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# Exploring Job Satisfaction and Preceptorship Capacity Among Applied Epidemiologists

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# EXPLORING JOB SATISFACTION AND PRECEPTORSHIP CAPACITY AMONG APPLIED EPIDEMIOLOGISTS

by

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## ABSTRACT

Job satisfaction is important to consider when developing strategies for recruitment and retention. The Public Health Workforce Interests and Needs Survey (PH WINS) conducted in 2014 was the first nationally representative assessment of the state public health workforce. Prior to this assessment, the job satisfaction of state agency public health workers and preceptor capacity had not been measured. This study fills the current research gaps by studying the job satisfaction among the applied epidemiology workforce, identifying factors influencing job satisfaction, and the describing the preceptorship capacity among epidemiologists.

This research is based on the 2014 PH WINS data. The analysis was limited to those who identified epidemiologist as their role within the agency (n=681), and for this sub-sample, new statistical weights were developed and used, to generate national estimates for the applied epidemiology workforce. Descriptive statistics, t-test, ANOVA, and logistic regression were performed. Comments about job satisfaction were thematically analyzed.

The study findings indicate state epidemiologists have a high level of job satisfaction. Sources of job satisfaction include commitment to public health, meaningfulness of work, and task diversity. Other factors significantly associated with higher job satisfaction scores include: supervisory level, intention to depart the workforce, being a preceptor, training support, organizational support, supervisor support, overall organization satisfaction, and overall pay satisfaction ($p = <.05$).

Approximately 26% of epidemiologists serve as preceptors. Forty-five percent of preceptors are below the age of 40 and 73% are female. Most are white (66%). Preceptors hold positions across all supervisory levels. Approximately 56% of preceptors have been at their agency for 10 years or less, while 62% have more than 10 years of experience in public health practice. The distribution of subject area of practice among all epidemiologists and those who serve as preceptors is similar.

The applied epidemiology workforce on average experiences higher levels of job satisfaction compared to the general public health workforce. Sources of satisfaction and dissatisfaction should be considered when developing recruitment and retention strategies. Applied epidemiology preceptorships are generally reflective of the epidemiology workforce. Practicum experiences in applied epidemiology may be one strategy to increase epidemiology capacity.

INDEX WORDS: Applied epidemiology, Job satisfaction, Workforce development, Practicum, Preceptor

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## DEDICATION

This dissertation research is dedicated to my husband for his love, patience, and support of my professional pursuits.

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# Chapter I. Background & Significance

## Background

The public health workforce is experiencing dynamic changes (Beck & Boulton, 2015; Shah & Madamala, 2015). The public health workforce must respond to a growing focus on accountability, massive budget and workforce cuts, changes in the overall health system, and new technologies (Trust for America's Health, 2013). Emerging public health topics such as informatics, health care reform, and emerging high-throughput technologies require specialized skill sets involving systems thinking, change management, and working with diverse populations (Brownson et al., 2015; Kaufman et al., 2014). Currently, there are not sufficient numbers of skilled workers, specifically epidemiologists to perform the Essential Public Health Services. Epidemiologists are fundamental to support public health surveillance capacity (Drehobl, Roush, Stover, & Koo, 2012). The 2013 Council of State and Territorial Epidemiologists (CSTE) Epidemiology Capacity Assessment (ECA) illustrated that two of the four epidemiology-centric essential services, evaluate effectiveness, accessibility, and quality of health services, and research for new insights and innovative solutions were reported by less than 40% of state health departments of having substantial to full (>50%) capacity (Hadler et al., 2015). The lack of capacity does vary by subject area illustrating more demand for epidemiologists specializing in oral health, substance abuse, occupational health, and mental health (Hadler et al., 2015). Approximately 18% applied epidemiologists have indicated intentions to leave the workforce in the next five years, which may exacerbate the existing demands and pressures on the workforce (Hadler et al., 2015). Further organizational challenges include inequities in pay and

benefits and frequent use of cost-cutting measures (Drehobl et al., 2012). Combined these influences reiterate the importance of recruiting and retaining a diverse and qualified workforce.

The current epidemiology curricula provide insufficient preparation for the skills needed in the workplace (Brownson et al., 2015; Brunner Huber, Fennie, & Patterson, 2015; Hilliard & Boulton, 2012; Samet & Brownson, 2014). The Applied Epidemiology Competencies (AECs) offers a structure to bridge the resulting gap in academic training and applied skills, but the application has not yet been evaluated (Birkhead, Davies, Miner, Lemmings, & Koo, 2008; Brunner Huber et al., 2015). Furthermore, the AECs can provide a framework for workforce development activities to improve education and support recruitment and career paths (Drehobl et al., 2012). The Council on Education for Public Health (CEPH) accredits public health schools and programs. Accredited programs require students to complete a practicum prior to graduation that allows them to practice the skills acquired in the classroom (Council on Education for Public Health, 2011). CEPH encourages academic institutions to develop competency-based curriculums, however they are not prescriptive on methods of implementation or practicum requirements (Council on Education for Public Health, 2011). Academic institutions facilitating practicum experiences need community partnerships with willing working professionals that can serve as preceptors for the students. Practicum experiences are an opportunity to link the AECs to an experiential learning component of an academic program to improve training in applied epidemiology (Birkhead et al., 2008). Few practical experiences for both students and recent graduates have been documented in the literature to incorporated the AECs to achieve the programmatic aim

of increasing epidemiology capacity including CDC's Epidemic Intelligence Service (EIS) Program, Maternal and Child Health Graduate Internship Program, the CSTE Applied Epidemiology Fellowship Program and the CDC Epidemiology Elective Program (L. Cohen, Coronado, Folowoshele, Massoudi, & Koo, 2014; G. Phillips, Sappenfield, Handler, & Kogan, 2012).

Epidemiologists who serve as preceptors may experience increased job satisfaction or motivation from their experiences with students (Davis, 2013). Job satisfaction can be a predictor of employee retention (Blachut, 2013; Lamberth & Comello, 2005). However, limited information has been available about job satisfaction among epidemiologists until the fielding of the 2014 Public Health Workforce Interest and Needs Survey (PH WINS). Employee retention is important especially when there is a shortage of skilled and competent workers such as the current epidemiology workforce. The Leader Member Exchange Theory provides theoretical foundations to better understand the relationship of job satisfaction and motivation as it relates to relationships such as those between preceptors and students (Gerstner & Day, 1997).

While the number of epidemiology trainees is increasing, the capacity for applied epidemiology practicum opportunities necessary to prepare a student for employment may be insufficient (Hadler et al., 2015). In the event that the demand for practicum experiences is greater than the availability of preceptors, it will be important to be able to describe the benefits for preceptors and health departments to entice additional preceptors to supervise practicum experiences. These benefits include job satisfaction, increased motivation, increased productivity, and ultimately increased recruitment and retention of a qualified, diverse workforce (David, 2011; Dick et al., 2014; Haliru & Kabir,

2011; Hayes, 2014; Lee, Tzeng, Lin, & Yeh, 2009). Furthermore, practicum requirements are new for public health programs and the practicum experiences are not well documented in the literature (Goodman, 2015; Oglesby et al., 2013; Villanueva, Hovinga, & Cass, 2011). The literature mostly describes practical on-the-job experiences, such as internships or service learning experiences, for professions that are certifiable including: medicine, nursing, nutrition, social work, and teaching (Kelley, McBane, Thomas, & Karr, 2012; Kelly & McAllister, 2013; Peterson, Wardwell, Will, & Campana, 2014; Vinokur-Kaplan, Jayaratne, & Chess, 1994; Winham et al., 2012). Additionally, most of the existing literature, with the exception of nursing, is skewed towards the student's perspective and does not offer insight into the preceptor's experience (McIntosh, Gidman, & Smith, 2014; Myler, Buch, Hagerty, Ferrari, & Murphy, 2014). It is important to document the experiences of public health practicums, especially from the perspective of the preceptor to fill a gap in the literature and to better understand the preceptors' experience.

**Statement of the Problem**

Public health surveillance is ever changing and requires a skilled workforce. Opportunities offered by technological advancements and the threat of emerging diseases illustrates the need for enhanced public health surveillance, education, and training (Drehobl et al., 2012; Trust for America's Health, 2013). Epidemiologists act as a vital component of the public health workforce to conduct effective public health surveillance (Drehobl et al., 2012). Aligned with the foundational capabilities of public health, epidemiologists actively use integrated data sets for assessment, surveillance and evaluation to identify crucial health challenges, best practices and better health

(Trust for America's Health, 2013). With 13% of epidemiologists planning to retire in the next five years and another 21.6% intending to depart within the next year for reasons other than retirement, factors influencing retention among epidemiologists need to be explored (Pourshaban, Basurto-Davila, & Shih, 2015). Job satisfaction is an important component of employee retention (Pourshaban et al., 2015). Due to future projected workforce shortages, special consideration to describe the capacity for epidemiologists is essential to conduct public health surveillance. The current capacity of applied epidemiology preceptors to supervise practicums has not been previously assessed and should be evaluated to ensure the student demand can be met by the capacity in the field.

Currently, literature examining the job satisfaction of epidemiologists or the capacity of applied epidemiology preceptorships does not exist. The PH WINS data has been used to describe the job satisfaction of the general public health workforce, but epidemiologists were not explicitly described (Harper, Castrucci, Bharthapudi, & Sellers, 2015). The capacity of applied epidemiology preceptorships has not been assessed to date with the exception of the PH WINS data set. The lack of knowledge on the job satisfaction of epidemiologists limits the ability of public health leaders to make informed decisions regarding strategies of recruitment and retention for the epidemiology workforce. This analysis is the first to describe the job satisfaction and preceptor capacity among applied epidemiologists.

**Purpose of the Study**

The objective of this research is to describe the job satisfaction of epidemiologists, factors influencing job satisfaction, the capacity of epidemiology preceptorships, and factors associated with applied epidemiology preceptorship capacity. This research fits into the long-term goal of ensuring a competent epidemiology workforce to fulfill the Essential Public Health Services.

**Research Questions & Hypotheses**

The rationale for this research is to inform recruitment and retention strategies for epidemiologists. The central premise is that epidemiologists who serve as preceptors experience increased job satisfaction. To test this central idea, this research will accomplish the following specific research questions:

1. What is the level of job satisfaction among applied epidemiologists?
2. What are factors significantly associated with job satisfaction among applied epidemiologists?
3. What factors are associated with applied epidemiology preceptorship capacity?
4. Do applied epidemiologists who serve as preceptors experience higher levels of job satisfaction compared to those who do not serve as preceptors?

These research questions will be evaluated based on the following hypotheses:

*Table 1.1 Research Questions & Hypotheses*

| | | |
|---|---|---|
| RQ1 | $H_{o1}$ | The majority of applied epidemiologists are satisfied with their jobs. |
| RQ1 | $H_{a1}$ | The majority of applied epidemiologists are not satisfied with their jobs. |
| RQ2 | $H_{o2}$ | Among applied epidemiologists, factors of supervisory support are associated with an increase in job satisfaction. |
| RQ2 | $H_{a2}$ | Among applied epidemiologists, factors of supervisory support are not associated with an increase in job satisfaction. |
| RQ2 | $H_{o3}$ | Among applied epidemiologists, factors of organizational support are associated with an increase in job satisfaction. |
| RQ2 | $H_{a3}$ | Among applied epidemiologists, factors of organizational support are not associated with an increase in job satisfaction. |
| RQ3 | $H_{o4}$ | Applied epidemiology preceptors are racially diverse. |
| RQ3 | $H_{a4}$ | Applied epidemiology preceptors are not racially diverse. |
| RQ3 | $H_{o5}$ | Applied epidemiology preceptors are diverse by their supervisory level. |
| RQ3 | $H_{a5}$ | Applied epidemiology preceptors are not diverse by their supervisory level. |
| RQ3 | $H_{o6}$ | Applied epidemiology preceptors work across primary program areas similar to all epidemiologists. |
| RQ3 | $H_{a6}$ | Applied epidemiology preceptors do not work across primary program areas similar to all epidemiologists. |
| RQ3 | $H_{o7}$ | Among applied epidemiologists, collaboration with academia is associated with an increase in preceptorship. |
| RQ3 | $H_{a7}$ | Among applied epidemiologists, collaboration with academia is not associated with an increase in preceptorship. |
| RQ4 | $H_{o8}$ | Applied epidemiologists who serve as preceptors experience a greater level of job satisfaction compared with those who do not serve as preceptors. |
| RQ4 | $H_{a8}$ | Applied epidemiologists who serve as preceptors do not experience a greater level of job satisfaction compared with those who do not serve as preceptors. |

The expected outcomes of this study will inform recruitment and retention efforts for applied epidemiologists. This research would fill a gap in the literature about job satisfaction among applied epidemiologists and describe the epidemiologic preceptorship capacity reflective of training those preparing to enter the workforce. These results will be important for recruiting additional preceptors to meet the increasing demand by accredited academic institutions for practicum opportunities. Lessons learned will also inform other training programs based on a mentorship model.

**Delimitations**

This research uses a subset of observations from the PH WINS data set. The selected subset only included the respondents who identified themselves as an epidemiologist in response to question 27 "Please identify the classification that best represents your role in the organization." Additionally, the sample for analysis only included responses from state agencies.

**Definition of Terms**

This research uses language that may be considered colloquial or may have multiple meanings. A definition of terms has been provided to clarify the use of the terminology within the scope of this research.

**Applied Epidemiologist** – "An epidemiologist who works in a governmental public health agency (i.e., an agency with a legal mandate to conduct public health activities" (Birkhead et al., 2008, p. 69).

**Applied Epidemiology Competencies (AECs) –** a competency framework for applied epidemiology practice consisting of 149 competency statements across eight domains

of public health practice and four tiers of applied epidemiology practice (Birkhead et al., 2008).

**Association of Schools and Programs of Public Health (ASPPH)** – "the voice of accredited academic public health, representing schools and programs accredited by the Council on Education for Public Health (CEPH)" (Association of Schools and Programs of Public Health, 2016).

**Association of State and Territorial Health Officials (ASTHO)** – a national nonprofit representing chief health officials of U.S. states and territories to affect public health policy and state-based public health practice (Association of State and Territorial Health Officials, 2016).

**Capacity** – refers to an interdependent four tier hierarchy 1) structures, systems, and roles, 2) staff and facilities, 3) skills, and 4) tools necessary to optimal operations (Potter & Brough, 2004).

**Council of State and Territorial Epidemiologists (CSTE)** – a national nonprofit representing the interests of epidemiologists working in state, local, territorial, and tribal health departments to provide support for effective public health surveillance and good epidemiologic practice through training, capacity development, and peer consultation (Council of State and Territorial Epidemiologists, 2016).

**de Beaumont Foundation –** a national non profit that aims to improve the effectiveness and capacity of local and state health departments through research, collaboration and strategic grant making (de Beaumont Foundation, 2017).

**Epidemiologist** – "A person who investigates the occurrence of disease, injury, or other health-related conditions or events among populations to describe the distribution of disease or risk factors for disease occurrence for population-based prevention and control" (Birkhead et al., 2008, p. 69).

**Epidemiology Capacity Assessment (ECA)** – A periodic assessment of state and individual workforce and training needs to illustrate the current state of infrastructure and to enumerate the workforce (Hadler, 2014).

**Essential Public Health Services** – "The 10 Essential Public Health Services describe the public health activities that all communities should undertake and serve as the framework for the National Public Health Performance Standards instruments" (Centers for Disease Control and Prevention, 2014).

**Job in General (JIG) Scale** – a validated scale to measure global satisfaction with one's job (Steven et al., 2004).

**Job Satisfaction** – "the feelings a worker has about his or her job or job experiences in relation to previous experience, current expectations, or available alternatives" (Balzer et al., 2000).

**National Association of County and City Health Officials (NACCHO)** – a national nonprofit representing the interests of local health department officials (National Association of County and City Heath Officials, 2016).

**Public Health Workforce Interests and Needs Survey (PH WINS)** – The first assessment to describe the state of the public health workforce focused on worker

perspectives on emerging national initiatives and workplace environment indicators (NORC, 2015). PH WINS is the source of the data for this research.

**Practicum** – a planned, supervised, and evaluated practice experience that is part of a professional public health degree program (NORC, 2015). Within the literature other professions may also reference a practicum as an internship, residency, or clinical experience.

**Preceptor** – an individual who supervises the student during their practicum experience (NORC, 2015). Within the literature other professions may also reference a preceptor as a mentor.

**Recruitment** – efforts to advertise, select, and hire for a position (Mckinney, 2017).

**Retention** – efforts to maintain the existing workforce (WebFinance Inc, 2017).

# Chapter II. Literature Review

## Background

The public health workforce includes a variety of professions that seek to deliver the 10 Essential Public Health Services (EPHS) (Centers for Disease Control and Prevention, 2014). The 10 EPHS include (Centers for Disease Control and Prevention, 2014):

1. Monitor health status to identify and solve community health problems.
2. Diagnose and investigate health problems and health hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships and action to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. Assure competent public and personal health care workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Research for new insights and innovative solutions to health problems.

A competent and diverse workforce is vital for public health to satisfactorily provide these services across federal, state, and local jurisdictions. Epidemiology is an essential profession among the cadre of public health workers. Epidemiologists mostly address EPHS #1, #2, #9, and #10 (Centers for Disease Control and Prevention, 2014;

Hadler, 2014). Epidemiologists who work in a governmental public health agency (i.e., an agency with a legal mandate to conduct public health activities) are considered applied epidemiologists (Birkhead et al., 2008). Epidemiologists work across program areas, sectors, and all levels of government using data to promote population health.

Beyond the 10 EPHS, the role of the epidemiologist has been further defined through the development of the Applied Epidemiology Competencies (AECs) based on the eight competency areas contained in the Core Competencies for Public Health Professionals (Birkhead et al., 2008). The competency domains include: analytic/assessment, basic public health science, communication, community dimensions of practice, cultural competency, financing planning and management, leadership and systems thinking, and policy development/program planning (Birkhead et al., 2008). These competencies provide a functional foundation for epidemiologists, employers of epidemiologists, and educators at multiple levels. First, the AECs provide a defined career path which can be used to assess gaps in knowledge and develop specific training plans to address those gaps (Birkhead et al., 2008). Second, the AECs can be used to create position descriptions and job qualification statements to illustrate a career ladder (Birkhead et al., 2008). Third, the organization can use the AECs as an as assessment tool to describe epidemiology capacity (Birkhead et al., 2008). Fourth, curriculum development focused on the AECs can be used to prepare students for careers in applied epidemiology and for continuing education programming (Birkhead et al., 2008). The AECs summarize the role and skills of an epidemiologist and offer a structure for professional development.

The epidemiology workforce has been characterized by the Bureau of Labor Statistics (BLS), the Council of State and Territorial Epidemiologists (CSTE), Association of State and Territorial Health Officials (ASTHO), and the National Association of County and City Health Officials (NACCHO). Available data specifically address the enumerated workforce, program area, pay scale, knowledge, and identify gaps in workforce capacity.

In 2013, CSTE conducted an Epidemiology Capacity Assessment (ECA) to enumerate the state epidemiology workforce. CSTE identified an 11% increase from 2009 to 2013 for a total of 2,752 epidemiologists working at a state public health agency (Hadler, 2014). Despite the increase of epidemiologists, 1,374 additional epidemiologists were identified as needed to achieve optimal epidemiology capacity (Hadler, 2014). In general, ideal epidemiology capacity is defined as one epidemiologist per 100,000 population in order to effectively conduct public health surveillance activities (M. Boulton, Lemmings, & Beck, 2009). However, in consideration of a state's size, smaller states of less than five million need 2.5 epidemiologists per 100,000 population (M Boulton, Hadler, Beck, Ferland, & Lichtveld, 2011). The ASTHO and NACCHO profile surveys from 2010-2013, illustrate the number of state epidemiologists decreased from 2010 to 2012 by 8.6% from 2,549 to 2,329 (Beck & Boulton, 2015). However, there was not a significant shift at the local level from 2010 to 2013, 1,563 to 1,348 epidemiologists, respectively, representing approximately 3% of the local workforce (Beck & Boulton, 2015). It is important to note that while there are over 2,000 local health departments and only 50 state health departments, the proportion of epidemiologists working in local health departments is comparatively low; ultimately,

local epidemiologists could be overwhelmed by a large scale public health emergency (O'Keefe, Shafir, & Shoaf, 2013). The BLS estimated in 2014 approximately 5,800 epidemiology jobs in the United States across all sectors and anticipates 6% growth from 2014 to 2024 with an additional 400 positions (Bureau of Labor Statistics, 2014). Based on this data, approximately 71% of all epidemiology jobs are available in governmental public health (Bureau of Labor Statistics, 2014). The enumerated epidemiology workforce varies between state and local health departments, but there is a growing demand for epidemiologists across all jurisdictions.

As part of CSTE's ECA, individuals were assessed in addition to the state health agency. Among individual respondents, "the median age was 40 years (range, 22-88), 71% were female, 95.9% were full time employees, and 12% were contract employees. Overall, 1,535 (96.5%) provided their race-ethnicity: 75.9% were non-Hispanic white, 9.2% were non-Hispanic Asian, 8.1% were non-Hispanic black; 3.6% were Hispanic, 0.8% were American Indian/Pacific Islander and the rest were 'mixed' or 'other'" (Hadler, 2014, p. 44). The age, sex, and racial diversity of the current workforce is not representative of the United States population and may hinder the ability of the public health workforce to mirror the diversity of the communities they serve. A diverse workforce representative of the community is important to reduce disparities in leadership and healthcare providers that can perpetuate inequities and mistrust in the health system (J. Cohen, Gabriel, & Terrell, 2002). Individual respondents also identified their primary area of work as: infectious disease (50.4%), chronic disease (11.4%), maternal and child health (11.1%), environmental health (7.3%), bioterrorism and emergency preparedness (5.7%), injury (2.4%), occupational health (0.9%), oral

health (0.8%), substance abuse (0.7%), mental health (0.3%), and 'other' (9.0%) (Hadler, 2014). The subject areas of practice are also not diverse with a heavy emphasis on infectious disease rooted in historical siloes of funding. Based on the AEC four tiers categorizing workers, workers self-identified as entry level epidemiologists (25%), mid-level epidemiologists (41%), senior-level epidemiologists with supervisory or managerial responsibilities (23%), and senior scientists/subject matter expert level epidemiologists (11%) (Hadler, 2014). Approximately 34% of epidemiologists hold a senior position, which may be of concern in a time of high workforce departures due to retirement or nonretirement reasons.

In consideration of the individual responses, the competency of the existing workforce is of utmost importance. The United States' Department of Health and Human Services "estimates that only 20% of the nation's approximately 500,000 current public health professionals have the education and training needed to do their jobs effectively, with the remaining 80% lacking formal education or training in the field of public health" (Hilliard & Boulton, 2012, p. s21). The lack of formal public health training raises concern as "any differences that exist in the availability of on-the-job training in public health, coupled with low levels of formal public health training, are likely promoting wide disparities between and among health departments in capacity and capability to conduct the work of the public health enterprise" (Leider, Harper, Bharthapudi, & Castrucci, 2015, p. s65). Furthermore, the CSTE's ECA indicated that "more than 30% of entry and mid-level epidemiologists reported that they had not yet achieved competency in a number of areas and expressed a need for additional training" (Hadler, 2014, p. 10). The lack of public health training among the existing

workforce requires opportunities for professional development and a review of recruiting practices.

The ECA illustrated areas of strength and weakness among the states' epidemiology capacity. In 2013, states identified at least substantial surveillance and epidemiology capacity in infectious disease (98%), bioterrorism/emergency response (82%), maternal and child health (73%), chronic disease (66%), environmental health (49%), injury (45%), oral health (25%), and occupational health (20%) (Hadler, 2014). These results illustrate substantial gaps in epidemiology capacity for oral health, occupational health, substance abuse, and mental health surveillance (Hadler et al., 2015). The impaired capacity ultimately affects the epidemiology infrastructure and the ability to deliver the 10 EPHS. The ECA identified a large percentage of states that had minimal to no capacity to carry out several EPHS and basic surveillance and epidemiology functions. Only 35% reported at least substantial capacity while 16% of states reported minimal to no capacity for EPHS #9 (Evaluate effectiveness, accessibility, and quality of personal and population based health services) (Hadler, 2014). Responses for EPHS #10 (Research for new insights and innovative solutions to health problems) illustrated 37% of states had minimal to no capacity, and only 29% had at least substantial capacity (Hadler, 2014). The gaps in capacity are capitulated by a "continued lack of key technology capacity and capacity for evaluating effectiveness of prevention efforts and for conducting research for new insights and innovative solutions in many states" (Hadler et al., 2015, p. 396). The less than optimal epidemiology capacity leaves the current workforce desperate for infrastructure development and workforce investment.

Despite the apparent value of full capacity epidemiology and surveillance systems, other emerging trends are influencing the investment and growth of the applied epidemiology workforce. First, health systems and public health are collaborating towards a shared goal of population health within a complex system, especially after the implementation of the 2010 Patient Protection and Affordable Care Act (Fried, Begg, Bayer, & Galea, 2014). Second, unanticipated consequences of historic funding mechanisms have created a highly specialized workforce that does not possess the foundational skills demanded by the current tasks (Kaufman et al., 2014). Other trends affecting epidemiologists include: the growing availability of "big data" and the role of informatics; shifting population demographics; globalization; emerging technologies; greater focus on accountability; privacy changes; a greater focus on distal causes of diseases; the emergence of translational sciences; the growing centrality of team and transdisciplinary science; and the evolving funding environment (Brownson et al., 2015). Currently, public health leaders are referring to this era of trends and necessary skills as Public Health 3.0 (DeSalvo & Wang, 2016). In order for epidemiologists to remain relevant, resources must be leveraged to deliver the EPHS, evidence-based practice should be emphasized, and innovation should be supported.

