/OPRS is available if there are questions about subject's rights, which includes the appropriate phone numbers.

Please be sure to use your research protocol number (2015-0458) on any documents or correspondence with the IRB concerning your research protocol.

OPRS no longer sends hard copies via campus mail of protocol-related correspondence to investigators, research staff and Department Heads. For more information, please refer to the following: http://research.uic.edu/node/4117

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne
Assistant Director, IRB #7
Office for the Protection of Research Subjects

cc: Christina Welter, Public Health, M/C 923

Appendix C
2008 National Profile of Local Health Departments Approval Email From the National Association of City and County Health Officials

From:	"Jiali Ye" <JYe@naccho.org>
Subject:	Re: Data Request
Date:	Wed, October 29, 2014 7:03 am
To:	"kkovac5@uic.edu" <kkovac5@uic.edu>

Hi, Kevin,

This is to formally let you know that NACCHO has approved your use of the 2008 Profile study data and FIPS codes to examine the research project described in the data request form. The datasets have been attached. Your request for a fee waiver has also been granted.

Please check: http://nacchoprofilestudy.org/data-requests/ for information on the instrument and codebook.

Per our policy, you should not publish or publicly present data about specific LHDs without first getting their permission. If you need the data for a different project, you need to send us another data request form.

Regards,

Jiali

Jiali Ye, Ph.D.
Lead Research Scientist
Research & Evaluation
National Association of County & City Health Officials
1100 17th Street NW, 7th Floor
Washington, DC 20036
202-783-5550<tel:202-783-5550> (Main)
202-783-2491<tel:202-756-2491> (Direct)
202-783-1583<tel:202-783-1583> (Fax)
jye@naccho.org<mailto:jye@naccho.org>
www.naccho.org<http://www.naccho.org/>

Appendix D
2013 National Profile of Local Health Departments Approval Email From the National Association of City and County Health Officials

Kevin Kovach

From: Jiali Ye <JYe@naccho.org>
Sent: Wednesday, June 10, 2015 4:13 PM
To: kkovac5@uic.edu
Subject: RE: 2013 Profile Request
Attachments: Profile2013_id_public_ALLv3.dta

Hi, Kevin,

This is to formally let you know that NACCHO has approved your use of 2013 Profile study data for the research project described in the data request form. Please find the attached dataset. Your request for a fee waiver has also been granted.

Regards,

Jiali

Jiali Ye, Ph.D.
Lead Research Scientist
Research & Evaluation
National Association of County & City Health Officials
1100 17th Street NW, 7th Floor
Washington, DC 20036
202-783-5550 (Main)
202-783-2491 (Direct)
202-783-1583 (Fax)
jye@naccho.org
www.naccho.org

Appendix E
2015 Exploratory Survey of Local Health Departments

Collaboration Between Local Health Departments and Schools or Programs of Public Health

PURPOSE AND DESCRIPTION OF THE SURVEY: The purpose of this survey is to learn about collaboration between local health departments and schools or programs of public health. The survey is being conducted by Kevin A. Kovach from the University of Illinois at Chicago as part of his doctoral dissertation. It will take roughly 15 to 20 minutes to complete. There are four sections covering the following topics:

- How does your local health department work with schools or programs of public health?
- What schools or programs of public health does your local health department work with?
- What do you think is important to gain by working with schools or programs of public health and to what extent do you think this is being met?
- Characteristics of your local health department.

CONFIDENTIALITY: Your responses and any identifying information will be kept completely confidential. However, a map will be created that details the extent of collaboration between local health departments and schools or programs of public health throughout the United States.

BENEFITS AND RISKS OF PARTICIPATION: Participants will be entered into a raffle to receive a $20 Amazon gift card. Eight participants will be randomly selected to receive a gift card. Participants will have roughly a one percent chance of receiving a gift card. Longer-term benefits may accrue to your organization with the publication and dissemination of the study findings. There are no anticipated risks to your participation in this survey. Your participation is voluntary. If you decide to participate, you may withdraw from the survey at any time without penalty. Completing the survey constitutes your consent to participate.

CONTACT INFORMATION: If at any time you have questions about the study or the procedures, you may contact the Principal Investigator, Kevin A. Kovach. His contact information is presented below. If you have questions about your rights as a participant, contact the University of Illinois at Chicago Institutional Review Board at (312) 996-4995 or by email at ovcrweb@uic.edu.

Kevin A. Kovach, MSc, CHES
Doctor of Public Health Candidate
1235 W. 70th Street, Kansas City, Missouri 64113
(734) 347-5745
kkovac5@uic.edu

CONSENT: By completing this questionnaire you indicate that you have read the above information and that you voluntarily agree to participate in this study. If you do not agree with the information presented above, please do not complete the questionnaire.

Appendix E
2015 Exploratory Survey of Local Health Departments

This begins the survey

Participant Information

Your name: _____

Your job title or position: _____

Health Department Information

Health Department Name: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Appendix E
2015 Exploratory Survey of Local Health Departments

Section 1: How does your local health department work with schools or programs of public health?

The purpose of this section is to gain an understanding of the ways that your local health department works with schools or programs of public health. Schools or programs of public health are defined as an academic program that offers graduate degrees in a public health science. At a minimum the school or program must offer the Master of Public Health (MPH) degree.

Instructions: Check "yes" or "no" for each activity your local health department has worked with a school or program of public health in the past 12 months.

	Yes	No
1. My local health department has accepted students as trainees, interns, or volunteers.	❑	❑
2. My local health department has offered students practicum opportunities	❑	❑
3. Local health department staff have served as faculty for a school or program of public health (e.g., regular, adjunct, or guest)	❑	❑
4. Faculty or staff from a school or program of public health have conducted program evaluation with our local health department	❑	❑
5. Faculty or staff from a school or program of public health have participated in a research project with the local health department	❑	❑
6. Faculty or staff from a school or program of public health have provided consulting services to the local health department for other reasons than program evaluation or research.	❑	❑
7. Faculty or staff from a school or program of public health have served on a local health department advisory group	❑	❑
8. Local health department staff have served on a school or program of public health advisory group in the past 12 months	❑	❑
9. My local health department has a formal written partnership agreement (e.g., memorandum of understanding, affiliation agreement, association agreement)) with a school or program of public health.	❑	❑
10. My local health department participates in an academic health department relationship (a formal affiliation between a public health practice organization and an academic institution designed to enhance public health education, training, research and/or service) with a school or program of public health.	❑	❑

If you answered "yes" to any of the previous questions (1 to 10) please complete the remainder of the survey.
If you answered "no" to all of the previous questions (1 to 10) you should stop now.

Appendix E
2015 Exploratory Survey of Local Health Departments

Section 2: Which schools or program of public health does your local health department interact with?
Instructions: Please list the schools or programs of public health that your local health department has worked with the most in the past 12 months. Remember, schools or programs of public health are defined as an academic program that offers graduate degrees in a public health science. At a minimum the school or program must offer the Master of Public Health (MPH) degree.

Name of the school or program	Name of your primary contact	How many years have you worked with this school or program?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Appendix E
2015 Exploratory Survey of Local Health Departments

Section 3: What are the intended benefits and impact of working with schools or programs of public health?

The purpose of this section is to gain an understanding about what you think is (or is not) important to gain by working with schools or programs of public health and what you think your work with schools or programs of public health has (or has not) effectively impacted. The intent is to identify gaps between what you "want to get" and what you "are getting" from the relationship with the schools or programs of public health.

Instructions: For each of the following indicators, please rate how important you think each is, and how effective the partnership has been for each. You should check two boxes for each item – one in each column.

