BUILDING CAPACITY OF THE PUBLIC HEALTH WORKFORCE: AN EXAMINATION OF CHALLENGES AND OPPORTUNITIES RELATED TO ENHANCING INFECTION, PREVENTION, AND CONTROL EDUCATION AND TRAINING FOR STUDENTS

MPH Feasibility Study

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Abbreviations

APIC	Association for Professionals in Infection Control and Epidemiology, Inc.
AR	Antibiotic resistance
ASPPH	Association of Schools and Programs of Public Health
CBIC	Certification Board in Infection Control
CIC	Certification in Infection Control
COPH	College of Public Health
Epi	Epidemiology
EID	Emerging Infectious Diseases
HAI	Healthcare associated infections
IC	Infection Control
ID	Infectious Disease
ILE	Integrated learning experience
IPAP	Infection preventionist academic pathway
IPC	Infection prevention and control
IP	Infection preventionist
IRB	Institutional Review Board
IU	Indiana University
LLA	Lifelong Learning Academy
MPH	Masters degree in public health
MSPH	Masters of science degree in public health
PhD	Doctorate degree in Philosophy
PH	Public Health
PFL	Project Firstline
UGPHD	Undergraduate public health degree
VR	Virtual Reality

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Methods and Sources

Information presented in this report was collected through a multi-modal effort. Schools of public health and existing Infection Prevention and Control (IPC) academic programs were obtained through the academic program finder function available through the Association of Schools and Programs of Public Health (ASPPH).

Six (6) graduate assistants (GAs) were assigned to search for syllabi for MPH core classes from accredited schools of public health within the U.S. and Puerto Rico. Initially, GAs identified listings of core MPH classes and forward-facing syllabi for each school that are available on the internet. As a second phase, GAs sent email requests to each MPH program listing core MPH course syllabi that they were unable to identify on the internet and requesting a copy of these documents. Two (2) undergraduate student volunteers (from the IC minor) researched existing graduate programs related to IPC, listed courses, and sought syllabi for these IPC specific courses. One (1) undergraduate paid project manager served as project manager, assigning specific schools to individual GAs, tracking contact with those schools, and developing lists of collected syllabi.

As syllabi were obtained, they were coded for content areas related to IPC, HAI, and AR. On June 13th and June 15th, 2023, the USF project staff attended three-hour training sessions regarding coding of collected syllabi. These in-person sessions allowed for clarification of topics that fall under the categories of IPC, HAI, and AR and ensure consistent coding among GAs and individual syllabi. Each syllabus was independently coded by two members of the project team. Coded sections were reviewed by the PI prior to inclusion in this report.

Three surveys were designed and entered in Qualtrics, reviewed by NNPHI PFL and submitted to the Institutional Review Board (IRB) for review. An IRB designation of “not human research” was obtained (see Appendix C). Targeted survey audiences were: 1) alumna from the University of South Florida’s undergraduate infection control minor; 2) graduates of accredited MPH programs within the US and Puerto Rico; 3) instructors, curriculum designers for public health programs. Participants were offered a discount code worth $50 to attend any webinar on the USF College of Public Health Lifelong Learning Academy (LLA) portal. Surveys were distributed through IC minor alumna list, registrants list from the Lifelong Learning Academy, and social media. IC minor alumni were contacted via email outreach twice, plus a postcard mailing sent to the last home address on file. Email recruitment announcements for the graduate of MPH survey and instructors and curriculum designers were sent through the American Public Health Association (APHA) 2023 conference attendee list in January and February 2024. Additional recruitment flyers were posted through social media and professional networks.

A literature review was conducted to identify existing publications related to IPC workforce development and education, as well as workforce trends for public health graduates. The PI was in contact with the chair for APIC’s academic pathway committee. Slides and results from APIC’s mega survey, released in December 2022, were provided and are included as Appendices D and E. These slides and results are from applicable survey questions, as determined by APIC staff, and were provided as a professional courtesy.

Established IPC Academic Programs

There are very few existing academic IPC programs within Colleges of Public Health. Graduate level programs (certificate, MPH, MSPH, and PhD) that were identified during this effort are summarized in Figure 1. Appendix A: *ASPPH Academic Program Finder Results for Existing Programs* provides the full listing of the initial search results, as well as which programs were excluded. Programs were excluded if the required courses or content clearly did not address IPC, such as an environmental sciences program. The project team

is aware of an existing program at Drexel University. However, this program was not included in the ASPPH program finder and, thus, was excluded from review.

Despite extensive searches, the project team only identified one undergraduate program related to IPC – an Infection Control undergraduate minor located at the University of South Florida, College of Public Health. That minor consists of five courses, for a total of 15 credit hours. Course titles include *Occupational Health and Safety, Foundations of Public Health Immunology, Foundations of Food Safety, Emerging Infectious Diseases, and Foundations of Infection Control.*

Figure 1: Summary of Existing Infection Prevention and Control Academic Programs

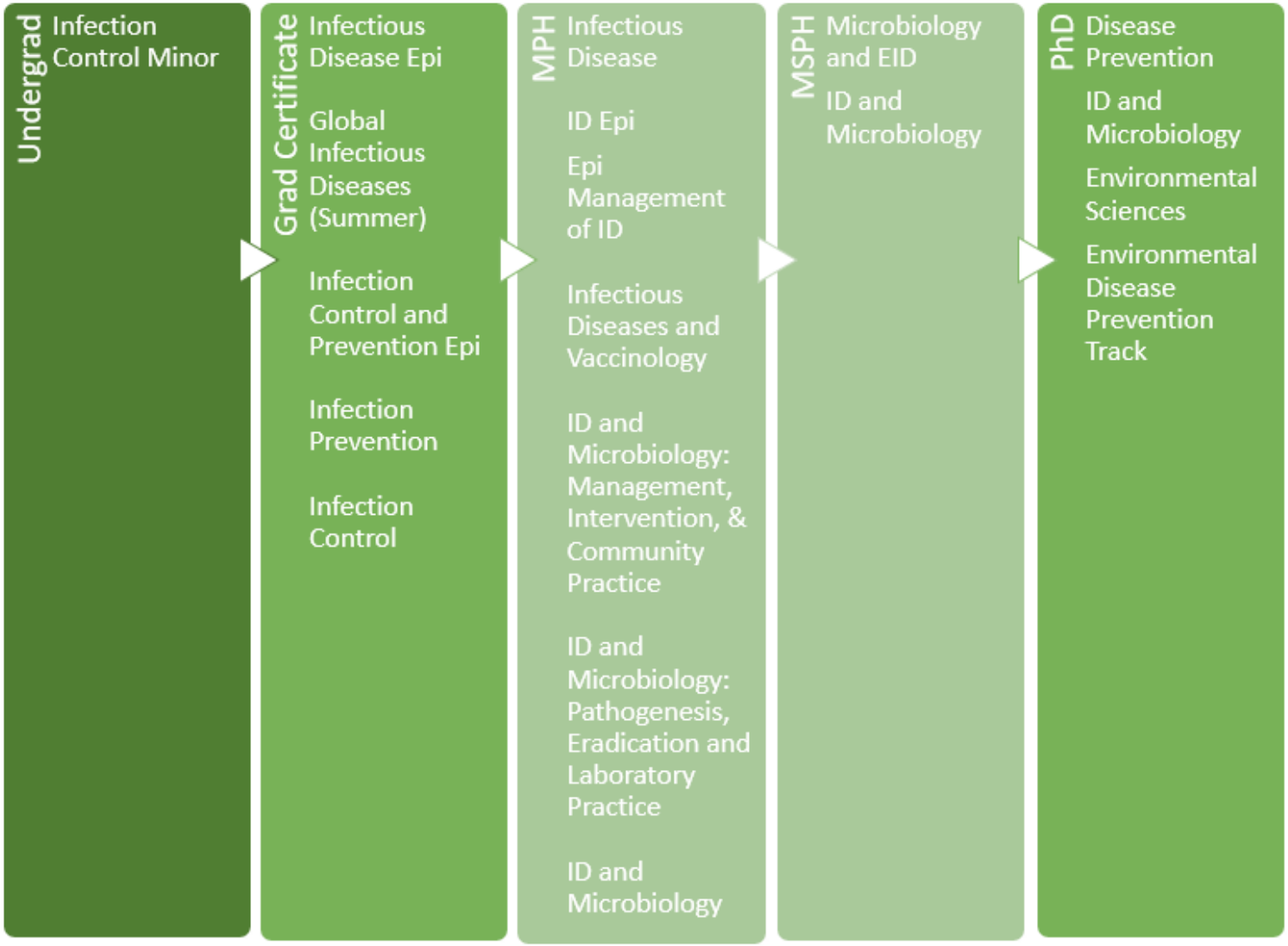


Table 1: Summary of Required Concentration Courses for Existing Graduate IPC Programs

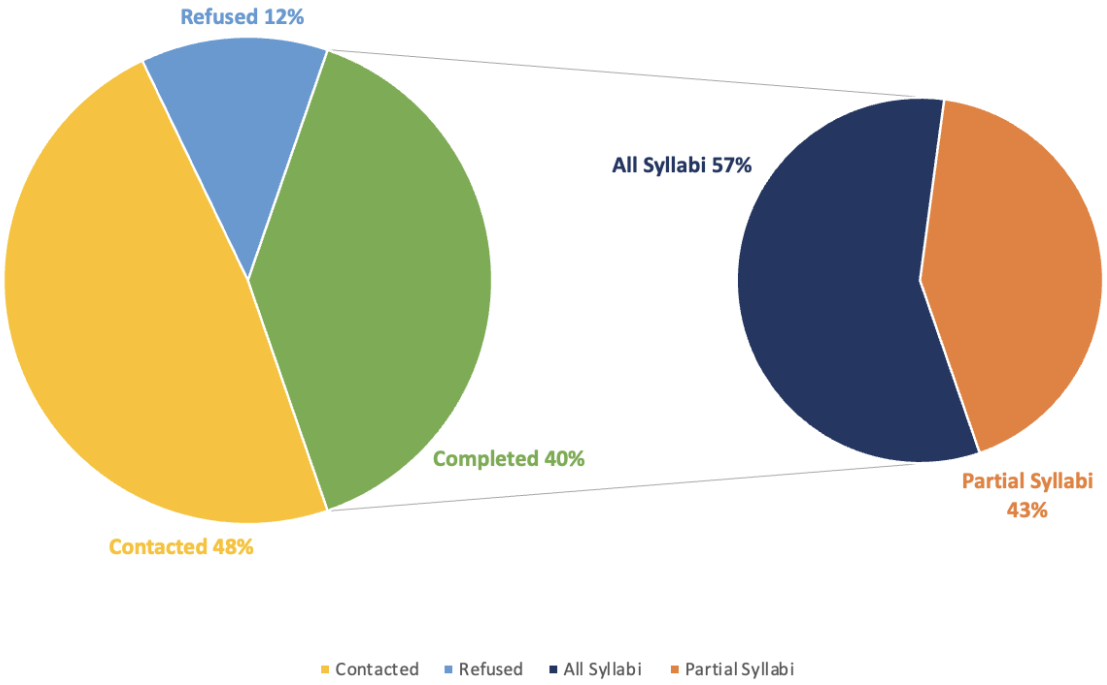
	Global Diseases, Tropical Infectious Diseases	Infectious Disease Epidemiology	Environment & Infectious Diseases	Infectious Disease & Public Health	Infectious Disease Principles	Vaccine Preventable Diseases	Transmission of Infectious Disease	Microbiology for Healthcare Workers	OneHealth	Malaria Biology & Control	AIDS/HIV Epidemiology & Control	Healthcare Epidemiology & Infection Control	Healthcare Associated Infections	Control of Infectious Diseases (General or Global)	Vector-borne/ Zoonotic Diseases	Foodborne & Waterborne Diseases	Infection Control Program Design	Immunology	Infectious Agents Associated with Cancer	Public Health Surveillance/ Surveillance Systems	Lifestyle & Infectious Diseases	Diagnostics in Infectious Diseases	Measurement Techniques in Infection Prevention	Advanced Epidemiology Course	Other Epidemiology (Reproductive Health, Disease Eradication, Neglected Tropical Diseases, Chronic Disease)	Field Placement or Practicum
Boston University	MPH	MPH	MPH	MPH		MPH			MPH															MPH		Unk
Cornell University				Cert						Cert														Cert		Unk
Florida International University		MPH									MPH	MPH													MPH	Yes
George Washington University	MSPH	MSPH									MSPH			MSPH	MSPH	MSPH		MSPH	MSPH						MSPH	Yes
Harvard University															Cert	Cert										No
Indiana University		Cert																		Cert						No
North Dakota State University					MPH															MPH	MPH					No
University of California, Berkeley		MPH			MPH								MPH	MPH	MPH							MPH				Yes
University of California, Irvine	PhD	PhD																		PhD					PhD	Yes
University of Nevada, Las Vegas		Cert					Cert					Cert											Cert			Unk
University of Pittsburgh	MPH, MS, PhD										MPH, MS, PhD	MPH, MS, PhD														Yes
University of South Florida							Cert MPH							Cert MPH			Cert MPH			Cert MPH						Yes - MPH No-Cert

The summary of required concentration courses for existing graduate IPC programs does not include core public health courses that comprise the academic program. Similar course titles were combined into one category even if the wording in the title was not exact. While some courses, such as *Infectious Disease Epidemiology* are shared requirements, there are many that are unique to individual programs, such as *Diagnostics in Infectious Diseases.* A portion of the courses listed have an overt relationship to the practice of IPC, while others are not as concretely linked to the anticipated knowledge base of an Infection Preventionist.

Syllabi and Curriculum of Core MPH Courses

Syllabi were requested and coded as described in the methods section above. Figure 2: *Core MPH Syllabi Tracking and Progress* depicts the collection rates of the syllabi. When this project began, there were 137 Master of Public Health programs accredited by the Association of Schools and Programs of Public Health. The project team obtained the full set of core MPH syllabi for 14 of the accredited schools of public health within the U.S. and Puerto Rico. Of all acquired syllabi, these complete sets accounted for 57% of the total syllabi yield while the remaining 43% were partially completed syllabi sets from an additional 40 schools. 17 schools, representing approximately 12% of all accredited programs, declined to provide syllabi for this project. The reasons cited for declining were most often that the program in question was undergoing restructuring or a concern for sharing the institute's intellectual property. Forty-eight percent (48%) of all contacted schools never responded; it should be noted that the initial outreach request occurred during the summer semester (April – July 2023).

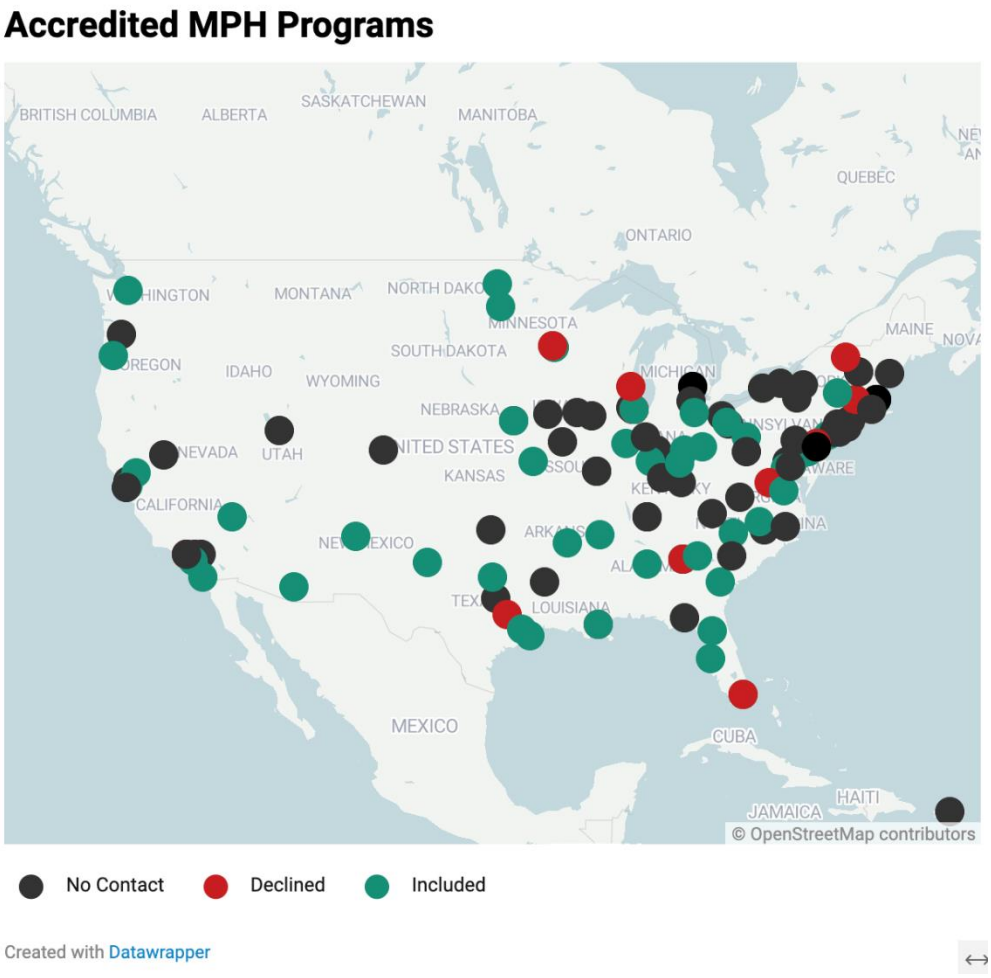
Figure 2: Core MPH Syllabi Tracking and Progress



Many colleges and universities experience decreased staffing during summer semester due to leave time or nine-month faculty appointments that exclude summer semester. However, subsequent outreach attempts were made in the following fall semester (November 2023 – February 2024). Appendix B: *Schools of Public Health and Collected Syllabi* provides a listing of the course numbers and titles, categorized by school.