In addition to these trends, specific challenges are affecting the public health workforce. These factors underlying the public health workforce challenges include:

> A diminishing number of workers because of an exodus of retiring public health workers; job losses associated with budget cuts; difficulty recruiting new workers because of non-competitive salaries and benefits; the gap between workforce skills and capacity caused by changes to public health practice (e.g., those related to technology and healthcare reform); lack of formal training in public health for the majority of public health workers;

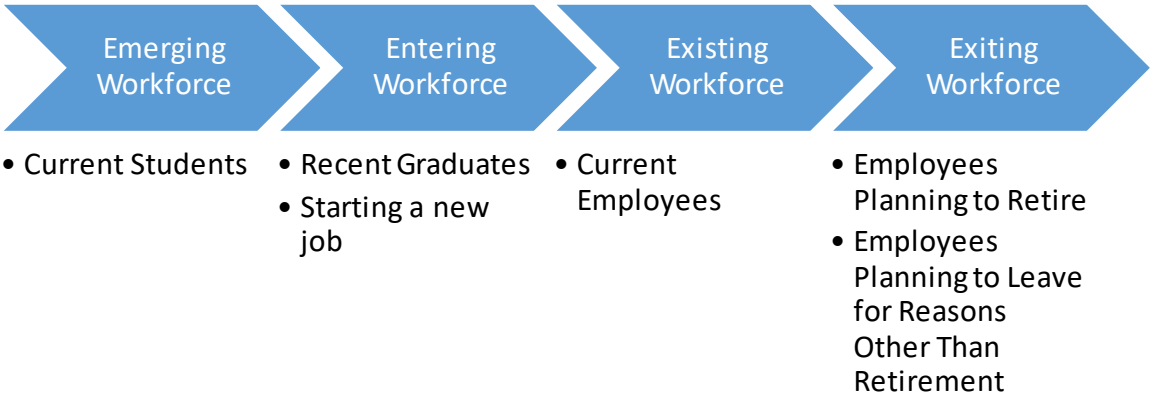
> and limited training opportunities for current workers (Drehobl, Stover, & Koo, 2014, p. s280).

While most of the public health epidemiologists are employed by a government agency, the variation of these trends should be evaluated across governance structure, geographic region, and population size. These characteristics were identified in previous research, which illustrated state health agencies, are more susceptible to shifting workforce patterns than local health departments (Beck & Boulton, 2015). The workforce trends and challenges can be summarized into four categories: composition and number of workers, competency of workers, contextual environment, and the work environment (Drehobl et al., 2014). In consideration of the public health workforce challenges and the enumerated epidemiology workforce, practices of recruitment and retention among epidemiologists should be reviewed to ensure that there are enough epidemiologists with the necessary skills, at the right time, and in the right place.

**Recruitment**

The workforce pipeline can be divided into four stages: emerging, entering, existing, and exiting (Tolentino, 2015). The emerging workforce refers to those preparing to enter the workforce such as students. The entering workforce includes recent graduates, new hires and individuals returning to the workforce. The majority of the workforce lies within the existing workforce as current employees. The exiting workforce is comprised of those employees with the intention to retire or those planning to leave for reasons other than retirement. The path from emerging, entering, existing to exiting can be linear. However, if an individual leaves for reasons other than retirement such as taking another job, they would reenter the cycle at the entering stage.

*Figure 2.1 Workforce Pipeline*




The stages of the workforce pipeline are important to consider when discussing issues of recruitment and retention. Recruitment typically focuses on those entering the workforce but may also address those in the emerging stage. In contrast, retention addresses the stages of the existing and exiting workforce.

Recruitment concentrates on hiring a qualified and competent workforce. Factors of recruitment among those entering the workforce from undergraduate and graduate programs are not well understood as they make decisions about employment (V. A. Yeager, Beitsch, & Hasbrouck, 2016). However, most health departments do follow general recruitment standards of practice. First, communications about the open position must be disseminated among those who are qualified to apply. In one study of local health departments, over half of the health departments indicated that they preferred to advertise open positions through print advertising, web job boards, internships, e-mail announcements to other agencies, and academic partnerships (Darnell, 2013). Less frequently used strategies included cultural events, social media, college job fairs, pooling resources, and traineeships (Darnell, 2013). However, larger health departments with relatively more resources reported using a broader array of

recruitment strategies and use of the strategies did vary somewhat by region reflecting the local culture (Darnell, 2013). Within the same sample of local health departments, "less than 50% of the health departments said that epidemiology positions were difficult to fill" (Darnell, 2013, p. 19). A variety of communication strategies are used to effectively recruit a qualified and competent workforce.

Second, the position announcement must attract qualified candidates. Candidates who specifically seek a position within governmental public health are most influenced by factors including specific duties and responsibilities, competitive benefits, job security and being able to identify with the mission of the organization (V. Yeager, Wisniewski, Amos, & Bialek, 2015). Most epidemiology jobs require a master's degree (Bureau of Labor Statistics, 2014). However, the earning differences between a bachelor's and master's degree is only about $4,000 (Castrucci, Leider, Liss-Levinson, & Sellers, 2015). With the growing costs of obtaining a master's degree, other "policies such as loan repayment programs or reclassification of positions leading to higher earnings may be necessary to recruit candidates with a master's degree for key positions" (Castrucci et al., 2015, p. s77). The leading barriers to recruiting epidemiologists include: restrictions on offering competitive pay (88%), opportunities for promotion (76%), and salary scale (71%) (Hadler, 2014). Attracting qualified epidemiologists will extend beyond simple salary considerations to include the total compensation package and the organizational culture.

Third, the agency must select the candidate with the best fit for the organization. New hires who are a good fit with the job, colleagues, and the organization, and who will have high performance, trust, and engagement with their colleagues is critical (J. M.

Phillips & Gully, 2015). In general, hiring costs will decrease if turnover is reduced through the selection of hires with the best fit, especially if the position is difficult to fill (J. M. Phillips & Gully, 2015). In a study of economic costs in hiring environmental health workers, the authors emphasized the importance of hiring individuals who had the knowledge, skills, and abilities to "hit the ground running" and not to lower the profession's standards just to fill the open positions (Neistadt & Murphy, 2009). Filling positions without consideration for fit incurs additional costs (e.g. hiring, training, temporary workers) in the long term (Neistadt & Murphy, 2009). Selecting qualified candidates who share the organization's values and cultures can result in positive short-term, intermediate, and long-term outcomes between employees and employers.

When recruiting epidemiologists it is important to consider the demand for the knowledge, skills, and abilities despite the current and emerging challenges. The ideal epidemiology workforce has expertise in informatics in addition to epidemiology, surveillance and strong communication skills (P. Smith, Hadler, Stanbury, Rolfs, & Hopkins, 2013). Additionally epidemiologists should be innovative with the ability to design systems, collaborate across sectors, critically evaluate data and determine its utility, and communicate the importance of surveillance to policy makers, health systems, and the general public especially to articulate the need for adequate funding and support (P. Smith et al., 2013). The AECs also provide a standardized foundation for knowledge, skills and abilities that can be tailored to a specific position. Beyond the knowledge, skills, and abilities of the individual candidate, the profession of epidemiology continues to evolve to deliver the EPHS as new challenges emerge. The responsibilities of epidemiologists have expanded in the 21st century to include:

establish uniform national surveillance methodologies; harness new sources of data while protecting confidential information; advise CDC on best practices and systems for national surveillance; advocate for public health information technology needs; develop technical implementation guides for data sharing between public health, health systems, and public health laboratories; and to standardize surveillance practices (P. Smith et al., 2013). Current and future recruiting efforts of epidemiologists should focus on selecting candidates that can dynamically adapt and apply their skills innovatively to solve problems.

Additionally it is important to consider differences in the practice of surveillance and the role of an epidemiologist between the state and local level agencies. Most infectious disease surveillance occurs at the local level and is supported by the local disease control programs (P. Smith et al., 2013). The state complements the local efforts by supporting local health officials as needed, including, but not limited to providing resources and expertise; coordinating statewide surveillance, compiling and reporting statewide surveillance reports, and coordinating activities across multiple states and with the CDC (P. Smith et al., 2013). In contrast, the state is primarily responsible for noninfectious disease surveillance (P. Smith et al., 2013). Noninfectious disease surveillance occurs at the state level for three reasons: interventions are often long-term and statewide, the state possesses the legal authority for mitigating causes, and many local health departments do not have the personnel and expertise to manage the large and complex data sets used for noninfectious disease surveillance (P. Smith et al., 2013). The differences in epidemiologic functions between the state and local

health departments may provide an explanation to the diversity of subject matter expertise between the different types of governmental public health agencies.

Diversity is another important aspect of recruitment. Typically, diversity has focused on race, sex and disability. However, diversity goes beyond physical attributes and includes knowledge, skills and abilities. When an organization seeks to employ diversity recruitment strategies there are several important considerations. First, "leaders must clearly articulate the strategic objectives of the organization and assess the extent to which the existing organizational reputation, rank and culture support those goals" as it may be necessary to address diversity initiatives among the existing workforce in addition to the entering workforce (Myers & Dreachslin, 2007, p. 295). Second, align culturally sensitive recruitment activities and materials (Myers & Dreachslin, 2007). Third, recruit new candidates beyond informal recommendations to prevent a homogeneous culture (Myers & Dreachslin, 2007). Fourth, the recruiter should be honest and informative about the organization's policies, culture and work expectations to prevent attrition (Myers & Dreachslin, 2007). Fifth, use a variety of selection and screening techniques (Myers & Dreachslin, 2007). Sixth, while competitive compensation will attract candidates, it is important to note that nonmonetary rewards are just as important to retain them (Myers & Dreachslin, 2007). The candidates are just as important to consider as the organization's strategies of recruitment.

Epidemiology is a profession that often requires post-graduate education. However, racial minorities disproportionately pursue and complete post-graduate education resulting in an under representation of qualified candidates of color for

epidemiology positions (National Center for Educational Statistics, 2010). It is important for academic institutions to conduct minority-specific recruitment activities to attract and train underrepresented minority students (St George, Schoenbach, Reynolds, Nwangwu, & Adams-Campbell, 1997). Among doctoral public health graduates, only 7.4% were from under-represented minority groups yet they represent 25.7% of the US population (Hilliard & Boulton, 2012). The lack of diversity among those trained creates a barrier to the profession's capacity for placing minorities in prominent leadership roles in public health (Hilliard & Boulton, 2012). Furthermore, a diverse workforce representative of a community is important, especially as health disparities persist, to build trust and relationships within the community (Liss-Levinson, Bharthapudi, Leider, & Sellers, 2015). Attention to diversity of skill, knowledge, and abilities in addition to race, gender, disability and age will be necessary for the profession to grow and attract the next generation of epidemiologists.

**Preceptors and Practicums**

Practicums are applied student learning experiences that can be supervised by a preceptor. All schools and programs of public health accredited by the Council on Education for Public Health (CEPH) require a practicum component for all graduate students (Council on Education for Public Health, 2011). The practicum is an opportunity for the student to practice the skills they have learned in the classroom in an applied practice-based setting. While CEPH requires the practicum experience, they are not prescriptive on how many credit and contact hours are expected, or how the experience should be assessed (Oglesby et al., 2013). This latitude allows the academic institutions to design the practicum experience that meets the needs of their

students, but it creates substantial variation to satisfy the degree requirement (Oglesby et al., 2013). While "field placement programs benefit students, employers, and academic institutions, they can be difficult to establish, manage, sustain, and evaluate" (McCormick et al., 2014, p. 78s). The quality of the experience is often dependent on the student's capacity for observing, listening, and negotiating with their preceptor who has a clearly identified need constrained with local considerations (Villanueva et al., 2011). While all students participate in a practicum, the individual experience varies greatly.

The role of the preceptor is to provide supervision and mentorship for the student. The preceptor is expected to "monitor the implementation of practicum projects, model effective public health practices, and provide important feedback to faculty and students" (Oglesby et al., 2013, p. 558). Oftentimes, the preceptor functions as a mentor. Ideal mentors possess key traits including: "ability to teach, empathy, honesty, organizational savvy (ability to understand how the company works), understands company's core values, willingness to share time, acceptance, bearing/personal presence, compassion/understanding, concern for effectiveness, confidentiality, dependability, genuine, high moral and ethical standards, integrity, knowledge, professional competence and trust" (W. J. Smith, Howard, & Harrington, 2005, p. 51). Academic institutions rely on the preceptors to volunteer and facilitate the student experiences. While the literature describes qualities of an ideal preceptor, the relationship between the preceptor and the student also heavily influences the quality of the experience.

Practicums benefit the hosting agency. The students "enhance the capacity of agencies to serve their communities, often providing a new service or comprehensive evaluation of an existing program in addition to new perspectives and ideas" (Hernandez, Bejarano, Reyes, Chavez, & Mata, 2014, p. 99). The most beneficial experiences allowed the students to lead a project, contribute ideas and innovation, and receive dedicated mentoring time from preceptors (Hernandez et al., 2014). Additionally, engaging students at a public health agency can increase agency productivity and may alleviate some of the workforce shortage in public health (Hayes, 2014). Public service practicums provide "short-term additional skilled staff personnel, new perspectives, enthusiasm, someone who can bring unfinished projects to successful fruition, and, perhaps, a recruit for a long-term position" (Cupps & Olmosk, 2008). Agencies may also consider virtually hosting a practicum student. A virtual practicum at a national public health nonprofit provided the agency "additional manpower and produced work that did not require the traditional oversight and physical space of their in-house internship program" (Goodman, 2015, p. 9). Practicums can be tailored to meet the needs of the hosting agency and the student. The flexibility of the practicum impacts the perceived benefits of participating by both preceptor and student.

Mentors who experience short-term benefits from mentoring others have reported stronger intentions to serve as a mentor in the future (Eby, Durley, Evans, & Ragins, 2006).

> Short-term instrumental benefits were more important predictors of job satisfaction and organizational commitment, whereas short-term relational benefits were more important in predicting behavioral intentions to mentor in the future. Essential mentoring relationships that provide external

> (instrumental) and internal (relational) benefits are likely to have the most far reaching positive effects on mentors (Eby et al., 2006, p. 438).

Promotion potential due to mentoring should not be overstated as none of the short-term benefits were predictive of career success measures of promotion or compensation (Eby et al., 2006). Another study of employees in a health care organization found that mentors report greater salary, greater promotion rates, and stronger subjective career success than do their colleagues without mentorship experience (Allen, Lentz, & Day, 2006). The CSTE Applied Epidemiology Fellowship, providing post-graduate epidemiology field training, evaluated the first nine years of the program and found that nearly all mentors (90%) described their experience as positive while 79% indicated mentoring for the program impacted their career with over half specifying skill development, fresh perspective or resulted in more project engagement (Dick et al., 2014). Mentor benefits vary based on their experience, but it appears a positive experience can influence their professional growth.

The relationship between the preceptor and student is vital to the success of the practicum. A strong match between the preceptor and student in terms of belief structures, values, and expectations optimizes the organizational learning and the development of the mentoring relationship (W. J. Smith et al., 2005). To avoid a poor match of student and preceptor, training and clear contracting is recommended for all involved (W. J. Smith et al., 2005). Oftentimes, preceptors may model previous positive and negative supervisory behaviors as they experienced from their own time as a trainee (Giddings, Vodde, & Cleveland, 2004). Supervisory style is one of the most common source of problems for students characterized by “a lack of supervision or deficit of supervision, a harsh and unyielding supervisory style, unprofessional behavior

on the part of the field instructor, and extreme violations of supervisory comportment" (Giddings et al., 2004, p. 203). Standardized training should be provided to all preceptors in order to provide a quality training experience and foster positive mentoring.

The similarity between the preceptor and student provides insight to other factors of success. One study where mentees self-selected their mentors found a reduced emphasis on age, gender and race while shared values, goals and problem-solving styles were prioritized (Ensher, Grant-Vallone, & Marelich, 2002). The perceived attitudinal similarity between the mentee and the mentor was the most significant predictor of mentee satisfaction with their mentor (Ensher et al., 2002). In consideration of the compared similarity of preceptors and students, it reiterates the importance to address the relationship beyond the job tasks.

MPH practicum opportunities in epidemiology are not expected to be affected by the growth of the public health undergraduate conferrals. In 2012, only one epidemiology undergraduate program was in existence (Leider, Castrucci, et al., 2015). The new supply of undergraduates trained in public health provides a potential new source of governmental public health workers, but there are few opportunities to expose these graduates to career opportunities in governmental public health (Leider, Castrucci, et al., 2015). As of 2014, 60 of the 85 (71%) CEPH accredited institutions offered epidemiology programs of study, almost all at the graduate level (Joshi, Joshi, & Amadi, 2015). In 2014, only 27% of state workers indicated they had worked with the public health academic community (Dwelle, Halverson, & Petersen, 2015). While only 12% of the state public health workforce participated in a successful collaboration in the

past year (McCullough, 2015). The low amount of health departments successfully collaborating with academic institutions may indicate the potential for many more practicum opportunities that have not yet been defined.

The applied experience that practicums offer are essential for graduates to be qualified for entry-level positions. Practicums rooted in competencies, such as the AECs, have the potential to impact the capacity of the current workforce and build capacity to improve the performance of the 10 EPHS (Lengerich et al., 2003). Epidemiology field training programs that incorporate mentoring and competency-based frameworks can produce highly capable epidemiologists (Dick et al., 2014). "Graduates of epidemiology training programs who have not mastered the competencies demanded by government agencies or private employers will not be competitive for employment in the current and future job market" (Brownson et al., 2015, p. 459). Epidemiology field placements are key to strengthening health systems (Schneider, Evering-Watley, Walke, & Bloland, 2011). Students are able to observe the agency's organization, processes, people, and culture through their practicum experience (Cupps & Olmosk, 2008). Additionally, practicums provide exposure to public health practice that may guide the student's chosen career path.

Oftentimes, practicum opportunities arise from existing partnerships between health departments and the academic institution. These relationships are sometimes formalized as an "Academic Health Department" (AHD) defined as an "academic institution and a governmental public health agency which provides mutual benefits in teaching, research, and service, with academia informing the practice of public health, and the governmental public health agency informing the academic program" (Erwin,

Harris, Wong, Plepys, & Brownson, 2016, p. 630). Among CEPH-accredited schools and programs of public health, 55% indicate participating in an AHD (Erwin et al., 2016). The most common type of engagement for public health practice partners was hosting trainees, interns or volunteers (89%) compared to academic partners who acted as consultants for AHDs (72%) (Erwin et al., 2016). Approximately 52% of academic partners facilitated conducting a community health assessment (Erwin et al., 2016). The AHD partnership supporting practicum experiences provides an opportunity to expose students and practitioners to evidence-based public health practice and to strengthen the competencies of students, faculty and the public health workforce (Erwin et al., 2016).

Several practicum programs across a variety of public health professions have documented their experiences in the peer-reviewed literature. Only a small proportion of public health student experiences have been published on program development and impact evaluation, despite national efforts to increase student experiences (Beck, Sarigiannis, Thomas, Montgomery, & Boulton, 2013).

One study of Master's of Public Health (MPH) students who graduated from 2008 to 2011 identified 14 strengths of the practicum experience. The strengths included: "preceptor feedback, independence, networking, real world exposure, challenging opportunity, application of knowledge, exposure, respect, communication, encouragement, strength of the course, self-growth, knowledge acquisition, and community engagement" (Villanueva et al., 2011, p. 341). Service learning practicums in public health provide an experience supporting civic engagement, common welfare, and social progress as impacts of public health practice (Gregorio, DeChello, & Segal,

2008). These graduates also noted areas for improvement for the practicum experience including: "support, guidance, respect, further exposure, more communication between the site and the school, time requirement, difficulty balancing school and practicum, initiating the practicum earlier, increasing community interaction, enhancing the diversity of projects, and increasing time on site while reducing class time" (Villanueva et al., 2011, p. 342). Other studies suggested ideas for improving the practicum experience included: establishing written guidelines for students and faculty; increasing flexibility in the type and amount of time spent at or in a practicum; adding more support for students to find a practicum (Linnan et al., 2010). The documented success of practicums can be used to inform future planning of practicum programs and training.

Within a study of an accredited institution's health behavior/health education 400 hour praciticum requirements, "faculty (84%), students (92%), and alumni (91%) expressed strong support for the practicum requirements, with alumni reporting that practica helped both skill development and resume building" (Linnan et al., 2010, p. 1996). A Hawai'I laboratory internship survey of mentors and interns reported an overall positive experience (Whelen & Kitagawa, 2013). The internship appeared to be an effective tool to expose students to career opportunities in public health laboratories and to address short-term staffing deficits (Whelen & Kitagawa, 2013). The interns reported that they would participate in the internship even if they were not paid, received a lower pay, or only received academic credit (Whelen & Kitagawa, 2013). A cohort evaluation of a cancer epidemiology internship program reported their students as having a moderate or high potential for careers as field researchers in epidemiology (Soliman, Mullan, & Chamberlain, 2010). The impact of the internship was also

illustrated by the high proportion of students who completed scholarly manuscripts related to their internship (Soliman et al., 2010). To increase maternal and child health epidemiology capacity, practical experiences for students and recent graduates have been developed including: CDC's Epidemic Intelligence Service (EIS) Program, Maternal and Child Health Graduate Internship Program, and the CSTE Applied Epidemiology Fellowship Program (G. Phillips et al., 2012). Additionally CDC provides an Epidemiology Elective Program for medical and veterinary students to gain competence in applied epidemiology and opportunities to learn about population health (L. Cohen et al., 2014). A group practicum experience has illustrated the benefit of collaborative problem solving through a meaningful service learning opportunity (Gregorio et al., 2008). Additionally, the impact of the students' efforts "have resulted in tangible assessment, assurance, and policy-development tools for promoting the public health agenda in Connecticut" (Gregorio et al., 2008, p. 51). Similarly across several publications, students who participate in student outbreak and response teams were more likely to work in governmental public health (Beck et al., 2013; Horney, Davis, Ricchetti-Masterson, & MacDonald, 2014). Published literature indicates that student experiences or practicums can be utilized as a competitive benefit for recruiting public health students into governmental public health.

**Retention**

Retention of public health employees is of utmost concern in a time of an exiting workforce. There are two types of exiting workforce: those who are retiring and those who are leaving for reasons other than retirement. Approximately 25% of state public health workers plan to retire before 2020, with an additional 18% intending to leave the

agency for reasons other than retirement within the year (Pourshaban et al., 2015). Older, more experienced workers were significantly more likely to plan to retire (Pourshaban et al., 2015). The rates of planned retirement vary significantly by job classification. "Nearly one-third of health services workers (oral health, nutritionists, and clinical services), as opposed to only 13% of epidemiologists reported plans to retire in the next five years" (Pourshaban et al., 2015, p. s82). Approximately 11% of the public health epidemiology workforce left during 2012 with another almost 18% intending to leave in the next five years illustrating the need to review and develop new recruitment and retention strategies for epidemiologists (Hadler, 2014). Leading barriers to retaining epidemiologists include restrictions on merit raises, pay scale, and opportunities for promotion (Hadler, 2014). In planning for the exiting workforce, it is important to develop recruitment strategies based on retention goals.

State employees reporting that they were leaving for reasons other than retirement included "workers younger than 41 years, workers of African American, Hispanic, and other race/ethnicity, or those with salaries less than $55,000 per year with a master's degree with 10 or fewer years of experience in public health and those not satisfied with the pay or job in general" (Pourshaban et al., 2015, p. 82). Across public health professions, the highest rates of intended voluntary departure within the year were "among health educators (25.2%) and epidemiologists (21.6%), although most in the latter group reported intentions to seek jobs within public health" (Pourshaban et al., 2015, p. s82). The high rate of intended departure among young workers seeking higher pay, make it difficult for governmental public health to attract and retain new talent (Pourshaban et al., 2015). High rates of intention to leave for reasons other than

retirement indicate the need for retention initiatives rather than a problem with recruitment (Pourshaban et al., 2015). In consideration of almost 22% of epidemiologists intending to leave the workforce for reasons other than retirement, further investigation explaining the departing workforce's intentions is important to inform strategic retention initiatives.

Some amount of turnover is expected within an agency. However, excess unplanned turnover can be expensive. The financial cost to replace an employee "can cost at least 150 percent of the employee's annual salary. These costs include hiring and recruiting costs, training costs, lost productivity during the first six months of employment, and use of temporary employees during transitions" (Izzo & Withers, 2002, p. 53). Beyond the financial cost is the loss of institutional knowledge and relationships associated with long-term employees (Izzo & Withers, 2002). Furthermore, as task difficulty increases, it requires specialized skills among employees which makes it even more challenging to replace trained employees in consideration of rising education and training costs (Meier & Hicklin, 2008). The rate of turnover within a government agency is a critical factor to the effectiveness of operations (Ertas, 2015). Applied epidemiologists provide a specialized skill set and it may be difficult to fill vacant positions and can ultimately affect the effectiveness of the health department.

Modeling of optimal turnover within an organization addresses individual attributes (skill level, types of rewards desired, occupational characteristics, demographics), organizational attributes (structure, technology, staffing strategies, climate), and environmental attributes (geographic location, environmental turbulence, size of metropolitan area, competition in market place, economic conditions, support

organizations) (Abelson & Baysinger, 1984). Individual, organization, and environmental attributes lead to the individually perceived costs and benefits of quitting or staying, which compose an individual's propensity to quit and ultimately defines the baseline aggregate organizational turnover rate (Abelson & Baysinger, 1984). Retention costs (higher compensation, promotion/intraorganizational transfer, conflict enhancement, diminished staffing flexibility) should be compared to turnover costs (higher administrative overhead, new employee socialization, opportunity costs to the organization, group dynamics interfered with by new staff) to define an organization's human resource policies to achieve the optimal rate of organizational turnover (Abelson & Baysinger, 1984). When an employee's performance is high, turnover would be considered dysfunctional (Abelson & Baysinger, 1984). In comparison when an employee's performance is low, turnover would be identified as functional (Abelson & Baysinger, 1984). Turnover should be managed to encourage healthy change within the organization, but not so much it hinders the agency's performance (Meier & Hicklin, 2008). Turnover can be managed through strategic recruitment and retention.