	Importance					Impact				
	Very Unimportant	Unimportant	No Opinion	Important	Very Important	Very Ineffective	Ineffective	No Opinion	Effective	Very Effective
11. Develop a community health assessment (e.g., a data profile)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
12. Use current technology (e.g., GIS or statistical software)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
13. Maintain registries (e.g., immunizations, etc.)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
14. Investigate infectious diseases	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
15. Respond to emergencies	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
16. Use university laboratory services	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
17. Conduct health promotion programs	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
18. Communicate with the media	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
19. Strengthen community partnerships or coalitions	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
20. Develop a local health department strategic plan	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

Appendix E
2015 Exploratory Survey of Local Health Departments

	Importance					Impact				
	Very Unimportant	Unimportant	No Opinion	Important	Very Important	Very Ineffective	Ineffective	No Opinion	Effective	Very Effective
21. Develop a community health improvement plan	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
22. Develop a public health emergency response plan	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
23. Address laws, regulations, or ordinances	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
24. Identify personal health service needs of the community	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
25. Link individuals to personal health services	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
26. Address the competencies/skills of the public health workforce	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
27. Address the competencies/skills of current or future public health leaders	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
28. Evaluate population-based services (e.g., health promotion programs)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
29. Evaluate personal health services (e.g., prenatal care)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
30. Assess the delivery of the 10 essential public health services	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
31. Develop innovative practices	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
32. Gain linkages with other university programs	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
33. Conduct public health research	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

Appendix E
2015 Exploratory Survey of Local Health Departments

	Importance					Impact				
	Very Unimportant	Unimportant	No Opinion	Important	Very Important	Very Ineffective	Ineffective	No Opinion	Effective	Very Effective
34. Work with students to supplement the public health workforce	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
35. Work with faculty to supplement the public health workforce	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
36. Gain access to data held by the university	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
37. Gain access to the university's library	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
38. Gain access to the expert opinion of faculty members	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
39. Gain access to the university's technology (e.g., software)	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
40. Assist with applying for grants or other sources of funding	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

41. In your own words, what do you think is most important for your local health department to achieve by working with schools or programs of public health? Please write as much or as little as you like.

42. In your own words, what do you think your work with schools or programs of public health has been most effective at impacting? Please write as much or as little as you like.

43. In your own words, describe how your work with schools or programs of public health has (or has not) met your expectations? Please write as much or as little as you like.

Appendix E
2015 Exploratory Survey of Local Health Departments

Section 4: Local Health Department Characteristics

44. How many full-time equivalents (FTEs) were employed at your local health department in the most recent fiscal year? ..... _____
(Write In)

45. For your most recently completed fiscal year, what were the local health departments total expenditures? ..... _____
(Write In)

	Yes	No
46. Does your local health department have access to expertise in statistics?	❑	❑
47. Does your local health department have access to expertise in geographic information systems?	❑	❑
48. Has your local health department conducted a community health assessment in the previous five years?	❑	❑
49. Has your local health department developed a community health improvement plan in the previous five years?	❑	❑
50. Has your local health department developed a strategic plan in the previous five years?	❑	❑

Please scan and email this document to Kevin Kovach at kkovac5@uic.edu or mail it to Kevin Kovach, 1235 W. 70th Street, Kansas City, MO 64113.

Thank you for participating in the survey. I appreciate your time and effort. You will be entered into the raffle for one of the eight $20 Amazon gift cards.

Sincerely,

Kevin A. Kovach

Appendix F
2016 Group Interview Guide

Focus Group Discussion Guide

Information and Consent Process

Consent forms for focus group participants were completed in advance. Below is a summary of the information in the consent form that the facilitator should remind the participants of.

Thank you for agreeing to participate in the focus group. We are very interested to hear what your thoughts are about collaboration between local health departments and schools or programs of public health.

- *The primary purpose is to get your thoughts on what you think is valuable about your collaborative relationship. We are also interested in hearing about what you think is going well and what could go better with regard to how you work together.*
- *We included people from both the local health department and academic institutions because we want to learn what your shared aspirations are for your collaboration.*
- *The discussion will take roughly an hour and a half.*
- *What you say is completely confidential. We will not include your name or the name of your organization in any of the reports that come from this study.*
- *The focus group will be recorded so that we can transcribe the discussion. The recordings will be destroyed after the study is completed.*
- *We will send you a transcript of the discussion in about a week for you to review.*
- *You may refuse to answer any question or withdraw from the study at any time.*
- *We understand how important it is that this information is kept private. We ask that participants respect each other's confidentiality.*

Ground Rules

- *We ask that everyone participates.*
- *Please try to state your name before speaking, since this is taking place over the phone.*
- *Are there any questions? If not, let's begin.*

Introduce Myself

- *Educational background*
- *Work history*

Appendix F
2016 Group Interview Guide

Concept	Questions
Introduction (5 minutes)	1. First, I would like everyone to introduce themselves. Please, tell us your name and what your role is with regard to your collaboration.
Collaboration (10 minutes)	2. Next, please describe how your organizations work together? (PROBE FOR STUDENT LEARNING ACTIVITIES, LHD STAFF WORKING AS FACULTY, CONSULTING, RESEARCH, OR EVALUATION, AND ADVISING.)
Benefits of Collaboration (20 minutes)	3. How do you think your organization has benefited from working together? a. *Can you give me an example?* b. *Why do you think this is important for your organization?* 4. What do you think the most important benefits are? *a. Can you give me an example?* *b. Why do you think this is the most important for your organization?* *5.* How do you think that your collaboration has impacted public health practice? *a. Can you give me an example?* *6.* How do you think that your collaboration has impacted public health outcomes? a. *Can you give me an example?* (PROBE FOR: ACCREDITATION, CAPACITY, EFFICIENCY, GOALS, LEGITIMACY, CHANGE, IMPROVING THE REGIONAL/STATEWIDE PUBLIC HEALTH, ASSESSMENT, POLICY DEVELOPMENT, OR ASSURANCE)
Collaborative Advantage (20 minutes)	7. What do you want to get from your partner organization? a. What do you think is the most important thing to get from them? 8. How satisfied are you with your collaborative efforts? a. What makes you say this? 9. What type of goals do you think that your organizations can accomplish together that you could not accomplish by working alone? *a. Can you give me an example?* *b. Why don't you think you could have done this alone?*
Barriers & Facilitators (20 minutes)	10. What do you think is going well with regard to your collaboration? *a. Why do you think that this is going well?* 11. What isn't going well with regard to your collaboration? *a. Why do you think this isn't going well?* *b. How do you think this affects how your organizations work together?* c. *How have you addressed these issues?*
Reflection (10 minutes)	12. If everything were to go perfectly, what would your organizations have accomplished together in the next three years?
A Posteriori (5 minutes)	13. Finally, is there anything that we haven't discussed that you think is relevant to the value of your partnerships?

Thank you all for taking the time to participate in this discussion. I have really enjoyed it. I will transcribe the recordings in about a week and will email you the transcripts. Please feel free to let me know if you think I've captured our discussion accurately. Also, if something comes to mind that you think I should include in my study, please feel free to email or call me. Thanks again for helping me with this study. Have a nice day everyone.

Appendix G
Preliminary Codebook

Code	Definition	Example
Family 1: Public Health Benefits		
Monitor Health Status	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to collect, maintain, analyze, or interpret public health data. Statements that refer to the dissemination of public health information should be coded as "10EPHS: Inform, Educate, Empower." Statements made about how public health data are shared with coalitions should be coded as "10EPHS: Mobilize Community Partnerships."	The SPPH helped us to conduct a community health assessment.
Diagnose and Investigate	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to improve how the LHD identifies or responds to public health threats including both routine communicable disease surveillance (i.e., food-borne illness or reportable conditions) and emergency response (i.e., pandemic influenza or bioterrorism).	The SPPH helped us develop a surveillance plan for our infectious disease program.
Inform, Educate, Empower	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to create, communicate, or deliver health information through a variety of means including those controlled by the organization (i.e., website), through the media (i.e., press release, interview, or press conference), or through programmatic means (i.e., presentations to specific constituencies such as students or senior citizens).	We worked together to communicate the risks of exposure to raw milk after an outbreak of salmonella.
Mobilize Community Partnerships	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to manage or work with community coalitions aimed at improving the public's health or delivering the 10 essential public health services. Phrases that refer only to collaboration between the LHD and SPPH should be coded as "Meta-Strategy" instead.	By working with the SPPH we were able to develop a strategic plan for our community health coalition.
Develop Policies/Plans	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to develop plans or policies to prevent disease or injury, promote wellness, or to protect personal, community, and environmental health. Here, plans and policies must have an ultimate aim for improving health and not simply improving how the organizations collaborate or changing laws. Phrases that refer to plans and policies for collaboration should be coded as "meta-strategy" and plans or policies that refer to changing laws should be coded as "10EPHS: Enforce laws."	The SPPH helped us develop a community health improvement plan.
Enforce Laws	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to review, evaluate, revise, or enforce public health laws at the organizational, city, county, state, or national levels.	An intern reviewed the laws affecting our jurisdiction and compared them to our community