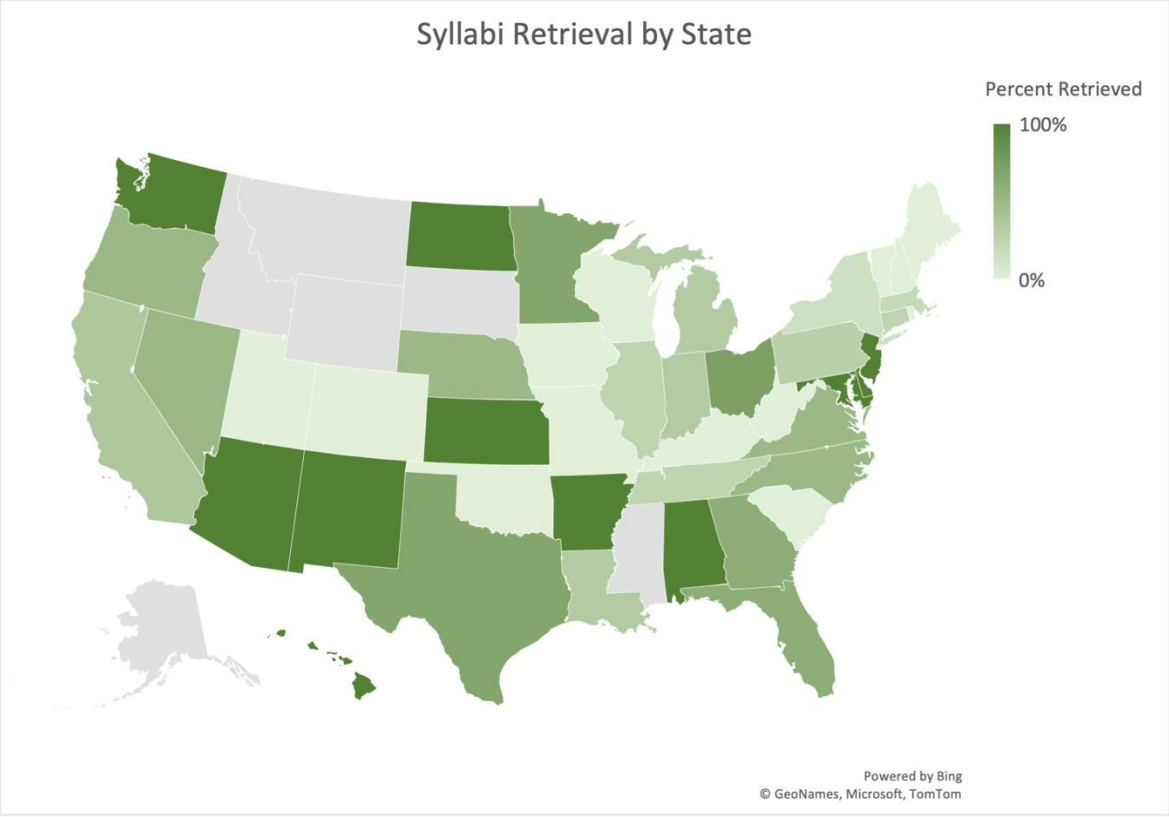
The geographic spread of all accredited MPH programs in the U.S. and Puerto Rico is illustrated in Figure 3, shown below, with all programs displayed with colors relating to their inclusion in this study (Hawaii and Alaska are not included in this visual; there is one applicable program in Hawaii). Green represents programs with syllabi included, red are programs that denied inclusion, and grey represents all programs that did not respond to contact attempts. This helps to illustrate the geographic spread of programs available at the time of this study and where there are opportunities to broaden the availability of MPH programs with integrated IPC competencies. The following six states had no applicable programs listed at the time research began and were therefore unable to be included; Alaska, Idaho, Mississippi, Montana, South Dakota, and Wyoming.

Figure 3: Current Accredited MPH Programs in U.S. and Puerto Rico



Of the remaining 46 states and territories in which there were applicable programs, we were able to retrieve and include data from 34 of these states. There was an average of 3 programs in each state (excluding those with no relevant data), although nearly half (21) of these only had one applicable program. Outlying states such as New York with 14 programs and California with 11 likely skewed this average. 100% of all available data was included for 11 states, representing 14 complete programs (approximately 10% of all programs). However, 15 states yielded no data as programs either refused inclusion or never responded to repeated contact efforts, representing 20 programs (approximately 15% of all programs). Figure 4: *Program Syllabi Retrieval by State* illustrates syllabi retrieval by state.

Figure 4: Program Syllabi Retrieval by State



During the syllabi review, course objectives, competencies, and topics relevant to IPC, AR, and HAI were identified and are listed below. Of the 245 syllabi reviewed, 76 (31%) had specific IPC content; 119 of reviewed courses (49%) had natural “inclusion points” for IPC content, and 72 courses (30%) had neither IPC content nor potential inclusion points. Courses with no IPC content or inclusion points tended to be biostatistics, health policy and management, or environmental health classes. Trends and observations from this listing were used to inform recommendations for inclusion of IPC content in graduate public health curriculum.

Existing competencies, course learning outcomes/objectives, and modules/topics related to IPC material are listed below, with the school and course identified in parenthesis.

COMPETENCIES, COURSE LEARNING OUTCOMES, and OBJECTIVES with IPC Content

- Apply epidemiologic methods to assess the risk of communicable and non-communicable diseases in the community (Kent State, EPI52017 and HPM 53010)
- Assess global variation in burden of disease and its relationship to social, economic, and cultural factors (New York University, GPH-GU-2140)
- Evaluate the role of environmental and global health in the top challenges facing mankind, including overpopulation, energy, pollution, climate change, and infectious disease, to develop research directions and priorities (University of Nevada, Las Vegas, EOH710)
- Identify basic theory, concepts and models of health promotion, disease causation and prevention; analyze trends using primary and/or secondary community and health status data (University of Nevada, Las Vegas, EOH710 and EAB705)
- Describe the natural history of disease, i.e., disease causation, pathogenesis, and prognosis (Kent State, EPI52017)
- Calculate the measures of disease frequency, excess risk, and impact (Kent State, EPI52017)
- Understand the steps involved in an outbreak investigation (Kent State, EPI52017)
- Describe global variation in disease burden (New York University, GPH-GU-2140)
- To describe the key characteristics of an outbreak and the key steps to identifying the cause of the outbreak (New York University, GPH-GU-5106)
- Be familiar with environmental health hazards, the routes by which humans are exposed to hazards, various media in which they are found, and disease outcomes associated with exposures (Northeastern University, PHTH5112)
- Explain various theories of disease causation (e.g. contagion, germ, lifestyle, environmental) and understand their historical and political context (Northeastern University, PHTH6204)
- Describe those mechanisms which clarify the relationship between social factors and the distribution of disease and injury (Northeastern University, PHTH6204)
- Explain an ecological perspective on the connections among human health, animal health, and ecosystem health (eg. OneHealth) (St. Catherine University, HLTH6110; Temple University, SBS5002)

- Articulate the importance of epidemiology in an outbreak investigation, disease surveillance, and public health (University of Georgia, EPIC7010)
- Articulate relevance of absolute measures of disease for targeting interventions and assessing impact of public health programs (University of Minnesota, PUBH6341)
- Identify the major routes of transmission of infectious diseases, and the environmental factors controlling them (University of Minnesota, PUBH6102)
- Discuss criteria for disease causation (University of Nevada, Las Vegas, EAB705)
- Describe the global burden of morbidity and mortality but region, social class, race/ethnicity, gender, and their intersectionalities, and identify ill/health/care patterns of inequities across communicable and non-communicable diseases (University of New Mexico, PH560)
- Discuss the area called “health security” and the effects of crisis and emergencies on both population health and health systems (pandemics, wars, habitat destruction, natural and human-made disasters, forced migration) (University of New Mexico, PH560)
- Explain how the immune system functions normally to protect against disease (University of Pittsburgh, PUBHLT2015)
- Describe how the normal functions of the immune system are enhanced by vaccine (University of Pittsburgh, PUBHLT2015)
- Identify the principles and strengths and limitations of public health programs focused outbreak investigation, surveillance, and screening (University of Pittsburgh, EPI2110)
- List, define, and calculate measures and methods used in outbreak investigation, infectious disease epidemiology, chronic disease epidemiology, disease prevention trials, and evaluation of screening tests including major measures of disease frequency used in epidemiologic research and practice and measures of association between a given risk factor and a disease or health outcome (University of Washington, PHI512)
- Describe methods to perform an investigation of disease outbreak in the community (University of Toledo, PUBH6010)
- Understand the processes of a disease outbreak investigation (Texas Tech University, GSPH5307)
- Discuss basic principles of infectious disease (Texas Tech University, GSPH5307)
- Define the terms outbreak, epidemic, and pandemic (Texas Tech University, GSPH5307)

- Perform an outbreak investigation using the gastrointestinal illness in Oswego as a case study (Texas Tech University, GSPH5307)
- Explore the applications of epidemiology, including policy development, outbreak investigation, social and behavioral issues, the environment, and occupational health (University of New Haven, PUBH6615)
- Calculate basic measures of disease occurrence and association (University of New Haven, PUBH6615)
- Identify factors of the agent, host, and environment that interact to cause infectious disease (Georgia State University, PHPH7010)
- Discuss the characteristics of vaccines and the risk perceptions about them (Georgia State University, PHPH7010)
- Identify the public health factors associated with COVID19 in the US (Georgia State University, PHPH7010)
- Discuss the history and need for the One Health approach (Georgia State University, PHPH7010)
- Describe global efforts to recognize and control pandemic disease (Georgia State University, PHPH7010)
- Relate the biological factors with other components of the ecological model for emerging infections in the global environment (University of Albany, HBS505)
- Integrate general biological and molecular principles into public health problems such as infectious disease, disease susceptibility, and drug resistance and assisted reproduction (University of Albany, HBS505)
- Explain the function of the immune system, the basic biology of major viral diseases and the biological basis for vaccination (University of Albany, HBS505)
- Explain what a vaccine is and why we have effective vaccines for some infectious diseases, but not all (University of Albany, HBS505)
- Identify immune responses to pathogens, manipulation of immune response for vaccines and immunotherapy, and failure or aberrant immune responses (University of Albany, HBS505)
- Explain the biological principles and vaccination strategies that allowed smallpox eradication (University of Albany, HBS505)
- Describe the role, benefits, and limitations of vaccines in assuring the health of populations (University of Albany, HBS505)

- Explain the genetic changes that are key in generating emerging infectious diseases (University of Albany, HBS505)
- Discuss the multiple factors that influence infectious disease epidemics (University of Albany, HBS505)
- Discuss concepts of natural history of disease and prevention (University of Nebraska, CPH504)
- Apply epidemiological methods to an outbreak investigation (Wright University, PPH7040)
- Understand the principles of epidemiology and epidemiologic methods, including disease transmission and descriptive epidemiology (Wright University, PPH7020)
- Apply epidemiologic methods to an outbreak investigation (Wright University, PPH7020)
- Define and properly use terms to describe disease and disease transmission (University of California Davis, EPI205)
- Describe the conduct of and interpret data from an outbreak investigation (University of California Davis, EPI205)
- Define the terms disease cluster, outbreak, epidemic, and pandemic (Virginia Commonwealth University, EPID571)
- Knowledge of the core practices of public health including communicable disease control, epidemiology, and environmental health (University of Illinois Urbana-Champaign, CHLH410)
- Describe the general steps of an outbreak investigation (University of Delaware, EPID605)
- Identify appropriate study design(s) to use for a given outbreak (University of Delaware, EPID605)

MODULES and TOPICS with IPC Content

- Epidemiologic approach to disease (Kent State, EPI52017)
- Foodborne outbreak (Kent State, EPI52017)
- COVID19 (New York University, GPH-GU-5175)
- Occupational Health and Safety/ Accident Theory and Prevention (New York University, GPH-GU-2153)
- Review steps in an outbreak investigation (New York University, GPH-GU-5106)
- Outbreak investigations (New York University, GPH-GU-5106 and (San Diego State University, PH601)

- Screening (New York University, GPH-GU-5106)
- The Immune System, Case Study: HIV/AIDS (New York University, GPH-GU-5190)
- Vector-borne Diseases, Case Study: Zika Virus (New York University, GPH-GU-5190)
- Respiratory Tract Diseases, Case Study: COVID-19 (New York University, GPH-GU-5190)
- Introduction to Public Health Biology: Control and Prevention of Infectious Disease (New York University, GPH-GU-2190)
- Introduction to Disease Transmission (San Diego State University, PH601)
- Introduction to Microbiology and Infectious Diseases: Prokaryotic microbes, Viruses, Fungi, Protists (New York University, GPH-GU-2190)
- Respiratory tract infections: Acute respiratory Infections: Influenza virus, pneumonia, vaccinations, tuberculosis (New York University, GPH-GU-2190)
- Vector-borne disease (Northeastern University, PHTH5112)
- Vaccination rates and behavior models (Northeastern University, PHTH6204)
- Screening and outbreak investigation (Northeastern University, PHTH5202)
- Environmental burden of disease and a Global OneHealth Approach (Ohio State University, PUBHLTH6002)
- Biology and Physiology for Public Health: Intro to Infectious Diseases (Oregon State University, H513)
- Introduction to epidemiology and biostatistics: Disease transmission measurement (St. Catherine University, HLTH6010)
- Occurrence of disease: Disease surveillance, measures of morbidity, mortality, disease impact (St. Catherine University, HLTH6010)
- Introduction to environmental health – local and global perspectives: OneHealth (St. Catherine University, HLTH6110)
- Infectious diseases (University of Florida, PHC6313)
- Water, sanitation, and hygiene (drinking water and sanitation) (University of Florida, PHC6313)
- Sources of data, disease transmission, and descriptive epi (University of Florida, PHC6001)
- Historical perspective: milestones in disease prevention and health promotion (University of Georgia, HPRB7010)
- Ecology of diseases (University of Georgia, EHSC7010)
- Environmental determinants of infectious disease (University of Minnesota, PUBH6102)
- Infectious and communicable disease (University of Nevada, Las Vegas, EOH710)
- OneHealth (University of Nevada, Las Vegas, EOH710)
- Dynamics of disease transmission (University of Nevada, Las Vegas, EAB705)
- Natural history of disease and diagnosis and screening (University of Nevada, Las Vegas, EAB705)
- The host response to infectious disease (University of Pittsburgh, PUBHLT2015)
- Vaccination and public health importance of smallpox and polio (University of Pittsburgh, PUBHLT2015)
- Emerging infectious disease I: HIV/AIDS (University of Pittsburgh, PUBHLT2015)
- Cancer: Genes, environment, cancer (University of Pittsburgh, PUBHLT2015)
- COVID-19 (University of Pittsburgh, PUBHLT2015)

- Epidemiologic approach to disease: Describing patterns of disease (University of Pittsburgh, EPI2110)
- Epidemiologic approach to disease: Assessing disease in populations (University of Pittsburgh, EPI2110)
- The infectious disease process; The dynamics of disease transmission (University of Pittsburgh, EPI2110)
- The prevention of infectious disease and outbreak investigation (University of Pittsburgh, EPI2110)
- Epidemiology in practice: Outbreak investigation (University of Pittsburgh, EPI2110)
- Identifying disease in the community: Surveillance (University of Pittsburgh, EPI2110)
- Measures of disease frequency and Mortality (University of Pittsburgh, EPI2110)
- Innovative strategies for investigating disease outbreaks (University of South Florida, PHC6757)
- Levels of prevention and screening (University of South Florida, PHC6756)
- Disease process and transmission: Screening tests and surveillance (University of South Florida, PHC6756)
- Immune system, vaccination, and risk communication (University of South Florida, PHC6756)
- Population health policies – Communicable and infectious diseases (sexually transmitted diseases, disease control and prevention policy, health inspection) (University of Texas, PHM3715)
- Discuss the dynamics of disease progression (natural history of disease) (University of Texas, PHWM2612)
- Infectious disease, epidemics, and transmission (University of Texas Medical Branch, SPPH6469)
- Emerging and re-emerging infectious diseases (University of Toledo, PUBH6090)
- Biomedical basis of public health: Infectious, chronic, and genetic diseases (Texas Tech University, GSPH5313)
- Disease surveillance and reportable diseases (University of Michigan, PUBHLTH512)
- Disease transmission (University of North Texas Health Science Center at Ft. Worth, EPID5300)
- Occurrence of disease (University of North Texas Health Science Center at Ft. Worth, EPID5300)
- Measures of disease frequency (University of New Haven, PUBH6615)
- Elements to measuring disease occurrence (Georgia State University, PHPH7011)
- Public health screening and levels of prevention (Georgia State University, PHPH7011)
- History of disease causation thinking (Georgia State University, PHPH7011)
- The biological basis of infectious disease Georgia State University, PHPH7010)
- One Health as a public health paradigm (Georgia State University, PHPH7010)
- Zoonotic and vector-borne diseases (University of Albany, EHS590)
- Globalization and pandemics (Tulane University, SPHL6020)
- Infectious disease epidemiology (University of Nebraska, CPH504)
- Outbreak investigation (University of Nebraska, CPH504)
- Biological and genetic factors in population health – communicable disease (University of Nebraska, CPH500)
- Globalization and burdens of disease (University of Nebraska, CPH500)

- Public health preparedness and pandemic fallout (University of North Caroline at Charlotte, HLTH6213)
- HIV (University of North Caroline at Charlotte, HLTH6200)
- Public health to One Health (University of North Caroline at Charlotte, HLTH6200)
- Infectious disease epidemiology (Wright University, PPH7020)
- Outbreak investigation, emergency preparedness, and epidemiology (Wright University, PPH7020)
- Outbreak investigation (University of California Davis, EPI205)
- Molecular epi: COVID-19 test diagnostics (University of California Davis, EPI205)
- Epidemiology in action – COVID19 modeling (University of California Davis, EPI205)
- Introduction and dynamics of disease transmission (George Mason University, GCH712)
- Dynamics of disease transmission, natural history of disease, disease prevention, outbreak investigations, attack rates (University of Illinois Chicago, IPHS 402)
- Modes of disease transmission, outbreak investigation, herd immunity (University of Illinois Chicago, IPHS 404)
- Dynamics of disease transmission, outbreak investigation (University of Illinois Urbana-Champaign, CHLH572)
- Foodborne disease outbreak investigation (University of Illinois Urbana-Champaign, CHLH572)
- OneHealth (University of Illinois Urbana-Champaign, CHLH469)
- Outbreak investigation (University of Delaware, EPID605)
- Occupational biohazards (University of Arkansas, ENVH51003)
- Legal and ethical considerations of quarantine (University of Arkansas, COPH5003)
- Ebola outbreak and Sierra Leone response (University of Arkansas, COPH5003)
- Biological risk in population disease (University of California Irvine, PH200)
- Foodborne-diseases, mercury, and health

HAI and AR EXISTING CONTENT

Course content specifically addressing healthcare-associated infections and antibiotic-resistance was scarce. Details of that content are listed below.

- Within an *Essentials of Public Health Biology* course, *Respiratory Tract Diseases module,* there is a section titled *Pneumonia* which has topics of *Hospital-acquired Pneumonia* and *Community-acquired Pneumonia.*(New York University, GPH-GU-2190)

- Within an *Essentials of Public Health Biology* course, *Infectious Disease Genomics module,* there is a section titled *Resistance Detection and Therapeutic Design,* there is a topic entitled *Antimicrobial Resistance.*(New York University, GPH-GU-2190)

- Within a *Fundamentals of Environmental Health Science* course, there is a topic entitled *Microbiome and Antibiotic Resistance.* (University of Georgia, EHSC7010)

- Within an *Environmental Determinants of Health I* course, there is a topic entitled *Toxic Chemicals and Food Safety,* which includes a learning outcome of *Explain how pesticide*

and antibiotic resistance arises and the human health and ecological consequences. (University of North Texas Health Science Center at Ft. Worth, EOHS5300)

- As a learning objective (*Integrate general biological and molecular principles into public health problems such as infectious disease, disease susceptibility, and drug resistance and assisted reproduction* in a *Biological Basis of Public Health* course. (University of Albany, HBS505)

- Within an *Epidemiology Methods 1 course, Incidence and prevalence and presenting data module* with required reading *High prevalence of infection and low incidence of disease in child contacts of patients with drug-resistant tuberculosis: A prospective cohort study* (University of Delaware, EPID605)[102]

- Within an *Environment, Population, and Health* course, described in the assessment of student learning: *Use course content to explain the basic terminology and definitions of environmental health including, but not limited to, systems thinking, sustainability, growth rate….exposure, antibiotic resistance, disease…..*(Georgia Southern University, PUB6532)

Inclusion of IPC Education and Training into Existing Public Health Programs

During the review of syllabi for core MPH courses "inclusion points" were identified where topics related to IPC, AR, HAI could reasonably be inserted without revision to the course. Natural inclusion points for IPC content were identified in 119 of 245 syllabi reviewed (49%) Identified course objectives and topics to serve as inclusion points are listed below, with the school and course number identified in parenthesis.