An analysis of state health department employees found that most voluntary turnover can be explained by job satisfaction and pay satisfaction. If all of the respondents would have been satisfied with the job and pay, the rate of intended departures would be 7.4%, less than half the reported rate of 17.7% (Pourshaban et al., 2015). These results warrant additional attention to job satisfaction and pay satisfaction among health department employees.

A study of Millennial federal government employees offers insight to workforce trends of the next generation. The turnover intention of Millennials were approximately

five times as large as the odds for an older employee after controlling for other factors (Ertas, 2015). However across all federal workers, as pay satisfaction and job satisfaction increased, turnover intention decreased for all workers (Ertas, 2015). Lower turnover intentions were also associated with higher perceptions of fairness of the performance evaluation and promotions in the workplace, opportunities for skill development, support for creativity, and employee appreciation (Ertas, 2015). In comparing the older and younger federal workers, overall job satisfaction mattered more for the Millennials than the older workers while the lack of support for creativity mattered more for the older workers (Ertas, 2015). In comparing the Millennials' intention to leave to the older employees, the Millennial federal workers were 4.4 times more likely to leave for another job in the federal government while 6.1 times more likely to leave for a job outside of the government (Ertas, 2015). In consideration of the needs and demands of the younger workers replacing the Baby Boomer generation, as well as a dynamically changing workforce, increased recruitment efforts, additional training, flexible workforce initiatives, and alternative management strategies are needed (Ertas, 2015). While federal agencies may not have the ability to address pay satisfaction, they can be creative and flexible in an attempt to improve job satisfaction to attract and retain the federal workforce (Ertas, 2015). Another separate study of intentions to leave among federal employees also found job satisfaction as the most important predictor; other relevant factors included age and race/ethnicity (Pitts, Marvel, & Fernandez, 2011). Despite possible generational differences, job satisfaction remains an important influence of voluntary turnover.

When reviewing the influences for exiting the workforce, it is important to consider why other workers are choosing to stay at their job. "Perceptions of greater organizational support and employee engagement, and higher job satisfaction, and pay satisfaction are predictive of lower intentions of leaving one's job within the next year" (Liss-Levinson et al., 2015, p. s98). Interestingly, intentions to leave were not predicted by reasons for initially entering the public health workforce or salary (Liss-Levinson et al., 2015). In a study of human resource practices of large public and private Australian organizations, intention to stay was significantly related to recognition, remuneration, training and career development, and person to organization fit (Chew & Chan, 2008). However, challenging assignment was not significantly related to intention to stay, and training and career development was not significantly related to organizational commitment (Chew & Chan, 2008). A Taiwan study of nurse epidemiologists found additional predictors of the intention to stay including: occupational stress (workload, operation and personal safety hazard), psychological stress (isolation/stigma) and human resources (organizational and human capital) (Tsai & Ya-Ti, 2008). Employee intention to stay is as equally important as the employee's intention to leave. Both intention to stay and intention to leave should be considered when developing retention strategies.

Local health departments currently employ several retention strategies including: paying for conferences, retirement benefits, paying for training, paying for continuing education, informal mentoring, job rotation, unpaid recognition and awards, flexible work hours, internal-only vacancy postings and promotions (Darnell, 2013). However, other desired retention strategies include the use of competitive pay (Darnell, 2013). Despite

the low levels of turnover among local health department employees, 62% of health departments were very or extremely concerned about retention while fewer than 20% reported it was very or extremely difficult to retain qualified staff in any job categories (Darnell, 2013). Some employees will remain in a job due to community and workplace attachments (Mitchell, Holtom, Lee, & Graske, 2001). However, opportunities for advancement may be limited in a local health department. Only physicians, epidemiologists, laboratory technicians and information technology specialists were described as having good to excellent advancement opportunities by at least half of the local health departments (Darnell, 2013). A major challenge to sustaining the public health workforce is the level or reduced funding that specifically supports epidemiologists, laboratory researchers, and preparedness personnel (Beck & Boulton, 2012). Other health department specific retention strategies have been shared in the literature. Among local health departments, turnover among staff is low despite relatively noncompetitive pay (Newman, Ye, & Leep, 2014). Given the low levels of turnover, local health department leaders should provide training to current employees to improve their individual knowledge and skills while building agency capacity (Newman et al., 2014). State health agencies have the potential to maintain and attract a skilled and diverse workforce, despite decreasing budgets and an aging workforce, by recognizing employees' achievements, encouraging professional development and training, fostering a positive work environment, and participating in equitable hiring and compensation practices (Liss-Levinson et al., 2015). While health departments may not have much autonomy for managing the funding of epidemiologists, other retention

strategies are within the authority of the health department to tailor to the needs of the agency and its employees.

Motivational theories offer a theoretical foundation to develop and implement employee retention practices. Critical factors identified across motivational theories include: needs of the employee, work environment, responsibilities, supervision, fairness and equity, effort, and employees' development (Rainlall, 2004). The theoretical foundation of motivational theories can be used to inform research on the public health workforce. A recent study identified personal commitment to public health service and wanting a job in the public health field as significant factors of governmental public health employees to remain at the agency (V. Yeager, Wisniewski, Amos, & Bialek). Furthermore, organizational factors were rated more favorable compared to individual factors including specific work functions/activities, competitive benefits, job secuirty, and identifying with the mission of the organization (V. Yeager, Wisniewski, Amos, & Bialek, 2016). Interestingly, despite challenges to compete with the private sector regarding salary, these identified organizational factors can be addressed by health department leadership to increase retention of public health workers (V. Yeager et al., 2016). When compared to other public health agency employees at the federal (69%) and local levels (67%), state health department employees had the lowest overall satisfaction with their organization (65%) (Leider, Harper, Shon, Sellers, & Castrucci, 2016). In review of the current literature on public health workers, the recent availability of the PH WINS data has fostered additional publications to describe the general public health workforce. However, few publications have addressed areas of diversity, retention, worker pay satisfaction, and job satisfaction relative to a specific profession

such as epidemiology. This gap in the literature offers research ideas to improve the knowledge on public health workforce recruitment and retention among specific professions.

**Job Satisfaction**

Researchers at Bowling Green State University define job satisfaction "as the feelings a worker has about his or her job or job experiences in relation to previous experience, current expectations, or available alternatives" (Balzer et al., 2000). Job satisfaction is implicitly interwoven among issues of recruitment and retention. Influences of satisfaction or dissatisfaction are factors that can be managed by setting expectations during recruitment and should continue to be addressed to retain the workforce.

Among state health department employees job satisfaction and pay satisfaction were found to be the most important predictors of intention to leave (Pourshaban et al., 2015). Approximately 17% of the state health department workforce intended to leave in 2015, but if all workers were satisfied with their job and pay, departures would occur among only 7% of the workforce (Pourshaban et al., 2015). Pay satisfaction is highest among CDC employees (66%) compared to state health department staff (48%), and among local or regional health department staff (42%) (Leider, Harper, et al., 2016). Similarly, the responses illustrate job satisfaction as a function of workplace characteristics and not necessarily determined by education and salary alone (Pourshaban et al., 2015). Employees who strongly agreed with organizational support factors such as training, communication, creativity, workload, and whether individuals recommend their organization as a good place to work, also had a significantly higher

job satisfaction score (Harper et al., 2015). In general, the state health department employees have a very high level of job satisfaction despite the influences of uncertainty and dynamic change related to policy, funding, and technology (Harper et al., 2015). Across jurisdiction type, 79% of state health department employees are somewhat or very satisfied with their job compared to 83% of local and regional health departments and 71% of CDC employees (Leider, Harper, et al., 2016). In another study of municipal government employees, over 50% of job satisfaction was positively and significantly predicted by environmental factors including: advancement opportunities, compensation satisfaction, performance appraisal satisfaction, equipment and resources, training, workload, supervisory relationships, and work culture (Ellickson & Logsdon, 2002). Clearly, job satisfaction is influenced by many factors including the environment, relationships, available resources, and compensation.

Opportunities to improve job satisfaction among state health department workers have recently been studied. Employees feel that creativity and innovation are not rewarded, which contributes to low job satisfaction and possibly attrition (Harper et al., 2015). Unique to the state health department work environment, employees may feel constricted due to the funding and political regulations tied to federal funding and state policies and procedures (Harper et al., 2015). There were "significant differences in job satisfaction among employees with a shorter agency tenure, who are nonwhite, and who are not in a supervisory position" (Harper et al., 2015, p. s53). In order to increase job satisfaction among these employees, additional organizational and supervisory support efforts are needed (Harper et al., 2015). Those who were nonwhite experienced lower job satisfaction compared to white employees, identifying a need for

additional research on the complex personal and emotional factors related to diversity and job satisfaction (Harper et al., 2015). Efforts to improve job satisfaction can be implemented agency wide but targeted efforts should be tailored to less satisfied groups for an equitable impact.

Suggestions to improve job satisfaction among state health department employees include: "improving relationships between employees and supervisors, avoiding excessive workloads, improving communication between senior leadership and the general workforce, ensuring workers can apply their skills in their regular work, and improving workers' perceptions regarding the importance of their own work and how it contributes to the agency's goals" (Pourshaban et al., 2015, p. s88). Furthermore, beyond improving skills and performance, addressing training needs through the investment of time and money will increase job satisfaction (Harper et al., 2015). Additionally, creativity and innovation aligned with public health goals can be fostered through the diversification of funding sources, engagement of partnerships, and policy revisions to improve job satisfaction, performance, and retention (Harper et al., 2015). Among new employees, participating in orientation and onboarding programs may increase the new hires' level of comfort and security while promoting assimilation into the new work environment, to ultimately increase the longevity of the employee with the organization (Harper et al., 2015). Training programs for supervisors aimed at improving communication behaviors and awareness of leadership styles can positively affect employee job satisfaction and increase employee performance (Madlock, 2008). Opportunities for empowered employees to make decisions and contributions to the organization can also lead to increased job satisfaction (Harper et al., 2015). Among

public health nurses, increased opportunities for vertical and horizontal decision making led to an increase in their job satisfaction (Campbell, Fowles, & Weber, 2004). Efforts to improve job satisfaction occur at the individual and the organizational level and overtime can be embedded in the organizational culture.

Mentoring and informal coaching are other methods to improve job satisfaction. These types of relationships through the provisions of time and space can foster additional organizational and supervisory support necessary to reduce dissatisfaction (Harper et al., 2015). Furthermore, mentoring may affect the individual's perceptions of supervisory support as they foster relationships between employees and agency leadership through more frequent interactions (Harper et al., 2015). Those who serve as mentors to others may also experience other career benefits. Among employees of a health care organization, those serving as mentors reported higher salary, greater promotion rates, and stronger subjective career success compared to those who do not serve as mentors (Allen et al., 2006). Building relationships through mentoring is one method to improve job satisfaction among employees.

The Job in General (JIG) scale is one method to assess job satisfaction among workers. The JIG scale was developed in 1989 to complement the Job Descriptive Index (JDI) (Ironson, Smith, Brannick, Gibson, & Paul, 1989). While the JDI used facet scales to measure work, pay, promotion, supervision, and coworkers, an instrument to assess general overall feelings about the job was needed (Ironson et al., 1989). The JIG scale was constructed to provide multiple items to furnish an estimate of internal consistency, ease of reading and response, minimal overlap of distinct variables, demonstrate convergent validity, and be compatible with the JDI (Ironson et al., 1989).

The JIG scale consists of 18 adjectives and short phrases to describe the job (e.g. pleasant, superior, inadequate, and rotten) (Ironson et al., 1989). Responses (yes, no, ?) to the scale could be assigned a value of 3, 0, or 1, respectively, where the range of scores could be 0 to 54 (Balzer et al., 2000). While the cut offs vary by sample distribution, scores above 27 indicate satisfaction and scores below 27 indicate dissatisfaction (Balzer et al., 2000). In 2004, a shorter version of the JIG scale was validated to establish the Abridged Job in General (aJIG) scale. The aJIG scale contains only eight scale items (good, undesirable, better than most, disagreeable, makes me content, excellent, enjoyable and poor). The respondents select "yes," "no" or "cannot decide." "Yes" is assigned 3 points, "no" receives 0 points, and "cannot decide" is 1 point. The scale ranges from 0-48. The scoring guidance is approximate where 24 is the neutral point, but neutral scores can range from 19-29. Therefore, scores equal to or greater than 29 are considered satisfied while scores less than or equal to 19 are dissatisfied. The shorter aJIG scale "offers both practitioners and researchers a way to efficiently and accurately measure workers' overall evaluations of their jobs" while maintaining the psychometric properties of the JIG scale and reducing the time and space needed to measure a particular construct (Steven et al., 2004, p. 891). The standardized aJIG scale allows job satisfaction to be measured consistently across professions despite numerous influences on job satisfaction.

**Theoretical Framework**

The Leader Member Exchange (LMX) Theory has evolved since its inception in 1975 by Graen and Cashman (Graen & Uhl-Bien, 1995). However, leader member exchange was not well defined until 1986 as "(a) a system of components and their relationships, (b) involving both members of a dyad, (c) involving interdependent patterns of behavior and (d) sharing mutual outcome instrumentalities and (e) producing conceptions of environments, cause maps, and value" (Scandura, Graen, & Novak, 1986, p. 580). LMX is a leadership model that focuses on the relationship, or dyad, between members of a group, specifically delineated by in and out groups (Ledlow & Coppola, 2014). In 1978, Graen and Cashman coined the term "vertical dyad linkage" to describe the interactions between leaders and group members, judgments, and opinions that are formed by the leader and the group members of each dyad (Ledlow & Coppola, 2014). The vertical dyad linkage, or leader member exchange, describes leader-member agreement as a function of their relationship. For example,

> Those members establishing high-quality exchanges with their leaders (in-group exchanges) can be expected to show higher agreement with their leaders than those who develop low-quality exchanges (out-group exchanges), and those who establish medium quality exchanges (middle-group exchanges) can be expected to show agreement with their leader that is between the in and out groups (Graen & Schiemann, 1978, p. 211).

The LMX can be reduced to the interaction between the domains of leader, follower, and their relationship (Graen & Uhl-Bien, 1995). The LMX functions multi-directionally as the leader, follower, and the relationship interact.

The three domains of leader, follower, and the relationship each offer a different perspective for theoretical application. The perspective of the leader focuses leader

behaviors and characteristics such as personality, attitudes, perceptions, power and influence (Graen & Uhl-Bien, 1995). The perspective of the follower focuses on how traits, behaviors, attitudes, perceptions and expectations affect the type and effectiveness of certain leadership styles and techniques on the followers (Graen & Uhl-Bien, 1995). The relationship-based perspective focuses specifically on the dyadic relationships between the leader and the follower. The dyad is studied to better understand the identifying characteristics of dyadic relationships such as trust, respect, and mutual obligations, evaluating reciprocal influence, and evaluating the correlation of variables of interest and the quality of the dyadic relationship (Graen & Uhl-Bien, 1995). Each perspective approaches the definition of leadership differently as described in Table 2.1 (adopted from Graen & Uhl-Bein, 1995). These three domains are a more recent approach to applying the LMX Theory. While each of these domain approaches to leadership are important, the follower-based approach is most applicable to examining job satisfaction and preceptorship.

*Table 2.1 Three Domain Approaches to Leadership*

| | Leader-based | Relationship-based | Follower-based |
|---|---|---|---|
| What is leadership? | Appropriate behavior of the person in leader role | Trust, respect, and mutual obligation that generates influence between parties | Ability and motivation to manage one's own performance |
| What behaviors constitute leadership? | Establishing and communicating vision; inspiring, instilling pride | Building strong relationships with followers; mutual learning and accommodation | Empowering, coaching, facilitating, giving up control |
| Advantages | Leader as rallying point for organization; common understanding of mission and values; can initiate wholesale change | Accommodates differing needs of subordinates; can elicit superior work from different types of people | Makes the most of follower capabilities; frees up leaders for other responsibilities |
| Disadvantages | Highly dependent on leader; problems if leader changes or is pursuing inappropriate vision | Time-consuming; relies on long-term relationship between specific leaders and members | Highly dependent on follower initiative and ability |
| When appropriate? | Fundamental change; charismatic leader in place; limited diversity among followers | Continuous improvement teamwork; substantial diversity and stability among followers; network building | Highly capable and task committed followers |
| Where most effective? | Structured tasks; strong leader position power; member acceptance of leader | Situation favorability for leader between two extremes | Unstructured tasks; weak position power; member nonacceptance of leader |
| (Adapted from Graen &Uhl-Bien, 1995, p. 224) | | | |

The LMX Theory has evolved over the years to incorporate other theories and evidence from the field. LMX began as a contingency theory and now is considered both a transactional and transformational leadership theory (Graen & Uhl-Bien, 1995). The development of the LMX Theory can be described in four stages. The vertical dyad linkage describes stage one as focused on the validation of differentiation within work

units, where the level of analysis are the dyads within the work unit (Graen & Uhl-Bien, 1995). In stage one, the initial focus was on the leader behavior but it did not account for the variation of follower response about their leaders (Graen & Uhl-Bien, 1995). The initial stage of LMX did not account for the relationship between the leader and the follower.

Stage two focused on the validation of differentiated relationships for organizational outcomes, where the level of analysis is the dyad (Graen & Uhl-Bien, 1995). Stage two marks the shift in nomenclature from the vertical dyad linkage to the leader member exchange. Researchers noted "LMX relationships are influenced by characteristics and behaviors of leaders and members and occurs through a role-making process and that higher-quality LMX relationships have very positive outcomes for leaders, followers, work units, and the organization in general" (Graen & Uhl-Bien, 1995, p. 229). The evidence suggests that effective leadership processes occur when leaders and followers develop and maintain high quality social exchange relationships (Graen & Uhl-Bien, 1995, p. 229). Stage two is distinguished by the concentration on the relationship between the leader and follower.

Leadership-making is the third stage that focuses on the theory and exploration of dyadic relationships development, where the level of analysis the dyad (Graen & Uhl-Bien, 1995). Stage three shifts from the in-group/out-group approach of stage one to developing leadership capacity across an organization (Graen & Uhl-Bien, 1995). Developing partnerships among leaders and subordinates for all employees is the new focus in contrast to the previous emphasis on developing relationships with only some of the employees (Graen & Uhl-Bien, 1995). Fostering the development of high quality

relationships beyond the functional silos of work contributes to the shift from individual improvement to organizational success. The leaders and followers are able to develop a partnership based on mutual reciprocal influence (Graen & Uhl-Bien, 1995). The leaders rely on the followers to provide them with partnership assistance when needed and the followers rely on the leads for support, encouragement, and career investments (Graen & Uhl-Bien, 1995). As the relationship grows, it fosters mutual trust, respect, and obligation toward each other shifting the relationships from transactional leadership to transformational leadership.

The fourth stage incorporates a systems-level perspective addressing how the interdependent dyadic relationships form a larger system of network assemblies, where the level of analysis is the group of dyads (Graen & Uhl-Bien, 1995). The relationships within the workplace are not restricted to organizational boundaries, but relationships can emerge beyond formal superior-subordinate relationships to include relationships among peers, teammates, and across other organizational levels and organizations (Graen & Uhl-Bien, 1995). These relationships emerge based on the mutual dependencies of the work such as task structure and individual characteristics of the employee (Graen & Uhl-Bien, 1995). While not all coworkers become friends, LMX Theory suggests that organizations should train team members to develop leadership relationships with their teammates as a professional relationship (Graen, Chun, & Taylor, 2006). Stage four describes the importance of organizational culture fostered through both transactional and transformational leadership.

The constructs of the LMX Theory are based on the characteristics of a working relationship. Graen & Uhl-Bien (1995) state that LMX contains three dimensions,

respect, trust, and obligation as the foundation to develop partnerships. Partnerships will not grow without "mutual respect for the capabilities of the other, the anticipation of deepening reciprocal trust with the other, and the expectation that interacting obligation will grow over time as career-oriented social exchanges blossom into a partnership" (Graen & Uhl-Bien, 1995, p. 237). Researchers recognize the lack of consistency in which the constructs of LMX are operationalized. The lack of consistency makes it difficult to compare results across studies (Gerstner & Day, 1997; Schriesheim, Castro, & Cogliser, 1999). Research rooted in LMX constructs should explicitly describe their measurement and generalizability.

The quality of the LMX can affect an employee's intention to leave the organization. Employees in a low quality relationship may consider other employment opportunities in order to lower their feelings of discomfort, especially if they feel "pushed" out of an organization (Harris, Kacmar, & Witt, 2005). Those in middle quality relationships appear to experience lower levels of turnover intentions compared to those in low quality LMX relationships (Harris et al., 2005). The low and moderate quality LMX relationships align with previous research on the negative linear relationships of intention to leave and the quality of the LMX relationship (Harris et al., 2005). However, the relationship of high quality LMX and the intent to turnover may be curvilinear (Harris et al., 2005). While a high quality LMX fosters mutual reciprocal influence it does not directly translate into intent to stay. High quality LMX subordinates may receive job opportunities that are more attractive than their current place of employment (Harris et al., 2005). Additionally, high quality LMX subordinates who identify important goals that are unlikely to be met may have higher motivation to leave their current position (Harris

et al., 2005). Furthermore, high quality LMX subordinates who aspire to advance in the organization, but opportunities are not available can lead to higher levels of turnover intentions (Harris et al., 2005). In general, the relationship between LMX quality and the intent to leave an organization is negative, but these other factors among high quality LMX relationships may result in a curvilinear relationship (Harris et al., 2005). Previous research illustrates the quality of the LMX can influence an employee's intention to leave the organization.

Organizational learning culture and LMX quality are influences on organizational commitment, which affects an employee's turnover intention. One study found that employees demonstrated the highest organizational commitment when the organization had a strong learning culture and employees were supervised in a supportive manner (Joo, 2010). Approximately 43% of the variance in organizational commitment was explained by the LMX quality and the organizational learning culture (Joo, 2010). Furthermore, employees exhibited the highest turnover intention when they perceived higher organizational commitment, accounting for 40% of the variance in turnover intention (Joo, 2010). These results illustrate that organizational commitment can almost completely mediate the employee's turnover intention (Joo, 2010). Another study, identified organizational support as a stronger correlate of organizational commitment than LMX (Settoon, Bennett, & Liden, 1996). Instead, this study found LMX to be highly related to citizenship instead of perceived organizational support (Settoon et al., 1996). Previous studies illustrate that organizational culture and support affects an employee's turnover intention according to the LMX Theory.

Research indicates LMX is positively related to performance ratings. There is a "positive correlation between LMX and objective performance, satisfaction with supervision, overall satisfaction, organizational commitment and role clarity" (Gerstner & Day, 1997, p. 835). However, there is a significant negative correlation between LMX and role conflict and turnover intentions. These results suggest "LMX is more strongly related to subjective performance ratings and member affective outcomes than to objective measures such as productivity and turnover" (Gerstner & Day, 1997, p. 835). Additionally, LMX can be a mediator in the negative relationship between performance orientation and job satisfaction (Janssen & Van Yperen, 2004; Wang, Law, Hackett, Wang, & Chen, 2005). A lower quality LMX is associated with lower levels of in-role and innovative job performance and with lower levels of job satisfaction (Janssen & Van Yperen, 2004). The supervisor determines the tasks of the subordinate's job making them the most salient agent of change within the organization for the subordinate (Janssen & Van Yperen, 2004). Essentially, the quality of LMX affects the employees' job effectiveness as measured by in-role and innovative job performance and job satisfaction (Janssen & Van Yperen, 2004). Furthermore, low LMX employees can experience gains in efficiency, job satisfaction and supervisor satisfaction through a one-on-one leadership intervention (Scandura & Graen, 1984). One study illustrated a single leadership intervention resulted in a 19% improvement in productivity among workers (Scandura & Graen, 1984). The leadership intervention can result in change between supervisors and subordinates ultimately translating into substantial cost savings for an organization (Scandura & Graen, 1984). The supervisor or leader is the

key influence to establishing expectations of performance and innovation and ultimately job satisfaction.

Mentoring is a relevant application of the LMX Theory. The mentor is the leader while the mentee identifies as the subordinate or follower. The mentor provides increased attention, support and sensitivity compared to those not participating in a mentorship program (Thibodeaux & Lowe, 1996). Other benefits of the mentor relationship include career advancement and personal development. Career advancement occurs through receiving inside information, greater latitude in role development, and influence in decision-making (Thibodeaux & Lowe, 1996). Personal development benefits include consideration for attention, feelings, support and sensitivity from the mentor (Thibodeaux & Lowe, 1996). Furthermore, mentors may utilize referent and expert power in working with mentees whereas coercive power may be more commonly used among non-mentees (Thibodeaux & Lowe, 1996). Mentoring relationships also exhibit transformational leadership behaviors. Transformational leadership behaviors are social currency and cultivate high-quality LMX (Wang et al., 2005). Task performance and organizational citizenship behaviors are positively associated with transformational leadership (Wang et al., 2005). Transformational leaders provide opportunities beyond the current mentee's role through the relationship development (Wang et al., 2005). The LMX brings a meaningful and personal lens to transformational leadership (Wang et al., 2005). Mentoring within the framework of LMX can be cultivated through transformational leadership strategies.

**Summary**

Key aspects of the literature review that inform this study include the following.