Appendix G
Preliminary Codebook

		health improvement plan.
Code	Definition	Example
Family 1: Public Health Benefits (Continued)		
Link/Assure Personal Health Services	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to address gaps between the community's need for and access to personal health services by linking individuals to services or providing them through the LHD. Personal health services are defined as those aimed at intervening at the individual level and are not population-based. Phrases that are population-based should be coded as "10EPHS: Develop Policies/Plans."	We were able to develop a partnership with the residency program hosted by the University by working with the SPPH to provide prenatal care.
Assure Competent Workforce	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to identify, set, measure, or close gaps in the competencies of the public health workforce. Here, the public health workforce refers to any individual that contributes to the delivery of the 10 essential public health services and is not limited to LHD employees.	The SPPH helped us develop a training plan for the LHD.
Evaluate	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to judge the accessibility or quality of existing personal health services or population-based programs in order to refine how resources are allocated or services and programs are structured. Research into new programs or programs that are not currently in place should be coded as "10EPHS: Research."	By working with the SPPH we were able to develop a quality improvement program for LHD services.
Research	Statements made by either LHD or SPPH staff about how collaboration was intended to or has helped to conduct studies that can be generalized to the broader public health discipline or that promote innovation (i.e., change or adoption of new practices) in the local public health system. Statements related to how research practices (i.e., surveys, epidemiology, biostatistics, focus groups, etc.) were used for routine organizational purposes (i.e., monitoring health status, diagnosing and investigating, etc.) should be coded using the other 10EPHS designation.	With the SPPH we researched how our cross-jurisdictional sharing practices enhanced our capacity and published an article so that other LHDs could learn from our experience.
Faculty	Statements made by SPPH staff about how collaboration was intended to or has helped enhance the SPPH faculty's practical application of public health education or research.	We developed a new concentration and needed faculty to teach courses.
Student	Statements made by SPPH staff about how collaboration was intended to or has helped enhance the student's practical application of public health education or research.	We felt students needed to understand practice.
Pipeline	Statements made by SPPH staff about how collaboration was intended to or has helped educate or link students to professional career opportunities.	The LHD has hired students graduating

		from our MPH program.
Code	Definition	Example
Family 1: Public Health Benefits (Continued)		
Accreditation	Statements made by either the LHD or SPPH about how collaboration has helped them with their accreditation efforts. This could include PHAB, CEPH or other types of accreditation (state-based public health systems).	Collaboration has really helped us with accreditation.
Family 2: Organizational Benefits		
Capacity	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or has helped LHDs or SPPH gain access to resources (i.e., human, technological, financial, etc.) that supports their primary mission. Statements not about resources should use another code.	We have tried to use interns to supplement our communicable disease surveillance program because we tend to lack capacity here to keep up.
Efficiency	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or have helped LHDs or SPPH to bear fewer costs or utilize fewer resources to produce services.	We can offer more introductory courses using LHD staff as adjunct professors, compared to having to pay full time faculty.
Productivity	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or has helped LHDs or SPPH to accomplish their mandates, mission, or goals. This code is about outcomes and statements that do not specifically link collaboration to outcomes should be coded using a different "Self Interest" code.	We needed to do a community health assessment for accreditation and the SPPH helped us do this.
Legitimacy	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or has helped LHDs or SPPH to protect themselves from critique from outside sources (e.g., the public, city council, county commissioners, students) in order to maintain or strengthen their claim to their role, function, or resources.	We were criticized for concentrating too closely on pure science and not practice. We wanted to work with the LHD to help alleviate these concerns.
Code	Definition	Example
Family 2: Organizational Benefits (Continued)		
Security	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or has helped LHDs or SPPH to avoid making organizational changes when faced with adverse environmental conditions. Statements that discuss how collaboration helped the organization make changes should be coded as “Adaptability."	The ACA threw us through a loop. Do we continue to do clinical services? The SPPH helped us develop a plan to bill insurance, allowing

		us to keep our clinical services.
Adaptability	Statements made by either the LHD or SPPH about their own organization about how collaboration was intended to or has helped LHDs or SPPH to make organizational changes (i.e., reorganization, revised mission/vision) in order to cope with environmental circumstances (i.e., PPACA, budget cuts). Statements about how collaboration was intended to or has helped LHDs or SPPH to avoid making organizational changes due to environmental conditions should be coded as "Security."	The ACA threw us through a loop. Do we continue to do clinical services? The SPPH helped us develop a plan to concentrate on the core public health functions.
Family 3: Location of Benefits		
LHD Benefits	Statements made by the LHD about how collaboration has benefited the LHD. This code should always co-occur with a code from the families public health benefits or general organizational benefits.	It was really important that the SPPH could help us with assessment.
SPPH Benefits	Statements made by the SPPH about how collaboration has benefited the SPPH. This code should always co-occur with a code from the families public health benefits or general organizational benefits.	It was really important that the LHD could host hour MPH students.
Shared Benefits	Statements made by the LHD and the SPPH about how collaboration benefits both the LHD and SPPH.	I think that we both found our community advisory council to be beneficial.
System Benefits	Statements made by the LHD and the SPPH about how collaboration benefits society or the greater public health system. This should include statements that allude to benefits going beyond their organizations (the LHD and SPPH).	We were really able to bring in the communities voice through the community advisory council – to empower our residents.
Code	Definition	Example
Family 4: Barriers/Facilitators		
Trust	Statements made by either LHD or SPPH staff about how confident they are that the other organization will fulfill its promises and will not exploit its vulnerabilities. Supports answering the question, "should we risk working with them?"	We wanted to work more closely with the LHD but it never seemed like they could make collaborating a priority. They missed meetings, ignored students, and generally didn't seem interested.

Appendix G
Preliminary Codebook

Competence	Statements made by either LHD or SPPH staff about how capable the other organization is of doing what they need. Supports answering the question, "Can the other organization help?"	We found that students weren't able to get the gist of the program until their term was near the end. This created a cycle of training and leaving, which created more work for us.
Reciprocity	Statements made by either LHD or SPPH staff about how they perceive the equality of the degree that collaboration meets their needs, or equality of the degree of effort being placed into the collaboration by each organization.	We provide a lot of staff time to work with students from the SPPH, but we don't ever seem to see faculty members, just students.
Effort	Statements made by either LHD or SPPH staff about how they perceive the degree of exertion or non-financial resources required to collaborate compared with what it would normally take to do a similar task individually.	It seemed to take a lot of work to do a project that seemed relatively simple.
Time	Statements made by either LHD or SPPH staff about how they perceive the amount of time required to collaborate compared with what it would normally take to do a similar task individually.	We could have done that project a lot faster on our own.
Financial Resources	Statements made by either LHD or SPPH staff about how they perceive the financial costs required to collaborate compared with what it would normally take to do a similar task individually.	We provided faculty support free of charge, when they could have been working on grant projects that bring money into our institution.
Meta-Strategy	Statements made by the LHD or SPPH about how they have worked to develop a strategy for their collaboration, which includes identifying goals that they could not accomplish without collaborating.	We determined that if we worked together around accreditation – there was a lot we could both benefit from.

Appendix H
Final Codebook

Code	Definition
Theme 1: Benefits to Education	
Changes Teaching	Use this code to refer to how collaboration has resulted in changes to how faculty teaches courses.
New Perspectives (Faculty)	Use this code to refer to how collaboration has helped to provide new perspectives for faculty members.
LHD Staff Teaches	Use this code to refer to when LHD staff teaches a course.
LHD Staff Presents	Use this code to refer to when LHD staff present in a course.
Expand Course Offering	Use this code to refer to how faculty or staff perceive that they could expand their course offerings by working with LHDs.
Changes Students for the Better	Use this code to refer to how faculty perceive that students are improved by their internships or other work with LHDs.
New Perspectives (Students)	Use this code to refer to how collaboration has helped to provide new perspectives for students.
Create Interest (Students)	Use this code to refer to how LHD officials think they can help to motivate students to enter a career in local public health service.
Marketability (Students)	Use this code to refer to how students improve their skills or expertise by working with LHDs, so that they are viewed more favorably by potential employers.
Networking (Students)	Use this code to refer to how students can meet and get to know individuals working in the public health field by their work with LHDs.
Jobs (Students)	Use this code to refer to how students can directly gain employment by their work with LHDs.
Future PH Workforce	Use this code to refer to how collaboration helps to improve the pipeline of students to public health practice.
Required Degree	Use this code to refer to how students are required to complete an internship or other service learning activity for their degree.
Theme 2: Benefits to Practice	
Accreditation	Use this code to refer to how collaboration can help with PHAB, CEPH or similar accreditation.
CHA/CHIP	Use this code to refer to how collaboration can help with community health assessment or community health improvement processes.
Community Engagement	Use this code to refer to how collaboration helps LHDs go beyond working with organizations in the community, to working directly with people to get their voices.
Improved Service Delivery	Use this code to refer to discussion about how collaboration helps improve service delivery, such as environmental health or personal health services.
Data Collection and Analysis	Use this code to refer to how collaboration helped improve how LHDs collect, analyze or use data.
Evidence-Based Practice	Use this code to refer to how collaboration can help LHDs interpret, translate, or use the evidence base better.
Better Public Health Practice	Use this code when it refers to how collaboration has improved the LHD's provision of the 10 essential public health services or other programs and functions.
Improved PH Outcomes	Use this code to refer to specific health outcomes that collaboration helped bring about.