COURSE LEARNING OUTCOMES and OBJECTIVES with IPC Inclusion Points

- Identify the principles and limitations of public health screening and evaluate the validity and reliability of screening tests (Kent State, EPI52017)

- To identify appropriate measures of morbidity and mortality used to examine the major causes and trends of morbidity and mortality in the US and other populations (New York University, GPH-GU-5106)

- Articulate the influence of social, economic, and cultural factors on the incidence and prevalence of disease and illness (New York University, GPH-GU-5140)

- Critically examine social and behavioral approaches to prevention and intervention in public health using a social-ecological perspective (New York University, GPH-GU-5190)

- Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc. (New York University, GPH-GU-5106;Ohio State University, PUBHLTH6002, 6003, and 6004; Oregon State University, H513; Rutgers University, PHCO0502; San Diego State University, PH604; St. Catherine University, HLTH6000; Temple University, SBS5002; University of Florida, PHC6001;

University of Nevada, Las Vegas, EOH710; University of North Dakota, PH504 and 510; University of Pittsburgh PUBHLT2033, EOH2013, and PUBHLT2011; University of South Florida, PHC6757, PHC6756, and 6145; University of Maryland, SPHL601; University of Michigan, PUBHLTH512; University of North Texas Health Science Center at Ft. Worth, EPID5300; University of Maryland, SPHL602/603; University of Albany, HPM525; Tulane University, SPHL6020; University of Nebraska, CPH500; Georgia State University, PHPH7010; University of Alabama, PUH604 and PUH600; University of North Caroline at Charlotte, HLTH6200; Wright University, PPH7040; University of California Davis, SPH290; Virginia Commonwealth University, EPID571; University of Illinois Chicago, IPHS402, IPHS403, IPHS401; Georgia Southern University, PUB6532; University of Arkansas, COPH 5003;and Florida International University, PHC6410 and University of Hawaii PH600)

- Identify and provide examples of primary, secondary, and tertiary prevention (University of Texas, PHWM2612)

- Analyze how primary, secondary, and tertiary prevention is used in the design of implementation of population health interventions (University of Washington, PHI515)

- Define the three core functions of public health and explain how each contributes to a primary, secondary, and tertiary prevention of disease in different settings (University of Washington, PHI511)

- Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg. OneHealth) (Ohio State University, PUBHLTH6002, University of Pittsburgh, PBHLT2011, Georgia Southern University, PUB6532;, and University of South Florida, PHC6145)

- Explain how globalization affects global burdens of disease (Ohio State University, PUBHLTH6002; Oregon State University, H513; Rutgers University, PHCO0505; St. Catherine University, HTLH6000; University of Florida, PHC6001; and University of Nevada, Las Vegas, EOH710; University of North Dakota, PH541; University of Pittsburgh PUBHLT2033 and PUBHLT2011; University of South Florida, PHC6145; University of North Texas Health Science Center at Ft. Worth, EOHS5300; Tulane University, SPHL6020; University of Nebraska, CPH500; University of Alabama, PUH600; Wright University, PPH7040; University of Illinois Chicago, IPHS 401; University of California Irvine, PH200; and Georgia State University, PHPH7010)

- Understand the impact of globalization on disease (University of Albany, EHS590)

- Recognize the major determinants of human health and disease, including the importance of socio-economic and behavioral factors (Ohio State University, PUBHLTH6004 and University of South Florida, PHC6756)

- Recognize and discuss major determinants of health in relation to trends of morbidity and mortality (University of Washington, PHI514)

- Articulate the role of health education/health promotion in addressing public health problems (Rutgers University, PHCO0505)
- Describe the tools that are used to analyze health impacts of environmental exposures, such as the risk assessment process, epidemiology, and industrial hygiene (Rutgers University, PHCO0503)
- Describe the main methods used to control health hazards, such as reducing or preventing exposure (Rutgers University, PHCO0503)
- List major causes and trends of morbidity and mortality in the US and around the globe (San Diego State University, PH604; University of Nevada, Las Vegas, EOH710; University of Maryland, SPHL601; and University of Memphis, PUBH7160)
- List major causes and trends of morbidity and mortality in the US and other communities relevant to the school or program (St. Catherine University, HLTH6000; Temple University, SBS5001; University of North Dakota, PH504; University of Pittsburgh, PUBHLT2015, University of South Florida, PHC6145; and University of Michigan, PUBHLTH512)
- Describe disease and mortality variation by time, place, and person (University of Toledo, PUBH6010)
- Gain an understanding of issues and challenges related to long-term care, mental health, ambulatory care, and other types of healthcare services to vulnerable or other special populations (San Diego State University, PH605)
- Apply causal theory and casual criteria to identify determinants of health related states or events (St. Catherine University, HLTH6010)
- Apply public health theories, concepts, models and practices to specific public health problems (St. Catherine University, HLTH7200)
- Describe how social and behavioral science models and theories can be used to explain, predict, and intervene on current public health issues (University of Florida, PHC6410)
- Analyze how direct and indirect human, ecological, and safety effects of major environmental and occupational agents affect human and environmental health. (University of Georgia, EHSC7010)
- Define, calculate, apply, and interpret common epidemiologic measures of disease occurrence and measures of association (University of Georgia, EPIC7010 and University of Maryland SPHL602/603)
- Discuss how intervention strategies such as education, engineering, and enforcement may be implemented to prevent or minimize environmental and occupational hazards (University of Minnesota, PUBH6102)

- Identify the links between social determinants of health; disease exposure, risk factors, and health outcomes (University of Nevada, Las Vegas, HED720)
- Understand and critically discuss definitions of health promotion/disease prevention/health protection (University of New Mexico, PH501)
- Define key concepts pertinent to screening (University of Texas, PHWM2612)
- Identify principles and critical limitation of screening programs for disease (University of Texas, PHWM2612)
- Interpret surveillance data to assess community health status and develop a community health improvement plan (University of Washington, PHI516)
- Recommend and apply prevention and control strategies in response to a public health problem (University of Washington, PHI516)
- Calculate and describe morbidity and mortality measures (University of Toledo, PUBH6010)
- Calculate measures of disease frequency and makes comparisons by person, place, and time (Texas Tech University, GSPH5307)
- Describe situations suitable for screening; evaluating validity, and reliability of screening tests (Texas Tech University, GSPH5307)
- Appreciate the use of epidemiology in Public Health and understand the epidemiologic approach to Public Health issues and data (Texas Tech University, GSPH5307)
- Describe the surveillance procedures as well as systems commonly used in Public Health (Texas Tech University, GSPH5307)
- Describe the types of state and local surveillance systems that are currently available (Texas Tech University, GSPH5307)
- Discuss environmental/macro approaches to public health, especially in the area of health promotion and disease prevention (Texas Tech University, GSPH5334)
- Define intervention and intervention components (Texas Tech University, GSPH5334)
- Define the term “OneHealth” (University of North Carolina, SPHG713)
- Explain the behavioral and psychological factors that affects a population’s health (University of North Texas Health Science Center at Ft. Worth, BACH5300)

- Explain the role of quantitative and qualitative methods and sciences to described and assess a population's health (University of North Texas Health Science Center at Ft. Worth, BIOS5300)

- Explain the effects of environmental factors on a population's health (University of North Texas Health Science Center at Ft. Worth, EOHS5300)

- Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities (University of North Texas Health Science Center at Ft. Worth, HMAP
5300)

- Advocate for political, social or economic policies and programs that will improve health in diverse populations (Indiana University, SPHX685)

- Describe the surveillance and disease monitoring systems (Indiana University, SPHX650)

- Understand and calculate basic measures of disease frequency (Indiana University, SPHX650)

- Identify and summarize the most current issues impacting human health throughout the globe (University of New Haven, PUBH6672)

- Evaluate how health systems impact disease trends at the local levels in different regions of the world (University of New Haven, PUBH6672)

- Compare the major categories of morbidity and mortality between high, middle, and low-income regions of the world (University of New Haven, PUBH6672)

- Articulate moral arguments for or against public health policies or practices (University of Maryland, SPHL611)

- Describe public health problems according to magnitude, person, place, and time, using qualitative and quantitative approaches (University of Maryland, SPHL602/603 and University of Albany, EPI501)

- Explain biological and genetic factors that affect a population's health (University of Maryland, SPHL602/603; University of Alabama, PUH600; University of North Caroline at Charlotte, HLTH6200; Wright University, PPH7040; University of Illinois Chicago, IPHS 401; and Georgia State University, PHPH7010)

- Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities (University of Maryland, SPHL602/603 and University of Alabama, PUH600)

- Identify the role social, political, and economic determinants have in prevention methods. (Georgia State University, PHPH7010)
- Explain an ecological perspective on the connections among human health, animal health, and ecosystem health (e.g. One Health) Georgia State University, PHPH7010 University of Nebraska, CPH500; University of Alabama, PUH600 and PUH601; Wright University, PPH7020; University of Arkansas, COPH5003; and Tulane University, SPHL6020)
- Discuss human-animal interactions and their positive and negative impact on health and disease Georgia State University, PHPH7010)
- Evaluate opportunities for leveraging policy to advance population health and health equity Georgia State University, PHPH7160)
- Identify chemical, physical, microbial, and nano-agents that originate in the environment and can impact health (University of Albany, EHS590)
- Explain the role of biology linking animal health and ecosystem health in the ecological model of population-based health (University of Albany, HBS505)
- Discuss environmental factors affecting expression of determinants of susceptibility of disease during development (University of Albany, HBS505)
- Describe molecular, cellular, genetic, and physiological interactions with environmental factors in assessing public health issues (University of Albany, HBS505)
- Discuss the effects of ecosystem changes, for example, global warming on changes in disease biology or geographic distribution (University of Albany, HBS505)
- Determine the role of genetic factors in the susceptibility to and progression of disease (University of Albany, HBS505)
- Explain the importance of epidemiology for informing scientific, ethical, economic, and political discussion of a public health issue (University of Albany, EPI501)
- Discuss models of disease causation (University of Nebraska, CPH504)
- Identify the components of public health screening programs (University of Nebraska, CPH504)
- Advocate for political, social or economic policies and programs that will health in diverse populations (University of Nebraska, CPH539)
- Explain biological and genetic factors that affect a population's health (University of Nebraska, CPH500 and Virginia Commonwealth University, EPID604)

- Describe the major social, psychological, social psychological, and cultural variables that influence the maintenance of health and acquisition of disease (Florida International University, PHC6410)
- Identify and discuss “risk factors”, “risk appraisal”, and “risk reduction” in relation to the disease prevention and development of community health promotion programs (Florida International University, PHC6410)
- Describe and evaluate disease/exposure surveillance systems and programs (Wright University, PPH7040)
- Describe, analyze, and interpret community screenings (Wright University, PPH7040)
- List major causes of morbidity and mortality in the US or other community relevant to the school or program (Wright University, PPH7040 and Virginia Commonwealth University, SBHD605)
- Public health and wastewater surveillance (University of California Davis, SPH290)
- Understanding how risk assessment can be used to predict potential risks and how risk management and risk communication can be used to help reduce risks and explain the likely risks to the population (University of California Davis, SPH262)
- Define and discuss the One Health concept and its relevance to public health (Virginia Commonwealth University, EPID593)
- Explain the critical importance of evidence in advancing public health knowledge (Virginia Commonwealth University, EPID571)
- List the key characteristics of diseases appropriate for screening, as well the key features of a screening test (Virginia Commonwealth University, EPID571)
- Demonstrate an understanding of the conceptional foundations for epidemiologic approaches to identifying determinants of disease (University of Illinois Chicago, IPHS 402)
- Demonstrate an understanding of the conceptual foundations for epidemiologic approaches to identifying determinants of disease (University of Illinois Chicago, IPHS 404)
- Synthesize and interpret a body of epidemiological and other public health evidence to ascertain whether an exposure causes a disease (“causal reasoning”) (University of Illinois Chicago, IPHS 404 and IPHS 405)
- Demonstrate and understanding of the conceptual foundations for epidemiologic approaches to identifying determinants of disease (University of Illinois Chicago, IPHS 405)

- Calculate measures of association between risk factors and diseases and use statistical inference procedures, namely estimation and hypothesis testing, to identify significant determinants of disease (University of Illinois Chicago, IPHS 405)

- Knowledge of the core practices of public health including communicable disease control, epidemiology, and environmental health (University of Illinois Urbana-Champaign, CHLH410)

- Identify cause(s) and effect(s) of health problems in populations (University of Delaware, EPID605)

- Define disease occurrence by person, place, and time characteristics (University of Delaware, EPID605)

- Describe how the understanding of how disease occurs has changed over time (University of Delaware, EPID605)

- Describe a pathway of disease (University of Delaware, EPID605)

- Identify biological, chemical, and physical hazards in the environment and their significance in public health (University of Delaware, EPID605)

- Demonstrate an understanding of core concepts related to healthcare quality and safety and their impact on cost and delivery of services (Georgia Southern University, PUBH6534)

- Provide examples of the rising costs of healthcare (University of California Irvine, PH222)

- Quality and patient safety (University of California Irvine, PH222)

COURSE TOPICS and MODULES with IPC Inclusion Points

- Measuring the extent of disease (Kent State, EPI52017)
- Measures of screening, diagnosis, and prognosis (Kent State, EPI52017)
- Understanding the social determinants through public health research: Surveillance, observation, and evaluating interventions (New York University, GPH-GU-2140)
- Analysis, reporting, and sustaining assessment plans (Kent State, HPM53010)
- Calculate key measures of morbidity and mortality (incidence and prevalence) (New York University, GPH-GU-5106)
- Compare and contrast qualitative and quantitative data collection methods to (1) select methods appropriate for a given public health context, (2) understand factors impacting the health of populations, and (3) ensure on-going surveillance of health within and across populations (New York University, GPH-GU-5106)
- Health care quality (Northeastern University, PHTH5112)

- Planning models of health education and promotion (Northeastern University, PHTH5540)
- Measures of disease frequency (Northeastern University, PHTH5202)
- Host biology, genetics, psychological, and behavioral factors relative to environmental exposure and disease continuum (Ohio State University, PUBHLTH6002)
- Medicaid, Medicare, and long term care (Ohio State University, PUBHLTH6002)
- Occupational health policy (Oregon State University, H513)
- Occupational health (Rutgers University, PHCO0503)
- Screening and diagnostic testing (San Diego State University, PH601)
- Population and disease patterns (San Diego State University, PH605)
- Determinants of disease and health disparities (San Diego State University, PH605)
- Measuring health and global burden of disease (St. Catherine University, HLTH6000)
- Seniors and other vulnerable populations (St. Catherine University, HLTH7200)
- Solid waste management (University of Florida, PHC6313)
- Occupational health (University of Florida, PHC6313)
- Screening in public health practice (University of Florida, PHC6001)
- Primary and long-term care (University of Florida, PHC6114)
- Levels of prevention and levels of intervention (University of Georgia, HPRB7010)
- Comparing categorical data in 2x2 tables: Odds ratios and relative risks: Comparing the extent of disease between groups (University of Minnesota, PUBH6450)
- Quality of care issues in health care (University of Nevada, Las Vegas, EOH701)
- Disease control vertical programs (University of New Mexico, PH560)
- COVID-19 and the healthcare systems around the world University of New Mexico, PH560)
- Pandemics, wars, habitat destruction, natural and man-made disasters, forced migration: The future of public health (University of New Mexico, PH560)
- Overview of determinants of health and disease (University of New Mexico, PH501)
- Concepts of prevention, health promotion, disease prevention, health protection, harm reduction – different paradigms (University of New Mexico, PH501)
- Globalization and risk factors for infectious diseases (University of North Dakota, PH551)
- Health services professionals (University of North Dakota, PH541)
- Federalism; Pandemic policymaking (University of Pittsburgh, HPM2001)
- The importance of prevention (University of South Florida, PHC6145)
- Safeguarding our future health: Emergency preparedness (University of Texas, PHM3715)
- Public health surveillance (University of Washington, PHI516)
- Introduction and measures of disease frequency (University of Maryland SPHL602/603)
- Review of screening in public health practice (University of Maryland SPHL602/603)
- Health promotion and disease prevention (University of Maryland SPHL611)
- Measures of disease frequency and numerical summaries (University of Maryland SPHL603)
- Public health preparedness (University of Toledo, PUBH6090)
- The future of public health: Emergencies, achievements, challenges (Texas Tech University, GSPH5313)
- Quality of care (University of California, Berkeley, PHW200E)
- Prevention and screening (University of Michigan, PUBHLTH512)

- Quantifying disease burden and mortality University of Michigan, PUBHLTH512)
- Globalization as a determinant of health (University of North Carolina, SPHG713)
- Environmental factors in disease causation (University of North Texas Health Science Center at Ft. Worth, EPID5300)
- Applying systems thinking tools to a public health issue (Indiana University, SPHX660)
- The process of identifying a causal pathway (Indiana University, SPHX660)
- Measures of disease frequency (Indiana University, SPHX650 and University of Albany, EPI501)
- Concepts of disease occurrence (Indiana University, SPHX650)
- Natural history of disease (Indiana University, SPHX650 and Tulane University, SPHL6060)
- The global burden of disease (University of New Haven, PUBH6672)
- Communicable diseases (University of New Haven, PUBH6672)
- Outbreak investigations overview (University of Maryland, SPHL602/603)
- Infectious disease (University of Maryland, SPHL602/603)
- Systems thinking about COVID (University of Maryland, SPHL620)
- Inpatient care, healthcare quality and safety (Georgia State University, PHPH7160)
- Public health screening, sensitivity, and specificity (University of Albany, EPI501)
- Cost, access, and quality (University of Albany, HPM500)
- Communicable and non-communicable diseases (Tulane University, SPHL6020)
- Workplace safety and health (Tulane University, SPHL6020)
- Screening in public health programs (University of Nebraska, CPH504)
- Public health surveillance (University of Nebraska, CPH504)
- Interventions, primary, secondary, and tertiary prevention and health promotion (University of Nebraska, CPH500)
- Global burdens of disease and ecological perspective (University of Nebraska, CPH500)
- Prevention, morbidity, and mortality (University of Alabama, PUH600)
- Globalization, health, and public health practice (University of Alabama, PUH601)
- Introduction to health promotion and disease prevention (Florida International University, PHC6410)
- Descriptive epidemiology and burden of disease for different populations (Wright University, PPH7020)
- Disease surveillance (University of California Davis, EPI205)
- Screening for disease (University of California Davis, EPI205)
- Occupational epidemiology (Virginia Commonwealth University, EPID604)
- Public health surveillance (University of Illinois Chicago, IPHS 404)
- Public health screening (University of Illinois Chicago, IPHS 404)
- Health quality and safety (Georgia Southern University, PUBH6534)
- History of environmental and occupational health (University of Arkansas, ENVH51003)
- Occupational health regulations (University of Arkansas, ENVH51003)
- Key issues in public health: Leading contributory causes of morbidity and mortality in the US (University of Arkansas, ENVH51003)
- The evolution of health and disease in Arkansas in the last 200 years (University of Arkansas, COPH5003)
- Long-term care (University of Arkansas, HPMT5103)
- Current issues and trends in healthcare (University of Arkansas, HPMT5103)