- Practicum experiences offer applied learning experiences for students (Council on Education for Public Health, 2011). The success of the practicum is largely based on the relationship between the student and the preceptor (Ensher et al., 2002; W. J. Smith et al., 2005). Health departments experience numerous benefits from hosting a practicum including: increased short-term skilled personnel, new perspectives and ideas, and can recruit for a long-term position (Cupps & Olmosk, 2008; Hayes, 2014; Hernandez et al., 2014).
- The applied epidemiology workforce anticipates an increase in departures due to retirement and reasons other than retirement (Hadler, 2014; Pourshaban et al., 2015). The increase in departures may compromise the ability of the applied epidemiology workforce to fulfill the 10 Essential Public Health Services and provide the public health foundational capabilities (Centers for Disease Control and Prevention, 2014; Trust for America's Health, 2013).
- Job satisfaction is an important component of employee retention (Pourshaban et al., 2015).
- The Leader Member Exchange (LMX) Theory offers a theoretical framework to understand how relationships, job satisfaction, and turnover intention are related (Graen & Uhl-Bien, 1995).

# Chapter III. Methods

## Study Design

This descriptive study examines secondary data from the 2014 Public Health Workforce Interests and Needs Survey (PH WINS). ASTHO collected the cross-sectional data in 2014 from state health department employees. This research limited the sample to those who identify their role in the organization as an epidemiologist and a state health department employee (n=681). A mixed methods approach using quantitative and qualitative analysis of the PH WINS data was conducted to describe correlations between job satisfaction and preceptorship capacity among epidemiologists employed at state health agencies. This research aims to expand upon the previous work completed by ASTHO and the de Beaumont Foundation (Harper et al., 2015; Sellers et al., 2015) to better understand job satisfaction and preceptorship capacity among epidemiologists compared to the general public health workforce. All quantitative analysis was conducted using SAS University (Cary, NC), and the qualitative analysis was conducted using NVIVO 10. The Georgia Southern University of Research Services and Sponsored Programs determined this research was "exempt" (H16362).

## Data Sources and Sampling Design

The 2014 PH WINS used a cross-sectional design of state and local health departments. PH WINS was fielded from September to December of 2014 (Leider, Bharthapudi, Pineau, Liu, & Harper, 2015). While all 50 states were invited to respond, ultimately only 37 elected to participate (NORC, 2015). Some local health departments participated in the piloting of the survey. The sampling frame was established by lists of current permanent central office employees (NORC, 2015). The desired margin of error

for estimates within each level of geography, population size and governance type was set at 2.5% for an estimated proportion of 50% (NORC, 2015). At this level, the data provides relatively high reliability of survey estimates without imposing an undue burden of survey completion per state (NORC, 2015).

Each state's level of participation determined its sample status and sample size. Three options were available: standard (minimum of 50 completed surveys, superseded by a larger sample size if necessary to meet reliability requirements at the region level), agency (a minimum of 300 completed surveys, superseded by a larger sample size if necessary to meet reliability requirements at the region level), and census (all staff within a state health department) (NORC, 2015). Eleven states participated at the standard level, three opted for the agency requirements, and the remaining 23 chose to provide census level data (NORC, 2015). After the sampling frame was established in each state, the samples were drawn using systematic random sampling within each state (NORC, 2015). This sampling method generated unique probabilities of selection for each state (NORC, 2015).

**Measures**

This research will focus on select variables from the PH WINS instrument to answer the following research questions in Table 3.1. The full survey instrument can be found in Appendix A or online at http://www.astho.org/phwins/Instrument/.

*Table 3.1 Research Questions & Hypotheses*

| | |
|---|---|
| **RQ1 - What is the level of job satisfaction among applied epidemiologists?** | |
| $H_{o1}$ | The majority of applied epidemiologists are satisfied with their jobs. |
| $H_{a1}$ | The majority of applied epidemiologists are not satisfied with their jobs. |
| **RQ 2 - What are factors significantly associated with job satisfaction among applied epidemiologists?** | |
| $H_{o2}$ | Among applied epidemiologists, factors of organizational and supervisory support are associated with an increase in job satisfaction. |
| $H_{a2}$ | Among applied epidemiologists, factors of organizational and supervisory support are not associated with an increase in job satisfaction. |
| $H_{o3}$ | Among applied epidemiologists, factors of training support are associated with an increase in job satisfaction. |
| $H_{a3}$ | Among applied epidemiologists, factors of training support are not associated with an increase in job satisfaction. |
| **RQ 3 – What factors are associated with applied epidemiology preceptorship capacity?** | |
| $H_{o4}$ | Applied epidemiology preceptors are racially diverse. |
| $H_{a4}$ | Applied epidemiology preceptors are not racially diverse. |
| $H_{o5}$ | Applied epidemiology preceptors are diverse by their supervisory level. |
| $H_{a5}$ | Applied epidemiology preceptors are not diverse by their supervisory level. |
| $H_{o6}$ | Applied epidemiology preceptors work across program areas similar to all epidemiologists. |
| $H_{a6}$ | Applied epidemiology preceptors do not work across program areas similar to all epidemiologist. |
| $H_{o7}$ | Among applied epidemiologists, collaboration with academia is associated with an increase in preceptorship. |
| $H_{a7}$ | Among applied epidemiologists, collaboration with academia is not associated with an increase in preceptorship. |
| **RQ 4 - Do applied epidemiologists who serve as preceptors experience higher levels of job satisfaction compared to those who do not serve as preceptors?** | |
| $H_{o8}$ | Applied epidemiologists who serve as preceptors experience a greater level of job satisfaction compared with those who do not serve as preceptors . |
| $H_{a8}$ | Applied epidemiologists who serve as preceptors do not experience a greater level of job satisfaction compared with those who do not serve as preceptors. |

**Dependent Variables.**

Measures of job satisfaction and preceptorship are the two primary dependent variables of interest for this study. The quantitative measure of job satisfaction was assessed using the Bowling Green University's Abridged Job in General Scale (aJIG). The respondents select "yes," "no" or "cannot decide" to eight descriptors of the job: good, undesirable, better than most, disagreeable, makes me content, excellent, enjoyable, and poor. "Yes" is assigned 3 points, "no" receives 0 points, and "cannot decide" is 1 point. The scale ranges from 0-48. The scoring guidance is approximate where 24 is the neutral point, but neutral scores can range from 19-29. Therefore, scores equal to or greater than 29 are considered satisfied while scores less than or equal to 19 are dissatisfied. The scores are subsequently referred to as the "JIG score." The negatively framed questions (undesirable, disagreeable, and poor) were reverse-coded. Additionally, participants who provided straight-lined responses and who had more than two missing responses were excluded from analysis to avoid biasing the results toward the null. Preceptorship status was self-reported by participants indicating "yes" or "no" to supervising a student experience in the last year. Preceptorship status is utilized to determine preceptorship capacity throughout the analysis.

**Independent Variables.**

Measures of the workplace environment and training support were selected as independent variables of interested based on previous studies (Harper et al., 2015) and the Leader-Member Exchange Theory (Graen & Uhl-Bien, 1995) implicating factors of organizational, supervisor and training support as influential for job satisfaction and intention to leave. There are 20 items in the PH WINS that describe the employees'

perceptions of their workplace environment listed in Table 3.2. These items were measured with a 5-point Likert scale from "strongly agree" to "strongly disagree." The questions were positively worded such that agreement indicated a higher level of support.

*Table 3.2 Measures of organizational and supervisory support in the PH WINS assessment[a], United States, 2014*

| **Measures of Organizational and Supervisory Support** |
|---|
| I know how my work relates to the agency's goals and priorities |
| The work I do is important |
| Creativity and innovation are rewarded |
| Communication between senior leadership and employees is good in my organization |
| Supervisors/team leaders work well with employees of different backgrounds |
| Supervisors/team leaders in my work unit support employee development |
| My training needs are assessed |
| Employees have sufficient training to fully utilize technology needed for their work |
| Employees learn from one another as they do their work |
| My supervisor supports my need to balance work and family issues |
| My workload is reasonable |
| My supervisor/team leader provides me with opportunities to demonstrate my leadership skills |
| I am inspired to meet my goals at work |
| I feel completely involved in my work |
| I am determined to give my best effort at work every day |
| I am satisfied that I have opportunities to apply my talent and expertise |
| My supervisor and I have a good working relationship |
| My supervisor/team leader treats me with respect |
| My co-workers and I have a good working relationship |
| I recommend my organization as a good place to work |
| [a] Source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/<br>PH WINS = Public Health Workforce Interest and Needs Survey |

Training support was also measured across eight items listed in Table 3.3 with a "yes" or "no" response.

*Table 3.3 Measures of training support in the PH WINS assessment[a], United States, 2014*

| **Measures of Training Support** |
|---|
| Require continuing education |
| Include education and training objectives in performance reviews |
| Allow use of working hours to participate in training |
| Pay travel/registration fees for training |
| Provide on-site training |
| Have staff position(s) responsible for internal training |
| Provide recognition of achievement |
| Other |

[a] Source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
PH WINS = Public Health Workforce Interest and Needs Survey

Other independent variables of interest include demographic variables such as: race, supervisory level, program area, and collaboration with academia, in order to compare applied epidemiologists and the subset of applied epidemiology preceptors for significant differences.

**Analytic Techniques**

ASTHO and the de Beaumont Foundation provided the data after it was cleaned, logic checked, composite variables were created, and missing or extreme data were recoded to missing (Leider, Bharthapudi, et al., 2015). Utilizing the provided data, this study generated a new statistical weight variable using post-stratification to be

representative of epidemiologists at all state health agencies based on the state enumeration data from the 2013 ECA to be used for secondary analysis as not all states participated in PH WINS. Additionally, the post-stratification accounts for the nonresponse and avoids underestimation of standard errors. The quantitative analysis accounted for the new sampling weight using the SAS PROCSURVEY procedures for calculations.

Descriptive statistical analyses were conducted using SAS PROC SURVEYFREQ to describe the demographic characteristics, overall satisfaction, organizational and supervisory support factors, training support factors, and subject area of practice. The demographic variables of interest include: supervisory status, gender, race, age, degree attainment, duration of employment in position, duration of employment in agency, duration of employment in public health practice, salary, intent to depart the agency, and preceptorship.

T-tests and ANOVAs were calculated using PROC SURVEYREG between the JIG score and the demographics, overall satisfaction variables, organizational and supervisory support factors, and training support factors to test for statistically significant relationships ($\alpha=0.05$). The t-test provides a statistical test of significance to compare two groups where the dependent variable is continuous while the ANOVA analysis allows the comparison of the means between more than two groups with equal variances and normal distribution.

Additionally, the demographic variables were assessed among the subgroup of preceptors. Preceptorship status is a binary variable, thus was analyzed using PROC SURVEYLOGISTIC with the variables of race, age, gender, supervisory level, annual

salary, educational attainment, years in current position, years in the agency, years in public health practice, collaborate with academia, and overall job satisfaction.

**Qualitative Coding.**

The factors influencing job satisfaction were assessed quantitatively and qualitatively. Responses to the open-ended question on job satisfaction were coded and grouped thematically. Another individual coded a subsample of the qualitative responses. The two sets of code were compared using the intercoder reliability test indicating 80-100% similarity. The differences in coding were discussed and addressed with coding revisions and updating the codebook.

# Chapter IV. Results

First, the qualitative results are presented to better understand the respondents' perspective on job satisfaction. Second, the results of the quantitative analysis provide data to describe the demographics and work environment of the respondents.

## Results from the Qualitative Analysis

The responses to the prompt "If you wish, you may provide comments below about your job satisfaction" were qualitatively analyzed by 11 major themes. The themes include: advancement, job security, job satisfaction, organizational culture, organizational structure, pay satisfaction, professional development, recognition, retention, supervisor support, and workload. Each major theme has its own subthemes as illustrated in Table 4.1. Only one select quote is provided to illustrate each major theme per the request of ASTHO.

*Table 4.1 Major themes and subthemes of job satisfaction among epidemiologists responding to the PH WINS assessment[a], United States, 2014*

| Major Theme | Subthemes |
|---|---|
| Advancement | Funding, changing jobs, skill set |
| Job security | Federal funding, organizational changes |
| Job satisfaction | Commitment to public health, meaningfulness of the work, task diversity |
| Organizational culture | Diversity, equity, leadership, morale, politics, professional conduct |
| Organizational structure | Reorganization and change, understanding epidemiology |
| Pay satisfaction | Pay freeze, equity, health insurance, inadequate pay, job classification, loan forgiveness |
| Professional development | Opportunities for growth, opportunities for professional development |
| Recognition | Accountability, CDC compliments, under-appreciated, under-valued |
| Retention | Pay satisfaction, private sector |
| Supervisor support | Leadership, task diversity |
| Workload | Task diversity, understaffed, teamwork, time for family |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
PH WINS = Public Health Workforce Interest and Needs Survey

The first theme of advancement has three subthemes: funding, changing jobs, and skill set. The subtheme of funding focused mostly on how budget cuts or program funding affected the availability of promotions. The subtheme of changing jobs was illustrated by comments indicating that regardless of performance, promotions or an increase in compensation is negligible. The only way to receive an increase in compensation is to take a different position. This is further illustrated by the subtheme focused on skill set as it relates to advancement. Not only would staff have to take another position to receive additional compensation, the other position may entail a completely different professional skill set as exemplified in the following quote, “There is no movement up, I am almost at the top of my range, and unless I become management, I cannot advance. Moving to management would be a complete change in skill set.”

Second, job security has two subthemes of federal funding and organizational changes. The tenuous nature of federal funding negatively influences perceived job

security by staff. One respondent described the impact of federal funding as "Most of the positions in my organization are short-term 100% federally funded so we worry about grant renewal cycles… All this leads to a perpetual feeling of job insecurity as well as disruptions in productivity and morale." Additionally organizational changes such as widespread position elimination and a shift in staffing strategy leads to concerns about perceived job security.

The third theme is job satisfaction with three subthemes: commitment to public health, meaningfulness of the work, and task diversity. Commitment to public health by state agency epidemiologists is a source of job satisfaction. One respondent described their job satisfaction, "Most of the positions in my organization are short-term 100% federally funded so we worry about grant renewal cycles… All this leads to a perpetual feeling of job insecurity as well as disruptions in productivity and morale." Furthermore the perceived meaningfulness of the work contributes to individual job satisfaction. Lastly, job satisfaction influenced by task diversity is summarized by the opportunity for staff to work on a variety of assignments and exercise creative freedoms.

The fourth theme of organizational culture has six subthemes including: diversity, equity, leadership, morale, politics, and professional conduct. Diversity is a subtheme of organizational culture illustrated by the distribution of employees in supervisory positions and recognizing the variety of skills that staff can contribute at the agency. The subtheme of equity is illustrated by comments of inequity where respondents felt that not all employees were supported equally. Leadership is a major influence of organizational culture. Many respondents commented that engaging with leadership was frustrating or demotivating. One respondent commented, "Management does not

support the assessment of processes or programs so the collection of data often feels pointless." Morale is another subtheme of organizational culture characterized by administrative or policy barriers restricting individual advancement or performance. Respondents indicated that politics influences organizational culture through the limitations of unions, the practice of pulling voting records when considering candidates for positions, and relying heavily on social capital instead of individual qualifications. Lastly professional conduct rooted in collegial respect from management to staff and the ability to resolve workplace conflict is another subtheme of organizational culture.

The fifth theme of organizational structure includes subthemes of reorganization and change and understanding epidemiology. The subtheme of reorganization and change is illustrated by comments of staffing changes and organization position structure negatively affecting job satisfaction. Furthermore, agency leadership in positions overseeing the epidemiology staff without competence in epidemiology can negatively influence job satisfaction of the epidemiology staff. One respondent indicated, "I am not sure senior management here has a clear understanding of public health or epidemiology."

The sixth theme is pay satisfaction. Its subthemes include: pay freeze, equity, health insurance, inadequate pay, job classification, and loan forgiveness. The subtheme of pay freeze is summarized by dissatisfaction with the lack of raises and cost of living increases. Differences in pay between agency type, location, and individual experience illustrates the challenge of pay equity. One respondent commented, "I am doing Epi II work, but only getting Epi I pay and so far not allowed to do the competencies. Other's who are just hired, are made Epi II's almost right after, with no

competencies required." Despite receiving minimal to no pay increases, the costs of employer provided health insurance are rising. Ultimately, employees are paying more for worse health insurance coverage and bringing home a smaller paycheck. Capitulated with inadequate pay, workers are frustrated with their level of pay, especially as it relates to published local and national averages. One challenge mentioned specifically is the lack of consistency in the job classification scale where individuals with less responsibility can earn the same or more than those in management or with a longer agency tenure. Lastly, the availability of loan forgiveness programs could increase levels of job satisfaction to reduce the financial burden of student debt, especially as most epidemiology positions require post-graduate degrees.

The seventh theme is professional development and its subthemes include opportunities for growth and opportunities for training. Respondents indicated that they desired opportunities to acquire new skills by participating in professional development. Those interested in receiving training reported restrictions on training opportunities. One respondent commented, "I was interested in a training, but I was told that some training opportunities were to be offered to the younger staff in order to retain them. Thus, I was not eligible." In addition to training restricted to specific staff, comments about the available opportunities to governmental workers compared to the private sector illustrated the current training opportunities are perceived as limited.

The eighth theme is recognition. The four subthemes include: accountability, CDC compliments, under-appreciated, and under-valued. The subtheme of accountability is exemplified by the lack of merit-based incentives and rewarding individual and agency accomplishments. CDC compliments on the work of the state

epidemiologists were highly valued and compared to the lack of praise from their own agency. Under-appreciation of staff is resulting in lower job satisfaction based on comments from respondents. Staff also report feeling under-valued despite excelling on the job. One respondent commented, “Recognition and personal growth opportunities have been limited, I feel very undervalued. I am hopeful that things will change with new supervisor and unit changes.” In sum, the subthemes indicate a lack of staff recognition can adversely influence job satisfaction.

The ninth theme of retention has two subthemes pay satisfaction and private sector. Comments surrounding pay satisfaction illustrate respondents are dissatisfied with their level of pay for their performance, experience, and education. One respondent stated, “Unfortunately, pay is very low across the agency. Leadership's basic thought is that people will quit if the pay is too horrible and since there isn't high staff turnover, the pay must be fine. Never mind that we can't always fill vacancies due to the offered pay.” Other comments indicated dissatisfaction with their salary compared to the private sector and the attraction to work in the private sector to get away from the governmental restrictions. Ultimately, the level of pay satisfaction and competing opportunities in the private sector negatively influence retention of applied epidemiologists.

The tenth theme is supervisor support, which has two subthemes: leadership and task diversity. Leadership’s supervisory style is a source of dissatisfaction. One respondent indicated, “Most of my job dissatisfaction comes from the supervisory and management in our section and division.” However, the task diversity supported by the supervisor favorably influences job satisfaction.

The eleventh and final theme is workload. There are four subthemes: task diversity, understaffed, teamwork, and time for family. While task diversity is acclaimed by some as a source of job satisfaction, additional duties taken on by staff to fill the gaps left by vacancies can result in a burdensome workload. The subtheme of understaffed illustrates the negative impact on current epidemiology staff when vacancies remain unfilled. One respondent described their experience, "I think my satisfaction with my job would be higher if we could get to the point of being fully staffed. Covering job duties for other positions in addition to mine has been stressful." Some respondents indicated their dissatisfaction for compensating for underperforming teammates. Others indicated that they intentionally took a lower level position to reduce their workload in order to foster better work life balance.

**Results from the Quantitative Analysis**

The demographics for the epidemiologists in the sample (n=681) are described in Table 4.2. Within the sample almost 75% are female, 73% are white, 68% have a bachelors and masters degree, 51% are non-supervisors, 59% have five years or less experience in their current position, 39% have five years or less experience in the agency, 20% have 21 or more years of public health experience, and 27% are planning to depart within the year.

*Table 4.2 Number and percent of epidemiologists responding to the PH WINS assessment[a], United States, 2014*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| Supervisory Level | | | |
| *Non supervisor* | 354 | 50.95 | 46.65, 55.25 |
| *Team leader* | 126 | 19.87 | 16.54, 23.21 |
| *Supervisor* | 140 | 19.41 | 16.19, 22.62 |
| *Management* | 59 | 9.76 | 7.02, 12.52 |
| Gender | | | |
| *Female* | 491 | 74.44 | 70.91, 77.97 |
| *Male* | 184 | 25.56 | 22.03, 29.09 |
| Preceptor | | | |
| *No* | 496 | 73.84 | 69.92, 77.76 |
| *Yes* | 174 | 26.16 | 22.24, 30.08 |
| Race | | | |
| *Asian OR AI/AN OR NHOPI OR 2+ Races* | 95 | 13.40 | 10.56, 16.25 |
| *Black* | 50 | 7.37 | 5.44, 9.30 |
| *Hispanic* | 37 | 5.97 | 3.68, 8.24 |
| *White* | 481 | 73.27 | 69.53, 77.00 |
| Age | | | |
| *30 or below* | 124 | 19.57 | 16.08, 23.07 |
| *31 to 35* | 97 | 14.62 | 11.58, 17.66 |
| *36 to 40* | 106 | 16.18 | 12.94, 19.41 |
| *41 to 45* | 94 | 12.90 | 10.18, 15.62 |
| *46 to 50* | 68 | 10.51 | 7.86, 13.16 |
| *51 to 55* | 52 | 7.09 | 5.03, 9.15 |
| *56 to 60* | 56 | 8.75 | 6.10, 11.39 |
| *Over 60* | 64 | 10.38 | 7.60, 13.16 |
| Years of experience in current position | | | |
| *0-5 years* | 398 | 59.15 | 54.92, 63.37 |
| *6-10 years* | 156 | 22.63 | 19.14, 26.12 |
| *11-15 years* | 75 | 10.68 | 8.12, 13.24 |
| *Over 15 years* | 44 | 7.54 | 4.96, 10.13 |
| Years of experience in agency | | | |
| *0-5 years* | 250 | 39.06 | 34.95, 43.27 |
| *6-10 years* | 160 | 22.65 | 19.02, 26.28 |
| *11-15 years* | 128 | 18.85 | 15.56, 22.14 |
| *16-20 years* | 56 | 8.33 | 6.02, 10.66 |
| *21 or more years* | 77 | 11.11 | 8.46, 13.76 |
| Years of experience in public health practice | | | |
| *0-5 years* | 154 | 22.31 | 18.87, 25.75 |
| *6-10 years* | 158 | 24.56 | 20.85, 28.28 |
| *11-15 years* | 151 | 21.22 | 17.57, 24.86 |
| *16-20 years* | 77 | 12.13 | 9.30, 14.95 |
| *21 or more years* | 138 | 19.78 | 16.48, 23.08 |

| | | | |
|---|---|---|---|
| Departing the workforce within the year | | | |
| *No* | 489 | 73.23 | 69.43, 77.04 |
| *Yes* | 178 | 26.77 | 22.96, 30.57 |
| Departing the workforce within the year | | | |
| *No* | 489 | 73.23 | 69.43, 77.04 |
| *Yes, other* | 50 | 6.73 | 4.45, 9.00 |
| *Yes, to retire* | 23 | 3.68 | 1.96, 5.40 |
| *Yes, to take a non-governmental job* | 44 | 6.70 | 4.65, 8.73 |
| *Yes, to take another governmental job* | 61 | 9.66 | 6.98, 12.35 |
| Annual Salary | | | |
| *Less than $45,000* | 57 | 8.70 | 6.67, 10.73 |
| *$45,000.01 to $55,000* | 136 | 23.05 | 19.67, 26.43 |
| *$55,000.01 to $65,000* | 121 | 19.78 | 16.47, 23.09 |
| *$65,000.01 to $75,000* | 108 | 17.29 | 13.93, 20.64 |
| *$75,000.01 to $85,000* | 85 | 14.27 | 11.33, 17.20 |
| *$85,000.01 to $95,000* | 50 | 8.62 | 6.17, 11.07 |
| *$95,000.01 to $105,000* | 30 | 4.15 | 2.52, 5.77 |
| *More than $105,000* | 32 | 4.14 | 2.53, 5.75 |
| Educational Attainment | | | |
| *Bachelors* | 41 | 5.62 | 3.75, 7.49 |
| *Bachelors Masters* | 456 | 68.92 | 65.15, 72.68 |
| *Bachelors Masters Doctorate* | 136 | 19.51 | 16.29, 22.72 |
| *Bachelors Doctorate* | 42 | 5.96 | 4.06, 7.86 |
| Certifications | | | |
| *No* | 523 | 77.51 | 73.78, 81.25 |
| *Yes* | 157 | 22.49 | 18.75, 26.22 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey
AI/AN = American Indian / Alaska Native
NHOPI = Native Hawaiian or Pacific Islander

Approximately 26% of epidemiologists are preceptors (Table 4.2). The subgroup analysis of preceptors (Table 4.3) show that 45% of preceptors are below the age of 40 and almost 73% are female. Most are white (66%). Preceptors hold positions across all supervisory levels: non-supervisor (33%), team leader (19%), supervisor (32%), and management (16%). Over 58% of preceptors earn less than $75,000 annually. Nearly 61% hold bachelors and masters degrees while 29% hold bachelors, masters and doctorate degrees. Approximately 56% of preceptors have been in their current position

for five years or less while 56% have been at their agency for 10 years or less. Approximately 62% of preceptors have more than 10 years of experience in public health practice. Nearly 72% of preceptors collaborate with academia. Almost 89% of preceptors strongly agree or agree they have overall job satisfaction.