Appendix H
Final Codebook

Evaluation	Use this code to refer to how collaboration helped improve how LHDs evaluate or judge the effectiveness of their programs.
Organizational Capacity	Use this code when it refers to how collaboration can help improve LHD organizational capacity (number of employees, expertise, etc.).
Grant Writing	Use this code to refer to discussion about how collaboration helps with grant writing or funding sources.
Elected Officials	Use this code to refer to how collaboration helped the LHD work with elected officials, for policy change or funding.
Credibility	Use this code to refer to how collaboration helped improve the trustworthiness of LHDs or SPPH from their stakeholder's perspective.
Organizational Management	Use this code to refer to discussion about how collaboration helps LHDs with organizational management, such as strategic planning, quality improvement, etc.
Changed Thinking About 10 EPHS	Use this code to refer to how collaboration can help LHDs change perspectives about public health services to be more population- or evidence-based.
Maxed Out	Use this code to refer to discussion about how LHDs lack capacity, expertise or other issues and feel like they are being asked to do more than they can achieve.
Provides Expertise	Use this code to refer to discussion about how the LHD receives expertise from the SPPH.
Training	Use this code to refer to discussion about how the SPPH provides training for LHD staff.
Non-Partial Support	Use this code to refer to discussion about how the SPPH supports the LHD's positions with other organizations.
Facilitation	Use this code to refer to discussion about how the SPPH provides the LHD with facilitation support for group processes.
Surge Capacity	Use this code to refer to discussion about how the SPPH can provide faculty or students to supplement LHD staff during emergencies.
Up-To-Date	Use this code to refer to discussion about how the SPPH helps keep the LHD informed of the newest evidence-based practices.
New Perspectives (LHD)	Use this code to refer to how collaboration has helped to provide new perspectives for LHD staff.
Theme 3: Benefits for Research	
Gaps in the Evidence-Base	Use this code to refer to discussion that focuses on areas of public health that need more research.
Contribute to Evidence-Base	Use this code to refer to how collaboration can help to promote research and close gaps in the evidence-base.
LHD Connects to Community	Use this code to refer to how LHDs can help to connect SPPH to their community.
Academia Better at Publishing	Discussion focused on how the SPPH is better at publishing in peer reviewed journals than LHDs.
Theme 4: Barriers and Facilitators to Collaboration	
Proximity	Discussion focused on the distance between the LHD and SPPH.
Geographic Equity	Use this code to refer to discussion about the need to work with remote LHDs because everyone deserves quality public health services.
Not enough close internships	Use this code to refer to discussion about how there are not enough internships in the SPPH's community to fulfil their student's needs.

Appendix H
Final Codebook

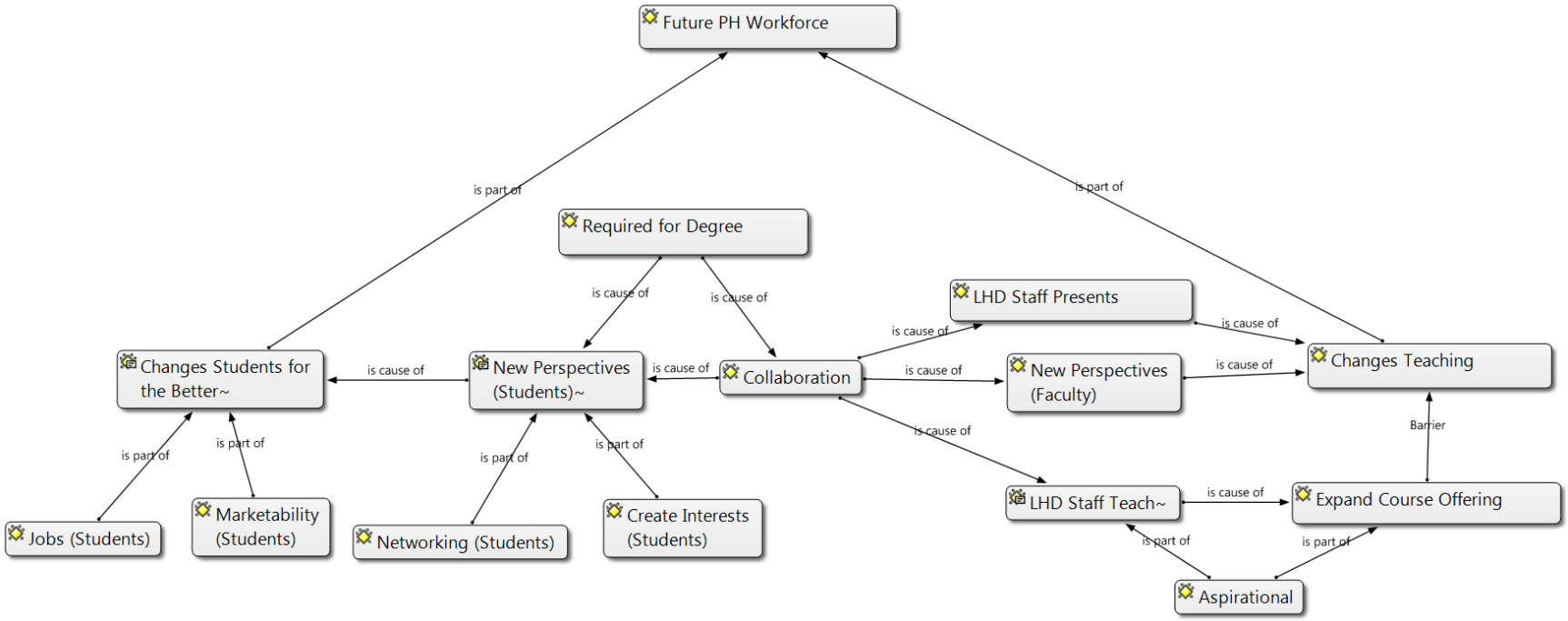
Community Involvement	Use this code to refer to how the LHD and SPPH are both involved in community-based activities, although, not necessarily as a part of their collaboration.
Rural LHDS provide different perspective	Use this code to refer to discussion from SPPH about how rural LHDs are good for students to intern at because they can get a broader or different perspective on public health practice.
Student Issues	Use this code to refer to issues that students face interning at certain LHDs.
Commute	Use this code to refer to issues students have commuting to internship sites.
Housing	Use this code to refer to issues students have relocating, finding housing, or affording housing at internship sites.
Financial Assistance	Use this code to refer to how financial assistance (stipends, paid internships) can help overcome barriers to proximity.
Student Reluctance	Use this code to refer to how students can be reluctant to relocate to remote LHDs due to their lack of community amenities.
Remote Working	Use this code to refer to how working remotely (via internet) can help overcome barriers to proximity.
Student Exposure to Remote LHDs	Use this code to refer to discussion of how faculty are worried that their students do not get enough exposure to LHD practice.
LHD Characteristics	Use this code to refer to discussion about LHD characteristics that SPPH faculty or staff find desirable.
Cutting Edge LHDs	Use this code to refer to discussion about how LHDs that are higher performers are more desirable to SPPH faculty and staff.
Dedicated Part of LHD	Discussion about how one division or department of the LHD tends to collaborate with the SPPH more than other parts of the LHD.
LHD Staff Characteristics	Use this code to refer to discussion about how LHD staff can champion or lead collaborative efforts with SPPH.
Champion	Use this code to refer to discussion about how LHD staff work with SPPH faculty or staff to address problems that they have collaborating.
Builds Trust	Use this code when it refers to issues about trust, such as competence, loyalty, or confidence in someone from the other organization.
Alumni	Use this code when discussion refers to how alumni are helpful for facilitating collaboration.
Passion	Use this code when discussion refers to how LHD staff have a passion for collaborating with SPPH.
Address Hesitancy	Use this code when discussion refers to how LHD staff work with other LHD staff to promote collaborating with SPPH.
Experienced Staff	Use this code to refer to discussion about how the degree of experience LHD staff have is important to SPPH.
Systematic Collaboration	Use this code when discussion refer to how systematic or planned the approach to collaboration is.
Systematic Orientation	Use this code to refer to how a more organized orientation for students is desirable to SPPH faculty and staff.
Focal Point	Use this code to refer to a go-to-person that spearheads collaboration for the organization. Someone that people from the other organization can go to for help working together.
Builds Connections	Use this code when it refers to how individuals need to work to engage people that they don't know to enhance collaboration.