- Measures of disease frequency (University of California Irvine, PH206)
- Screening and clinical epidemiology (University of California Irvine, PH206)
- Environmental determinants of population disease (University of California Irvine, PH200)

EXAMPLES of Inclusion of IPC Content in non-IPC Modules

Module: *Human Rights and Public Health;* Reading: *Frameworks matter. Ecosocial and human rights perspectives on disparities in women's health – the case of tuberculosis*[1] (New York University, GPH-GU-5185)

Topic: *Housing and place-based health disparities;* Reading: *Broken windows and the risk of gonorrhea*[2] (New York University, GPH-GU-2140)

Topic: *Social networks, social norms, and social influence processes;* Reading: *Social context, sexual networks, and racial disparities in rates of sexually transmitted infection*[3] (New York University, GPH-GU-2140)

Topic: *Ecological models: Multi-level and organizational theories and models;* Reading: *The diffusion of a community-level HIV intervention for women: Lessons learned and best practices*[4] (New York University, GPH-GU-2140)

Topic: *Ecological models: Multi-level and organizational theories and models;* Reading: *Ecosocial and psychosocial correlates of sexually transmitted infections of young adults in the United States*[5](New York University, GPH-GU-2140)

Topic: *The political and normative context: National and international agendas for social determinants; Constructing and understanding conceptual frameworks;* Reading: *Establishing a holistic framework to reduce inequities in HIV, Viral Hepatitis, STDs, and Tuberculosis in the United States*[6] (New York University, GPH-GU-2140)

Topic: *Randomized trials*; Reading: *Diaphragm and lubricant gel for prevention of HIV acquisition in southern African women: A randomized controlled trial*[7](New York University, GPH-GU-5106)

Topic: *Selection and information bias;* Reading: *High rates of HIV infection among injection drug users participating in needle exchange programs in Montreal: Results of a cohort study*[8] (New York University, GPH-GU-5106)

Topic: *Confounding;* Reading: *High rates of HIV infection among injection drug users participating in needle exchange programs in Montreal: Results of a cohort study*[8] (New York University, GPH-GU-5106)

Assignment: *Short Essay (pick one article of three);* Reading: *The 2022 outbreak and pathobiology of the Monkeypox virus*[9] (New York University, GPH-GU-5106)

Topic: *Individual-level health behavior theories;* Reading: Parents' health beliefs and HPV vaccination of their adolescent daughters[10] (New York University, GPH-GU-5140)

Topic: *Screening;* Reading: *Antibody testing for COVID19: Can it be used as a screening tool in areas with low prevelance?*[11] (New York University, GPH-GU-5140)

Topic: *Use of PH Information Systems and Surveillance;* Sub-topic: *Use of GIS mapping as a public health tool – From Cholera to cancer* (Northeastern University, PHTH5112)

Topic: *Promoting Population Health;* Sub-topic: *Social media and vaccine hesitancy: New updates for the era of COVID-19 and globalized infectious diseases* (Northeastern University, PHTH5112)

Topic: *Public Health Program Planning;* Reading: *A closer look at the economic argument for disease prevention*[12] (Ohio State University, PUBHLTH6002)

Topic: *Interpersonal Level Behavior Change Theories: Social Cognitive Theory and Diffusion of Innovations;* Reading: *Designing and evaluating a Health Belief Model-based Intervention to increase intent of HPV vaccination among college males*[13] (Rutgers University, PHCO0505)

Topic: *Introduction to Public Health Programming;* Reading: *Practical use of program evaluation among sexually transmitted disease (STD) programs*[14] (Temple University, SBS5002)

Topic: *Intervention Strategies, Components, and Activities;* Reading: *Multi-level intervention to prevent influenza infections in older low income and minority adults*[15] (Temple University, SBS5002)

Topic: *Public Health Priorities and Interprofessional Practice;* Reading: *Achievement in public health, 1990-1999*[16] (Temple University, SBS5002)

Topic: *Trends in Morbidity and Mortality;* Reading: *Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino communities*[17]

Topic: *Tracking Health – Surveillance;* Reading: *Opening battles: Tuberculosis and the foundations of surveillance*[18]

Topic: *Evidence-based Approaches to Public Health:* Assignment: *In-class exercise on Ebola outbreak* (University of Minnesota, PUBH6341)

Topic: *Evidence-based Approaches to Public Health:* Assignment: *In-class exercise on Zika outbreak* (University of Minnesota, PUBH6341)

Topic: *An Integrated Approach: Pulling it All Together (Social and Behavioral Sciences):* Reading: *Effective interventions: HIV prevention that works*[19]

Course: *Social and Behavioral Sciences;* Assignment: *Psychosocial approaches to increasing flu shots among seniors* (University of Minnesota, PUBH6020)

Course: *Diffusion of Innovations and Social Marketing;* Reading: *Mass diseases, mass exposures, and mass media*[20] (University of Minnesota, PUBH6020)

Topic: *Managing groups;* Reading: *MSF report cites WHO's failures in ongoing Ebola outbreak*[21] (University of Minnesota, PUBH6751)

Topic: *Managing disasters;* Reading: *Guidelines for large-scale novel H1N1 influenza vaccination clinics*[22] (University of Minnesota, PUBH6020)

Topic: *Managing disasters;* Reading: *Developing an incident management system to support Ebola response – Liberia*[23] (University of Minnesota, PUBH6020)

Topic: *Constitution of the field of public health;* Reading: *Decolonising global health in the time of COVID-19*[24] (University of New Mexico, PH560)

Course: *Epidemiology I;* Assignment: *Epidemiologic investigation of Cholera – John Snow (*University of North Dakota, PH551)

Topic: *The Ecological Perspective, Prevention, and Health Promotion*; Reading: *Disparities in the population at risk of severe COVID-19 by race/ethnicity and income*[25] (University of Pittsburgh PUBHLT2033)

Assignment: *Case Assignment;* Assignment details: *Improved meningitis vaccine surveillance and promotion (*University of Pittsburgh PUBHLT2033)

Topic: *Behavioral and psychological factors affecting population health;* Reading: *Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the Health Belief Model*[26] (University of Pittsburgh, BCHS2509)

Topic: *Identifying stakeholders and building coalitions;* Reading: *HPV-related cancer prevention through coalition building*[27](University of Pittsburgh, BCHS2509)

Topic: *Assessing evidence, alternative study designs, and introduction to implementation science;* Reading: *High-yield HIV testing, facilitated linkage to care, and prevention for female youth in Kenya (GIRLS Study): Implementation science protocol for a priority population*[28] (University of Washington, PHI513)

Topic: *Assessing evidence, alternative study designs, and introduction to implementation science;* Reading: *Effect of human papillomavirus (HPV) vaccination on clinical indicators of sexual behavior among adolescent girls: The Ontario Grade 8 HPV vaccine cohort study*[29] (University of Washington, PHI513)

Topic: *Assessing evidence, alternative study designs, and introduction to implementation science;* Reading: *Approach to optimize prevention of mother-to-child transmission of HIV using the consolidated framework for implementation research*[30] (University of Washington, PHI513)

Course: *Public Health Practice;* Assignment: *Case studies (total of 6), including contaminated water crisis in a resource limited setting, pandemic influenza preparedness and response, and managing a measles outbreak* (University of Washington, PHI516)

Topic: *Gender and Sexual Health*: Reading: *Application of theory of gender and power to examine HIV-related exposures , risk factors, and effective interventions for women*[44]

Course: *Introduction to Public Health:* Assignment: Case Study Role Play – *The Toronto Severe Acute Respiratory Syndrome II Experience* (Texas Tech University, GSPH5313)

Course: *Introduction to Public Health:* Assignment: Case Study Role Play – *Beyond Measurement: Evaluating Environmental Public Health: Assessing the Effectiveness of Food Safety Programs* (Texas Tech University, GSPH5313)

Topic: *Sustainability and Scalability:* Reading: *Diffusion of the D.A.R.E. and syringe exchange programs*[45] (University of Maryland, SPHL601)

Topic: *Health Disparities and Inequities:* Reading: *Structural racism in the COVID-19 pandemic: Moving forward*[46] (University of Maryland, SPHL601)

Topic: *The Future of Public Health;* Readings: *The critical need for a population health approach: Addressing the nation's behavioral health during the COVID-19 pandemic and beyond*[47] and *The COVID-19 pandemic as an opportunity to ensure a more successful future for science and public health*[48] (University of Maryland, SPHL601)

Topic: *The Future of Public Health:* Readings: *Operationalizing a OneHealth approach to global health challenges*[49] and *The OneHealth concept: 10 years old and a long road ahead*[50] (University of Maryland, SPHL601)

Topic: *SBS Theories in Public Health: Health Belief Model and Theory of Reasoned Action/Theory of Planned Behavior;* Reading: *Predicting human papillomavirus vaccine uptake in young adult women: Comparing the Health Belief Model and Theory of Planned Behavior*[51] (The University of Memphis, PUBH7160)

Topic: *Planning Promotion and Disease Prevention Programs;* Reading: *Intervention mapping as a participatory approach to developing an HIV prevention intervention in rural African American community*[52] (The University of Memphis, PUBH7160)

Topic: *Community-based Participatory Research Approaches to Health Promotion;* Reading: *Taking pictures to take control: Photovoice as a tool to facilitate empowerment among poor and racial/ethnic minority women with HIV/AIDS*[53] (The University of Memphis, PUBH7160)

Assignment: *Case Study Paper*: Topics (choose one from twelve options): *Vaccination, malaria control programs, Tuberculosis control programs, HIV/AIDS programs, Tropical diseases, Water-borne illness and water sanitation programs, COVID-19* (University of Maryland, SPHL610)

Topic: Relevance of Diversity and Disparities to Health Programs; Readings: *Excess deaths from COVID-19, community bereavement, and restorative justice for communities of color*[54] and *Health policy: Assessment of community-level disparities in Coronavirus Disease 2019*[55] (University of Maryland, SPHL610)

Topic: *Community Health Assessment for Program Planning:* Readings: *Promoting community malaria control in rural Myanmar through an active community participation program using participatory learning approach*[56] and *Strategic assessment of COVID-19 pandemic in Bangladesh: Comparative lockdown scenario analysis*, *public perception, and management for sustainability*[57] (University of Maryland, SPHL610)

Topic: *Characterizing and Defining the Health Problem*: Reading (optional): *Global, regional and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2010: A modelling study*[58] and *A role for community health promoters in tuberculosis control in the state of Chipas, Mexico*[59] and *Community assessment for COVID-19 prevention and control: A rapid evidence synthesis*[60] and *The colliding epidemics of COVID-19, Ebola, and measles in the Democratic Republic of Congo*[61] (University of Maryland, SPHL610)

Topic: *Program Quality and Fidelity;* Reading: *Implementation fidelity of the national malaria control program in Burkina Faso*[62] (University of Maryland, SPHL610)

Topic: *Implementation Evaluation: Measuring Inputs and Outputs;* Reading: *Impact evaluation of seasonal malaria chemoprevention under routine program implementation*[63] (University of Maryland, SPHL610)

Topic: *Quantitative Data Analysis and Interpretation;* Reading: *Low uptake of malaria testing within 24 hours of fever despite appropriate health-seeking among migrants in Myanmar: A mixed methods study*[64] (University of Maryland, SPHL610)

Topic: *Qualitative Methods for Planning and Evaluation;* Reading: *Knowledge and attitude towards Ebola and Marburg virus disease in Uganda using quantitative and participatory epidemiology techniques*[65] and *Micro-planning for polio immunization in Kaduna State, Nigeria: Lessons learnt, 2017*[66] and *Acceptability, feasibility and challenges of implementing an HIV prevention intervention for people living with HIV/AIDS among healthcare providers in Mozambique: Results of a qualitative study*[67] and *Personal protective equipment training for non-healthcare workers in the COVID-19 pandemic: Effectiveness of an evidence-based skills training framework*[68] (University of Maryland, SPHL610)

Topic: *Program Evaluation;* Reading: *Evaluation of treatment coverage and enhanced mass drug administration for Onchocerciasis and Lymphatic filariasis in five local government areas treating twice per year in Edo State, Nigeria*[69] and *Analyzing the impact of the Australian health sector emergency response plan for novel Coronavirus (COVID-19): A proposed approach*[70] (University of Maryland, SPHL610)

Topic: *Program Evaluation and Policy Making Process;* Reading (optional): *Public health preparedness and responses to the coronavirus disease 2019 (COVID-19) pandemic in South Asia: A situation and policy analysis*[71] (University of Maryland, SPHL610)

Topic: *Program Objectives and Setting Targets;* Readings: *90/90/90/50 Plan: Ending the HIV epidemic in the District of Columbia*[72] and *Setting targets for HIV: An evaluation of indicator quality and target achievement in National Strategic Plans*[73] (University of Maryland, SPHL610)

Topic: *Program Objectives and Setting Targets:* Video: *Theory of Change [example of HIV in Africa]*[74] (University of Maryland, SPHL610)

Topic: *Environmental Determinants of Heath:* Reading: *Anti-virus built environment: Lessons learned from COVID-19 pandemic*[75] (University of North Carolina, SPHG713)

Topic: *Quantifying the Disease Burden Associated with Determinants:* Reading: *Estimation of excess deaths associated with the COVID-19 pandemic in the United States, March 2020* [76] (University of North Carolina, SPHG713)

Topic: *Intercultural Communication and Effective Engagement to Understand Public Health;* Reading: *COVID-19-Related infodemic and its impact on public health: A global social media analysis*[77] (University of North Carolina, SPHG713)

Practical experience: "A few examples of how students could apply their public health knowledge and skills in a practicum experience are listed below: field activities associated with monitoring, research, or surveillance of a public health issue,..assist in the development of a health intervention." (St. Catherine University, HLTH7100/7103)

Assignment: *Ryan White HIV/AIDS Priority Setting Discussion* in *Budget module.* (Indiana University, SPHX611)

Course: *Program and Policy Planning, Implementation, and Evaluation;* Assignment: *Case Study Final Paper,* Pick one from list of topics, including: *Vaccination, Malaria control programs, Tuberculosis control programs, HIV/AIDS programs, Tropical disease, Water-borne illness and water and sanitation programs, COVID19* (University of Maryland, SPHL610)

Topic: *Content of Health Program Development and Evaluation;* Reading: *Mobilizing policy (in)capacity to fight COVID-19: Understanding variations in state responses*[78] (University of Maryland, SPHL610)

Topic: *Relevance of Diversity and Disparities to Health Programs;* Reading: *Health policy: Assessment of community-level disparities in Coronavirus disease 2019 (COVID-19) infections and deaths in large US metropolitan areas*[79] (University of Maryland, SPHL610)

Topic: *Community Health Assessment for Program Planning;* Reading: *Strategic assessment of COVID-19 pandemic in Bangladesh: Comparative lockdown scenario*

analysis, public perception, and management for sustainability[80] (University of Maryland, SPHL610)

Topic: *Characterizing and Defining the Health Problem;* Readings: *Global, regional, and national estimates of the population at an increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study* [81]; *A role for community health promoters in tuberculosis control in the state of Chiapas, Mexico*[82]; *Community engagement for COVID-19 prevention and control: A rapid synthesis*[83]; *The colliding epidemics of COVID-19, Ebola, and measles in the Democratic Republic of Congo*[84] (University of Maryland, SPHL610)

Topic: *Program Objectives and Setting Targets;* Reading: *Setting targets for HIV: An evaluation of indicator quality and target achievement in National Strategic Plans*[85] (University of Maryland, SPHL610)

Topic: *Process Theory for Program Implementation;* Reading: *Controlling the COVID-19 pandemic*[86] (University of Maryland, SPHL610)

Topic: *Monitoring Implementation through Budgets and Information Systems;* Reading: *Implementation science to respond to the COVID-19 pandemic*[87] (University of Maryland, SPHL610)

Topic: *Program Quality and Fidelity: Managerial and Contextual Considerations;* Reading: *Implementation fidelity of the national malaria program in Burkina Faso*[88] (University of Maryland, SPHL610)

Topic: *Implementation Evaluation: Measuring Inputs and Outputs;* Reading: *Impact evaluation of seasonal malaria chemoprevention under routine program implementation: A quasi-experimental study in Burkina Faso*[89] (University of Maryland, SPHL610)

Topic: *Qualitative Methods for Planning and Evaluation;* Readings: *Knowledge and attitude towards Ebola and Marburg virus disease in Uganda using quantitative and participatory epidemiology techniques*[90]; *Acceptability, feasibility, and challenges of implementing an HIV prevention intervention for people living with HIV/AIDS among healthcare providers in Mozambique: Results of a qualitative study*[91] (University of Maryland, SPHL610)

Topic: *Program Evaluation and the Policy Making Process;* Reading: *Public health preparedness and responses to the coronavirus disease 2019 (COVID-19) pandemic in South Asia: A situation and policy analysis*[92] (University of Maryland, SPHL610)

Module: *The Future of Public Health;* Readings: *The critical needs for a population health approach: Addressing the nation's behavioral health during the COVID-19 pandemic and beyond*[93]; *The COVID-10 pandemic as an opportunity to ensure a more successful future for science and public health*[94]; *Operationalizing a One Health approach to global health challenges*[95] (University of Maryland, SPHL601)

Topic: *Health Policy, Healthcare Reform, and Health-In-All Policies;* Reading: *Health justice strategies to combat COVID-19: Protecting vulnerable communities during a pandemic*[96] (Georgia State University, PHPH7160)

Topic: *Long-term Care;* Reading: *Nursing home care in crisis in the wake of COVID-19*[97] (University of Albany, HPM500)

Assignment: *Case 2 The World Health Organization and the COVID19 pandemic* in *Leadership and Ethics* course (Wright University, MBA7500)

Assignment: *Interprofessional education (IPE) Outbreak Simulation* in *Public Health Epidemiology* course (Wright University, PPH7020)

Topic: *Case control studies: Design, types, selection, odds ratio calculations;* Learning objective: *Explain the design* and utility of case-control studies; Reading: Adenovirus associated with acute diarrhea: A case control study (University of Delaware, EPID605)

Topic: *Case control studies: Design, types, selection, odds ratio calculations;* Learning objective: *Explain the design* and utility of case-control studies; Reading: Risk factors for encephalitis from West Nile Virus: A matched case-control study using hospital controls (University of Delaware, EPID605)

Topic: *Confounding;* Learning objective: *Understand the importance of confounding in epidemiologic studies* and *Calculate measures of association and use criteria to identify confounding;* Reading: *The impact of selection bias on vaccine effectiveness estimates from test-negative studies*[105]

Topic: *Confounding;* Learning objective: *Understand the importance of confounding in epidemiologic studies* and *Calculate measures of association and use criteria to identify confounding;* Reading: *Basic principles of test-negative design in evaluating influenza vaccine effectiveness*[106]

Topic: *Screening and surveillance;* Reading: *Quarterly screening optimizes detection of sexually transmitted infections when describing HIV-preexposure prophylaxis*[109] and *Tuberculosis control activities after Hurricane Katrina – New Orleans, Louisiana, 2005*[110] (University of Delaware, EPID605)

Topic: *Historical and philosophical foundations of public health;* Reading: *The smallpox eradication game*[111] (University of California Irvine, PH200)

Topic: *Public health infrastructure and workforce development;* Reading*: COVID-19 and underinvestment in public health infrastructure of the US*[112] (University of California Irvine, PH200)

Topic: *Stages of Change: The transtheoretical model;* Reading: *The transtheoretical model of change and HIV prevention: A review*[113] (University of California Irvine, PH244)

Conclusions and Recommendations for Development of IPC Content

This review of content of MPH core courses identified content that aligned with principles and topics within infection prevention and control. All MPH academic programs had at least one area within the core MPH courses that could serve as "inclusion points" for IPC content. These findings support the concept that public health core competencies naturally align with the domains depicted in APIC's Infection Preventionist competency model. These models are depicted in figures 5 and 6.