*Table 4.3 Percent distribution of characteristics of epidemiologists who served as preceptors, responding to the PH WINS assessment[a], United States, 2014*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| Age | | | |
| *30 or below* | 17 | 10.48 | 4.86, 16.11 |
| *31 to 35* | 22 | 14.60 | 8.76, 20.44 |
| *36 to 40* | 32 | 19.92 | 12.94, 26.89 |
| *41 to 45* | 23 | 11.48 | 6.78, 16.18 |
| *46 to 50* | 18 | 10.81 | 5.64, 15.97 |
| *51 to 55* | 19 | 7.70 | 3.98, 11.41 |
| *56 to 60* | 16 | 11.38 | 4.69, 18.08 |
| *over 60* | 20 | 13.63 | 7.33, 19.92 |
| Gender | | | |
| *Female* | 124 | 72.64 | 65.18, 80.11 |
| *Male* | 47 | 27.36 | 19.89, 34.82 |
| Race | | | |
| *White* | | | |
| *Black* | 114 | 67.52 | 59.43, 75.60 |
| *Hispanic* | 21 | 13.65 | 8.30, 19.01 |
| *Asian OR AI/AN OR NHOPI OR* | 13 | 9.00 | 2.84, 15.17 |
| *2+Races* | 19 | 9.82 | 5.10, 14.55 |
| Supervisory level | | | |
| *Non-Supervisor* | 61 | 33.16 | 25.27, 41.06 |
| *Team Leader* | 30 | 19.26 | 12.30, 26.22 |
| *Supervisor* | 58 | 31.81 | 24.11, 39.51 |
| *Management* | 25 | 15.77 | 8.78, 22.76 |
| Annual Salary | | | |
| *Less than $45,000* | 11 | 6.10 | 2.31, 9.89 |
| *$45,000.01 to $55,000* | 24 | 19.70 | 11.40, 28.00 |
| *$55,000.01 to $65,000* | 25 | 14.85 | 9.14, 20.56 |
| *$65,000.01 to $75,000* | 30 | 17.75 | 11.00, 24.50 |
| *$75,000.01 to $85,000* | 22 | 12.11 | 7.07, 17.15 |
| *$85,000.01 to $95,000* | 20 | 13.70 | 7.55, 19.85 |
| *$95,000.01 to $105,000* | 13 | 7.39 | 3.16, 11.62 |
| *More than $105,000* | 16 | 8.40 | 3.85, 12.94 |

| | | | |
|---|---|---|---|
| Educational Attainment | | | |
| *Bachelors* | 7 | 4.22 | 1.00, 7.44 |
| *Bachelors Masters* | 102 | 60.64 | 52.62, 68.66 |
| *Bachelors Masters Doctorate* | 55 | 29.21 | 21.94, 36.48 |
| *Bachelors Doctorate* | 10 | 5.92 | 2.01, 9.83 |
| Years in current position | | | |
| *0-5 years* | 90 | 55.78 | 44.98, 62.57 |
| *6-10 years* | 47 | 23.90 | 17.22, 30.58 |
| *11-15 years* | 20 | 10.21 | 5.38, 15.04 |
| *Over 15 years* | 13 | 12.11 | 4.78, 19.44 |
| Years in the agency | | | |
| *0-5 years* | 46 | 31.13 | 22.80, 39.45 |
| *6-10 years* | 43 | 24.76 | 17.20, 32.33 |
| *11-15 years* | 41 | 21.11 | 14.60, 27.62 |
| *16-20 years* | 21 | 11.51 | 6.24, 16.78 |
| *21 or more years* | 19 | 11.49 | 5.66, 27.31 |
| Years in public health practice | | | |
| *0-5 years* | 24 | 15.27 | 9.03, 21.51 |
| *6-10 years* | 35 | 22.38 | 15.20, 29.56 |
| *11-15 years* | 46 | 24.23 | 16.78, 31.67 |
| *16-20 years* | 24 | 12.21 | 6.98, 17.43 |
| *21 or more years* | 44 | 25.92 | 18.38, 33.46 |
| Collaborate with academia | | | |
| *No* | 52 | 28.25 | 20.92, 35.59 |
| *Yes* | 122 | 71.75 | 64.42, 79.08 |
| Overall Job satisfaction | | | |
| *Strongly disagree/ disagree* | 14 | 7.11 | 2.99, 11.23 |
| *Neither agree nor disagree* | 7 | 4.08 | 0.78, 7.37 |
| *Agree* | 74 | 41.58 | 33.28, 49.88 |
| *Strongly agree* | 79 | 47.23 | 38.79, 55.68 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey
AI/AN = American Indian / Alaska Native
NHOPI = Native Hawaiian or Pacific Islander

The diversity of subject area is compared between all epidemiologists and among preceptors in Table 4.4. The most common subject area of practice for all epidemiologists (31%) and preceptors (29%) is infectious disease. General epidemiology and surveillance is the focus of 23% of both epidemiologists and preceptors. Behavioral health and injury has the smallest representation of 4% of all

epidemiologists and 2% of preceptors. Chronic disease epidemiology is only practiced among 4% of all epidemiologists and 5% of preceptors.

*Table 4.4 Number and percent distribution of epidemiologists and preceptors by subject area responding to the PH WINS assessment,[a] United States, 2014*

| Subject area | All (n) | All weighted percent[b] (95% confidence interval) | Preceptors only (n) | Preceptors only weighted percent[b] (95% confidence interval) |
|---|---|---|---|---|
| Infectious Disease | 195 | 30.80 (26.63, 34.97) | 53 | 29.01 (21.44, 36.59) |
| Maternal and Child Health | 61 | 11.63 (8.39, 14.87) | 16 | 13.39 (6.54, 20.23) |
| Chronic Disease | 32 | 4.31 (2.74, 5.89) | 10 | 5.19 (1.80, 8.58) |
| Environmental Health | 58 | 9.85 (7.11, 12.58) | 12 | 10.28 (4.16, 16.41) |
| Behavioral Health and Injury | 29 | 3.56 (2.24, 4.89) | 6 | 2.42 (0.43, 4.41) |
| General Epidemiology and Surveillance | 159 | 22.93 (19.23, 26.64) | 39 | 23.39 (15.68, 31.09) |
| Other | 112 | 16.91 (13.83, 19.98) | 27 | 16.32 (9.92, 22.72) |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey

Table 4.5 describes the distribution of preceptorships and academic partnerships. In 2013, over 26% of epidemiologists supervised a practicum. Nearly 79% reported that the work required to host the practicum was equal or outweighed the work required to host the practicum. Furthermore, 52% of epidemiologists collaborated with members of the academic community (faculty/staff/students) on public health practices issues. Almost 92% of those that collaborate with the academic community identify the value of the academic partnership to be somewhat or very helpful.

*Table 4.5 Number and percent of epidemiology preceptors regarding preceptorships and academic partnerships responding to the PH WINS assessment,[a] United States, 2014*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| Perceived Preceptorship Value | | | |
| *The work required to host the practicum outweighed the benefit a lot* | 10 | 7.32 | 3.83, 10.81 |
| *The work required to host the practicum outweighed the benefit a little* | 24 | 14.06 | 8.51, 19.62 |
| *The work required to host the practicum was equal to the benefit* | 64 | 36.47 | 28.82, 44.12 |
| *The benefit to the department outweighed the work required to host the practicum a little* | 27 | 17.44 | 10.47, 24.41 |
| *The benefit to the department outweighed the work required to host the practicum a lot.* | 47 | 24.71 | 17.38, 32.05 |
| Participate in academic partnerships | | | |
| *No* | 52 | 28.25 | 20.92, 35.58 |
| *Yes* | 122 | 71.75 | 64.42, 79.08 |
| Value of Academic Partnerships | | | |
| *Not helpful* | 6 | 5.37 | 0.88, 9.85 |
| *Somewhat helpful* | 46 | 39.55 | 29.30, 49.80 |
| *Very helpful* | 70 | 55.09 | 45.09, 65.09 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey

Table 4.6 describes the distribution of training support available at State Health Agencies. Among State Health Agencies, 13% require continuing education, 55% include education and training objectives in performance reviews, 93% allow the use of working hours to participate in training, 79% pay for travel or registration fees for training, 75% provide on-site training, 51% have at least one staff position responsible for internal training, 61% provide recognition of achievement, and 3% offer other methods of training support.

*Table 4.6 Number and percent of epidemiologists responding to the PH WINS assessment[a] regarding available training support, United States, 2014*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| Require continuing education | | | |
| *Yes* | 91 | 13.42 | 10.50, 16.34 |
| *No* | 590 | 86.58 | 83.66, 89.50 |
| Include education and training objectives in performance reviews | | | |
| *Yes* | 385 | 54.69 | 50.44, 58.93 |
| *No* | 296 | 45.31 | 41.07, 49.56 |
| Allow use of working hours to participate in training | | | |
| *Yes* | 640 | 93.23 | 90.75, 95.71 |
| *No* | 41 | 6.77 | 4.29, 9.25 |
| Pay for travel/registration fees for training | | | |
| *Yes* | 531 | 78.67 | 75.13, 82.21 |
| *No* | 150 | 21.33 | 17.79, 24.87 |
| Provide on-site training | | | |
| *Yes* | 524 | 75.06 | 71.25, 78.87 |
| *No* | 157 | 24.94 | 21.13, 28.75 |
| Have staff position(s) responsible for internal training | | | |
| *Yes* | 360 | 50.67 | 46.59, 54.76 |
| *No* | 321 | 49.32 | 45.24, 53.41 |
| Provide recognition of achievement | | | |
| *Yes* | 401 | 60.77 | 56.66, 64.89 |
| *No* | 280 | 39.23 | 25.11, 43.35 |
| Other | | | |
| *Yes* | 22 | 2.79 | 1.55, 4.01 |
| *No* | 659 | 97.22 | 95.98, 98.45 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey

Table 4.7 summarizes the distribution of organizational and supervisory support factors present at state health agencies. Approximately 84% of epidemiologists agree or strongly agree that they know how their work relates to the agency's goals and priorities. Over 90% agree or strongly agree that the work they do is important. Nearly 44% agree or strongly agree that creativity and innovation are rewarded at the agency.

Only 39% agree or strongly agree that communication between senior leadership and employees is good in their organization. Approximately 72% of epidemiologists agree or strongly agree that supervisors/team leaders work well with employees of different backgrounds. About 73% agree or strongly agree that supervisors/team leaders in their work unit support employee development. Nearly 38% agree or strongly agree that their training needs are assessed. Less than 47% of epidemiologists agree or strongly agree that they have sufficient training to fully utilize technology needed for their work. Almost 82% agree or strongly agree that employees learn from one another as they do their work. Approximately 88% agree or strongly agree that their supervisor supports their need to balance work and family issues. Only 61% agree or strongly agree that their workload is reasonable. Nearly 69% agree or strongly agree that their supervisor/team leader provides them with opportunities to demonstrate their leadership skills. About 75% agree or strongly agree that they are inspired to meet their goals at work. Similarly, 78% agree or strongly agree that they are determined to give their best effort at work every day. Less than 69% agree or strongly agree that they are satisfied with the opportunities to apply their talent and expertise. About 85% agree or strongly agree that they have a good working relationship with their supervisor, similarly 86% agree or strongly agree that their supervisor/ team leader treats them with respect. Over 91% agree or strongly agree that they have a good working relationship with their co-workers. Lastly, only 66% agree or strongly agree to recommend their organization as a good place to work.

*Table 4.7 Number and percent of epidemiologists responding to the PH WINS assessment[a] regarding the organizational & supervisory support, United States, 2014*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| I know how my work relates to the agency's goals and priorities | | | |
| *Strongly disagree* | 7 | 1.09 | 0.22, 1.95 |
| *Disagree* | 28 | 3.57 | 2.15, 5.00 |
| *Neither agree nor disagree* | 71 | 11.33 | 8.40, 14.27 |
| *Agree* | 367 | 54.49 | 50.08, 58.89 |
| *Strongly agree* | 203 | 29.52 | 25.74, 33.61 |
| The work I do is important | | | |
| *Strongly disagree* | 6 | 0.99 | 0.16, 1.81 |
| *Disagree* | 7 | 0.87 | 0.19, 1.55 |
| *Neither agree nor disagree* | 53 | 7.90 | 5.67, 10.14 |
| *Agree* | 289 | 41.96 | 37.84, 46.08 |
| *Strongly agree* | 324 | 48.28 | 44.11, 52.45 |
| Creativity and innovation are rewarded | | | |
| *Strongly disagree* | 57 | 8.20 | 5.69, 10.71 |
| *Disagree* | 117 | 15.97 | 12.98, 18.96 |
| *Neither agree nor disagree* | 213 | 31.89 | 27.88, 35.89 |
| *Agree* | 239 | 35.21 | 30.10, 39.44 |
| *Strongly agree* | 54 | 8.74 | 6.20, 11.28 |
| Communication between senior leadership and employees is good in my organization | | | |
| *Strongly disagree* | 80 | 11.30 | 8.53, 14.06 |
| *Disagree* | 183 | 27.24 | 23.37, 31.11 |
| *Neither agree nor disagree* | 154 | 22.84 | 19.29, 26.38 |
| *Agree* | 203 | 30.08 | 26.11, 34.05 |
| *Strongly agree* | 60 | 8.54 | 6.21, 10.88 |
| Supervisors/team leaders work well with employees of different backgrounds | | | |
| *Strongly disagree* | 19 | 2.95 | 1.18, 4.72 |
| *Disagree* | 44 | 6.37 | 4.23, 8.45 |
| *Neither agree nor disagree* | 126 | 18.31 | 15.05, 21.57 |
| *Agree* | 33 | 48.31 | 44.00, 52.62 |
| *Strongly agree* | 160 | 24.06 | 20.52, 27.61 |

| | | | |
|---|---|---|---|
| Supervisors/team leaders in my work unit support employee development | | | |
| *Strongly disagree* | 22 | 3.48 | 1.61, 5.35 |
| *Disagree* | 45 | 6.51 | 4.45, 8.58 |
| *Neither agree nor disagree* | 118 | 16.72 | 13.63, 19.81 |
| *Agree* | 302 | 44.56 | 40.52, 48.88 |
| *Strongly agree* | 192 | 28.72 | 24.81, 32.63 |
| My training needs are assessed | | | |
| *Strongly disagree* | 36 | 5.65 | 3.61, 7.69 |
| *Disagree* | 147 | 28.17 | 24.56, 31.79 |
| *Neither agree nor disagree* | 185 | 28.23 | 24.51, 31.95 |
| *Agree* | 270 | 29.35 | 25.54, 33.15 |
| *Strongly agree* | 47 | 8.59 | 6.24, 10.94 |
| Employees have sufficient training to fully utilize technology needed for their work | | | |
| *Strongly disagree* | 30 | 4.68 | 2.83, 6.53 |
| *Disagree* | 147 | 20.59 | 16.98, 24.20 |
| *Neither agree nor disagree* | 185 | 27.90 | 23.90, 31.89 |
| *Agree* | 270 | 39.90 | 35.61, 44.19 |
| *Strongly agree* | 47 | 6.94 | 4.78, 9.08 |
| Employees learn from one another as they do their work | | | |
| *Strongly disagree* | 7 | 1.00 | 0.22, 7.79 |
| *Disagree* | 34 | 4.87 | 3.04, 6.71 |
| *Neither agree nor disagree* | 85 | 12.13 | 9.57, 14.68 |
| *Agree* | 377 | 55.39 | 51.13, 59.66 |
| *Strongly agree* | 176 | 26.60 | 22.70, 30.50 |
| My supervisor supports my need to balance work and family issues | | | |
| *Strongly disagree* | 14 | 2.55 | 0.85, 4.25 |
| *Disagree* | 19 | 3.19 | 1.54, 4.83 |
| *Neither agree nor disagree* | 46 | 6.32 | 4.37, 8.26 |
| *Agree* | 288 | 42.30 | 38.00, 46.61 |
| *Strongly agree* | 312 | 45.64 | 41.27, 50.02 |

| | | | |
|---|---|---|---|
| My workload is reasonable | | | |
| *Strongly disagree* | 29 | 4.50 | 2.45, 6.56 |
| *Disagree* | 119 | 16.50 | 13.39, 19.61 |
| *Neither agree nor disagree* | 115 | 18.21 | 14.94, 21.49 |
| *Agree* | 337 | 49.00 | 44.60, 53.41 |
| *Strongly agree* | 76 | 11.78 | 9.02, 14.52 |
| My supervisor/team leader provides me with opportunities to demonstrate my leadership skills | | | |
| *Strongly disagree* | 37 | 5.18 | 3.11, 7.25 |
| *Disagree* | 58 | 8.95 | 6.50, 11.40 |
| *Neither agree nor disagree* | 122 | 16.97 | 13.87, 20.08 |
| *Agree* | 301 | 45.93 | 41.50, 50.36 |
| *Strongly agree* | 160 | 22.97 | 19.39, 26.54 |
| I am inspired to meet my goals at work | | | |
| *Strongly disagree* | 17 | 3.22 | 1.32, 5.12 |
| *Disagree* | 45 | 6.12 | 4.20, 8.05 |
| *Neither agree nor disagree* | 112 | 15.12 | 12.32, 17.91 |
| *Agree* | 333 | 49.56 | 45.20, 53.91 |
| *Strongly agree* | 172 | 25.98 | 22.30, 29.67 |
| I feel completely involved in my work | | | |
| *Strongly disagree* | 9 | 1.61 | 0.51, 2.72 |
| *Disagree* | 46 | 6.54 | 4.33, 8.75 |
| *Neither agree nor disagree* | 98 | 14.28 | 11.38, 17.18 |
| *Agree* | 311 | 44.39 | 40.12, 48.66 |
| *Strongly agree* | 214 | 33.18 | 29.12, 37.25 |
| I am determined to give my best effort at work every day | | | |
| *Strongly disagree* | 7 | 0.90 | 0.18, 1.62 |
| *Disagree* | 17 | 2.18 | 1.09, 3.28 |
| *Neither agree nor disagree* | 46 | 7.02 | 4.87, 9.17 |
| *Agree* | 324 | 48.31 | 43.90, 52.73 |
| *Strongly agree* | 285 | 41.58 | 37.25, 45.92 |
| I am satisfied that I have opportunities to apply my talent and expertise | | | |
| *Strongly disagree* | 31 | 4.07 | 2.50, 5.64 |
| *Disagree* | 94 | 13.60 | 10.56, 16.63 |
| *Neither agree nor disagree* | 100 | 13.75 | 10.95, 16.54 |
| *Agree* | 328 | 49.18 | 44.86, 53.51 |
| *Strongly agree* | 126 | 19.41 | 16.15, 22.67 |
| My supervisor and I have a good working relationship | | | |
| *Strongly disagree* | 19 | 2.92 | 1.15, 4.70 |
| *Disagree* | 27 | 3.42 | 2.11, 4.72 |
| *Neither agree nor disagree* | 56 | 8.95 | 6.51, 11.39 |
| *Agree* | 295 | 43.67 | 39.47, 47.86 |
| *Strongly agree* | 282 | 41.04 | 36.98, 45.10 |

| | | | |
|---|---|---|---|
| My supervisor/team leader treats me with respect | | | |
| *Strongly disagree* | 16 | 2.54 | 0.84, 4.21 |
| *Disagree* | 32 | 4.26 | 2.72, 5.79 |
| *Neither agree nor disagree* | 46 | 6.75 | 4.60, 8.90 |
| *Agree* | 270 | 39.31 | 35.33, 43.29 |
| *Strongly agree* | 314 | 47.15 | 42.97, 51.33 |
| My co-workers and I have a good working relationship | | | |
| *Strongly disagree* | 7 | 1.09 | 0.25, 1.93 |
| *Disagree* | 13 | 2.33 | 0.64, 4.02 |
| *Neither agree nor disagree* | 38 | 5.28 | 3.51, 7.04 |
| *Agree* | 339 | 49.07 | 44.68, 53.46 |
| *Strongly agree* | 281 | 42.23 | 37.94, 46.52 |
| I recommend my organization as a good place to work | | | |
| *Strongly disagree* | 25 | 4.02 | 2.07, 5.98 |
| *Disagree* | 55 | 8.26 | 5.74, 10.78 |
| *Neither agree nor disagree* | 156 | 21.90 | 18.53, 25.27 |
| *Agree* | 326 | 47.74 | 43.37, 52.11 |
| *Strongly agree* | 116 | 18.07 | 14.91, 21.24 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/

[b] Percentages may not total to 100 due to rounding.

PH WINS = Public Health Workforce Interest and Needs Survey

Table 4.8 describes the distribution of overall satisfaction. In consideration of everything, approximately 82% strongly agree or agree that they are satisfied with the job, 65% are satisfied with the overall organization, and 54% are satisfied with their pay.

*Table 4.8 Number and percent of epidemiologists responding to the PH WINS assessment[a] regarding overall satisfaction*

| Variable | Unweighted N | Weighted percent[b] | Weighted percent 95% confidence limits |
|---|---|---|---|
| Overall Job Satisfaction | | | |
| *Strongly disagree* | 23 | 2.98 | 1.69, 4.28 |
| *Disagree* | 68 | 10.00 | 7.51, 12.50 |
| *Neither agree nor disagree* | 33 | 4.82 | 3.03, 6.60 |
| *Agree* | 282 | 40.61 | 36.42, 44.80 |
| *Strongly agree* | 274 | 41.58 | 37.45, 45.71 |
| Overall Organization Satisfaction | | | |
| *Strongly disagree* | 40 | 5.67 | 3.84, 7.50 |
| *Disagree* | 116 | 16.64 | 13.43, 19.86 |
| *Neither agree nor disagree* | 85 | 12.29 | 9.57, 15.02 |
| *Agree* | 306 | 46.42 | 42.03, 50.81 |
| *Strongly agree* | 132 | 18.97 | 15.55, 22.40 |
| Overall Pay Satisfaction | | | |
| *Strongly disagree* | 62 | 9.14 | 6.62, 11.65 |
| *Disagree* | 154 | 23.92 | 20.13, 27.70 |
| *Neither agree nor disagree* | 86 | 12.57 | 9.80, 15.33 |
| *Agree* | 253 | 37.57 | 33.48, 41.67 |
| *Strongly agree* | 123 | 16.80 | 15.59, 20.02 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/

[b] Percentages may not total to 100 due to rounding.

PH WINS = Public Health Workforce Interest and Needs Survey

Table 4.9 describes the Job in General Scores (JIG score) values ranging between 0 and 48 with the mean of 38.80. Over 75% of epidemiologists have a JIG score above 34.

*Table 4.9 Distribution of JIG score among epidemiologists responding to the PH WINS assessment,[a] United States, 2014*

| | JIG score |
|---|---|
| Minimum | 0 |
| Maximum | 48 |
| Mean | 38.80 |
| Q1 (25%) | 34.42 (32.40, 36.43) |
| Median (50%) | 41.47 (40.31, 42.63) |
| Q3 (75%) | 44.71 (44.20, 45.23) |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
[b] Percentages may not total to 100 due to rounding.
PH WINS = Public Health Workforce Interest and Needs Survey
JIG Score – Job in General Score

Exploratory analyses were conducted to identify variables associated with job satisfaction. Some demographics were significantly and positively associated with the JIG score listed in Table 4.10. Compared to non-supervisors, supervisors ($p$ = .0105) and management ($p$ = .0032) have significantly higher job satisfaction scores. Job satisfaction scores are significantly higher among blacks compared to whites ($p$ = .0118). Those who are preceptors have significantly higher job satisfaction scores compared to those who are not preceptors ($p$ = .0023).

Those who are planning to depart the workforce in the year have significantly lower JIG scores compared to those who are not planning to leave (p = <.0001). There are differences among those who are planning to depart the workforce in the year. Those planning to depart the workforce in the year to take another governmental job ($p$ = <.0001), to take a non-governmental job ($p$ = <.0001), or other ($p$ = .0002) have significantly lower JIG scores compared to those not planning to leave. However, those planning to depart the workforce within the year to retire do not have statistically significant different JIG scores compared to those not planning to leave ($p$ = .4613).

Overall, annual salary is not statistically significantly associated with the JIG score. However, those who earn $45,000.01 to $55,000 do have a significantly higher job satisfaction scores compared to those who earn less than $45,000 ($p$ = .0335).

There are no statistically significant differences in the mean JIG score for demographic variables including gender, age, years in current position, years in agency, years in public health practice, educational attainment, and possession of certifications.