Appendix H
Final Codebook

Better Student Experience	Use this code when it refers to how some LHDs are perceived to be able to provide better internships or practicum than other LHDs.
Steering Committee	Use this code when discussion refers to a central planning committee (steering committee) that leads the collaborative efforts between the LHD and SPPH.
Systematic Projects	Use this code when discussion refers to how student internship projects can be planned in a better way to make them more strategic and useful.
Agreements Provide Clarity	Discussion mentions that the LHD and SPPH have an agreement or plan and states that this clarifies how they work together.
Relationship overcome planning	Use this code when discussion refers to how strong inter-personal relationships between members of the LHD and SPPH can overcome the need for more formal plans and contracts.
Culture of Collaboration	Use this code to refer to issues related to the expectations and norms within the LHD or SPPH related to collaboration.
Critical Partner	Use this code to refer to how the LHD or SPPH perceives that working with the other organization is essential to achieving their mission.
Reciprocity	Use this code to refer to how providing the other organization with resources helps to improve their collaborative relationship.
Understands our Needs	Use this code to refer to discussion about the need for individuals from one organization to understand the needs of individuals from the other organization.
Engaged Faculty	Use this code to refer to discussion of how faculty are engaged with their collaboration, not just students.
Bureaucracy	Use this code to refer to issues related to organizational rules and processes.
Faculty with Practice-based Experience	Use this code to refer to discussion of how faculty have worked in a practice-based setting, such as LHD, state health department, hospital, etc.
Tangible Reason for Collaboration	Use this code to refer to discussion about the need for concrete tasks when collaborating, not just continual planning or “pie in the sky.”

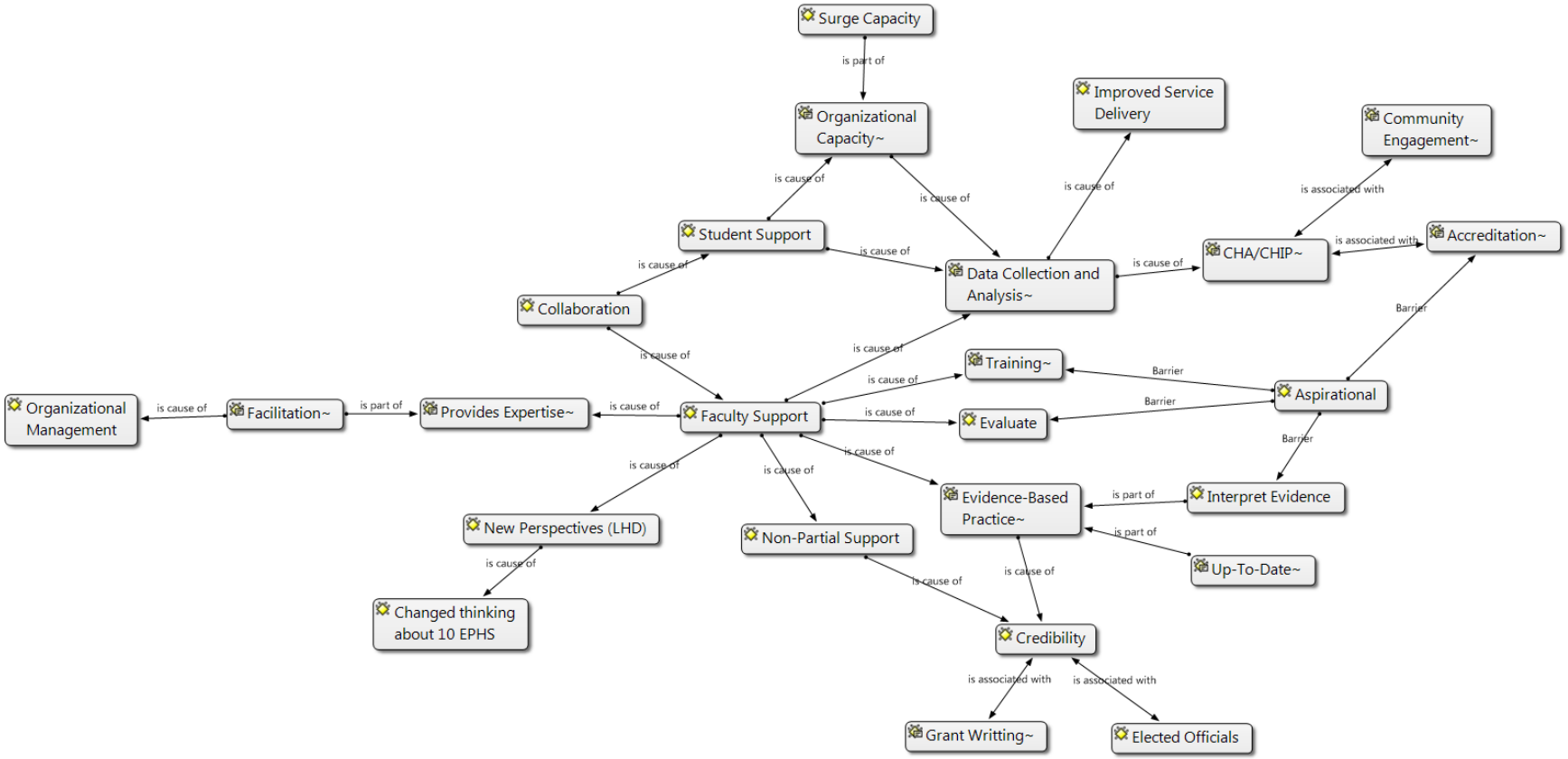
Appendix I
Qualitative Data Analysis – Network Views

Benefits to Education



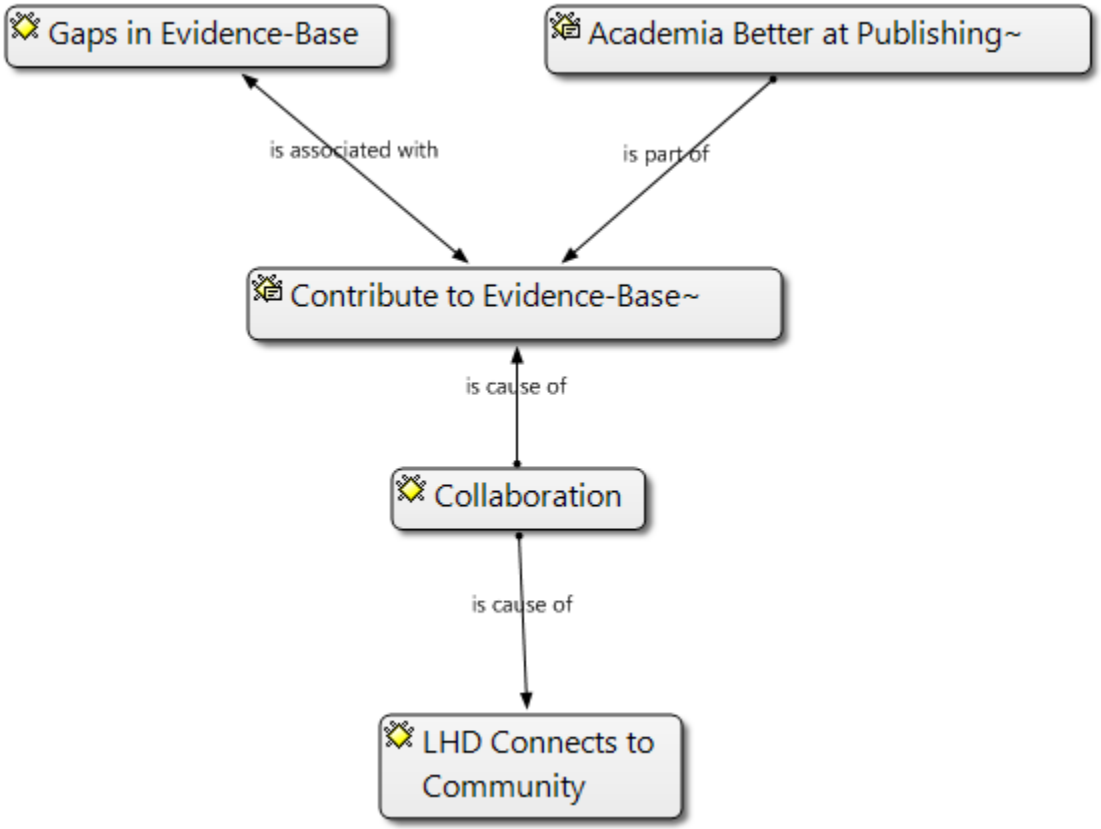
Appendix I
Qualitative Data Analysis – Network Views