Vassallo and Boston[42] mapped the 2013 APIC competency self-assessment components, IP practice areas, MPH core knowledge areas or foundational competencies, and Council of Education for Public Health (CEPH) 2016 accreditation requirements. A summary of their findings is included as Appendix F. This review found that 78% (29/37) of IP practice areas identified in the 2013 APIC/CBIC competency self-assessment were covered by the MPH foundational competencies.[42] "Only 8 of the practice areas covered in the practice areas are not addressed by the typical MPH program."[42]

The University of South Florida project team completed an analysis and comparison between the Council on Education for Public Health's Master of Public Health competencies (2021) and the Certification Board of Infection Control and Epidemiology, Inc.'s CIC® exam content outline. Content overlap was found between the CIC® Outline and the CEPH MPH Competencies in five of the eight content areas: Identification of Infectious Diseases, Surveillance and Epidemiologic Investigation, Employee/Occupational Health, Management and Communication, and Education and Research. Therefore, a professional obtaining the Master of Public Health degree from a CEPH-accredited program will possess foundational knowledge in these CIC® exam content areas. A professional obtaining the Master of Public Health degree with a concentration in Epidemiology will additionally possess advanced knowledge in the CIC® exam content areas of Identification of Infectious Diseases and Surveillance and Epidemiologic Investigation, albeit without the focus towards infection prevention and control (IPC).

Based on this analysis, the gaps related to foundational IPC, HAI, and AR knowledge for professionals with MPH degrees are focused primarily in the content areas of Preventing/Controlling the Transmission of Infectious Agents, Environment of Care, and Cleaning, Disinfection, Sterilization of Medical Devices and Equipment. Training in these gaps or "bridge areas" is required to prepare an MPH professional with foundational knowledge needed for entry to the IPC workforce

Table 2: Alignment of CBIC CIC Exam Outline and CEPH MPH Competencies

CBIC CIC Exam Outline	CEPH MPH Competencies
1. Identification of Infectious Diseases	[1]Apply Epi methods to settings/situations in PH practice. [2]Select quan/qual data collection methods appropriate for a given PH context. [4]Interpret results of data analysis for public health research, policy or practice
2. Surveillance and Epidemiologic Investigation	[1]Apply Epi methods to settings/situations in PH practice. [2]Select quan/qual data collection methods appropriate for a given PH context.

	[3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software. [4]Interpret results of data analysis for public health research, policy or practice
3. Preventing/Controlling the Transmission of Infectious Agents	N/A
4. Employee/Occupational Health	[1]Apply Epi methods to settings/situations in PH practice. [9]Design a pop-based policy, program, project, or intervention. [11]Select methods to evaluate PH programs. [18]Select communication strategies for different audiences & sectors. [19]Communicate audience-appropriate PH content, both in writing & through oral presentation.
5. Management and Communication	7, 9, 10, 11, 17, 18, 19 [7]Assess pop needs, assets, & capabilities that affect communities' health. [9]Design a pop-based policy, program, project, or intervention. [10]Explain basic principles/tools of budget & resource management. [11]Select methods to evaluate PH programs. [17]Apply negotiation & mediation skills to address organizational/community challenges. [18]Select communication strategies for different audiences & sectors. [19]Communicate audience-appropriate PH content, both in writing & through oral presentation.
6. Education and Research	[7]Assess pop needs, assets, & capabilities that affect communities' health. [9]Design a pop-based policy, program, project, or intervention. [16]Apply leadership and/or management principles to address a relevant issue. [18]Select communication strategies for different audiences & sectors. [19]Communicate audience-appropriate PH content, both in writing & through oral presentation.
7. Environment of Care	N/A
8. Cleaning, Disinfection, Sterilization of Medical Devices and Equipment	N/A

In addition to the review of the CBIC's exam content outline, the team compared the CEPH MPH Competencies with the domains from the Association for Professionals in Infection Control and Epidemiology's Competency Model (2019).

Table 3: Alignment of APIC Competency Domains with CEPH MPH Competencies

APIC Competency Domains	CEPH MPH Competencies
Leadership	[7]Assess pop needs, assets, & capabilities that affect communities' health. [8]Apply awareness of cultural values/practices to the design, implementation or critique of PH policies or programs. [10]Explain basic principles/tools of budget & resource management. [13]Proposed strategies to identify stakeholders and build coalitions/partnerships for influencing PH outcomes. [16]Apply leadership and/or management principles to address a relevant issue. [17]Apply negotiation & mediation skills to address organizational/community challenges. [18]Select communication strategies for different audiences & sectors. [19]Communicate audience-appropriate PH content, both in writing & through oral presentation. [21]Integrate perspectives from other sectors/professions to promote & advance population health.
Professional Stewardship	[5]Compare the organization, structure, & function of health care, PH, & regulatory systems across national/international settings. [7]Assess pop needs, assets, & capabilities that affect communities' health. [8]Apply awareness of cultural values/practices to the design, implementation or critique of PH policies or programs. [9]Design a pop-based policy, program, project, or intervention. [10]Explain basic principles/tools of budget & resource management. [14]Advocate for political, social, or economic policies and programs that will improve health in diverse populations. [21]Integrate perspectives from other sectors/professions to promote & advance population health. [22]Apply a systems thinking tool to visually represent a PH issue in a format other than standard format.
Research	[1]Apply Epi methods to settings/situations in PH practice. [2]Select quan/qual data collection methods appropriate for a given PH context. [3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software. [4]Interpret results of data analysis for public health research, policy or practice.
IPC Operations	[1]Apply Epi methods to settings/situations in PH practice. [2]Select quan/qual data collection methods appropriate for a given PH context. [3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software. [4]Interpret results of data analysis for public health research, policy or practice. [7]Assess pop needs, assets, & capabilities that affect communities' health.

	[9]Design a pop-based policy, program, project, or intervention. [18]Select communication strategies for different audiences & sectors. [19]Communicate audience-appropriate PH content, both in writing & through oral presentation.
Quality Improvement	1, 2, 3, 4, 8, 22 [1]Apply Epi methods to settings/situations in PH practice. [2]Select quan/qual data collection methods appropriate for a given PH context. [3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software. [4]Interpret results of data analysis for public health research, policy or practice. [8]Apply awareness of cultural values/practices to the design, implementation or critique of PH policies or programs. [22]Apply a systems thinking tool to visually represent a PH issue in a format other than standard format.
IPC Informatics	[3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software. [18]Select communication strategies for different audiences & sectors.

Table 4: Alignment of CEPH MPH Foundational Competencies with CBIC CIC Exam Content and APIC Competency Domains

CEPH MPH Foundational Competencies	
A. Evidence-based Approaches to Public Health	
1. Apply epidemiological methods to settings and situations in public health practice ➢ *CBIC Exam Content:* • Identification of Infectious Diseases • Surveillance and Epidemiologic Investigation • Employee / Occupational Health	➢ *APIC Domains:* • Research • IPC Operations • Quality Improvement
2. Select quantitative and qualitative data collection methods appropriate for a given public health context ➢ *CBIC CIC Exam Content:* • Identification of Infectious Diseases • Surveillance and Epidemiologic Investigation	➢ *APIC Domains:* • Research • IPC Operations • Quality Improvement
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming, and software, as appropriate ➢ *CBIC CIC Exam Content:* • Surveillance and Epidemiologic Investigation	➢ *APIC Domains:* • Research • IPC Operations • Quality Improvement • IPE Informatics
4. Interpret results of data analysis for public health research, policy, or practice	

➢ *CBIC CIC Exam Content:* • Identification of Infectious Diseases • Surveillance and Epidemiologic Investigation	➢ *APIC Domains:* • Research • IPC Operations • Quality Improvement
B. Public Health and Care Systems	
5. Compare the organization, structure, and function of health care, public health, and regulatory systems across national and international settings ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Professional Stewardship
6. Discuss the means by which structural bias, social inequities, and racism undermine health and create challenges to achieving health equity at organizational, community and systemic levels ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:*
C. Planning and Management to Promote Health	
7. Assess population needs, assets, and capacities that affect communities' health ➢ *CBIC CIC Exam Content:* • Management and Communication • Education and Research	➢ *APIC Domains:* • Leadership • Professional Stewardship • IPC Operations
8. Apply awareness of cultural values and practices to the design, implementation, or critique of public health policies or programs ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Leadership • Professional Stewardship • Quality Improvement
9. Design a population-based policy, program, project, or intervention ➢ *CBIC CIC Exam Content:* • Employee / Occupational Health • Management and Communication • Education and Research	➢ *APIC Domains:* • Professional Stewardship • IPC Operations
10. Explain basic principles and tools of budget and resource management ➢ *CBIC CIC Exam Content:* • Management and Communication	➢ *APIC Domains:* • Leadership • Professional Stewardship
11. Select methods to evaluate public health programs ➢ *CBIC CIC Exam Content:* • Employee / Occupational Health • Management and Communication	➢ *APIC Domains:*
D. Policy in Public Health	
12. Discuss the policy-making process, including the roles of ethics and evidence ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:*
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes	

➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Leadership
14. Advocate for political, social, or economic policies and programs that will improve health in diverse populations ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Professional Stewardship
15. Evaluate policies for their impact on public health and health equity ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:*
E. Leadership	
16. Apply leadership and/or management principles to address a relevant issue ➢ *CBIC CIC Exam Content:* • Education and Research	• *APIC Domains:* • Leadership
17. Apply negotiation and mediation skills to address organizational or community challenges ➢ *CBIC CIC Exam Content:* • Management and Communication	• *APIC Domains:* • Leadership
F. Communication	
18. Select communication strategies for different audiences and sectors ➢ *CBIC CIC Exam Content:* • Employee / Occupational Health • Management and Communication • Education and Research	➢ *APIC Domains:* • Leadership • IPC Operations • IPE Informatics
19. Communicate audience-appropriate (i.e., non-academic, non-peer audience) public health content, both in writing and through oral presentation ➢ *CBIC CIC Exam Content:* • Employee / Occupational Health • Management and Communication • Education and Research	➢ *APIC Domains:* • Leadership • IPC Operations
20. Describe the importance of cultural competence in communicating public health content ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:*
G. Interprofessional and/or Intersectorial Practice	
21. Integrate perspectives from other sectors and/or professions to promote and advance population health ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Leadership • Professional Stewardship
H. Systems Thinking	
22. Apply a systems thinking tool to visually represent a public health issue in a format other than standard narrative ➢ *CBIC CIC Exam Content:*	➢ *APIC Domains:* • Leadership • Professional Stewardship • Quality Improvement

This project team proposes an MPH-IPC Competency Framework that incorporates both the Public Health Core Competencies Model and the APIC Infection Preventionist Competency Model. This proposed framework is shown in figure 5 and be used as a tool to direct initial discussions with stakeholders about structure and organization of graduate public health IPC programs.

Figure 5: Association of Schools of Public Health Core Competency Model for the MPH Degree[37]

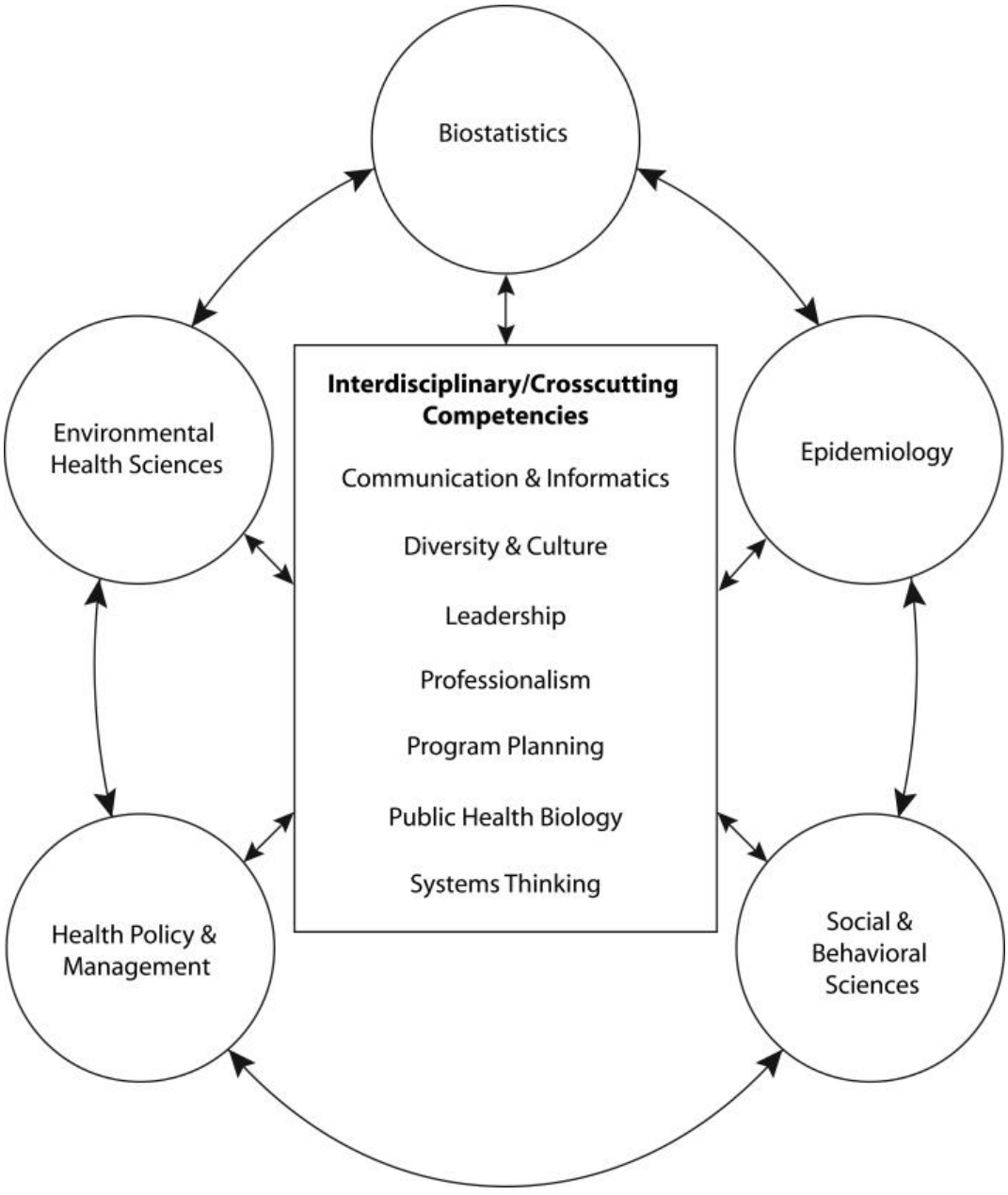
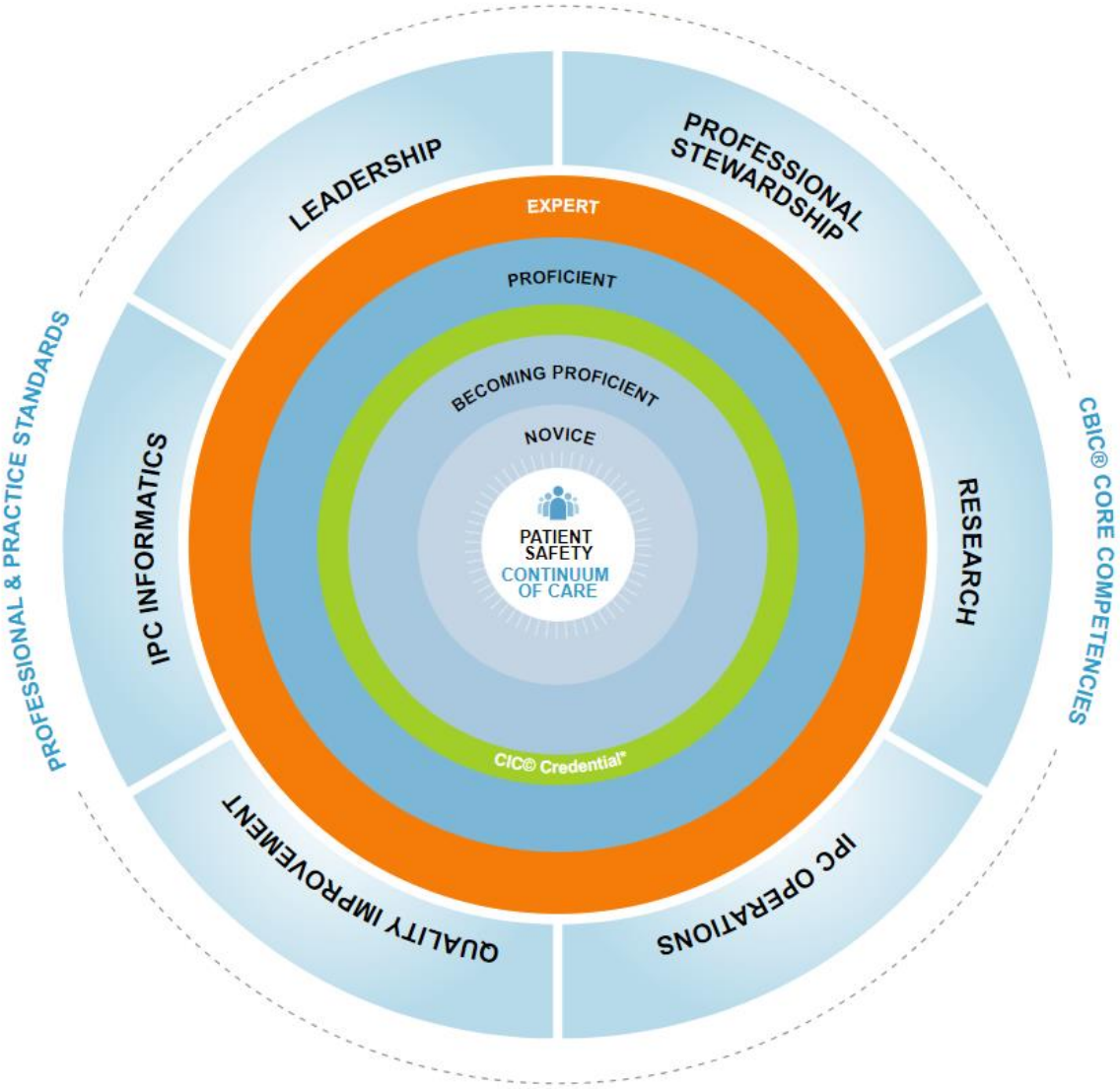
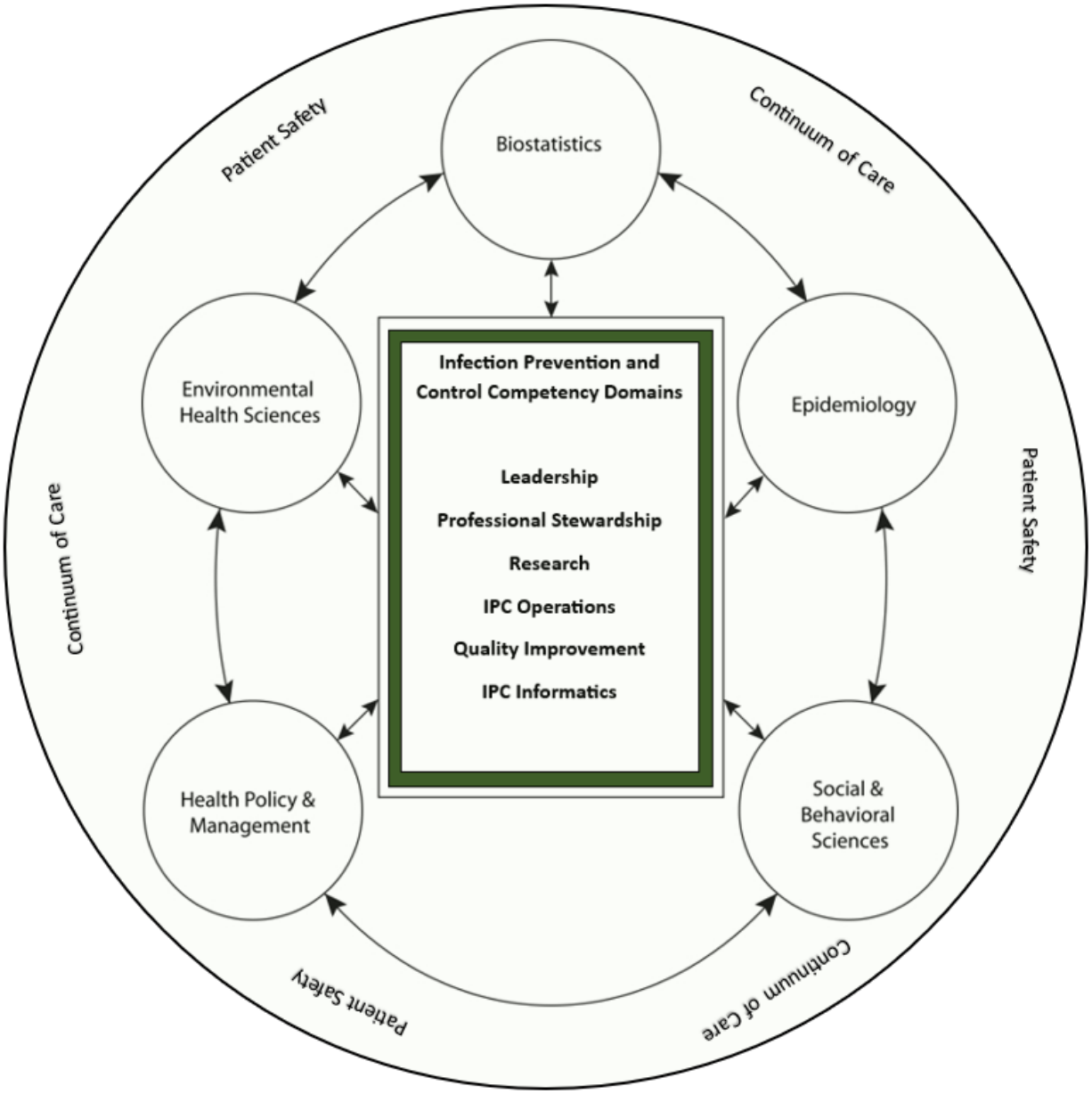