*Table 4.10 Comparison of mean JIG Scores for job satisfaction by demographic characteristics of epidemiologists responding to the PH WINS assessment,[a] United States, 2014*

| Variable | Mean JIG score | 95% Confidence interval | P-value |
|---|---|---|---|
| Supervisory Level | | | 0.0119 |
| *Non-supervisor (Ref)* | 37.54 | 36.04, 39.04 | |
| *Team Leader* | 39.31 | 37.35, 41.27 | 0.1697 |
| *Supervisor* | 40.33 | 38.83, 41.83 | 0.0105 |
| *Management* | 41.65 | 39.37, 43.93 | 0.0032 |
| Gender | | | 0.6526 |
| *Male (Ref)* | 38.46 | 37.88, 40.04 | |
| *Female* | 38.96 | 36.56, 40.36 | 0.6526 |
| Race | | | 0.0778 |
| *White (Ref)* | 38.54 | 37.40, 39.69 | |
| *Asian OR AI/AN OR NHOPI OR 2+ Races* | 38.59 | 36.10, 41.08 | 0.9757 |
| *Black* | 41.21 | 39.48, 42.93 | 0.0117 |
| *Hispanic* | 39.79 | 35.91, 43.66 | 0.5457 |
| Age | | | 0.4046 |
| *30 or below (Ref)* | 39.75 | 37.52, 41.98 | |
| *31 to 35* | 40.66 | 38.27, 43.04 | 0.5848 |
| *36 to 40* | 38.93 | 36.84, 41.02 | 0.5991 |
| *41 to 45* | 37.62 | 35.02, 40.21 | 0.2232 |
| *46 to 50* | 40.15 | 37.72, 42.57 | 0.8159 |
| *51 to 55* | 35.42 | 30.43, 40.40 | 0.1215 |
| *56 to 60* | 37.50 | 34.37, 40.63 | 0.2494 |
| *Over 60* | 38.54 | 35.79, 41.29 | 0.5112 |
| Years in current position | | | 0.0843 |
| *0-5 years (Ref)* | 39.36 | 38.20, 40.53 | |
| *6-10 years* | 37.01 | 34.73, 39.29 | 0.0745 |
| *11-15 years* | 37.61 | 34.58, 40.65 | 0.2946 |
| *Over 15 years* | 41.26 | 38.54, 43.97 | 0.2118 |

| | | | |
|---|---|---|---|
| Years in the agency | | | 0.3401 |
| *0-5 years (Ref)* | 39.31 | 37.83, 40.78 | |
| *6-10 years* | 38.16 | 35.85, 40.48 | 0.4117 |
| *11-15 years* | 37.21 | 35.11, 39.32 | 0.1139 |
| *16-20 years* | 40.09 | 37.39, 42.78 | 0.6171 |
| *21 or above* | 39.99 | 37.43, 42.54 | 0.6587 |
| Years in public health practice | | | 0.6459 |
| *0-5 years (Ref)* | 39.82 | 38.05, 41.58 | |
| *6-10 years* | 38.94 | 36.70, 41.18 | 0.5418 |
| *11-15 years* | 38.09 | 36.19, 39.99 | 0.1955 |
| *16-20 years* | 39.27 | 36.88, 41.66 | 0.7187 |
| *21 or above* | 38.01 | 35.88, 40.14 | 0.2001 |
| Departing the workforce within the year | | | <.0001 |
| *No (Ref)* | 41.39 | 40.60, 42.48 | |
| *Yes* | 31.58 | 29.02, 34.15 | <.0001 |
| Departing the workforce within the year | | | <.0001 |
| *No (Ref)* | 41.39 | 40.59, 42.19 | |
| *Yes, other* | 32.84 | 28.44, 37.24 | 0.0002 |
| *Yes, to retire* | 39.73 | 35.42, 44.04 | 0.4613 |
| *Yes, to take a non-governmental job* | 26.24 | 21.62, 30.85 | <.0001 |
| *Yes, to take another governmental job* | 31.56 | 26.77, 36.35 | <.0001 |
| Annual Salary | | | 0.5212 |
| *Less than $45,000 (Ref)* | 34.67 | 30.10, 39.25 | |
| *$45,000.01 to $55,000* | 40.01 | 38.15, 41.87 | 0.0335 |
| *$55,000.01 to $65,000* | 38.45 | 36.12, 40.79 | 0.1486 |
| *$65,000.01 to $75,000* | 39.07 | 36.80, 41.35 | 0.0912 |
| *$75,000.01 to $85,000* | 37.96 | 35.20, 40.71 | 0.2289 |
| *$85,000.01 to $95,000* | 39.66 | 36.90, 42.42 | 0.0672 |
| *$95,000.01 to $105,000* | 39.30 | 35.17, 43.42 | 0.1412 |
| *More than $105,000* | 40.23 | 36.73, 43.73 | 0.0585 |
| Educational Attainment | | | 0.9103 |
| *Bachelors (Ref)* | 37.45 | 32.96, 41.94 | |
| *Bachelors Masters* | 39.01 | 37.86, 40.16 | 0.5091 |
| *Bachelors Masters Doctorate* | 38.94 | 37.21, 40.66 | 0.5442 |
| *Bachelors Doctorate* | 38.23 | 33.55, 42.90 | 0.8187 |
| Certifications | | | 0.5684 |
| *No (Ref)* | 38.95 | 37.91, 39.99 | |
| *Yes* | 38.27 | 36.19, 39.99 | 0.5684 |
| Preceptors | | | 0.0023 |
| *No (Ref)* | 38.11 | 36.96, 39.27 | |
| *Yes* | 40.94 | 39.55, 42.33 | 0.0023 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/

PH WINS = Public Health Workforce Interest and Needs Survey
AI/AN = American Indian / Alaska Native
NHOPI = Native Hawaiian or Pacific Islander
JIG Score = Job in General Score
Ref = reference group

Table 4.11 illustrates those who strongly agree or agree with overall job satisfaction ($p$ = <.0001), organization satisfaction ($p$ = <.0001), and pay satisfaction ($p$ = <.0001) have significantly higher JIG scores compared to those who strongly disagree.

*Table 4.11 Comparison of Mean JIG Score by overall satisfaction among epidemiologists responding to the PH WINS assessment,[a] United States, 2014*

| Variable | Mean JIG score | 95% Confidence interval | P-value |
|---|---|---|---|
| Overall Job Satisfaction | | | <.0001 |
| *Strongly disagree (Ref)* | 7.07 | 3.61, 10.53 | |
| *Disagree* | 23.28 | 19.74, 26.82 | <.0001 |
| *Neither agree nor disagree* | 28.92 | 24.26, 33.58 | <.0001 |
| *Agree* | 39.16 | 38.27, 40.04 | <.0001 |
| *Strongly agree* | 45.20 | 44.62, 45.78 | <.0001 |
| Overall Organization Satisfaction | | | <.0001 |
| *Strongly disagree (Ref)* | 20.66 | 14.65, 26.67 | |
| *Disagree* | 29.72 | 26.96, 32.47 | 0.0080 |
| *Neither agree nor disagree* | 35.62 | 33.66, 37.58 | <.0001 |
| *Agree* | 41.84 | 40.01, 42.78 | <.0001 |
| *Strongly agree* | 45.97 | 45.21, 46.72 | <.0001 |
| Overall Pay Satisfaction | | | <.0001 |
| *Strongly disagree (Ref)* | 30.87 | 26.38, 35.36 | |
| *Disagree* | 36.71 | 34.54, 38.88 | 0.0252 |
| *Neither agree nor disagree* | 34.28 | 31.29, 37.27 | 0.2228 |
| *Agree* | 41.91 | 40.84, 42.98 | <.0001 |
| *Strongly agree* | 42.25 | 40.91, 43.60 | <.0001 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
PH WINS = Public Health Workforce Interest and Needs Survey
JIG Score = Job in General Score
Ref = reference group

Several variables were analyzed to determine influencing factors of job satisfaction. When present, most of the training support indicators are significantly associated with a higher JIG score as listed in Table 4.12: require continuing education ($p$ =<.0001), include education and training objectives in performance reviews ($p$ =<.0001), allow use of working hours to participate in training ($p$ = .0010), pay for

travel/registration fees ($p$ = .0006), provide on-site training ($p$ = .0006), have staff position(s) responsible for internal training ($p$ = <.0001), and provide recognition of achievement ($p$ = .0005). Those who indicated other training support is available are significantly associated with a lower JIG score compared to those who did not indicate having other training support available.

*Table 4.12 Comparison of Mean JIG Score and indicators of training support among epidemiologists responding to the PH WINS assessment,[a] United States, 2014*

| Variable | Mean JIG score | 95% Confidence interval | P value |
|---|---|---|---|
| Require continuing education | | | |
| *No (Ref)* | 38.27 | 37.23, 39.31 | <.0001 |
| *Yes* | 42.06 | 40.49, 43.63 | <.0001 |
| Include education and training objectives in performance reviews | | | |
| *No (Ref)* | 36.69 | 35.03, 38.35 | <.0001 |
| *Yes* | 40.55 | 39.56, 41.53 | 0.0001 |
| Allow use of working hours to participate in training | | | |
| *No (Ref)* | 28.10 | 21.47, 34.74 | <.0001 |
| *Yes* | 39.43 | 38.56, 40.30 | 0.0010 |
| Pay for travel/registration fees for training | | | |
| *No (Ref)* | 34.71 | 31.87, 37.44 | <.0001 |
| *Yes* | 39.81 | 38.88, 40.73 | 0.0006 |
| Provide on-site training | | | |
| *No (Ref)* | 35.21 | 32.72, 37.71 | <.0001 |
| *Yes* | 39.93 | 38.99, 40.87 | 0.0006 |
| Have staff position(s) responsible for internal training | | | |
| *No (Ref)* | 36.44 | 34.87, 38.00 | <.0001 |
| *Yes* | 41.02 | 40.05, 41.99 | <.0001 |
| Provide recognition of achievement | | | |
| *No (Ref)* | 36.54 | 34.82, 38.27 | <.0001 |
| *Yes* | 41.19 | 39.13, 41.24 | 0.0005 |
| Other | | | |
| *No (Ref)* | 38.99 | 38.06, 39.92 | <.0001 |
| *Yes* | 31.54 | 24.76, 38.32 | 0.0334 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
PH WINS = Public Health Workforce Interest and Needs Survey
JIG Score = Job in General Score
Ref = reference group

All indicators of organizational and supervisory support are significantly associated with a higher JIG score compared to those who strongly agree to those who strongly disagree with the indicator, illustrated in Table 4.13.

*Table 4.13 Comparison of Mean JIG Score and indicators of organizational and supervisory support among epidemiologists responding to the PH WINS assessment,[a] United States, 2014*

| Variable | Mean JIG score | 95% Confidence interval | P-value |
|---|---|---|---|
| I know how my work relates to the agency's goals and priorities | | | <.0001 |
| *Strongly disagree (Ref)* | 13.09 | 1.20, 24.98 | |
| *Disagree* | 26.43 | 19.96, 32.91 | 0.0549 |
| *Neither agree nor disagree* | 31.47 | 28.11, 34.83 | 0.0039 |
| *Agree* | 39.29 | 38.16, 40.43 | <.0001 |
| *Strongly agree* | 42.79 | 41.49, 44.08 | <.0001 |
| The work I do is important | | | <.0001 |
| *Strongly disagree (Ref)* | 9.26 | 0, 19.22 | |
| *Disagree* | 14.41 | 5.40, 23.41 | 0.4534 |
| *Neither agree nor disagree* | 26.65 | 22.54, 30.76 | 0.0017 |
| *Agree* | 38.41 | 37.06, 39.75 | <.0001 |
| *Strongly agree* | 41.98 | 41.00, 42.95 | <.0001 |
| Creativity and innovation are rewarded | | | <.0001 |
| *Strongly disagree (Ref)* | 20.74 | 16.15, 25.33 | |
| *Disagree* | 32.84 | 30.05, 35.63 | <.0001 |
| *Neither agree nor disagree* | 39.70 | 38.41, 41.00 | <.0001 |
| *Agree* | 42.39 | 41.42, 43.37 | <.0001 |
| *Strongly agree* | 46.52 | 45.70, 47.35 | <.0001 |
| Communication between senior leadership and employees is good in my organization | | | <.0001 |
| *Strongly disagree (Ref)* | 27.99 | 23.80, 32.18 | |
| *Disagree* | 36.57 | 34.82, 38.32 | 0.0002 |
| *Neither agree nor disagree* | 38.65 | 36.75, 40.56 | <.0001 |
| *Agree* | 42.99 | 42.07, 43.91 | <.0001 |
| *Strongly agree* | 44.57 | 42.77, 46.38 | <.0001 |

| | | | |
|---|---|---|---|
| Supervisors/team leaders work well with employees of different backgrounds | | | <.0001 |
| *Strongly disagree (Ref)* | 14.32 | 6.59, 22.06 | |
| *Disagree* | 29.94 | 24.20, 35.69 | 0.0015 |
| *Neither agree nor disagree* | 35.18 | 32.81, 37.54 | <.0001 |
| *Agree* | 40.25 | 39.30, 41.20 | <.0001 |
| *Strongly agree* | 43.02 | 41.50, 44.54 | <.0001 |
| Supervisors/team leaders in my work unit support employee development | | | <.0001 |
| *Strongly disagree (Ref)* | 14.54 | 8.28, 20.80 | |
| *Disagree* | 28.36 | 22.27, 34.44 | 0.0019 |
| *Neither agree nor disagree* | 33.68 | 31.62, 35.74 | <.0001 |
| *Agree* | 40.72 | 39.67, 41.76 | <.0001 |
| *Strongly agree* | 43.26 | 42.15, 44.37 | <.0001 |
| My training needs are assessed | | | <.0001 |
| *Strongly disagree (Ref)* | 20.01 | 13.71, 26.32 | |
| *Disagree* | 36.04 | 34.35, 37.72 | <.0001 |
| *Neither agree nor disagree* | 39.56 | 37.99, 41.12 | <.0001 |
| *Agree* | 42.52 | 41.43, 43.52 | <.0001 |
| *Strongly agree* | 44.72 | 43.36, 46.09 | <.0001 |
| Employees have sufficient training to fully utilize technology need for their work | | | <.0001 |
| *Strongly disagree (Ref)* | 20.88 | 13.43, 28.33 | |
| *Disagree* | 35.81 | 33.71, 37.92 | 0.0002 |
| *Neither agree nor disagree* | 38.69 | 37.11, 40.26 | <.0001 |
| *Agree* | 41.58 | 40.52, 42.64 | <.0001 |
| *Strongly agree* | 44.58 | 42.85, 46.31 | <.0001 |
| Employees learn from one another as they do their work | | | <.0001 |
| *Strongly disagree (Ref)* | 14.88 | 0, 30.77 | |
| *Disagree* | 29.58 | 23.50, 35.66 | 0.0903 |
| *Neither agree nor disagree* | 35.32 | 32.84, 37.80 | 0.0129 |
| *Agree* | 38.88 | 37.63, 40.12 | 0.0032 |
| *Strongly agree* | 42.61 | 41.36, 43.87 | 0.0007 |
| My supervisor supports my need to balance work and family issues | | | <.0001 |
| *Strongly disagree (Ref)* | 17.67 | 6.74, 28.61 | |
| *Disagree* | 35.97 | 29.92, 42.01 | 0.0041 |
| *Neither agree nor disagree* | 29.50 | 24.68, 34.33 | 0.0522 |
| *Agree* | 37.94 | 36.52, 39.35 | 0.0003 |
| *Strongly agree* | 41.82 | 40.76, 42.87 | <.0001 |
| My workload is reasonable | | | <.0001 |
| *Strongly disagree (Ref)* | 23.18 | 15.38, 30.98 | |
| *Disagree* | 36.85 | 34.57, 39.13 | 0.0010 |
| *Neither agree nor disagree* | 36.46 | 33.95, 38.97 | 0.0015 |
| *Agree* | 40.24 | 39.22, 41.26 | <.0001 |
| *Strongly agree* | 44.44 | 43.31, 45.57 | <.0001 |

| | | | |
|---|---|---|---|
| My supervisor/team leader provides me with opportunities to demonstrate my leadership skills | | | <.0001 |
| *Strongly disagree (Ref)* | 18.02 | 12.17, 23.87 | |
| *Disagree* | 28.89 | 25.15, 32.64 | 0.0023 |
| *Neither agree nor disagree* | 35.56 | 33.33, 37.78 | <.0001 |
| *Agree* | 41.02 | 40.02, 42.03 | <.0001 |
| *Strongly agree* | 44.07 | 43.00, 45.14 | <.0001 |
| I am inspired to meet my goals at work | | | <.0001 |
| *Strongly disagree (Ref)* | 15.14 | 5.41, 24.87 | |
| *Disagree* | 25.17 | 20.49, 29.85 | 0.0730 |
| *Neither agree nor disagree* | 31.38 | 29.08, 33.68 | 0.0015 |
| *Agree* | 40.75 | 39.77, 41.72 | <.0001 |
| *Strongly agree* | 44.37 | 43.43, 45.32 | <.0001 |
| I feel completely involved in my work | | | <.0001 |
| *Strongly disagree (Ref)* | 4.35 | 0, 10.59 | |
| *Disagree* | 25.60 | 20.61, 30.59 | <.0001 |
| *Neither agree nor disagree* | 30.31 | 27.36, 33.26 | <.0001 |
| *Agree* | 40.73 | 39.82, 41.63 | <.0001 |
| *Strongly agree* | 43.95 | 43.04, 44.86 | <.0001 |
| I am determined to give my best effort at work every day | | | <.0001 |
| *Strongly disagree (Ref)* | 12.66 | 0.41, 24.91 | |
| *Disagree* | 25.10 | 17.29, 32.90 | 0.0930 |
| *Neither agree nor disagree* | 28.42 | 23.04, 33.81 | 0.0209 |
| *Agree* | 38.85 | 37.62, 40.08 | <.0001 |
| *Strongly agree* | 41.65 | 40.58, 42.72 | <.0001 |
| I am satisfied that I have opportunities to apply my talent and expertise | | | <.0001 |
| *Strongly disagree (Ref)* | 11.40 | 6.88, 15.92 | |
| *Disagree* | 30.07 | 27.24, 32.90 | <.0001 |
| *Neither agree nor disagree* | 34.42 | 32.11, 36.73 | <.0001 |
| *Agree* | 41.73 | 40.96, 42.50 | <.0001 |
| *Strongly agree* | 45.50 | 44.40, 46.60 | <.0001 |
| My supervisor and I have a good working relationship | | | <.0001 |
| *Strongly disagree (Ref)* | 13.97 | 6.41, 21.53 | |
| *Disagree* | 25.04 | 20.54, 29.54 | 0.0134 |
| *Neither agree nor disagree* | 30.57 | 26.85, 34.30 | 0.0001 |
| *Agree* | 38.63 | 37.36, 39.90 | <.0001 |
| *Strongly agree* | 43.22 | 42.30, 44.15 | <.0001 |

| | | | |
|---|---|---|---|
| My supervisor/team leader treats me with respect | | | <.0001 |
| *Strongly disagree (Ref)* | 13.77 | 4.82, 22.73 | |
| *Disagree* | 23.24 | 17.88, 28.60 | 0.0768 |
| *Neither agree nor disagree* | 28.60 | 23.90, 33.31 | 0.0042 |
| *Agree* | 38.50 | 37.25, 39.74 | <.0001 |
| *Strongly agree* | 42.91 | 42.04, 43.77 | <.0001 |
| My co-workers and I have a good working relationship | | | <.0001 |
| *Strongly disagree (Ref)* | 15.84 | 2.13, 29.54 | |
| *Disagree* | 25.90 | 12.42, 39.38 | 0.3009 |
| *Neither agree nor disagree* | 29.50 | 25.42, 33.58 | 0.0590 |
| *Agree* | 37.90 | 36.64, 39.17 | 0.0017 |
| *Strongly agree* | 42.14 | 41.03, 43.25 | 0.0002 |
| I recommend my organization as a good place to work | | | <.0001 |
| *Strongly disagree (Ref)* | 12.11 | 5.00, 19.23 | |
| *Disagree* | 27.27 | 22.82, 31.71 | 0.0005 |
| *Neither agree nor disagree* | 33.96 | 32.29, 35.63 | <.0001 |
| *Agree* | 41.68 | 40.72, 42.65 | <.0001 |
| *Strongly agree* | 46.00 | 45.24, 46.75 | <.0001 |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/
PH WINS = Public Health Workforce Interest and Needs Survey
JIG Score = Job in General Score
Ref = reference group

To better understand the differences among preceptors, the results of the calculated unadjusted and adjusted odds ratios are listed in Table 4.14. Independent factors of age, race, supervisory level, annual salary, educational attainment, years in current position, years in agency, years in public health practice, collaborating with academia, and overall job satisfaction have significantly higher odds of being a preceptor. In general, age is not significantly associated with preceptorship, but those who are age 36 to 40 have the odds of 2.83 (95% CI: 1.31, 6.15), age 51 to 55 have the odds of 2.50 (95% CI: 1.04, 6.04), age 56-60 have the odds of 2.08 (95% CI: 1.24, 7.65), age 61 to 65 have the odds of 4.11 (95% CI: 1.61, 10.46) compared to the odds of those who are 30 or younger of being a preceptor. The odds of being a Black preceptor is 2.87 (95% CI: 1.50, 5.46) the odds of being a white preceptor. Compared to the odds of a preceptor being a non-supervisor, the odds of being a preceptor as a

supervisor is 3.67 (95% CI: 2.25, 5.97) or a preceptor as a manager is 3.55 (95% CI: 1.79, 7.04). Typically, annual salary is not significantly associated with preceptorship. However, those who earn $55,000.01 to $65,000 have the odds of 0.56 (95% CI: 0.35, 0.89), those who earn $85,000.01 to $95,000.00 have the odds of 3.07 (95% CI: 1.17, 8.06), those who earn $95,000.01 to $105,000 have the odds of 3.99 (95% CI: 1.33, 12.03), and those who earn more than $105,000 have the odds of 5.23 (1.76, 15.56) compared to those who are preceptors that earn less than $45,000. Educational attainment is significantly associated with preceptorship. The odds of being a preceptor possessing a bachelors, masters and a doctorate is 2.67 (95% CI: 1.03, 6.89) compared to the odds of a preceptor with only a bachelors degree. The odds of a preceptor having over 15 years of experience in their current position is 2.32 (95% CI: 1.05, 5.12) the odds of preceptors having five or less year of experience in their current position. The odds of a preceptor having 16-20 years of experience in their current agency is 2.15 (95% CI: 1.06, 4.36) the odds of a preceptor having less than five years of experience in their agency. The odds of a preceptor having 11-15 years in public health practice is 1.98 (95% CI: 1.07, 3.66) or 21 or more years in public health practice are 2.43 (95% CI: 1.28, 4.62) the odds of a preceptor having five or less years of experience in public health practice. The odds of a preceptor collaborating with academia is 3.13 (95% CI: 2.06, 4.75) the odds of a preceptor not collaborating with academia. Gender and overall job satisfaction are not significantly associated with preceptorship as independent factors.

Adjusted odds ratios are reported as the independent factors do not exist in isolation but coexist with the holistic experience of one individual. After adjusting for

independent variables in the model (e.g., age, gender, race, supervisory level, annual salary, educational attainment, years in current position, years in the agency, years in public health practice, collaborating with academia, and overall job satisfaction) few factors were significant in predicting preceptorship. The adjusted odds of being a black preceptor is 3.98 (95% CI: 2.01, 7.88) the adjusted odds of being a white preceptor. Compared to the adjusted odds of a preceptor being a non-supervisor, the adjusted odds of being a team leader is 2.09 (95% CI: 1.07, 4.05), supervisor is 2.75 (95% CI: 1.25, 6.08), or a manager is 2.70 (95% CI: 1.15, 6.34). The adjusted odds of being a preceptor collaborating with academia is 3.11 (95%CI: 1.82, 5.34) the odds of a preceptor not collaborating with academia.

Age, gender, years in current position, annual salary, educational attainment, years in current position, years in the agency, years in public health practice, and overall job satisfaction are not significantly associated with preceptorship in the adjusted model.

*Table 4.14. Logistic regression of epidemiology preceptors responding to the PH WINS assessment,[a] United States, 2014*

| | Odds Ratio | Adjusted Odds Ratio |
|---|---|---|
| Variable | OR (95% CI) | AOR (95% CI) |
| Age | | |
| *30 or below (Ref)* | | |
| *31 to 35* | 2.14 (0.97, 4.70) | 1.95 (0.58, 6.57) |
| *36 to 40* | 2.83 (1.31, 6.15) | 1.50 (0.41, 5.52) |
| *41 to 45* | 1.85 (0.84, 4.07) | 0.80 (0.22, 2.90) |
| *46 to 50* | 2.23 (0.95, 5.23) | 0.62 (0.13, 2.87) |
| *51 to 55* | 2.50 (1.04, 6.04) | 0.93 (0.22, 3.89) |
| *56 to 60* | 3.08 (1.24, 7.65) | 1.17 (0.26, 5.24) |
| *61 to 65* | 4.11 (1.61, 10.46) | 1.51 (0.30, 7.48) |
| *over 65* | 1.28 (0.32, 5.20) | 0.41 (0.03, 5.26) |
| Gender | | |
| *Female (Ref)* | | |
| *Male* | 1.17 (0.75, 1.80) | 0.72 (0.44, 1.17) |
| Race | | |
| *White (Ref)* | | |
| *Black* | 2.87 (1.50, 5.46) | 3.98 (2.01, 7.88) |
| *Hispanic* | 2.26 (0.93, 5.47) | 2.65 (1.00, 7.01) |
| *Asian OR AI/AN OR NHOPI OR 2+Races* | 0.78 (0.42, 1.43) | 0.61 (0.29, 1.29) |
| Supervisory level | | |
| *Non-Supervisor (Ref)* | | |
| *Team Leader* | 1.66 (0.93, 2.97) | 2.09 (1.07, 4.05) |
| *Supervisor* | 3.67 (2.25, 5.97) | 2.75 (1.25, 6.08) |
| *Management* | 3.55 (1.79, 7.04) | 2.70 (1.15, 6.34) |
| Annual Salary | | |
| *Less than $45,000 (Ref)* | | |
| *$45,000.01 to $55,000* | 1.24 (0.49, 3.12) | 0.95 (0.38, 2.35) |
| *$55,000.01 to $65,000* | 0.56 (0.35, 0.89) | 0.95 (0.36, 2.47) |
| *$65,000.01 to $75,000* | 1.56 (0.66, 3.84) | 0.93 (0.32, 2.71) |
| *$75,000.01 to $85,000* | 1.25 (0.51, 3.05) | 0.74 (0.22, 2.57) |
| *$85,000.01 to $95,000* | 3.07 (1.17, 8.06) | 1.43 (0.40, 5.08) |
| *$95,000.01 to $105,000* | 3.99 (1.33, 12.03) | 2.16 (0.41, 11.41) |
| *More than $105,000* | 5.23 (1.76, 15.56) | 1.97 (0.27, 14.50) |
| Educational Attainment | | |
| *Bachelors (Ref)* | | |
| *Bachelors Masters* | 1.25 (0.51, 3.09) | 0.75 (0.26, 2.21) |
| *Bachelors Masters Doctorate* | 2.67 (1.03, 6.89) | 1.27 (0.41, 3.96) |
| *Bachelors Doctorate* | 1.43 (0.45, 4.59) | 0.70 (0.23, 2.15) |
| Years in current position | | |
| *0-5 years (Ref)* | | |
| *6-10 years* | 1.24 (0.79, 1.95) | 1.46 (0.74, 2.86) |
| *11-15 years* | 1.08 (0.57, 2.05) | 2.01 (0.83, 4.88) |
| *Over 15 years* | 2.32 (1.05, 5.12) | 2.12 (0.64, 7.06) |

| | | |
|---|---|---|
| Years in the agency | | |
| *0-5 years (Ref)* | | |
| *6-10 years* | 1.56 (0.92, 2.64) | 0.75 (0.34, 1.67) |
| *11-15 years* | 1.60 (0.92, 2.78) | 0.62 (0.21, 1.83) |
| *16-20 years* | 2.15 (1.06, 4.36) | 0.65 (0.13, 3.24) |
| *21 or above* | 1.41 (0.68, 2.91) | 0.24 (0.05, 1.19) |
| Years in public health practice | | |
| *0-5 years (Ref)* | | |
| *6-10 years* | 1.46 (0.77, 2.76) | 0.75 (0.34, 1.67) |
| *11-15 years* | 1.98 (1.07, 3.66) | 1.65 (0.60, 4.55) |
| *16-20 years* | 1.62 (0.79, 3.34) | 1.46 (0.37, 5.78) |
| *21 or above* | 2.43 (1.28, 4.62) | 2.98 (0.76, 11.66) |
| Collaborate with academia | | |
| *No (Ref)* | | |
| *Yes* | 3.13 (2.06, 4.75) | 3.11 (1.82, 5.34) |
| Overall Job satisfaction | | |
| *Strongly disagree/ Disagree (Ref)* | | |
| *Neither agree nor disagree* | 1.66 (0.54, 5.10) | 2.52 (0.79, 8.06) |
| *Agree* | 2.21 (1.07, 4.54) | 1.88 (0.89, 3.98) |
| *Strongly agree* | 2.48 (1.20, 5.11) | 1.90 (0.89, 4.06) |

[a] Data source: Association of State and Territorial Health Officials. Public Health Workforce Interests and Needs Survey, 2014. Available from: http://www.astho.org/phwins/

[b] Based on univariate logistic regression models

PH WINS = Public Health Workforce Interest and Needs Survey

AI/AN = American Indian / Alaska Native

NHOPI = Native Hawaiian or Pacific Islander

Ref = reference group

# Chapter V. Summary, Discussion & Conclusions

## Summary

In alignment with other efforts to enumerate and describe the public health workforce, this research aims to describe the job satisfaction of epidemiologists, factors influencing job satisfaction, and the capacity of epidemiology preceptorships. Prior to this assessment, the job satisfaction of state epidemiologists and epidemiology preceptorship capacity had not been measured. In summary, the applied epidemiology workforce experiences high levels of job satisfaction, and preceptorship is generally reflective of the epidemiology workforce.