Benefits to Practice



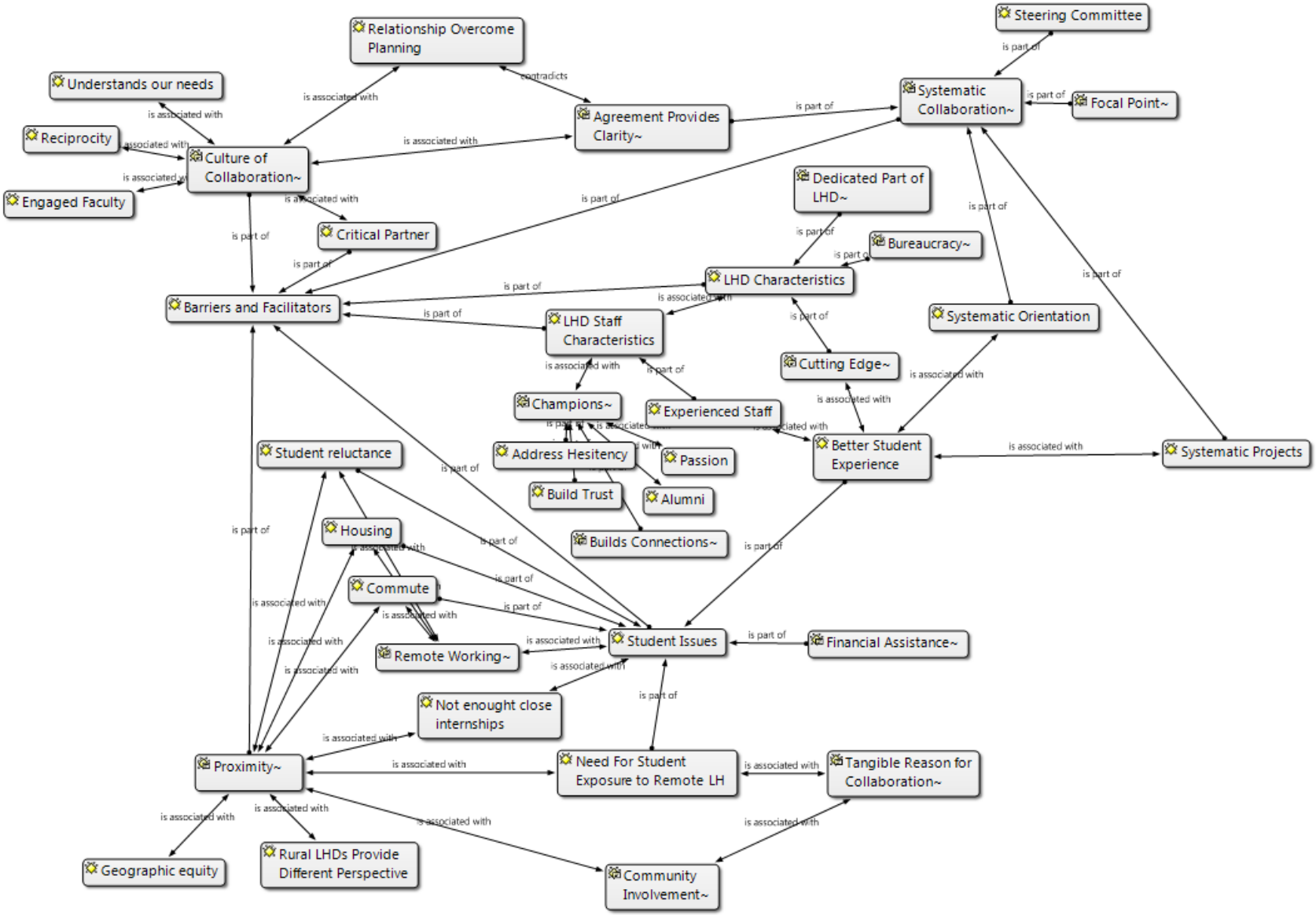
Appendix I
Qualitative Data Analysis – Network Views

Benefits to Research



Appendix I
Qualitative Data Analysis – Network Views

Barriers and Facilitators to Collaboration



Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 1: WHAT IS THE EXTENT OF COLLABORATION BETWEEN LHDS AND SPPH?			
Construct	**Interpretation of Findings and Recommendations Supported**	**2008 Survey**	**2015 Survey**
Continuum of Collaboration: A general order of low to high level collaboration.	• Tends to be a general order of low to high level collaboration, starting with student learning activities, and adding consulting, research & evaluation; adjunct faculty; and advising – in that order. • Not every LHD fits this model, showing that the way collaboration grows between LHDs and SPPH can vary.	86% of LHDs fit this model	73% of LHDs fit this model
Extent of Collaboration: How widespread collaboration with SPPH is among LHDs.	• Collaboration between LHDs and SPPH is widespread, with 81.2% of LHDs collaborating with SPPH to some extent, and 23.9% collaborating to a high degree in 2015. • Collaboration between LHDs and SPPH has increased, with a 12.0 percentage point increase in any collaboration, and a 13.3 percentage point increase in those using 4 strategies between 2008 and 2015.	No Interaction 30.8% 1 Strategy 28.2% 2 Strategies 17.4% 3 Strategies 12.9% 4 Strategies 10.6% Student Learning 64.6% Consulting, etc. 36.2% Advising 16.5% Faculty 26.6% Contract N/A AHD N/A	No interaction 18.8% 1 Strategy 21.8% 2 Strategies 18.4% 3 Strategies 17.0% 4 Strategies 23.9% Student Learning 72.8% Consulting, etc. 53.2% Advising 41.9% Faculty 37.5% Contract 37.5% AHD 21.4%
SUPPORTED RECOMMENDATIONS: • **Supports the recommendations that LHDs should form high quality internships, because almost every LHD and SPPH collaborative involves this type of activity.** • **Supports the recommendation that SPPH should engage LHDs in ways other than student learning activities, because there are gaps between these more strategic activities (consulting, evaluation, research, advising, AHD) and student learning activities.**			

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 2: WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LHDS AND SPPH?			
Construct	**Interpretation of Findings and Recommendations Supported**	**2015 Survey**	**2016 Group Interviews**
Benefits to Education: How collaboration between LHDs and SPPH can improve student education.	Student learning activities are foundational to collaboration because it meets an ongoing and tangible SPPH need, and LHDs value it.	• LHDs ranked "students supplement workforce" #1 most important (87.2%) • LHDs mentioned benefits of working with students, such as helping build the future public health workforce, students supplementing their workforce, and gaining special expertise.	• Meets a long term and tangible need for SPPH • Valued by LHDs
	SPPH value collaboration for educational activities because it provides a new perspective to students, which readies them for practice.		• Provides new perspectives to students • Increases student interest in local public health • Improves students' marketability
	SPPH value collaboration because it provides faculty with new perspectives, which makes them better teachers.		• Provides faculty with new perspectives • Helps align education with practice
	Educational benefits are perceived to be largely realized.	• 18 percentage point gap between importance and effectiveness, which ranks as second best.	• "Key things to come from collaboration." SPPH • "I'm satisfied" SPPH
	High collaborators more likely to realize educational benefits	• 11 percentage point gap and 18 percentage point gap between how high and low collaborators rank importance and effectiveness of "students supplement workforce" respectively.	• Higher collaborators tended to discuss a more robust and systematic approach to collaborating around education.
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that LHDs should form high quality internships, because both LHDs and SPPH find student learning activities to be valuable and internships provides a tangible task for LHDs and SPPH to develop a collaborative relationship around.** • **Supports the recommendation that SPPH should engage LHDs in other way of collaboration, not just student learning activities, because faculty receives new perspectives by working with LHDs, which can improve how they teach.**			