Figure 6: APIC Infection Preventionist Competency Model



Source: https://apic.org/professional-practice/infection-preventionist-ip-competency-model/

Figure 7: Proposed MPH-IPC Competency Framework



Efforts to create new curriculum or new degree pathways should consider the resource allotment related to accreditation, as well as established requirements for the MPH program. ASPPH's Framing the Future Task Force proffered key consideration for a 21st century MPH degree.[38] Select concepts that are relevant to this current effort include:

- The MPH degree should be clearly distinguished from the BSPH and the DrPH, as the BSPH becomes an entry-level degree in the field and then DrPH emerges as a high-level degree focused on public health leadership and management.

- MPH education should be rigorous, applied, and skills-based to differentiate it from the BSPH and to ensure that graduates will be well prepared to function effectively in their chosen specializations and work settings.

- The MPH should be designed as an advanced degree focused on specialist education that is directly responsive to the needs of students and their perspective employers.

- The content delivered in MPH curricula should be regularly aligned with the knowledge, skills, and attitudes that employers expect in graduates.

- Public health is inherently interdisciplinary and interprofessional and, thus, MPH graduates must be prepared to function in increasingly interdisciplinary and interprofessional roles and settings.

- MPH education must be competency-based and competencies should be updated on a regular basis.

- The MPH degree is a professional degree, so it is important that MPH education continue to have strong connections to applied public health practice, broadly defined.

The Framing the Future Task Force also identified design features of a 21st century MPH degree.[38] Pertinent recommendations are:

- The MPH degree should offer in-depth education in concentration areas that are responsive to the interests of students, the strengths of the institution, and the needs of employers.

- Concentration requirements should consist of at least four courses beyond the introductory level that are appropriately sequenced and layered and that are not parts of the practicum or culminating experience.

- Concentrations may include options that are within traditional disciplines, options that cross disciplines, and options that address emerging topics and fields.

- The concentration learning objectives for a particular MPH degree should assess learning in terms of knowledge, comprehension, application, and analysis in a defined specialty area.

- Learning objectives for the practicum and the culminating experience should be linked primarily to the concentration rather than to the core, and they should be focused on higher levels of learning including analysis, synthesis, and evaluation.

This framework provided by ASPPH encourages and allows adaptation of the MPH curriculum to meet the needs of students and employers, as well as emerging topics such as infection

prevention and control. It's critical that IPC PH graduate programs adhere to guidelines and recommendations from ASPPH. This will ensure development of high-quality programs which provide relevant education.

As with all public health programming, it's necessary to involve stakeholders in the planning and implementation of IPC graduate programs. Stakeholders in this effort include representatives from APIC, ASPPH, employers of IPs in various sectors, schools of public health, and IPC students.

The MPH practicum, or applied practice experience, should be used as a component for field placement in a setting that is relevant to IPC. As APIC develops an apprenticeship model, internship/externship requirements should consider the MPH practicum requirement in order to avoid duplication of student efforts.

The syllabi review identified two opportunities or approaches for encouraging inclusion of IPC content in MPH curriculum. While identifying "inclusion points" within MPH core courses, it was noted that many learning outcomes and objectives or modules and topics were similar between schools. For example, twentny-nine (29) schools of public health had an established competency related to "Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc". Initial efforts to develop "toolkits" for inclusion of IPC content should focus on these areas of overlap between schools. A targeted effort on areas of commonality will increase the impact of the effort.

A second approach to emphasize the practicality of including IPC content in curriculum or implementing an IPC academic program involves evaluation of individual schools. In this method, core MPH syllabi for each COPH would be reviewed and a "school specific assessment" would be developed. This school specific assessment would summarize existing IPC content in core courses, as well as learning outcomes, objectives, modules, and topics that are reasonable "inclusion points" for IPC material. It is anticipated that providing a realistic view of incorporation of IPC content without significant course revision would increase the likelihood of adaptation of the recommendations.

Inclusion of IPC content within existing public health courses allows for exposure of students to the concepts that form the foundation of IPC practice and fosters an interest in the topics for future academic and professional development. Two toolkits have been developed as examples of including IPC examples to address existing competencies. These examples address competencies related to primary, secondary, and tertiary prevention and the impact of globalization on the global impact of disease. The content can be accessed through Canvas (login information provided to Nicolas Llinas at NNPHI), through the toolkits (Appendices M and N) or in the instructor primers (Appendices O and P).

Table 5: CORNERSTONE FINDINGS and RECOMMENDATIONS

- MPH core courses have "inclusion" points where IPC materials can be reasonably included with existing course competencies, learning objectives, and topics.
- Existing IPC graduate programs require a wide range of concentrations courses, with little overlap. There is a need for standardization across schools and programs.
- Commonalities between the public health core competency model and APIC's Infection Preventionist competency model should be emphasized when discussing program development with stakeholders.
- Efforts to protect against the "substitution effect" should include task, skill, and content differentiation between different levels of academic programs.
- Development of academic pathways should adhere to MPH program recommendations from ASPPH.
- Stakeholders should be engaged in planning and implementing IPC academic pathways. These participants include representatives from APIC, ASPPH, employers of IPs, schools of public health, and IPC students.
- The MPH practicum (applied learning experience) should be used as a component for field placement relevant to IPC practice.
- Targeted IPC curriculum planning ("school specific assessments") should incorporate existing data regarding core MPH courses, syllabi, and content to provide rationale about inclusion of IPC content and development of IPC academic programs.
- A proposed MPH-IPC competency framework should be used as a tool to begin discussions with stakeholders regarding the structure and organization of MPH-IPC programs.
- Examples of inclusion of IPC-content in non-IPC topics and modules should be provided to curriculum designers and instructors to guide efforts to implement a similar approach.

Collaboration and Discussions with Stakeholders

Indiana University

Project team members (McGuire-Wolfe & Burke) attended the Association of Schools and Programs of Public Health (ASPPH) Annual Meeting in March 2024 to meet with members of the NNPHI team and colleagues from Indiana University Richard M. Fairbanks School of Public Health (IU). IU team members included Shandy Dearth, MPH, and Thomas Duszynski, PhD, MPH, as well as additional program staff. NNPHI team members in attendance included Nicolas Llinas, PhD(c), MA; Jaime Jimenez, MPH; and Francesca Toledo-Alexander, MS.

The group discussed project progression for both groups, as well IU's perspective in providing a graduate certificate in infection control and epidemiology and potential transition to an MPH in infection control. The importance of introduction to the clinical setting was agreed on, as well as in-person shadowing and mentorship opportunities. USF team members shared challenges in facilitating required internship opportunities in an on-line program, while IU discussed possible approaches for introduction to clinical settings through virtual reality (VR).

The importance of inclusion of professional and academic stakeholders to reach a consensus regarding recommendations for the intersection of graduate public health curricula and infection prevention and control programs.

Association for Professionals in Infection Control and Epidemiology (APIC) Annual Conference

Dr. McGuire-Wolfe presented the proposed competency model at the APIC annual conference in June 2024 with comments from the audience lasting approximately 30 minutes after the end of the session. Slides from that presentation are located in Appendix L. Discussion points focused on the need for incorporation of real-world experiences into graduate training programs. One attendee addressed the need for exploration of "what public health practice brings to infection control", as this current effort addresses how infection control competencies are met. There are public health approaches that strengthen infection prevention and control efforts – this needs to be explored and emphasized.

Interest in infection control education programs and options was significant, including questions about inclusion of IPC content in doctorate of nursing programs, incoming MPH-IC students, and DrPH students.

Survey of Undergraduate Infection Control Minor Alumni, Public Health Graduates, and Instructors/Curriculum Designers

To better understand the inclusion of IPC/HAI/AR content in public health curricula and identify gaps in workforce capacity, training, and education, we conducted an evaluation of former undergraduate infection control minor students, MPH students, and instructors/curriculum designers in public health programs.

METHODS

Three surveys were designed and entered in Qualtrics, reviewed by NNPHI PFL and submitted to the Institutional Review Board (IRB) for review. An IRB designation of "not human research" was obtained (see Appendix C). Targeted survey audiences were: 1) alumna from the University of South Florida's undergraduate infection control minor; 2) graduates of accredited MPH programs within the US and Puerto Rico; 3) instructors, curriculum designers for public health programs. Participants were offered a discount code worth $50 to attend any webinar on the USF College of Public Health Lifelong Learning Academy (LLA) portal. Surveys were distributed through IC minor alumna list, registrants list from the Lifelong Learning Academy, and social media. IC minor alumni were contact via email outreach twice, plus a postcard mailing sent to the last home address on file. Email recruitment announcements for the graduate of MPH survey and instructors and curriculum designers were sent through the American Public Health Association (APHA) 2023 conference attendee list in January and February 2024. Additional recruitment flyers were posted through social media and professional networks.

The research team sent a recruitment e-mail (see Appendix G) and distributed flyers (see Appendix H) the participant pool, with their consent to participate determined by their progression to the Qualtrics Survey. The first section, the recruitment survey (see Appendix I) was delivered via Qualtrics. Each survey was sent to members who identified as undergraduates, graduates, or instructors of an infection control program. This activity was conducted through convenience sampling of our research team's public health (PH) networks and subsequent snowball sampling to expand the participant pool. Follow-up emails were sent to individuals monthly for three months. Survey flyers were marketed on LinkedIn to the American Public Health Association (220,828 members), Certified Health Education Specialist (9,307 members), ASPPH Public Health Connections (604 members), Global Public Health (30,324 members) and the Center for Leadership in Public Health Practice COPH (3,000 members). Additionally, these surveys were posted on the University of South Florida College of Public Health's Research Initiative page.

RESULTS

Survey recruitment began on June 21, 2023. On February 15, 2024, the survey was closed for data analysis. Twenty-seven (27) participants completed the Undergraduate survey, sixty-five (65) participants completed the Graduate survey, and twenty-four (24) participants completed the Instructor survey. Synthesized data from the surveys can be found in Appendix J.

UNDERGRADUATE SURVEY REPSONSE

The Undergraduate Survey was comprised of 33 questions: 29 multiple choice questions, 4 open-ended questions, and 6 questions offered a text limited option. Utilizing Qualtrics, we identified 27 responses within the platform for the recruitment survey from June 21, 2023, to February 15, 2024. One response did not meet the criteria for participation and was removed from the analysis, when they responded "No, they did not complete an undergraduate degree in Infection Control."

Academics
The first section of the survey asked questions related to the undergraduate's academic history. Most of the graduates, 75%, graduated between 2021-2023 with 59% of those students graduating during a Spring semester. Thirty-six percent of those students graduated with a Biomedical Science degree, 31.82% graduated with a Public Health degree, 22.73% graduated with a Health Science Degree, and 9.09% selected "Other" degree, and listed Pre-Med, Microbiology, Epidemiology, Chemistry, Chemical Biology, and Biomedical Sciences. Of those students, 43.48% said they attended or are enrolled in graduate school, 56.52% said they did not attend or are enrolled in graduate school and skipped completing the employment section of the survey. Only one student completed the question about which graduate program they are in and where (MPH at USF).

Approximately 40% of the respondents felt that the undergraduate minor infection control strengthened their application for graduate school, but more than half were uncertain if it strengthened their application or not. However, about 50% agreed that the minor in infection control influenced their academic path. When asked about mentorship opportunities, 20% volunteered for mentorship opportunities, 20% completed a mentorship program as part of course credit, 10% received mentorship through undergraduate research, and 40% of the respondents did not participate in a mentorship program. Eighty percent said that the mentorship program did not address IPC/HAI/AR.

Employment:
The second section of the survey asked questions related to the undergraduate's employment. Eighteen respondents answered this question. Approximately 80% of respondents were employed in a variety of fields, materials engineering, claims adjustment, state or local government, academic institutions, healthcare industry, consultant, and or in a national or federal agency. Their titles included, Ophthalmic Technician, Sales Representative, Epidemiologist, Senior Clinical Research Associate, Data Scientist, Property Claim Adjuster, Material Engineer, Research Technician, CNA, and Applied Research Scientist II.

Approximately, 60% of the respondents stated that their professional role did not address issues related to IPC/HAI/IR. However, 80% of respondents said their professional role was within the scope of public health. Approximately, 25% of respondents agreed that the undergraduate minor in infection control influenced their professional career path. Yet over 66% were uncertain if the minor strengthened their application for employment. Over 60% of respondents felt that the undergraduate minor was missing competencies that are used in their everyday employment. None of the respondents are members of the Association of Professionals in Infection Control and Epidemiology (APIC). Nor do they have a certification in Infection Control Credentials (CIC) issued by the Certification Board of Infection Control and Epidemiology.

Some comments that were provided about the Infection Control minor and course content include:

- I loved all the classes I took to get my infection control minor!
- It has helped me get my job.
- It was a very fun minor.

Continuing Education/Future Trends:
The third section of the survey captured continuing education and professional development current practices, trends, and opportunities. All the respondents stated they had some interest in continuing education and professional development, with most of them, 85.72% stating they were either very interested or extremely interested in continuous learning. Over 57% stated they were very interested or extremely interested in continuing education opportunities related to IPC/HAI/AR. Over 76% stated they were interested in a postgraduate course, certificate, or micro-course, if it could advance their career. Most of the respondents stated they received free continuing education opportunities via employers, webinars, or sessions sponsored by professional organizations. For those who paid for professional development either through current academic programs or through self-paced online learning. Over 60% stated they preferred online education to supplement their education. Over half of the respondents stated they were likely to change their careers in the next 1-5 years.

Demographics:
The last section of the survey assessed the respondent's demographics. Approximately 92% of the respondents were under the age of 34. One respondent stated they were over the age of 55. Most of the respondents, 61.54% (n=8) stated they were White, 15.38% stated they were Black or African American, 7.69% stated they were Asian, and 15.38% selected other. Most of the respondents, 85.71% identified as female and 14.29% identified as male. Ninety-two percent of the respondents said they resided in Florida and 7% resided in Indiana.

GRADUATE SURVEY RESPONSE

The Graduate Survey was comprised of 29 questions: 30 multiple choice questions, 4 open-ended questions, and 6 text limited. Utilizing Qualtrics, we identified 65 responses within the platform for the recruitment survey from June 21, 2023, to February 15, 2024.