This study quantitatively and qualitatively assessed the job satisfaction and preceptorship capacity of applied epidemiologists through a secondary analysis of cross-sectional data from the 2014 Public Health Workforce Interests and Needs Survey. Descriptive statistics, t-tests, ANOVAs, and logistic regression were conducted for qualitative analysis using SAS University. The qualitative comments about job satisfaction were thematically coded and grouped using NVIVO 10.

## Discussion

The JIG scale measures job satisfaction on a scale of 0-48 where a score above 29 typically indicates satisfaction (Steven et al., 2004). Epidemiologists on average experience higher rates of job satisfaction (mean JIG score =38.80) compared to the general public health workforce (mean JIG score =37.19) (Harper et al., 2015). Sources of job satisfaction described in the qualitative analysis include commitment to public health, meaningfulness of the work, and task diversity. Other factors significantly

associated with higher job satisfaction scores include: supervisory level, intention to depart the workforce, being a preceptor, overall organization satisfaction, and overall pay satisfaction. Consistent with Harper et al (2015), all measured indicators of training support, organizational support, and supervisory support were positively and significantly associated with higher JIG scores. While health departments may not have the flexibility to increase pay or benefits, factors of training support, organizational support and supervisory support can be perceived and approached as opportunities to improve job satisfaction within the constraints of a governmental agency.

Applied epidemiologists more frequently reported the intention to leave the health department for reasons other than retirement (23%) compared to the general public health workforce (18%) (Pourshaban et al., 2015). Sources of job dissatisfaction can contribute to voluntary departures (Abelson & Baysinger, 1984; Pourshaban et al., 2015). Some of these sources of dissatisfaction are embedded in the organizational structure and are more difficult to change such as inadequate pay and opportunity for advancement. However, health department leadership can more readily engage staff to address perceived job security, the organizational culture, recognition and the immensity of workload. Historically, public health leaders often times are focused on reducing morbidity and mortality rather than building leadership and management competencies (Fraser, Castrucci, & Harper, 2017). However in an era of Public Health 3.0, leadership and management skills are essential to prepare staff for a shift in public health strategy and planning and the respective shifts in organizational culture (Fraser et al., 2017). The state health department work environment is political in nature (Harper et al., 2015) and may be a source of dissatisfaction if leadership cannot

effectively address political bureaucracy, shifts in funding, and agency hiring freezes or position elimination. If national initiatives coalesce to promote the recruitment and retention of the public health workforce, understanding and addressing the unique experiences across health departments would be critical in order to develop feasible and effective strategies that can be implemented across the variety of organizational structures and cultures.

Epidemiology preceptors have significantly higher JIG scores compared to epidemiologists who do not serve as preceptors (40.94 vs. 38.11; $p = <.01$). Health department leadership considering strategies to improve job satisfaction among staff may consider discussing opportunities to engage with local universities. In a 2016 study of CEPH-accredited schools and programs of public health 55% indicated participating in an academic health department (Erwin et al., 2016), yet among epidemiologists who supervise student experiences, 71% identified as collaborating with academia. It appears that schools and programs of public health may be underutilizing the public health practice community to provide student field-based learning experiences. Over 25% of preceptors are over the age of 55 and over 47% are supervisors or managers. In consideration of planned retirements in the upcoming years and changes in management, health department leadership and academic partners should encourage junior staff to also become preceptors as a means for professional growth and to prevent a disruption to the availability of student training experiences. Racial diversity should also be considered. Current epidemiology preceptors are racially more diverse than all epidemiologists, but the applied epidemiology workforce remains less racially diverse than the general population. Promotion of diversity by experience, race, and

culture among preceptors will be vital to ensure the future of the governmental public health workforce is representative of the American public they serve.

The distribution of subject area of practice among all state epidemiologists and state epidemiologists who serve as preceptors is similar, which indicates there are the same proportion of student experiences by subject area as the overall distribution of the workforce. However, in recognizing that low capacity subject areas, such as behavioral health and substance abuse, need to increase in capacity, the current influx of trained graduates will be insufficient to satisfy the workforce demands. One strategy for health departments to expand the workforce, is to increase the number of student trainees in low capacity subject areas. Essentially, if more students receive training in a specific subject area, they may be better qualified to enter the workforce in that specific subject area. Overtime, more graduates may seek out positions in low capacity subject areas and could ultimately increase a program's capacity. The present study illustrates the benefit to preceptors from hosting student experiences; almost 95% of preceptors found an academic partnership to be somewhat or very helpful and over 42% reported the benefit of hosting the practicum outweighed the work required to host the practicum. However, this strategy is largely limited by the burden it may impose on the existing workforce to balance the responsibilities of the preceptorship with their normal duties.

Previous research has illustrated the importance of the relationship to a successful preceptorship experience (W. J. Smith et al., 2005; Villanueva et al., 2011). Harper et al (2015) and this research found relationship-based factors of organizational and supervisory support to be positively and significantly associated with an increase in job satisfaction. Previously, Pourshaban et al (2015) recommended to improve

relationships between employees and supervisors as a means to increase job satisfaction. Consistent with the Leader Member Exchange Theory, high quality relationships have positive outcomes for leaders, followers, work units, and the organization (Graen & Uhl-Bien, 1995). The preceptorship experience reflects the individual dyadic relationship and organizational collaboration between the academic institution and the preceptorship sponsoring agency (e.g state health department). The increase in job satisfaction resulting from participating in preceptorships may result from the individual relationships and/or the organizational collaboration. Ultimately, the relationships resulting from the preceptorship experience, expands the participants' network and social capital, fostering long-term professional growth and satisfaction among the preceptor and student (Graen & Uhl-Bien, 1995). Public Health 3.0 leaders can act on these results by promoting efforts to increase the quality of relationships throughout and beyond the agency.

**Strengths and Limitations**

This study has several strengths. First, it is the first to assess and describe job satisfaction and preceptorship capacity among applied epidemiologists. Secondly, all quantitative analyses were weighted, using complex statistical weights, to provide national estimates of the state epidemiology workforce, making the estimates comparable to previously published workforce data of applied epidemiologists. The demographic distribution of epidemiologists in the 2014 PH WINS data is similar to the data collected in the 2013 ECA by gender (74% vs. 71% female), and race (73% vs. 76% white; 13% vs. 11% Asian or American Indian/Pacific Islander; 7% vs. 8% black; 6% vs. 4% Hispanic) respectively. The similarity of demographic distribution between

the ECA and PH WINS indicates reliability between the assessments to describe the applied epidemiology workforce. Understanding that both assessments collect similar information, efforts to coordinate the fielding of the assessments should occur to minimize participant survey burden. However, the distribution by supervisory level differs by the PH WINS and ECA data: non-supervisor (51%) vs entry-level (25%), team leader (20%) vs. mid-level (41%), supervisor (19%) or management (10%) vs. senior-level with management responsibilities (23%), respectively (Hadler, 2014). A difference in working definitions can result in different results (Kimberlin & Winterstein, 2008). The enumerated difference by supervisory level can most likely be attributed to the difference in working definitions provided to respondents. The distribution suggests that many mid-level epidemiologists identified by the ECA may not have supervisory responsibilities.

The research was not without limitations. First, despite reweighting the data to provide national estimates of the applied epidemiology workforce, only 37 of the 50 states participated in the 2014 PH WINS. Second, selection bias may have occurred among respondents who practice epidemiology, but did not identify it as their primary area of focus (e.g. nurses, biostatisticians, infomaticians, or sanitarians); these respondents were excluded from analysis. Third, only 14% of the sample provided qualitative remarks about their job satisfaction, which may not be generalizable for all epidemiologists resulting in participant bias. Fourth, the 2014 PH WINS data was self-reported but not independently verified, which may result in response bias. Fifth, the subset sample of epidemiology preceptors was too small to conduct tests of statistical significance on some variables of interest such as the comparison of subject area of

practice. Lastly, the cross-sectional nature of the data restricted the ability to assess trends.

**Implications & Recommendations for Public Health Practice & Policy**

This research found that the applied epidemiology workforce experiences high levels of job satisfaction, preceptors experience high levels of job satisfaction compared to non-preceptors, and preceptors are generally reflective of the epidemiology workforce. These results offer several implications for practice and policy. First, it provides data to inform recruitment and retention efforts of the state health agency epidemiologist workforce. Second, it addresses the gap in the literature to describe job satisfaction among epidemiologists, thus providing research evidence previously not known. Third, the research describes the epidemiologic preceptorship capacity reflective of the available training for those preparing to enter the workforce. Fourth, the results can be used to inform the recruitment of epidemiologists as preceptors for practicum opportunities. Fifth, the research can be used to inform other training programs based on a mentorship model, where a relationship is key to the mentor and mentee's success. Lastly, the research illustrates that policies can be developed at health departments and academic institutions to foster academic health departments in order to facilitate additional public health preceptorship experiences.

**Recommendations**

In order to sustain and develop the epidemiology workforce, state health departments should engage in efforts to recruit and retain qualified workers. First, health departments and academic institutions can collaborate to provide preceptorship

experiences, ultimately to build workforce capacity and to foster individual and organizational relationships. Furthermore, additional student experiences in low capacity program areas may provide an increasingly qualified workforce to be recruited and hired in public health agencies. Overtime, an increase in student learning experiences in low capacity program areas, may increase the overall workforce capacity to ultimately better serve the community and fulfill the Essential Public Health Services. Additionally, establishing standing policies for health departments to engage students as opportunities arise can provide surge capacity during public health emergencies, hiring freezes, and outbreak investigations. Second, health department leadership should encourage staff to become preceptors as an opportunity for professional growth, as preceptors experience an increase in job satisfaction. Third, health departments should examine the availability and implementation of training, organizational and supervisory support factors to foster job satisfaction among employees. Organizations that address the workplace environment and relationships to nurture high levels of job satisfaction may experience higher rates of employee retention. Lastly, health department leadership should receive management training specific to governmental settings that can address shifts in funding and corresponding perceived job security, recruitment and retention best practices in the midst of hiring freezes and organization restructuring, and how to assess and positively change the organizational culture. Adoption of these recommendations can strengthen the capacity of the epidemiology workforce.

**Future Research**

Historically, data about the epidemiology workforce have been collected in the ECA by CSTE. Comparing findings from the 2013 ECA data with the results of this analysis using 2014 PH WINS data resulted in similar measurements on the examined demographic variables. Additional research, comparing the survey instruments is recommended to prevent future survey duplication and excess survey burden among participating epidemiologists (Leider, Shah, et al., 2016). Additionally, while PH WINS captured the presence of training, supervisor and organizational support, the quality was not assessed. Future assessments of the public health workforce should qualitatively review the implementation and practice of training, supervisor and organizational support in the field to develop an evidence base of best practices for employee retention and promotion of job satisfaction within the constraints of a governmental agency. Cognizant of the variety of organizational structures and the complexity of relationship building within the workplace, organizational and behavioral theories should be incorporated where possible.

While the relationships affecting job satisfaction have been assessed at the individual and organizational levels, the literature is absent describing the effect of mentoring in teams on job satisfaction within public health practice. An examination of student outbreak response team activities across academic institutions in partnership with governmental health agencies may offer further insight and understanding of the relationship between team mentorship and job satisfaction in the field of public health. As student outbreak response team participants are already more likely to work in governmental public health (Beck et al., 2013; Horney et al., 2014), additional

knowledge about the dimensions of team work and mentoring could be beneficial when developing strategies for recruitment and retention among the applied epidemiology workforce, especially to supplement surge capacity during an emergency response.

**Conclusion**

Prior to this study, the job satisfaction and preceptorship capacity among applied epidemiologists had not been assessed. This study, using 2014 PH WINS data, presents evidence that state epidemiologists experience higher levels of job satisfaction compared to general public health workers at state health agencies. Factors significantly and positively associated with job satisfaction include: organizational and supervisory support, training support, and being a preceptor. Applied epidemiology preceptors are diverse by race and supervisory level. Preceptorships are offered proportionately across subject areas. Those who are preceptors more frequently collaborate with academia compared to non-preceptors.

Public health leaders should consider the following recommendations informed by this research to recruit and retain the applied epidemiology workforce.

1. Collaborate with academic institutions to provide preceptorship experiences.
2. Encourage staff to become preceptors as an opportunity for professional growth.
3. Examine the availability and implementation of training, organizational and supervisory support factors to foster job satisfaction among employees.
4. Participate in management training specific to governmental settings.

These findings offer a foundation to improve the applied epidemiology capacity at state health agencies.

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# APPENDIX

## Appendix A. PH WINS Survey Instrument

Public Health Workforce Interests and Needs Survey

Section I: Workplace Environment

Q1. Does your health department do any of the following? Check all that apply.

- ☐ Require continuing education
- ☐ Include education and training objectives in performance reviews
- ☐ Allow use of working hours to participate in training
- ☐ Pay travel/registration fees for trainings
- ☐ Provide on-site training
- ☐ Have staff position(s) responsible for internal training
- ☐ Provide recognition of achievement
- ☐ Other _____

Q2. Please rate your level of agreement with the following items:

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| I know how my work relates to the agency's goals and priorities. | ○ | ○ | ○ | ○ | ○ |
| The work I do is important. | ○ | ○ | ○ | ○ | ○ |
| Creativity and innovation are rewarded. | ○ | ○ | ○ | ○ | ○ |
| Communication between senior leadership and employees is good in my organization. | ○ | ○ | ○ | ○ | ○ |
| Supervisors/team leaders work well with employees of different backgrounds. | ○ | ○ | ○ | ○ | ○ |
| Supervisors/team leaders in my work unit support employee development. | ○ | ○ | ○ | ○ | ○ |
| My training needs are assessed. | ○ | ○ | ○ | ○ | ○ |
| Employees have sufficient training to fully utilize technology needed for their work. | ○ | ○ | ○ | ○ | ○ |
| Employees learn from one another as they do their work. | ○ | ○ | ○ | ○ | ○ |
| My supervisor supports my need to balance work and family | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| issues. | | | | | |
| My workload is reasonable. | ○ | ○ | ○ | ○ | ○ |
| My supervisor/team leader provides me with opportunities to demonstrate my leadership skills. | ○ | ○ | ○ | ○ | ○ |
| I am inspired to meet my goals at work. | ○ | ○ | ○ | ○ | ○ |
| I feel completely involved in my work. | ○ | ○ | ○ | ○ | ○ |
| I am determined to give my best effort at work every day. | ○ | ○ | ○ | ○ | ○ |
| I am satisfied that I have the opportunities to apply my talents and expertise. | ○ | ○ | ○ | ○ | ○ |
| My supervisor and I have a good working relationship. | ○ | ○ | ○ | ○ | ○ |
| My supervisor/team leader treats me with respect. | ○ | ○ | ○ | ○ | ○ |
| My co-workers and I have a good working relationship. | ○ | ○ | ○ | ○ | ○ |
| I recommend my organization as a good place to work. | ○ | ○ | ○ | ○ | ○ |

Q3. If you wish, you may provide comments about your workplace environment below.

Q4. Considering everything, how satisfied are you with:

| | Very dissatisfied | Somewhat dissatisfied | Neither dissatisfied nor satisfied | Somewhat satisfied | Very satisfied |
|---|---|---|---|---|---|
| Your job? | ○ | ○ | ○ | ○ | ○ |
| Your organization? | ○ | ○ | ○ | ○ | ○ |
| Your pay? | ○ | ○ | ○ | ○ | ○ |
| Your job security? | ○ | ○ | ○ | ○ | ○ |

Q5. If you wish, you may provide comments below about your level of job satisfaction.

Q6. Think of your job in general. All in all, what is it like most of the time? For each descriptor please indicate yes if it describes the job, no if it doesn't describe the job, or cannot decide.

| | No | Yes | Cannot decide |
|---|---|---|---|
| Good | ○ | ○ | ○ |
| Undesirable | ○ | ○ | ○ |
| Better than most | ○ | ○ | ○ |
| Disagreeable | ○ | ○ | ○ |
| Makes me content | ○ | ○ | ○ |
| Excellent | ○ | ○ | ○ |
| Enjoyable | ○ | ○ | ○ |
| Poor | ○ | ○ | ○ |

Q7. Please indicate how important EACH of these factors was in making your ORIGINAL decision to work in public health

| | Not at all important | Somewhat unimportant | Somewhat important | Very important |
|---|---|---|---|---|
| Desire to work in public health | ○ | ○ | ○ | ○ |
| Desire to make a difference | ○ | ○ | ○ | ○ |
| Importance of public health | ○ | ○ | ○ | ○ |
| Status of public health practitioners | ○ | ○ | ○ | ○ |
| Learning about public health in college | ○ | ○ | ○ | ○ |
| Opportunity to use my skills | ○ | ○ | ○ | ○ |
| Beginning salary & benefits | ○ | ○ | ○ | ○ |
| Advancement opportunities | ○ | ○ | ○ | ○ |
| Job security in public health | ○ | ○ | ○ | ○ |
| Extensive variety of job opportunities in public health | ○ | ○ | ○ | ○ |
| Lack of other career options | ○ | ○ | ○ | ○ |
| Other (please specify) | ○ | ○ | ○ | ○ |
| Other (please specify) | ○ | ○ | ○ | ○ |

Section II: Workforce Priorities

Q8. Please rate the following items in terms of importance to your current position and your current skill level. These items have been adapted from the Core Competencies for public health professionals. Please note, skill levels are defined as follows:

-- Not applicable: current position does not require performing this item
-- Unable to perform: lacking the necessary skills to perform
-- Beginner: able to perform with assistance
-- Proficient: able to perform independently
-- Expert: able to assist or teach others

| | How important is this item in your day-to-day work? | | | | What is your current skill level for this | | | |
|---|---|---|---|---|---|---|---|---|
| | Not important | Somewhat unimportant | Somewhat important | Very important | Not applicable | Unable to perform | Beginner | Proficier |
| Communicating ideas and information in a way that different audiences can understand. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Communicating in a way that persuades others to act. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Collaborating with diverse communities to identify and solve health problems. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Addressing the needs of diverse populations in a culturally sensitive way. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Assessing the broad array of factors that influence specific public health problems. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Understanding the relationship between a new policy and many types of public health problems. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Engaging staff within your health department to collaborate on projects. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Engaging partners outside your health department to collaborate on projects. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Managing change in response to dynamic, evolving circumstances. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Anticipating the changes in your environment (physical, political, environmental) that may influence your work. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Gathering reliable information to answer questions. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Interpreting public health data to answer questions. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Finding evidence on public health efforts that | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| work. | | | | | | | | |
| Applying evidence-based approaches to solve public health issues. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Applying quality improvement concepts in my work. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Influencing policy development. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Preparing a program budget with justification. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Ensuring that programs are managed within the current and forecasted budget constraints. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Q9. What (if any) additional skills would you like to gain or strengthen to achieve your career goals?

Section III: Trends

Q10. How much, if anything, have you heard about the following trends in public health?

| | Nothing at all | Not much | A little | A lot |
|---|---|---|---|---|
| Cross-jurisdictional sharing of public health services | ○ | ○ | ○ | ○ |
| Fostering a culture of quality improvement (QI) | ○ | ○ | ○ | ○ |
| Leveraging electronic health information | ○ | ○ | ○ | ○ |
| Public Health Systems and Services Research (PHSSR) | ○ | ○ | ○ | ○ |
| Public health and primary care integration | ○ | ○ | ○ | ○ |
| Evidence-Based Public Health Practice (EBPH) | ○ | ○ | ○ | ○ |
| Health in All Policies (HiAP) | ○ | ○ | ○ | ○ |
| Implementation of the Affordable Care Act | ○ | ○ | ○ | ○ |

Q10.1 Please rate the following trends in terms of importance, impact on your work, and perceived level of emphasis.

Q11. In the past year, have you personally served as a preceptor or host for a student completing a practicum. A practicum can be defined as a planned, supervised, and evaluated practice experience that is part of a professional public health degree program.

○ Yes
○ No

Q11.1 Considering the work involved in arranging the practicum and supervising the student, as well as the contributions the student made to the department, how would you rate the overall value of the practicum to the health department?

- ❍ The work required to host the practicum outweighed the benefit a lot.
- ❍ The work required to host the practicum outweighed the benefit a little.
- ❍ The work required to host the practicum was equal to the benefit.
- ❍ The benefit to the department outweighed the work required to host the practicum a little.
- ❍ The benefit to the department outweighed the work required to host the practicum a lot.

Q12. In the past year, have you worked with members of the academic community (faculty/staff/students) on public health practice issues?

- ❍ Yes
- ❍ No

Q12.1 To what extent was this collaboration helpful to you in your work?

- ❍ Not at all helpful
- ❍ Not very helpful
- ❍ Somewhat helpful
- ❍ Very helpful

Q13. In your opinion, to what extent will the Affordable Care Act result in the following?

| | Not at all | Not too much | A fair amount | A great deal |
|---|---|---|---|---|
| It will change the day-to-day operations of my health department | ❍ | ❍ | ❍ | ❍ |
| It will change the skills I need to do my job | ❍ | ❍ | ❍ | ❍ |
| My health department focus more on clinical care | ❍ | ❍ | ❍ | ❍ |
| My health department focus more on population-oriented services | ❍ | ❍ | ❍ | ❍ |

Section IV: Demographics

Please remember that your responses will remain anonymous.

Q14. What is your supervisory status? Please note, supervisory levels are defined as follows:
-- Non-supervisor: you do not supervise other employees;
-- Team leader: you provide employees with day-to-day guidance in work projects, but do not have official supervisory responsibility or conduct performance appraisals;
-- Supervisor: you are responsible for employees' performance appraisals and approval of their leave, but you do not supervise other supervisors;
-- Manager: you are in a management position and supervise one or more supervisors; and
-- Executive: member of Senior Executive Service or equivalent.

- ❍ Non-supervisor
- ❍ Team leader
- ❍ Supervisor
- ❍ Manager
- ❍ Executive

Q14.1 How many staff do you oversee as direct reports? (whole numbers only)

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8
- ○ 9
- ○ 10
- ○ 11
- ○ 12
- ○ 13
- ○ 14
- ○ 15
- ○ 16
- ○ 17
- ○ 18
- ○ 19
- ○ 20
- ○ Over 20

Q14.1a Please specify how many staff do you oversee as direct reports? (whole numbers only)

Q14.2 Please specify how many staff you oversee overall (whole numbers only), including direct reports, those who report to the direct reports, etc.

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8
- ○ 9
- ○ 10
- ○ 11
- ○ 12
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- ○ 94
- ○ 95
- ○ 96
- ○ 97
- ○ 98
- ○ 99
- ○ 100
- ○ Over 100

Q14.2a Please specify how many staff you oversee overall (whole numbers only), including direct reports, those who report to direct reports, etc.

Q15. What is your gender?
- ○ Male
- ○ Female

Q16. Are you Hispanic or Latino?
- ○ No
- ○ Yes

Q17. Please select the racial category or categories with which you most identify.
- ☐ White
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Two or more races

Q18. What is your age in years? Please round to the nearest whole year.