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 2: WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LHDS AND SPPH?			
Construct	**Interpretation of Findings and Recommendations Supported**	**2015 Survey**	**2016 Group Interviews**
Benefits to Practice: How collaboration between LHDs and SPPH can improve LHD function or the public health system's function	Most common benefit is enhanced capacity for data collection, analysis or use. Can improve and even revolutionize CHA and make information more actionable.	• LHDs ranked "evaluate population-based services" #2 most important (84.4%) and "CHA" #3 most important (81.9%). • Access to special expertise (i.e., epidemiologist)	• Improved data analysis for some LHD's CHA • Revolutionized one LHD's CHA • Made data more actionable by linking it with modern technology (GIS)
	Another common benefit was assistance with CHIP and other community coalitions. However, this was mostly limited to local collaborations.	• LHDs ranked "strengthen community partnerships" #5 (81.3%) and "CHIP" #8 most important (79.1%). • "We were able to complete our CHA and CHIP… with the help of our university partner… Without them, this would have been a difficult task."	• Leadership and evidence-based lens • Capacity for evaluation • Resources for selected initiatives • This was only discussed in a robust way by local collaborators.
	There is a desire to develop innovative practices and improve evidence-based practice, but relatively little was being done to support these types of initiatives.	• LHDs ranked "develop innovative practices" #6 most important, but there was a 31.6 percentage point gap between importance and effectiveness. • Assistance with evidence-based practice mentioned by 6.9% of LHDs, but discussed mostly in terms of having access to information.	• It is difficult for LHD officials to stay current on the evidence, so they want SPPH to provide them with this information. • Need to help LHDs interpret the evidence-base, since it is questionable if and how certain practices translate to different communities.
	May promote change in the LHD by providing new perspectives on the meaning of public health practice, as well as resources for strategic planning type activities.	• Strategic planning – "We have used [SPPH] to facilitate an internal discussion about [a] merger of our three LHDs. They have been excellent as a neutral party to facilitate discussion."	• Strategic planning – "We received assistance of an organizational psychologist." LHD • New perspectives – "LHDs are very nurse driven here. So talking about accreditation and the 10 essential public health services; that's not something they are used to. That's really valuable." LHD
	May improve the LHD's credibility by improving the perception that they are more evidence-based and by having a non-partial organization supporting their work.	• "We also are able to build more competitive grant proposals by partnering with SPPH on program development."	• Perceived as more evidence-based – "One of the things that we do when we write grant applications is to demonstrate our relationship with the SPH, to show capacity for research and evaluation that they bring. So that builds our credibility." LHD • Supportive voice – I think having multiple voices saying the same thing is critical. [When the LHD] gives a recommendation… to our council… But we work for [the council]." – LHD
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that SPPH should engage LHDs in other way of collaboration, not just student learning activities, because collaboration can promote change in LHDs, but many gaps exist with regard to how much is being done in this regard.** • **Supports the recommendation to form stretch objectives, because this may help to fill some of the gaps between what is possible and what is being achieved.** • **Supports the recommendations for PHAB to support LHD and SPPH collaboration, or for there to be funding to support collaboration, because this could be a way for LHDs to meet some of PHAB's criteria, or more simply, a way to improve local public health practice and maybe to improve public health outcomes.**			

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 2: WHAT ARE THE BENEFITS OF COLLABORATION BETWEEN LHDS AND SPPH?			
Construct	**Interpretation of Findings and Recommendations Supported**	**2015 Survey**	**2016 Group Interviews**
Benefits to Research: How collaboration between LHDs and SPPH improves public health research	Collaboration can enhance public health research by connecting SPPH to communities.		• "Then another piece is research. We have worked with several different LHDs on an NIH grant… The LHDs have played a crucial role in building relationships with critical access hospitals and clinics that would be intervention sites for the proposed study. They have laid the foundation for that relationship." – SPPH
	Collaboration can help close gaps in the evidence-base by helping to ensure that LHDs, more regularly, conduct evaluations in a way that they can contribute to the evidence-base and that these evaluations are done more frequently in communities where research is not typically done.		• "If you look at the Community Guide, you will find it's very limited… Why is that? Because it's being done every day, but nobody is doing it in a way that they can actually evaluate it… So when was the last time that something was done here in a way that it could be published and become part of the evidence…? That's the kind of thing that I want to be able to do and continue to do." – SPPH
	LHDs perceive research to be an important piece of collaboration with SPPH. However, it is unclear how effective collaboration is at promoting public health research, especially in terms of contributing to the evidence-base.	• LHDs ranked "conduct public health research" #9 most important (78.8%), but there was a 21.4 percentage point gap between importance and effectiveness.	• LHDs discussed public health research in ways that included assessment and evaluations not intended to contribute to the evidence-base. • None of the LHDs or SPPH discussed having a shared formal research agenda.
	It is unclear if high collaborators are more likely to realize research benefits.	• 19.1 percentage point gap and 18 percentage point gap between how high and low collaborators rank importance and effectiveness of "conduct public health research" respectively.	• Research was only discussed in-depth by two of the eight LHD/SPPH groups. One was a high collaborator and another was a low collaborator. However, the high collaborator did discuss an actual research project, while the low collaborator discussed ideas for the future.
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that SPPH should engage LHDs in other way of collaboration, not just student learning activities, because collaboration can help SPPH conduct research, and this is something that LHDs also value, which would help them stay motivated to participate in the collaborative.** • **Supports the recommendation to form stretch objectives, because this may help to fill some of the gaps between what is possible and what is being achieved.** • **Supports the recommendations for grant funding to support collaboration, because this could be a way to facilitate more useful or translatable research.**			

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 3: WHAT ARE THE BARRIERS AND FACILITATORS TO COLLABORATION BETWEEN LHDS AND SPPH?					
Construct	**Interpretation of Findings**	**2016 Group Interviews**	**2015 Survey**	**2008 Survey**	
Proximity: The distance between the LHD and SPPH	LHDs and SPPH within closer proximity of one another are more likely to collaborate because it is easier to do so. However, there is still recognition that non-local collaboration is important.	• Easier to host students locally due to commute, costs, and reluctance. • More opportunities for local LHDs and SPPH to collaborate (coalitions, CHIP). • Importance of geographic equity • Not enough local internships • Rural LHDs offer different perspectives	• More difficult to host students	**Distance** 117+ 68 – 116 31 – 67 0 – 30	**AOR (95% CI)** reference 0.94 (0.49 – 1.79) 0.95 (0.52 – 1.75) 2.55 (1.18 – 5.51)
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that long-distance collaborations between LHDs and SPPH should be expanded, because LHDs more than 30 miles away from SPPH are much less likely to collaborate. Forging these relationships is important, because some SPPH may have difficulty filling their students' needs for good internships, and rural LHDs can provide a different perspective for students and faculty. In addition, "geographic equity" is important. This is the notion that that all populations are deserving of high quality public health services, and if collaboration between LHDs and SPPH helps to improve public health, as this study suggests, and collaboratives are not formed with remote LHDs, than this will increase inequities in who receives high and low quality public health services.** • **Supports the recommendation for leadership that can see through problems to possibilities, because the issue of proximity could be taken as a non-starter, or unnatural. But some of the participants were able to see through this issue and form the beginnings of a good collaborative relationship.**					
LHD Capacity: The total resources available to the LHD to carry out their mission.	LHD capacity is highly related to collaboration. Capacity is important because collaboration does require extra work and LHDs need the staff to manage and lead collaborative efforts. In addition, capacity is related to performance and SPPH were more likely to want to collaborate with higher performing LHDs. Finally, collaboration with SPPH may be viewed as a way to enhance LHD capacity, but this may be difficulty to accomplish.	• More staff to lead collaborative efforts • More staff to participate in collaborative efforts (practicum) • Capacity is associated with performance and SPPH may prefer to collaborate with high performing LHDs	• Collaboration is difficult and requires work by LHDs • Difficult to sustain the benefits from collaboration. Need for a more constant flow of help	**Total Population** ≤99,999 100,000 to 499,999 500,000+	**AOR (95% CI)** Reference 2.34 (1.28 – 4.26) 12.26 (3.87 – 38.85)
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that LHDs should develop high-quality internships. By linking internships to strategy and using data about student's needs and developing internship projects that can be implemented sequentially, internships can help to address more robust public health problems, than a one-project at a time approach.**					