Academics:
The first section of the survey asked questions related to the undergraduate's academic history. Over 35% of the respondents graduated in 2023, 13% graduated in 2022, 7.55% graduated in 2021, 7.55% graduated in 2019 and over 32% graduated in a different year. Almost half, 49% of those respondents graduated in a spring semester. Respondents indicated they graduated from the following institutions:

- A.T. Still University College of Graduate Health Studies
- Boston University College of Public Health
- DePaul University Master of Public Health Program
- Drexel University Dornsife School of Public Health
- Florida International University Robert Stempel College of Public Health
- Johns Hopkins Bloomberg School of Public Health
- Michigan State University MPH Program
- Northwestern University Feinberg School of Medicine
- Purdue University Department of Public Health
- Tulane University School of Public Health and Tropical Medicine
- University of Hawaii of Manoa Public Health Program
- University of Illinois at Urbana Champaign College of Applied Health Science

- University of Miami Department of Public Health Sciences
- University of Michigan School of Public Health
- University of Minnesota School of Public Health
- University of North Carolina at Charlotte Public Health Programs
- University of San Francisco MPH Program
- University of South Florida
- University of Southern California Programs in Public Health
- University of Toledo
- University of Vermont Larner College of Medicine MPH Program
- Virginia Tech Public Health Program
- Yale School of Public Health

The respondents indicated that their primary concentration during their MPH program included the following:

- Epidemiology/Biostatistics 23.08%
- Infectious Disease/Communicable Disease 15.38%
- Health Behavior/Promotion/Education 13.46%
- Global Health Practice 9.62%
- Maternal and Child Health 5.77%
- Environmental/Occupational Health 1.92%
- Health Administration 1.92%
- Public Health and Law 1.92%

Over 95% of the respondents stated they participated in mentorship opportunities, 15.12% stated it was required, 15.12% stated it was an internship, 11.63% stated it was for course credit, 9.3% stated it was voluntary, 9.3 % identified by student, 9.3% shadowing opportunity, 9.3% stated it was a field placement opportunity, 6.98% stated it was related to employment, 6.98% site identified by school, 2.33% listed it as an applied practice experience. Approximately, half 51% stated their mentorship opportunity addressed IPC/HAI/AR. Over 62.86% concurred that their MPH degree presented them with ideas concerning the prevention and management of infections, however, 38% disagreed with this statement. Over 54.29% agreed that their MPH program introduced concepts about healthcare-associated infections. However, fewer 48.58% respondents concurred that their MPH program included information about antibiotic resistance, and even less, 28.57% agreed that antibiotic stewardship was included in their program.

Over 24% of respondents stated that access to prep courses for the a-IPC or CIC exam and or professional certification was an incentive for entering a field related to IPC/HAI/AR. Followed by availability of entry level/transition positions (22.43%) and then shadowing/mentoring opportunities (21.5%), student loan reimbursement programs (15.89%), and then sign-on bonus (14.02%). When respondents were asked to rate their degree of knowledge for IPC/HAI/AR they felt most confident about general infection prevention and control principles and less confident about antibiotic stewardship.

#	Field	No knowledge	Novice	Moderately Informed	Well-Informed	Subject Matter Expert
1	General Infection Prevention and Control Principles	0.00% 0	11.43% 4	28.57% 10	20.00% 7	40.00% 14
2	Healthcare-Associated Infections	2.86% 1	17.14% 6	25.71% 9	14.29% 5	40.00% 14
3	Antibiotic Resistance	2.86% 1	14.29% 5	25.71% 9	31.43% 11	25.71% 9
4	Antibiotic Stewardship	11.43% 4	25.71% 9	20.00% 7	25.71% 9	17.14% 6
5	Infection Preventionist as a profession	2.86% 1	28.57% 10	17.14% 6	25.71% 9	25.71% 9

Employment:
The second section of the survey asked questions related to the undergraduate's employment. In response to where respondents are currently employed, 20.45% of respondents stated that they were employed with the State or Local Government, 18.8% with an Academic Institution, 18.8% in the Healthcare Industry, 11.36% unemployed, 11.36% non-profit, 4.5% national/federal government agency, and 2.27% as a consultant. The final 13.64% stated other and their comments included state employee, private sector, academic, clinical research site, or clinical trials. Of those respondents who are employed 39.47% work at a state or local health department, 21.05% work at an acute care hospital, and 34.21% selected other and listed office, dentist, pharma, or community care.

Here are the respondent's job titles organized alphabetically, duplicates were removed:

- Analyst
- Associate Professor
- Biological Scientist
- Clinical Research Coordinator
- Clinical Research Coordinator / Data Analyst
- Clinical Social Work Educator
- Community health professional
- Coordinator or clinical education and paramedic
- Emergency Preparedness Manager
- Epidemiology Supervisor
- Evaluation Coordinator
- Executive Director of Healthy Living
- Fellow, Health Education
- HAI Epidemiologist
- Health Education Specialist II
- Implementation Data Manager
- Infection Control Manager

- Infection Prevention Education Specialist
- Infection Prevention Education Specialist
- Infection Prevention Specialist
- Infection prevention coordinator
- Infection preventionist
- Laboratory consultant
- Lead pharmacy technician
- Medical Investigator
- Medical Lab Scientist 3
- Office Manager
- Outbreak Investigator
- PhD student
- Prevention Specialist
- Project Director
- Public health project coordinators
- Quality Improvement Analyst
- Senior Analyst
- Senior Infection Control Officer
- Student - Graduate Teaching Assistant
- Vice President, Global Health

When respondents were asked to evaluate what influenced their personal choices about their career field most strongly agreed that “availability of open positions in their region” was the most influential reason for their career field, followed by internships or shadowing opportunities, and ease of entering a new position.

#	Field	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1	internships or shadowing opportunities during my MPH	10.53% 4	10.53% 4	13.16% 5	36.84% 14	28.95% 11
2	availability of open positions in my region	7.69% 3	12.82% 5	20.51% 8	25.64% 10	33.33% 13
3	pay scale or potential future salaries for specific types of careers in various areas of public health	2.63% 1	18.42% 7	18.42% 7	31.58% 12	28.95% 11
4	the ease/difficulty of entering a new position	5.26% 2	15.79% 6	15.79% 6	36.84% 14	26.32% 10
5	determined before I entered the MPH program (I was already employed in a	31.58% 12	13.16% 5	28.95% 11	15.79% 6	10.53% 4

Over 57% of respondents stated that their current professional role addresses issues with IPC/HAI/IR and more than 97% stated that it is within the scope of public health. Over 37.5% of respondents are a member of APIC, 62.5% are not. Seventy-five percent of respondents have a certification in Infection Control Credentials issued by the Certification Board of Infection Control and Epidemiology. Fifty-five percent of the respondents stated they were in an Urban area, 30% in a suburban area, and 12.5% in a rural area, and 2.5% stated they live in a federal location (miliary base, etc.).

Continuing Education/Future Trends:
The third section of the survey captured continuing education and professional development current practices, trends, and opportunities. Over 58% of respondents stated they were either extremely interested or very interested in continuing education or professional development opportunities related to IPC/HAI/AR. Almost 50% of respondents said they would be extremely or very interested in a post-graduate course, certificate, or micro-certificate. We asked the respondents where they currently receive their education and if they pay for this education or do they receive it for free. Most of the respondents stated they seek out free continuing education via webinars, followed by sessions sponsored by professional organizations, then employer opportunities, web-based courses, self-paced online learning, and finally academic programs. Most of the respondents stated they preferred online learning, followed by conferences, the one-time offerings, in-person training, and micro-certificates. Internships and shadowing opportunities were the least interesting approach for supplemental education. Over half, 51.22%, stated they were somewhat likely or extremely likely to change their profession in the next 1-5 years.

Demographics:
The last section of the survey assessed the respondent's demographics. Over 37% of the respondents were in the 25-34-year age group, followed by 35–44-year age group, then 18-24, then 45-54, 7.5% stated they were in the 55–64-year age group. Over 52% stated their ethnicity was White, 20% stated they were Black or African American, 10% Other, 6% Asian, and 2.5% Native Hawaiian or Pacific Islander. More than 75% stated they were female and 25% stated they were male. Respondents reported being from many states and 5% stated they lived overseas. The states include:

- Arizona
- California
- District of Columbia
- Florida
- Hawaii
- Illinois
- Indiana
- Massachusetts
- Michigan
- Missouri
- New Jersey
- New York
- North Carolina

- Ohio
- Pennsylvania
- Texas
- Utah
- Virgina
- Wisconsin

INSTRUCTOR/CURRICULUM DESIGNER RESPONSE

Description

The Instructor Survey was comprised of 30 questions: 22 multiple choice questions, 2 open-ended questions, and 7 questions offered a text limited option. Utilizing Qualtrics, we identified 19 surveys that were retained for analysis with a 100% completion rate for the recruitment survey from June 21, 2023, to February 15, 2024.

Academics:

The first section of the survey asked questions related to the undergraduate's academic history. Approximately, 36% of the respondents stated they were an instructor in a graduate program, 16% stated they were an instructor, but not in the graduate program and over 47% stated they were not an instructor but interested in IPC/HAI/AR development. Of the 36% who stated they were an instructor in the graduate program, 12.5% stated they have been teaching for 1-3 years, 25% for 4-7 years, 25% for 8-10 years, 25% for 11-15 years, and 12.5% for over 21 years. Half of those instructors identified as Associate Professors, 25% as Assistant Professors, and 25% as Professors. All those instructors stated they instructed a course related to public health in the last academic year, Summer 2022, Fall 2022, and Spring 2023. Respondents stated they taught in the following courses:

- Epidemiology
- EPI 539: Epidemiologic concepts and analysis
- EPI 550: Epidemiologic methods III
- Epi 764: Healthcare Associated Infections
- EPI 710: Probability theory for epidemiology
- Epi 811: Emergency Preparedness - Protection
- Epi 812: Emergency Preparedness - Response
- Health Policy
- Health Systems
- HLTH 207: Fundamentals of epidemiology
- NASX 595: American Indian Public Health
- P8654 Malaria Program Planning
- P9620 Applications of Implementation Science
- PUBH 591: Social Epidemiology
- Pubh 5130- foundations of epidemiology and biostatistics
- Pubh 5120- health systems and the environment
- P6070 Integration of Public Health Science and Practice 1
- Pubh 5410- chronic disease epidemiology and prevention
- P6071 Integration of Public Health Science and Practice2

- Pubh 5310- public health communication and promotion
- P8661 Planning, Managing and Communicating for Evidence-Based Public Health
- Research and Evaluation
- TRMD 440 International Training in Biosciences Research
- TRMD 441 Health Disparities
- TRMD 442 Summer Research Experience

Respondents stated that the level of instruction provided on the following topics:

#	Field	None	Introductory	Novice	Proficient	Technical/Expert	Total
1	General infection prevention and control topics	12.50% 1	37.50% 3	25.00% 2	12.50% 1	12.50% 1	8
2	Healthcare associate infections	37.50% 3	37.50% 3	0.00% 0	12.50% 1	12.50% 1	8
3	Antibiotic resistance	25.00% 2	37.50% 3	12.50% 1	12.50% 1	12.50% 1	8

#	Field	None	Introductory	Novice	Proficient	Technical/Expert	Total
4	Judicious antibiotic use and antibiotic resistance	50.00% 4	12.50% 1	12.50% 1	12.50% 1	12.50% 1	8

Respondents stated the supervised/mentored students in the following areas:

Required or course credit	27.78%
Field Placement	16.67%
Voluntary/At student discretion	11.11%
Site identified by school	11.11%
Internship	11.11%
Site Identified by student	11.11%
Shadowing	5.56%
Did not participate in a mentorship program	5.56%

Respondents stated that they graduated from the following institutions:

- Columbia University Maiman School of Public Health
- Drexel University Dornsife School of Public Health
- Emory Rollins School of Public Health
- Harvard T.H. Chan School of Public Health
- Johns Hopkins Bloomberg School of Public Health
- Oregan Health & Science University/Portland State University School of Public Health
- University of North Carolina Gillings School of Global Public Health
- University of Pennsylvania Master of Public Health Program

Respondents stated that of these mentorship opportunities approximately 28% of them addressed IPC/HAI/AR over 90% of the time, but over 70% of the respondents stated that IPC/HAI/AR were addressed less than half of the time. Over 62% of respondents stated that their academic program provided sufficient occasions for mentorship opportunities.

When respondents were asked what would increase the likelihood of inclusion of information regarding IPC/HAI/AR in your lectures, respondents indicated that prepared slides (25%) would be the most helpful, followed by FAQ sheets (20.83%), Identified readings (16.67%), Instructor Prep Tutorials (16.67%), Scripted quizzes/Exam Questions (4.17%) and one respondent stated that they include all these learning methods. When asked what increase the likelihood of using real-world examples related to IPC/HAI/AR in your courses, over 33% of respondents indicated that prepared exercises and examples would be the most helpful, followed by FAQ sheets (19.05%), Identified readings (19.05%), Instructor prep tutorial (14.29%), Documented requests/interest by students (9.52%), and one respondent stated that they include all these learning methods.

Participants were asked a series of questions related to IPC/HAI/AR and if they strongly agreed or disagreed with the following statements:

#	Field	Strongly disagree	Somewhat disagree	Neutral/No Opinion	Somewhat agree	Strongly agree
1	Knowledge of infection prevention and control is an important topic to relay to students.	0.00% 0	0.00% 0	0.00% 0	12.50% 1	87.50%
2	Antibiotic resistance is a critical public	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00%

#	Field	Strongly disagree	Somewhat disagree	Neutral/No Opinion	Somewhat agree	Strongly agree
	health issue in current times.					
3	Challenges related to healthcare associated infections are best addressed by healthcare facilities.	0.00% 0	50.00% 4	12.50% 1	25.00% 2	12.50%
4	A public health approach is the foundation to successful infection prevention and control.	0.00% 0	0.00% 0	0.00% 0	12.50% 1	87.50%

Employment:
The second section of the survey asked questions related to the undergraduate's employment. Over 45% stated they described their primary area of practice in Infectious Disease/Communicable Diseases, 18.18% selected epidemiology and biostatistics, 9.09% Environmental/Occupational Health, 9.09% Health Behavior/Promotion/Education, 9.09% Public Health and Law, 9.09% selected other. Over 45% stated they had a Ph.D., 27.27% had a master's degree, 18.18% had an MD degree, and 9.09% had a DrPH degree. Over 90% of respondents stated they considered themselves public health practitioners and 63% stated they considered themselves infection preventionist. Almost 82% of respondents were not members of the Association of Professionals in Infection Control and Epidemiology. Almost 92% stated they did not have a certification in Infection Control Credentials (CIC) issued by the Certification Board of Infection Control and Epidemiology.

Continuing Education/Future Trends:
The third section of the survey captured continuing education and professional development current practices, trends, and opportunities. Most respondents stated they receive most of their continuing education and professional development opportunities from free webinars (15.63%) or free sessions offered by professional organization (15.63%), followed by free self-paced online learning (12.5%), paid sessions paid by professional organizations (12.5%), employer opportunities (9.38%), web-based courses (9.38%), current academic programs (6.25%) other (6.25%), and paid self-paced online learning. Six percent stated that this is not a topic they seek for CE or that interests them. Every respondent indicated they had an interest in IPC/HAI/AR continuing education and professional development. Over 36% of the respondents stated they were extremely interested in topics 9% were very interested, 27% were moderately interested, and 27% stated they were slightly interested. However, more than half (54.55%) indicated they were not interested at all in a post-graduate course, certificate, or micro-certificate course. Twenty-five percent of the respondents stated they are interested in online approaches to supplement their education, followed by conferences (18.75%), in-person training (15.63%), one-time offerings (12.5%), micro-course, 9.38%), micro-certificate (9.38%), graduate certificate (6.25%), and re-occurring group sessions (3.13%).

Demographics:
The last section of the survey assessed the respondent's demographics. Over 54% of the respondents identified as female, 36% as male, and 9% as non-binary or a third gender. The distribution of responses by ethnicity indicated that approximately 63% of the respondents stated they were white, 9% Black or African American, 9% American Indian or Alaska Native, 9% and Asian. The distribution of responses by age range indicated 30% of the respondents were in the 55-64-year range, 20% in the 45-54-year range, 30% in the 35-44-year range, and 20% in the 25-34-year range. Respondents reported being from many states. The states include:

- California
- Georgia
- Hawaii
- Montana

- Nebraska
- New York
- North Carolina
- Pennsylvania
- Washington

Trends in the Infection Prevention Workforce

The Association for Professionals in Infection Prevention and Epidemiology (APIC) has prioritized the retention and development of IPs during an era of increasing demand, new regulatory requirements, significant staff turn-over, and pandemic and other public health emergencies.[39] In 2019, APIC administered the Recruitment and Hiring Practices Survey to members of APIC to assess recruitment, hiring, retention, and development strategies. Over half (52%) of respondents from this survey estimated that one-two IPs would retire from their organization in the next five years and an additional 7% estimating three or more IP retirements.

Table 3 identifies strategies to retain and professionally develop IPs in an organization from APIC's Recruitment and Hiring Practices Survey.[39] It's important to note that 79% of respondents identified continuing education support as an incentive for IP retention.

Table 6: Recruitment and Hiring Practices Survey: Strategies to Retain and Professionally Develop IPs[39]

Strategies to retain and professionally develop IPs in organization

Retention strategies (n = 445)	Total N (%)
Continuing education support	353 (79.3)
Certification support	322 (72.4)
Professional conference support	308 (69.2)
Flexible schedules	288 (64.7)
Tuition reimbursement for employee	258 (58.0)
Systems to support healthy work environments (eg, teamwork, open communication, accountability, minimize burnout)	251 (56.4)
Competitive salaries, bonuses, other benefits	229 (51.5)
Mentor for new IPs	194 (37.2)
Reward and recognition program	149 (33.5)
Systems to assess and balance workload	112 (25.2)
Career advancement ladder based on advanced knowledge/skill attainment	107 (24.0)
360 performance appraisal programs	82 (18.4)
Transportation and commute support (eg, bus passes, free parking, shuttles)	40 (9.0)
Tuition reimbursement for family members	18 (4.0)
Concierge services (eg, shopping, dry cleaning, day care)	8 (1.8)

There is a paradigm shift underway regarding classification of IP as solely a nursing role. Concurrently, there is clear evidence of the value of inclusion of MPH holders as IPs. Leaders within the field of IPC have begun to realize the value of including individuals with diverse

backgrounds, such as training in laboratory sciences, public health, microbiologists, and foreign medical graduates to the traditional IPC team of registered nurses.[40-42]
In an assessment of novice-level IP competencies, respondents with a master's degree or above were found to have consistently higher scores than other respondents, even those that had obtained Certification in Infection Control (CIC) through the Certification Board of infection Control.[40] While the IP workforce has historically been composed of individuals with a nursing background, nurses scored significantly lower than other respondents in this same survey regarding novice-level IP competency attainment.[40]

A review of the APIC MegaSurvey, determined that 72% of IPs with a public health background held a graduate-level degree, compared to 28% of nurses functioning as IPs.[41] However, IPs with a public health background were more likely to enter the with less than 15 years experience when compared to nurses, 83% and 48%, respectively.[41] These statistics underline the importance of a strong IPC academic program for MPH students who will enter the IP workforce.[42] Without the benefit of clinical healthcare experience, PH IPs require a solid knowledge base that aligns with the competencies required to effectively and efficiently function as an IP.

Existing data demonstrates that individuals with a background in public health are successful within the field of public health. APIC's MegaSurvey found that 54% of PH IPs obtained CIC certification, while 41% of nurses earned certification.[41] PH IPs and IPs with laboratory backgrounds are more likely to complete job tasks related to interpretation of surveillance data, outbreak investigations, and research.