- ○ 18 or below
- ○ 19
- ○ 20
- ○ 21
- ○ 22
- ○ 23
- ○ 24
- ○ 25
- ○ 26
- ○ 27
- ○ 28
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- ○ 75
- ○ 76
- ○ 77
- ○ 78
- ○ 79
- ○ 80 or above

Q19. Please move the sliders to indicate how long you have been in each of the following (in years). Please round to the nearest year.

_____ In your current position
_____ With your current agency in total (in any position)
_____ In public health practice in total (in any agency, in any position)

Q20. In years, please indicate how long you have been in public health management in total (in any agency, in any public health Manager or Executive position). Please round to the nearest year.

_____ 1

Q21. I am planning to retire in:
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- I am not planning to retire before 2020

Q22. Are you considering leaving your organization within the next year, and if so, why?
- No
- Yes, to retire
- Yes, to take another governmental job (in public health)
- Yes, to take another governmental job (not in public health)
- Yes, to take a non-governmental job (in public health)
- Yes, to take a non-governmental job (not in public health)
- Yes, other _____

Q23. Which of the following better describes your employment status?
- Contractor employed by third party rendering services to the health department
- Permanent staff employed directly by the health department
- Intern employed directly by the health department
- Temporary staff employed directly by the health department

Q24. Is your position a bargaining unit (union) position?
- Yes
- No

Q25. Are you currently employed full-time at the public health department?
- Yes
- No

Q25.1 Please indicate what percent time you are working at the public health department. (e.g., 50% for half-time [.5 FTE], 100% for full-time [1.0 FTE])
_____ Part-time percentage

Q26. Is your pay based on an annual salary or hourly wage?
- Annual salary
- Hourly wage

Q26.1 What is your current annual salary?
- Less than $25,000
- $25,000 - $35,000
- $35,000.01 - $45,000
- $45,000.01 - $55,000
- $55,000.01 - $65,000
- $65,000.01 - $75,000
- $75,000.01 - $85,000
- $85,000.01 - $95,000
- $95,000.01 - $105,000
- $105,000.01 - $115,000
- $115,000.01 - $125,000
- $125,000.01 - $135,000
- $135,000.01 - $145,000
- More than $145,000

Q26.1 What is your current hourly wage?
- Less than $12.50
- $12.51 - $17.50
- $17.51 - $22.50
- $22.51 - $27.50
- $27.51 - $32.50
- $32.51 - $37.50
- $37.51 - $42.50
- $42.51 - $47.50
- $47.51 - $52.50
- $52.51 - $57.50
- $57.51 - $62.50
- $62.51 - $67.50
- $67.51 - $72.50
- More than $72.50

Q27. Please identify the classification that best represents your role in the organization.
- Animal Control Worker
- Behavioral Health Professional
- Business Support - Accountant/Fiscal
- Clerical Personnel - Administrative Assistant
- Clerical Personnel - Secretary
- Community Health Worker
- Custodian
- Department/Bureau Director
- Deputy Director
- Engineer
- Environmentalist
- Epidemiologist
- Grant and Contracts Specialist
- Health Educator
- Home Health Worker
- Health Officer
- Human Resources Personnel
- Information Technology Specialist
- Laboratory Aide/Assistant
- Laboratory Developmental Scientist
- Laboratory Scientist - Manager
- Laboratory Scientist/Medical Technologist
- Laboratory Scientist - Supervisor
- Laboratory Technician
- Licensed Practical/Vocational Nurse
- Medical Examiner
- Nutritionist
- Other
- Other Business Support Services
- Other Facilities/Operations worker
- Other Management and Leadership
- Other Physician
- Other Professional and Scientific
- Other Oral Health Professional
- Other Registered Nurse- Clinical Services
- Other Veterinarian
- Physician Assistant
- Program Director
- Public Health Agency Director
- Public Health Dentist
- Public Health Informatics Specialist
- Public Health Manager/Program Manager
- Public Health/Preventative Medicine Physician
- Public Health Veterinarian
- Public Information Specialist
- Registered Nurse - Community Health Nurse
- Registered Nurse - Unspecified
- Sanitarian/Inspector
- Social Services Counselor
- Social Worker
- Statistician
- Student - Professional and Scientific
- Technician

Q27.1 Please specify the classification that best represents your role in the organization:

Q28. Please specify your setting.
- City/Town Health Agency
- County Health Agency
- Other Public Health Local Agency
- Multi-city Health Agency
- Multi-county Health Agency
- State Health Agency - Central Office
- State Health Agency - Local or Regional Office
- Other State Agency, not Health Agency
- Hospital or Primary Care Clinic
- Inpatient or Outpatient Clinical Setting
- Other

Q28.1 Please specify your setting:

Q29. Please specify your employer.
- Local government
- State government
- Federal government
- Non-governmental

Q30. Please indicate which degrees you have attained. Check all that apply.

- ❑ Associate's degree in nursing
- ❑ Other associate degree
- ❑ BS/BA
- ❑ BSN
- ❑ Other baccalaureate degree
- ❑ MA/MS
- ❑ MBA
- ❑ MHSA
- ❑ MPA
- ❑ MPH
- ❑ MSN
- ❑ MSW
- ❑ Other masters degree
- ❑ DDS/DMD
- ❑ DrPH/PhD/ScD/other public health doctorate
- ❑ DNP
- ❑ DVM/VMD
- ❑ JD
- ❑ MD/DO, or international equivalent
- ❑ PharmD
- ❑ PhD/ScD/other non-public health doctorate

Q30.1 Please indicate the primary major/concentration associated with your degrees, "eg BA Biology, MPH Health Policy, MD Internal Medicine". Write "N/A" if this is not applicable.

Q31. Please indicate which credentials you have attained. Check all that apply.

- ❑ Certified Health Education Specialist
- ❑ Certified in Public Health
- ❑ Laboratory Certification - Infection Control Certification
- ❑ Laboratory Certification - National generalist certification
- ❑ Laboratory Certification - National specialist certification
- ❑ Laboratory Certification - State licensure to practice laboratory science
- ❑ Nurse Certification - Advanced Public Health Nurse- Board Certified
- ❑ Nurse Certification - Clinical Nurse Specialist
- ❑ Nurse Certification - Nurse Executive, Advanced (NEA-BC)
- ❑ Nurse Certification - Nurse Executive RN- BC
- ❑ Nurse Certification - Nurse Practitioner
- ❑ Nurse Certification - Public/Community Health Clinical Nurse Specialist- Board Certified
- ❑ Nurse Certification - Other
- ❑ Nurse Certification - Registered Nurse Anesthetist
- ❑ Master Certified Health Education Specialist
- ❑ Physician Assistant - Certified
- ❑ Physician Certification - Aerospace Medicine
- ❑ Physician Certification - Preventive Medicine Physician
- ❑ Physician Certification - Public Health and General Preventive Medicine
- ❑ Physician Certification - Other Board Certified Physician
- ❑ Physician Certification - Specialty: Occupational Medicine
- ❑ Registered Dietitian
- ❑ Not formally certified
- ❑ Other certification _____

Q32. Please specify your primary program area.

- ○ Communicable Disease - HIV
- ○ Communicable Disease - STD
- ○ Communicable Disease - Tuberculosis
- ○ Other Communicable Disease
- ○ Non-Communicable Disease
- ○ Injury
- ○ Environmental Health
- ○ Maternal and Child Health
- ○ Maternal and Child Health - WIC
- ○ Clinical Services (excluding TB, STD, family planning)
- ○ Clinical Services - Immunizations
- ○ Oral Health/Clinical Dental Services
- ○ Administration/Administrative Support
- ○ Mental Health
- ○ Substance Abuse, including tobacco control programs
- ○ Public Health Genetics
- ○ Vital Records
- ○ Medical Examiner
- ○ Animal Control
- ○ Emergency Preparedness
- ○ Epidemiology Surveillance
- ○ Program Evaluation
- ○ Health Education
- ○ Health Promotion/Wellness
- ○ Community Health Assessment/Planning
- ○ Training/Workforce Development
- ○ Global Health
- ○ Other Program Area (specify)
- ○ I work equally in multiple programs

Q32.1 Please select your program areas.

- ❑ Administration/Administrative Support
- ❑ Animal Control
- ❑ Clinical Services (excluding TB, STD, family planning)
- ❑ Clinical Services - Immunizations
- ❑ Communicable Disease - HIV
- ❑ Communicable Disease - STD
- ❑ Communicable Disease - Tuberculosis
- ❑ Other Communicable Disease
- ❑ Community Health Assessment/Planning
- ❑ Emergency Preparedness
- ❑ Environmental Health
- ❑ Epidemiology Surveillance
- ❑ Global Health
- ❑ Health Education
- ❑ Health Promotion/Wellness
- ❑ Injury
- ❑ Maternal and Child Health
- ❑ Maternal and Child Health - WIC
- ❑ Medical Examiner
- ❑ Mental Health
- ❑ Non-Communicable Disease
- ❑ Oral Health/Clinical Dental Services
- ❑ Program Evaluation
- ❑ Public Health Genetics
- ❑ Substance Abuse, including tobacco control programs
- ❑ Training/Workforce Development
- ❑ Vital Records
- ❑ Other Program Area (specify) _____

Q32.2 Please indicate what percentage of your time you spend on each program area. For example, half time would be 50%, quarter-time would be 25%. The total must add to 100%

Q32.3 Please specify your primary program area

Q33. Please indicate your state.

- ○ AL
- ○ AK
- ○ AZ
- ○ AR
- ○ CA
- ○ CO
- ○ CT
- ○ DE
- ○ FL
- ○ GA
- ○ HI
- ○ ID
- ○ IL
- ○ IN
- ○ IA
- ○ KS
- ○ KY
- ○ LA
- ○ ME
- ○ MD
- ○ MA
- ○ MI
- ○ MN
- ○ MS
- ○ MO
- ○ MT
- ○ NE
- ○ NV
- ○ NH
- ○ NJ
- ○ NM
- ○ NY
- ○ NC
- ○ ND
- ○ OH
- ○ OK
- ○ OR
- ○ PA
- ○ RI
- ○ SC
- ○ SD
- ○ TN
- ○ TX

## Appendix B. Data Use Agreement

astho

### ASTHO Data Use Agreement

This Data Use Agreement ("Agreement") is entered into and made effective as of January 22, 2015 ("Effective Date"), by and between [Jessica Pittman, Gulzar Shah] "Principal Investigator"), [Georgia Southern University Research & Service Foundation], (the "University or Research Institution at which the Principal Investigator will conduct research on this Data"), and The Association of State and Territorial Health Officials ("ASTHO"). Principal Investigator and Institution are each a "Licensee" and, along with Collaborating Researchers (as defined below), are collectively referred to as "Licensees." For good and valuable consideration, the parties agree as follows:

1. **LICENSE GRANT.** Conditioned on Licensees continued compliance with the terms and conditions of this Agreement, this Agreement provides Licensees with a revocable, royalty-free, limited, non-exclusive, nontransferable license ("License") to use, for the term identified below, the Public Health Workforce Interests and Needs Survey ("PH WINS" or the "Data Set") for Licensees' internal use only and solely in connection with Licensees' own research and analysis. The Data Set and all information derived from the Data Set that contains individually identifiable information and information which identifies States or the organization from which the data is collected, or from which the identity of an individual or State could be deduced, are subject to this License. Principal Investigator shall not disclose the Data Set to anyone, including other employees of the Institution, except the researchers, listed in Exhibit A ("Collaborating Researcher(s)"). Notwithstanding the foregoing, any rights granted hereby are licensed and not sold or otherwise transferred or assigned to Licensees or any third party. References to Institution mean the entity-level licensee and user of the Data Set with which the Principal Investigator is affiliated.

2. **LICENSE GRANT RESTRICTIONS.** Except as provided in this Agreement, Licensees may not

   2.1. Modify, alter, translate, create derivative work(s) or, **distribute, broadcast, transmit, reproduce, publish,** license, sub-license, transfer, sell, exploit, rent, timeshare, outsource, provide on a service bureau basis, **lease,** grant a security interest in, assign or transfer any right(s) in, or otherwise use in any manner not expressly permitted herein

   2.2. Use the Data Set to learn the identity of any Person or identify a particular State or to contact any Person or State for any purpose, including, without limitation, to question, verify, or discuss the Data Set. For the purposes of this Agreement, "Person" means any individual (including an individual acting in his official capacity) and any private (i.e., non-government) partnership, corporation, association, organization, or entity (or any combination thereof), including family, household, neighborhood, health service, or institution.

   2.3. Remove or alter any proprietary notice on the Data Set or use any portion of the Data Set independently from the Data Set as a whole.

   2.4. Publish any paper, report, or other data product containing information based on the Data Set without obtaining ASTHO's prior review, provided that Licensees shall provide ASTHO with a copy of any such publication at least forty-five (45) days prior to its submission for publication review, publication, or other external dissemination. Review is required to ensure that confidential information is not advertently or inadvertently made public per 2.2.2 above and section 5 below.

   2.5. Disclose any Confidential Data (as defined in Section 5 below) without ASTHO's prior written approval.

   All rights not expressly granted to Licensees herein are hereby reserved to ASTHO.

3. **USER OBLIGATIONS.** By installing, downloading, accessing, and/or using the Data Set, Licensees represent that they agree to abide by the terms and conditions of this Agreement and all applicable local, state, national, and international laws and regulations with respect to Licensees' use of the Data Set, including, without limitation, any confidentiality requirements and obligations that apply to the Data Set. Licensees agree to assume all responsibility concerning the use of the Data Set by Principal Investigator and/or the Collaborating Researchers. ASTHO assumes no responsibility or liability for any claims that may result directly or indirectly from the communications, agreements, or interactions Licensees establish using the Data Set. Licensees also agree to acknowledge ASTHO and the de Beaumont Foundation in the

publication of any results from use of the Data Set by including the following notice: "Data from this study was obtained from the Public Health Workforce Interests and Needs Survey, a project supported through a cooperative agreement between the Association of State and Territorial Health Officials (ASTHO) and the de Beaumont Foundation. The use of the data does not imply ASTHO or the de Beaumont Foundation's endorsement of the research, research methods, or conclusions contained in this report." In addition, Principal Investigator agrees to provide ASTHO with a complete and accurate copy of any publication that uses the Data Set covered by this Agreement, consistent with the requirements of Section 2.4 herein.

4. **PROPRIETARY RIGHTS.** ASTHO and/or it licensors shall retain all ownership right, title, and interest in and to all programs, procedures, information, and documentation associated with the Data Set. ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS, ASTHO, and all other names, logos, and icons identifying ASTHO and its products and services are proprietary trademarks of ASTHO, and any use of such marks without the express written permission of ASTHO is strictly prohibited. Except as expressly provided herein, ASTHO does not grant any express or implied right to Licensees or any other person under any intellectual or proprietary rights. Accordingly, unauthorized use of the Data Set may violate intellectual property or other proprietary rights laws as well as other domestic and international laws, regulations, and statutes, including, but not limited to, United States copyright, trade secret, patent, and trademark law.

5. **CONFIDENTIALITY.** Licensees acknowledge and agree that the Data Set contains proprietary trade secrets and proprietary information of ASTHO and/or its licensors and suppliers, including, without limitation, any and all Confidential Data (the "Confidential Information"). For the purposes of this Agreement, "Confidential Data" means identifiable information, linkable to a specific individual, organization, or State either directly or indirectly, for which the individual, or organization, or State has the expectation that the information will not be released in a manner that allows public identification of the individual, organization, or State or causes some harm to the individual, organization, or State. Licensees agree to secure and protect the confidentiality of this Confidential Information of ASTHO in a manner consistent with the maintenance of ASTHO's rights therein, using at least as great a degree of care as Licensees use to maintain the confidentiality of Licensees' own confidential information of a similar nature, but in no event using less than reasonable efforts

   5.1. While Licensees may merge regional-level or national-level data, Licensees shall not merge or match the Data Set with any state-level data without advance written approval of ASTHO.

   5.2. Licensees shall not use Data Set for other than statistical purposes. Principal Investigator shall not use Data Set in any manner to change the status, condition, or public perception of any individual or State with regard to which Data Set are maintained. Principal Researcher shall not use or disclose Data Set for any administrative purpose.

   5.3. Principal Investigator may not disclose or allow Collaborating Researchers to disclose any information containing or derived from Data Set at levels of refinement that would enable the identities of individuals, organizations, or States whose information is contained in the Data Set to be deduced. Licensees shall ensure that the Collaborating Researchers shall have the same responsibilities and observe the same requirements respecting the Data Set that are set forth herein as to the Principal Investigator.

   5.4. Licensees shall not, nor permit any third party, including, without limitation, any of Licensees' contractors or agents, to, sell, transfer, publish, disclose, discuss, or otherwise make available any portion of the Data Set to third parties.

   5.5. Licensees shall abide by guidelines to avoid inadvertent disclosure of Confidential Data by being knowledgeable about what factors constitute disclosure risk and by using disclosure risk guidelines in the release of statistics or other content derived from the Confidential Data. The guidelines shall include but not be limited to:

      (a) No release of a sample for which only one record in the Confidential Data obtained through sampling (e.g., not a census) provides a certain combination of values from key variables. For example, in no table should all cases in any row or column be found in a single cell.

      (b) No release of an estimate for which only a small number of records (e.g., 3, 5, or 10 depending on sample characteristics) in the Confidential Data provide a certain

combination of values from key variables. For example, in no instance should the cell frequency of a cross-tabulation, a total for a row or column of a cross-tabulation, or a quantity figure be fewer than the appropriate threshold as determined from the sample characteristics.

(c) No release of a population for which only one record in the Confidential Data that represents the entire population (e.g., from a census) provides a certain combination of values from key variables. For example, in no table should all cases in any row or column be found in a single cell.

(d) No release of the statistic if the total, mean, or average is based on fewer cases than the appropriate threshold as determined from the sample characteristics.

(e) No release of the statistic if the contribution of a few observations dominates the estimate of a particular cell. For example, in no instance should the quantity figures be released if three cases contribute more than 60 percent of the quantity amount.

5.6. Security Provisions

(a) Licensees shall retain the original version of the Data Set at a single location and may make no copies or extracts of the Data Set available to anyone except as permitted by this Agreement.

(b) Licensees shall maintain the Data Set including printed or other material in a space that is limited to access by authorized personnel.

(c) Licensees shall ensure that access to the Data Set is maintained in computer memory is controlled by password protection. Licensees shall maintain all print-outs, diskettes, personal computers with the Data Set on hard disk, or other physical products containing Confidential Data derived from Data Set in locked cabinets, file drawers, or other secured locations when not in use.

(d) Licensees shall ensure that all printouts, tabulations, and reports are edited for any possible disclosures of the Data Set using generally accepted methods.

6. **SUBMISSIONS.** ASTHO welcomes Licensees' feedback and suggestions about how to improve the Data Set. Licensees agree that ASTHO shall have the perpetual, royalty-free, and irrevocable right to use such feedback and suggestions in any manner it deems desirable without providing any consideration, attribution, or payment to Licensees.

7. **WARRANTY DISCLAIMER.** ASTHO MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT THE SUITABILITY, COMPLETENESS, TIMELINESS, RELIABILITY, LEGALITY, OR ACCURACY OF THE DATA SET FOR ANY PURPOSE. THE DATA SET IS PROVIDED "AS IS" AND "AS AVAILABLE" WITHOUT WARRANTY OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND NON-INFRINGEMENT AS WELL AS ANY WARRANTY RELATED TO THE USE, OR THE RESULTS OF THE USE, OF THE DATA SET OR ANY DOCUMENTATION ASSOCIATED THEREWITH IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY, OR OTHERWISE. THE ENTIRE RISK AS TO THE QUALITY OF AND RESULTS FROM THE USE OF THE DATA SET IS WITH LICENSEES. MOREOVER, RECIPIENT ACKNOWLEDGES AND AGREES THAT ASTHO RESERVES THE RIGHT TO WITHHOLD THE DATA SET UNTIL ASTHO HAS COMPLETED ITS OWN ANALYSIS AND MADE ITS REPORT(S) OF THE FINDINGS PUBLIC.

8. **LIMITATION OF LIABILITY.** LICENSEES AGREE THAT IN NO EVENT SHALL ASTHO BE LIABLE TO THE LICENSEE FOR ANY INDIRECT, PUNITIVE, INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE USE OF THE DATA SET BY LICENSEES, WHETHER BASED IN CONTRACT, TORT, STRICT LIABILITY, OR OTHERWISE, EVEN IF LICENSEES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. WITHOUT LIMITATION OF THE FOREGOING, THE TOTAL LIABILITY OF ASTHO FOR ANY REASON

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf as of the Effective Date written above.

**ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS**

By: Digitally signed by mrobertson@astho.org DN: cn=mrobertson@astho.org Date: 2015.12.30 12:18:43 -05'00'

Name: Katie Sellers

Title: Chief Science and Strategy Officer, ASTHO

**PRINCIPAL INVESTIGATOR**

By:

Name: Gulzar Shah

Title: Associate Dean for Research

**INSTITUTION**

*The below signer represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement on behalf of the Institution. He/she represents and warrants that the execution and delivery of the Agreement and the performance of such party's obligations hereunder have been duly authorized and that the Agreement is a valid and legal agreement binding on such party and enforceable in accordance with its terms.*

By: Eleanor Haynes

Name: Eleanor Haynes

Title: Interim Executive Director

**Exhibit A**
**Collaborating Researchers**

1. Jessica Pittman
2. Jeff Jones,
3. Jingjing Yin
4.
5.

PH WINS Data Security Plan (ASTHO/ SHAH, PITTMAN, JONES, YIN)

The principle investigators (Gulzar Shah, Jessica Pittman, Jeff Jones, and JingJing Yin) plan to securely use the PH WINS data following the Data Use Agreement (DUA) stipulations as described below.

The Principle Investigators will:

a) Retain the original version of the Data Set at a single location and will make no copies or extracts of the Data Set available to anyone except as permitted by the DUA.. The Data Set will not be shared by email.
b) Maintain the Data Set including printed or other material in a space that is limited to access by authorized personnel.
c) Store the Data Set on a password protected external hard drive. All print outs, diskettes, personal computers with the Data Set on hard disk, or other physical products containing Confidential Data derived from Data Set in locked cabinets, file drawers, or other secured locations when not in use.
d) Destroy all materials containing confidential information and securely remove the data from all devices according to the Georgia Southern University security protocol at the end of the project by May 30, 2017.
e) Ensure that all printouts tabulations, and repots are edited for possible disclosures of the Data Set using generally accepted methods.
f) Have received training in handling sensitive data.
g) Have read and understood the DUA, and will comply with the terms of the agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf as of the Effective Date written above.

**ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS**

By: _____

Name: Katie Sellers

Title: Chief Science and Strategy Officer, ASTHO

**PRINCIPAL INVESTIGATOR**

By: _____

Name: Gulzar Shah

Title: Associate Dean for Research, JPHCOPH, Georgia Southern University

**INSTITITUION**

*The below signer represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement on behalf of the Institution. He/she represents and warrants that the execution and delivery of the Agreement and the performance of such party's obligations hereunder have been duly authorized and that the Agreement is a valid and legal agreement binding on such party and enforceable in accordance with its terms.*

By: _____

Name: Bruxanne Hein

Title: Executive Director, GSURSF

WHATSOEVER RELATED TO USE OF THE DATA SET OR FOR ANY CLAIMS RELATING TO THIS AGREEMENT OR THE DATA SET SHALL NOT EXCEED $5,000 (USD).

9. **INDEMNITY.** Each party shall be responsible for the acts and omissions of itself and its employees only. Nothing in this Agreement shall constitute a waiver by either party of any rights of indemnification, contribution, or subrogation which such party may have by operation of law. Likewise, nothing in this Agreement is intended to create a contractual obligation of indemnity in either party.

10. **GOVERNING LAW.** Blank.

11. **TERM AND TERMINATION.** This Agreement and Licensees' right to use the Data Set will commence as of the Effective Date and shall expire 24 months after the Effective Date unless terminated as set forth herein. Any renewal of this Agreement shall be subject to ASTHO's separate written consent. This Agreement will terminate automatically if Licensees fail to comply with any of the terms and conditions described herein, including by exceeding the scope of the license. Termination or expiration of this Agreement will be effective without notice. Licensees may also terminate at any time by ceasing to use the Data Set, but all applicable provisions of this Agreement will survive termination, as outlined below. Upon termination or expiration, Licensees must return, destroy, or delete from Licensees' systems all copies of the Data Set (and any associated materials provided by ASTHO) in Licensees' possession. The provisions concerning proprietary and intellectual property rights, submissions, confidentiality, indemnity, disclaimers of warranty and liability, termination, and governing law will survive the termination or expiration of this Agreement for any reason.

12. **MISCELLANEOUS.** There are no third party beneficiaries. Failure to insist on strict performance of any of the terms and conditions of this Agreement will not operate as a waiver of that or any subsequent default or failure of performance. No joint venture, partnership, employment, alliance, or agency relationship exists between Licensees and ASTHO as result of this Agreement or Licensees' utilization of the Data Set. Moreover Licensees may not bind ASTHO in any way or otherwise make any representations or statements for or on behalf of ASTHO or its licensors or suppliers, including, without limitation, making any statements indicating or suggesting that interpretations drawn are those of the data sources or ASTHO, without ASTHO's prior, separate, express, and written permission. This Agreement represents the entire agreement between Licensees and ASTHO with respect to Licensees' use of the Data Set, and it supersedes all prior or contemporaneous communications and proposals, whether electronic, oral, or written between Licensees and ASTHO with respect to the Data Set. This Agreement may not be assigned or transferred by Licensees without the prior express written consent of ASTHO. This Agreement may be modified only upon the prior and separate written consent of ASTHO.