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 3: WHAT ARE THE BARRIERS AND FACILITATORS TO COLLABORATION BETWEEN LHDS AND SPPH?				
Construct	**Interpretation of Findings**	**2016 Group Interviews**	**2015 Survey**	**2008 Survey**
Executive Characteristics: The qualifications of the LHD executive.	LHD executives may be more likely to promote collaboration with SPPH is they have pre-existing connections with SPPH, such as being an alumni. In addition, LHD executives can help to set expectations about collaboration by tasking people to manage and lead collaborative efforts and to share resources with SPPH.	• Sets expectations for collaboration by showing commitment and sharing personnel or resources • Builds and maintains relationships with SPPH. Being alumni can be important.	• Builds and maintains relationships with SPPH. Being alumni can be important.	**Executive's Highest Degree** / **AOR (95% CI)** Bachelor's or less: Reference Master's: 2.21 (1.21 – 4.01) Doctorate: 1.77 (0.79 – 3.95)
Workforce Characteristics: The number, type and qualifications of LHD employees	LHD workers can promote collaboration by working to solve problems and connect other parts of the organization with the collaborative efforts, which may help to build trust. In addition, preexisting connections, such as being an alumni can be important.	• Connect different parts of the LHD (Environmental health) • Health educators/health promotion divisions seem to be more likely to be involved. • Alumni – admiration for their alma mater		**Public Health Disciplines Employed** / **AOR (95% CI)** EH Specialist: 0.86 (0.43 – 1.73) Epidemiologist: 1.21 (0.67 – 2.19) Health Educator: 2.11 (1.23 – 3.63) PHEP Coordinator: 1.57 (0.89 – 2.76)
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that leaders are needed to build and cultivate relationships between LHDs and SPPH and that the executive can help set the tone or develop a culture in the LHD that staff will be expected to collaborate.** • **Supports the recommendation that leadership at all levels is necessary to support high functioning collaboration because staff are often the primary champions or facilitators of collaboration. Staff often solves the problems, build trust, and connect new people to the collaborative efforts.** • **Supports the recommendation that champions should be identified and empowered to promote collaboration because staff are often the primary champions or facilitators of collaboration. Staff often solves the problems, builds trust and connects new people to the collaborative efforts.**				

Appendix J
Chain of Evidence – Findings, Supporting Data, and Recommendations

RESEARCH QUESTION 3: WHAT ARE THE BARRIERS AND FACILITATORS TO COLLABORATION BETWEEN LHDS AND SPPH?				
Construct	**Interpretation of Findings**	**2016 Group Interviews**	**2015 Survey**	**2008 Survey**
Cultural Differences: A difference between what collaborating organizations think is valuable.	Some LHDs do not think that SPPH understand local public health practice, or have their best interests in mind.	"Faculty can get into their academic bubbles."	• "Most academia has no idea what it is like to actually practice public health in the real world." • "Schools are really not interested in real world activity. They have requirements for field experience for their students, but that is as far as it goes. They are not really interested in working with us in meaningful ways."	**N/A**
Expectations: A perspective of what the best case scenario is.	Many LHDs are satisfied with their collaboration with SPPH. However, many are not and would like to have closer relationships with SPPH and work together to do more than just host students.		• "Hosting students has been a favorable experience, but we want to go beyond just hosting students."	**N/A**
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that a practice, research, and educational agenda is needed to support the collaborative's work because, it may help to overcome cultural differences by providing assurance that both LHD and SPPH needs will be addressed, which may help to make sure that expectations are met.**				
Strategy: The degree that collaboration has been formalized and planned.	A more formalized strategy for how the process of collaboration works and what the vision or goals of the collaboration are is preferable to a less structured approach, because this helps facilitate action, provides clarity for the joint mission, and helps keep one another accountable – all of which help ensure that higher-level goals are worked towards and attained.	• One point of contact • Formal orientation to LHD • Sets expectations • Guides process • Makes aspirational goals more tangible	**N/A**	**N/A**
SUPPORTED RECOMMENDATIONS: • **Supports the recommendation that a practice, research, and educational agenda is needed to support the collaborative's work because LHDs and SPPH with a more formal process and more formalized goals were more likely to have set higher-level goals and more likely to be achieving these goals.**				

Appendix H
Curriculum Vitae

Kevin A. Kovach, MSc, CHES
1235 W. 70th Street, Kansas City, Missouri 64113
Phone: (734) 347-5745 // E-mail: kevinkovach@hotmail.com

EDUCATION:

DrPH, Leadership	University of Illinois at Chicago	*in progress*
MSc, Epidemiology	London School of Hygiene and Tropical Medicine	2009
BS, Public Health Education	Central Michigan University	2003

PROFESSIONAL EXPERIENCE:

Population Health Manager, **2014 to present**
American Academy of Family Physicians, Leawood, Kansas

Mr. Kovach manages the American Academy of Family Physicians' Population Health Department. The Population Health Department aims to assist members of the Academy with improving population health by developing education, resources, and tools to support prevention and health equity. Specific duties include acting as the staff executive to the Subcommittee on Health Equity and the Subcommittee on Public Health Issues – part of the Academy's formal governance structure; building up different lines of business, such as those to support health equity, tobacco cessation and control, and obesity prevention. This requires strategic planning, grant writing, collaboration and relationship development, and performance management skills. Mr. Kovach is also a member of the Division on Health of the Public and Science's Management Steering Committee.

Epidemiologist II **2011 to 2014**
Johnson County Department of Health and Environment, Olathe, Kansas

Mr. Kovach managed the department's community health assessment and assisted with community health improvement planning, quality improvement, PHAB accreditation, and communicable disease control. Mr. Kovach also helped to advance relationships with multiple partners in the community, including the University of Kansas' Master of Public Health (MPH) program. Mr. Kovach acted as a preceptor for multiple MPH students and spearheaded work to become an academic health department.

Cities Readiness Initiative Coordinator, **2008 to 2011**
Johnson County Department of Health and Environment, Olathe, Kansas
Mid America Regional Council, Kansas City, Missouri

Mr. Kovach provided multijurisdictional leadership, coordination, and support for public health emergency preparedness planning, response, and evaluation efforts for health departments in the Kansas City, Missouri metropolitan area. Under his leadership, technical assistance review scores from the Centers for Disease Control and Prevention improved by an average of 40% in the three years he managed the Cities Readiness Initiative program. In addition, he helped to lead a team to develop Dispense Assist (https://www.dispenseassist.net/) a website that automated screening for priority biological threats in order to minimize the number of staff required for mass prophylaxis dispensing operations and to speed the rate of dispensing.

Appendix H
Curriculum Vitae

Analytic Associate **2006 to 2007**
Thomson Healthcare, Ann Arbor, Michigan
Mr. Kovach provided data analysis of healthcare claims data and information support for clients.

Departmental Analyst (Strategic National Stockpile) **2005 to 2006**
Michigan Department of Community Health, Lansing, Michigan
Mr. Kovach's duties included program planning, implementation and evaluation support for statewide public health emergency preparedness programs, with a special emphasis on mass prophylaxis planning.

Health Educator **2003 to 2005**
Ionia County Health Department, Ionia, Michigan
Mr. Kovach duties included community health assessment and improvement, media relations, and coalition building. Mr. Kovach also helped prepare for the Michigan State Public Health Accreditation program.

ACADEMIC EXPERIENCE:

Adjunct Faculty in the Master of Health Care Administration Program **2013 to present**
Park University, Parkville, Missouri
Mr. Kovach teaches HA 533, Managerial Epidemiology.

COMPUTER PROFICIENCY:

Software Experience: Stata, Atlas.ti, Epi Info, Microsoft Office
Data Sources: Surveillance, Epidemiology and End Results (SEER) program; health insurance claims and encounter data; National Profile of Local Health Departments data (2008, 2010, and 2013); Kansas Behavioral Risk Factor Surveillance System data; and vital statistics (birth and death certificate data); primary data collection as part of doctoral dissertation (survey and semi-structured interviews)

PUBLICATIONS AND PRESENTATIONS:

Kovach, K., Pandya, P. (2014). Primary and Secondary Data Sources for Local Public Health Practice. Kansas Public Health Grand Rounds, Kansas City, Kansas

Kovach, K. (2013). Does the County Poverty Rate Influence Birth Outcomes in Kansas? A Multilevel Analysis. Council of State and Territorial Epidemiologists Annual Conference, Pasadena, CA - Winner of a Council of State and Territorial Epidemiologists Outstanding Poster Award for Chronic Disease/Maternal and Child Health/Oral Health.

Abbey, R., Herrmann, J., Pine, A., & Kovach, K. (2011). Electronic Screening Tools for Point of Dispensing Sites. Strategic National Stockpile Summit. Atlanta, GA.

Kovach, K. (2011). Comparative Analysis of Dispensing Methods: Using the Division of Strategic National Stockpile Dispensing Time Study Drill and RealOpt© to Evaluate Point of Dispensing Efficiency. Strategic National Stockpile Summit. Atlanta, GA.