Table 7: Endorsements of IPs with Public Health Backgrounds

"An IPC department with a diverse makeup of IPS may increase novel ideas and improve patient outcomes by helping to have a more robust and effective IPC program."[40]

"In a perfect world, an infection prevention department would consist of multiple individuals with diverse educational backgrounds."[41]

"The skill sets that MPH graduates bring to the table are an asset to any infection prevention program and complement the strong nursing and education teams that are typically present in hospitals."[42]

"MPH graduates are particularly strong in the future-oriented domains of the APIC competency model: leadership and program management, IPC technology, and performance improvement/ implementation science." [42]

In March 2021, APIC began the IP Academy Pathway (IPAP) as an effort to link undergraduate and graduate programs in the field of IPC.[43] This initiative will develop core concepts needed to an IP to work successfully in the field which can be integrated into a higher institution's academic programs through undergraduate, graduate, and continuing education programs. These guidelines will not be specific to Colleges of Public Health and have the potential for implementation in other academic settings, such as College of Nursing. To date, the IPAP does

not have recommendations that are available for external viewing [personal communication, Devin Jopp]. Once the IPAP content guide is available, existing and newly emerging IPC academic programs should assess their program structure to determine the extent of alignment and plan for amendments. However, the immediate need for IPs entering the workforce is significant and efforts to strengthen existing programs or add new programs should proceed in a timely fashion.

Recruitment of public health current students and graduates into the IPC workforce can be strengthened by purposeful, academic-healthcare facility partnerships. The APIC Badger Chapter (Wisconsin) provides an example of a sponsorship program to send MPH students to the Wisconsin IPC annual conferences. Of four students who attended the conference in 2021 and 2022, two graduated and entered IPC practice. These conferences provided an optimal opportunity for introduction to the profession, networking, and career planning.[99]

As individuals from the public health sector enter the IP workforce, there is a need to develop a solid knowledge base during the academic pathway combined with a structured on-boarding in an appropriate healthcare/IP setting. While the practice of infection prevention and control is not clinical in nature, an understanding of the clinical provision of care and the workflow faced by hands on providers is essential.[42]

Public Health Graduates and Workforce Trends

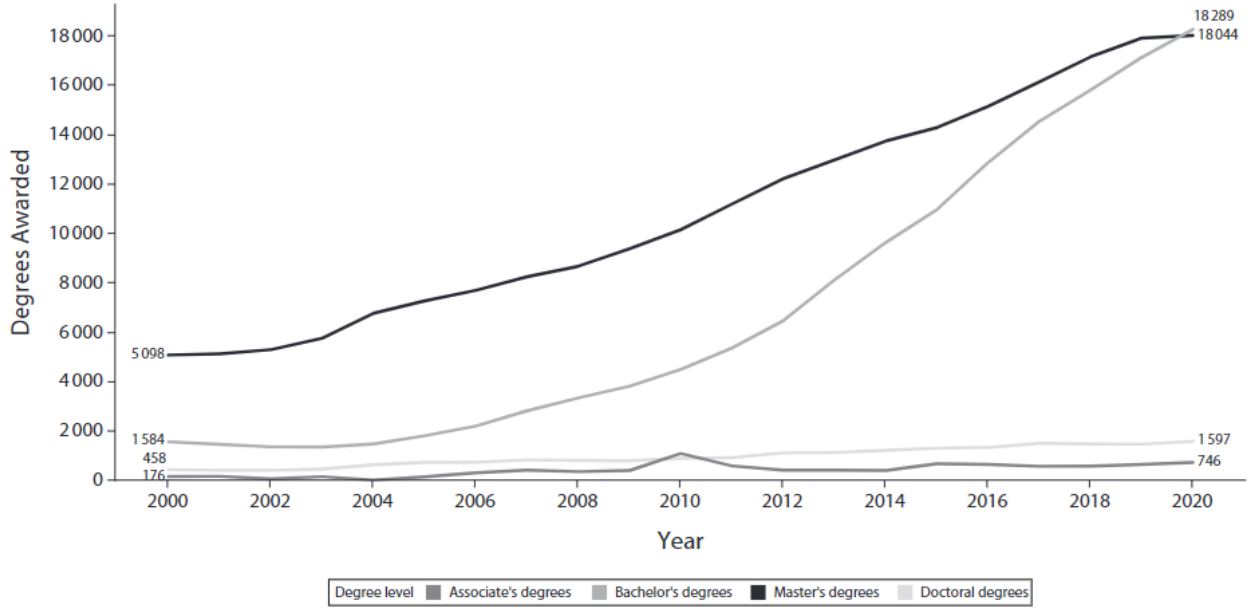
Results from the Public Health Workforce Interests and Needs Survey (PH WINS) were reviewed with findings relevant to this current effort summarized below.[31] PH WINS is a partnership between the de Beaumont Foundation and the Association of State and Territorial Health Officials (ASTHO) and is considered the "first and only nationally representative source of data about the governmental public health workforce."[31] In 2021, the web-based survey was distributed to 137,446 state and local governmental public health workers, representing 47 state health agencies, 29 big city health departments, and 259 local health departments. Thirty-one percent (31%) of respondents representing the PH governmental workforce held an MPH degree and fourteen percent (14%) had a degree specializing in public health. Issues related to longevity, historical knowledge within the workplace, and levels of experience were highlighted by data showing that half of the national public health workforce in 2021 had served at their agency for 5 years or less. PH WINS also revealed that more than a quarter of these workers are considering leaving their organization within the next year.

In a collaborative effort with the University of Minnesota School of Public Health and Johns Hopkins Bloomberg School of Public Health, the Association of Schools and Programs of Public Health (ASPPH) addressed trends in undergraduate public health degrees.[32] Based on 2020 data, more than 18,000 undergraduate public health degrees are conferred each year, with 28% of alumna working in healthcare and 10% working for government agencies. Additional data indicates that most public health graduates (both at the undergraduate and graduate levels) do not enter the governmental public health workforce.[33-36]

Leider, Burke, Nguyen et al. appear to present the most current and comprehensive analysis of trends in attainment of undergraduate public health degrees (UGPHDs.)[36] Their recent report reviewed data from the Integrated Postsecondary Education Data System (IPEDS), the College Scorecard from the National Center for Education Statistics (NCES), and the first-destination

outcomes from the Association of Schools and Programs of Public Health. This analysis emphasizes that, as of 2020, UGPHDs outnumber public health master's degrees. This growth was augmented by the increase in the number of institutions offering UGPHDs, as well as policy changes that allowed accreditation for UGPHD programs that were not associated with a CEPH-accredited graduate school of public health. Several questions are posed related to the impact of these UGPHD alumna and the existing workforce shortage for public health governmental positions. Low percentages of UGPHD graduates are entering the workforce as government employees, while larger percentages obtain employment in for-profit organizations and hospital/health systems, as shown in Figure 8.[36] While these trends raise concerns for staffing of the governmental public health workforce, they suggest there is an interest among UGPHD graduates for employment in the hospital and health-care settings, creating a potential to recruit for the infection preventionist workforce.

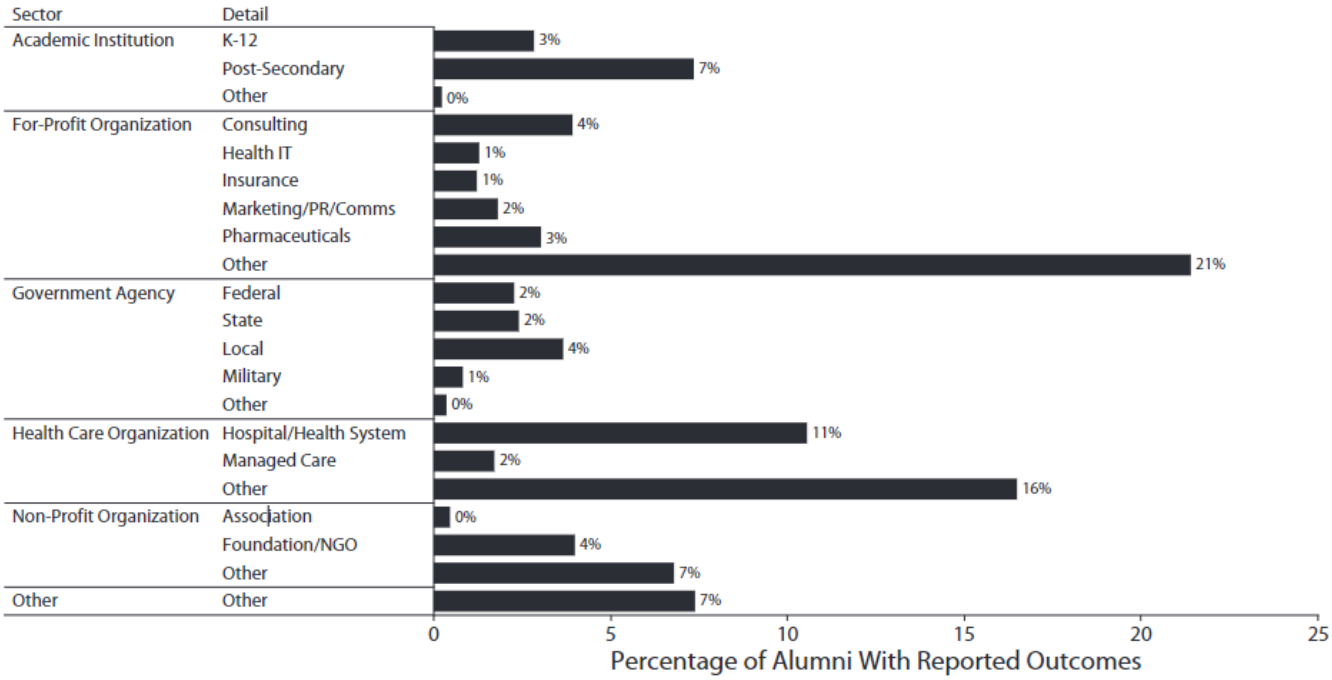
Figure 8: Trends in Public Health Degree Conferment [33]



Employment trends for alumni of public health graduate programs are similar, with 41% of these graduates entering the for-profit or healthcare sectors of the workforce.[36] The percentages of individuals entering governmental public health jobs with a graduate level public health degree are increasing slightly each year, leading Leider and colleagues to suggest that individuals with UGPHD and graduate level public health degrees are not competing for the same positions in the workforce. There is a need to avoid the "substitution effect" where UGPHD holders are preferentially hired at lower wages for the same jobs that graduate degree-holders typically filled or were recruited for.[36] Establishing task and skill differentiation for different levels of academic achievement can protect against development of the "substitution effect". While this approach is presented related to the public health workforce, a similar approach would benefit the infection preventionist workforce.

Leider, Yeager, Kirkland, et al (2023) describe the 23% increase in applications for graduate public health degree programs between fall 2019 to 2020 believed to be associated with the pandemic, but caution that is likely that application levels will return to pre pandemic levels.[100]

Figure 9: First-destination Employment Outcomes by Sector among Undergraduate Public Health Degree Alumni, Graduating Years 2015-2020: United States[36]



Significant changes to the public health workforce are occurring in the wake of systemic and individual worker-experiences during the COVID-19 pandemic.[33] Large increases in voluntary separations from public health agencies have led to the use of nomenclature such as “the Great Resignation.”[33] This exodus from governmental public agencies may present an opportunity to recruit public health personnel into infection prevention and control positions.

Conclusion

The IPC workforce is facing unprecedented challenges and growth, while concurrently losing members due to retirement and other factors. Patient safety, infection prevention and control programs, and employees benefit from a properly staffed IPC team. Individuals with public health academic and professional training can contribute significantly to the IPC workforce. Existing graduate public health infection control programs vary greatly and there is no national standard or guideline for required content or practicum time.

Public health and IPC competency have commonalities in several domains and some existing course content includes IPC concepts. Additional IPC content can be reasonably incorporated into existing course competencies, learning outcomes and objectives, and topics. Provision of

support materials, such as those demonstrated in the toolkits and instructor primers, may provide incentives for public health instructors to implement IPC examples.
A component of future IP training must include practicum, or internship time, along with introduction to the clinical setting. This internship time can concurrently meet the requirement for the MPH applied practice experience (APE) and efforts should be made to avoid duplication of internship time to meet various requirements.

There is a need for consensus among various stakeholders regarding the standardization of academic public health-infection control programs and training of public health practitioners to practice infection prevention. Provision of clear steps forward, with endorsement from a wide variety of professional and academic partners, is a critical step in supporting the growth of the IPC workforce.

Appendix A: ASPPH Academic Program Finder Results for Existing Programs
Search terms: "disease prevention" and "infection prevention and control"

School	Program
Boston University School of Public Health	MPH – Chronic and Non-Communicable Diseases [excluded]
	MPH – Infectious Disease
Cornell University MPH Program	MPH – GPHS/MPH 4+1 Accelerated Infectious Disease Epidemiology [excluded]
	MPH – Public Health Accelerated MD – Infectious Disease Epidemiology [excluded]
	Non-degree – Public Health – Infectious Disease Epidemiology
East Tennessee State University College of Public Health	BS – Health Sciences (?) [unable to locate/confirm]
Florida International University Robert Stempel College of Public Health and Social Work	MPH – Infectious Disease Epidemiology
George Washington University Milken Institute School of Public Health	MS – Public Health Microbiology and Emerging Infectious Diseases
Harvard T.H. Chan School of Public Health	Summer (non-degree) – Global Infectious Diseases Program
Indiana University Richard M. Fairbanks School of Public Health	Grad Certificate – Infection Control and Prevention Epidemiology
Johns Hopkins Bloomberg School of Public Health	MHS – Molecular Microbiology and Immunology [excluded]
	PhD – Molecular Microbiology and Immunology [excluded]
	ScM – Molecular Microbiology and Immunology [excluded]
North Dakota State University Department of Health	MPH – Epidemiology – Management of Infectious Diseases
University of California Berkeley School of Public Health	MPH – Infectious Diseases and Vaccinology
University of California, Irvine Program of Public Health	PhD – Disease Prevention
University of Miami Department of Public Health Sciences	MPH – Prevention Science and Community Health [excluded]
University of Nevada	Grad Cert – Infection Prevention

Las Vegas School of Public Health	
University of Pittsburgh School of Public Health	Acc MPH – Infectious Diseases and Microbiology: Management, Intervention, and Community Practice
	Acc MPH – Infectious Diseases and Microbiology: Pathogenesis, Eradication, and Laboratory Practice
	Acc MS – Infectious Diseases and Microbiology
	MPH – Infectious Diseases and Microbiology
	MS – Infectious Diseases and Microbiology
	PhD – Infectious Diseases and Microbiology
University of South Florida College of Public Health	Grad Certificate – Infection Control
	MPH – Infection Control
University of Texas Health Sciences Center at Houston School of Public Health	PhD – Environmental Sciences – Environmental Disease Prevention Track [excluded]
Virginia Tech Public Health Program	MPH – Master of Public Health [unable to locate/confirm]

Appendix B: Schools of Public Health and Collected Syllabi

School	Core Public Health Classes	Syllabi Received	Comments
Florida International University	PHC6410 Health Behavior and Public Health	XX	
	PHC6052 Biostatistics I	XX	
George Mason University	GCH611 Health Program Planning and Evaluation	XX	
	GCH712 Introduction to Epidemiology	XX	
Georgia Southern University	PUBH 6534 Health System, Policy, and Leadership in Public Health	XX	
	PUBH6530 Quantitative Applications for Evidence-Based Public Health	XX	
	PUBH6531 Community Assessment Application in Public Health	XX	
	PUBH6532 Environment, Population, and Health	XX	
	PUBH6510 Introduction to Public Health	XX	
Georgia State University	PHPH7017 Fundamentals of Biostatistics 1	XX	
	PHPH7011 Epidemiology for Public Health	XX	
	PHPB7140 Health Promotion, Planning, Administration, and Evaluation	XX	
	PHPH7010 Foundations of Public Health	XX	
	PHPB7160 Fundamentals of Health Systems, Leadership, and Policy	XX	
Indiana University School of Public Health	SPHX660 Population Health Determinants	XX	
	SPHX610 MPH Professional Development Seminar 1	XX	
	SPHX685 Public Health Policy and Politics	XX	

	SPHX611 Professional Development Seminar: Leadership	XX	
	SPHX650 Evidence-based Approaches to Public Health	XX	
Johns Hopkins University		XX	Excluded from analysis as core MPH courses differ by concentration. Atypical alignment.
Kent State University	BST 52019 Biostatistics in Public Health	XX	
	EPI 52017 Fundamentals of Public Health Epidemiology	XX	
	HPM 52016 Public Health Administration	XX	
	HPM 53010 Community Health Needs Assessment	XX	
	SBS 54634 Social Determinants of Health	XX	
New York University	GPH-GU-2106/5106 Epidemiology	XX	In-person and on-line classes have different course numbers.
	GPH-GU-2110/5100 Health Care Policy	XX	
	GPH-GU-2112/5112 Public Health Management	XX	
	GPH-GU-2140/5140 Global Issues in Social and Behavioral Health	XX	
	GPH-GU-2153/5153 Global Environmental Health	XX	
	GPH-GU-2190/5190 Essentials of Public Health Biology	XX	
	GPH-GU-2995/5995 Biostatistics for Public Health	XX	
	GPH-GU-5171 Global Health Informatics Workshop	XX	
	GPH-GU-5175 Readings in the History and Philosophy of Public Health	XX	
	GPH-GU-5180 Readings in the History and Philosophy of Public Health	XX	

	GPH-GU-5185 Readings in the History and Philosophy of Public Health	XX	
North Dakota State University	PH789 – Integrative Learning Experience	XX	
Northeastern University	PHTH5202 – Introduction to Epidemiology	XX	
	PHTH5210 – Biostatistics in Public Health	XX	
	PHTH5212 – Public Health Administration and Policy	XX	
	PHTH5214 – Environmental Health	XX	
	PHTH5540 – Health Education and Program Planning	XX	Can be substituted with PPUA6509 Techniques of Program Evaluation
	PHTH6204 – Society, Behavior, and Health	XX	
Ohio State University	PUBHTLH6001 – Methods in Quantitative Data Analysis	XX	
	PUBHTLH6002 – History, Values, and Essential Services of the US Public Health System	XX	
	PUBHTLH6003 – Methods in Public Health Planning and Evaluation	XX	
	PUBHTLH6004 – Essentials of Population Health	XX	
Oregon State University	H513 – Integrated Approach to Public Health	XX	Core consists of one 12 credit hour course. Also offered on-line as part 1 and 2
Rutgers University	PHCO0501 – Health Systems and Policy	XX	
	PHCO0502 – Principles and Methods of Epidemiology	XX	
	PHCO0503 – Introduction to Environmental Health	XX	
	PHCO0504 – Introduction to Biostatistics	XX	
	PHCO0505 – Social and Behavioral Health Sciences	XX	

	PHCO0513 – Leadership and Management Essentials	XX	
San Diego State University	PH601 Epidemiology	XX	
	PH602 Biostatistics	XX	
	PH603 Behavioral and Social Science in Public Health	XX	
	PH604 Environmental Determinants of Human Health	XX	
	PH605 Health Services Administration	XX	
St. Catherine University	HLTH6000 Critical Issues in Global Public Health	XX	
	HLTH6010 Principles of Epidemiology and Biostatistics I	XX	
	HLTH6020 Principles of Epidemiology and Biostatics II	XX	
	HLTH6040 Global Health Policy and Governance		
	HLTH6110 International Perspectives in Environmental Health Sciences	XX	
	HLTH7100 200-hour practicum	XX	
	HLTH7200 Capstone	XX	
Temple University	SBS5002 Program Planning, Theory, and Practice	XX	
	SBS5001 Fundamentals of Public Health	XX	
Texas Tech University	GSPH5307 Introduction to Epidemiology	XX	
	GSPH5313 Introduction to Public Health	XX	
	GSPH 5315 Organizational Leadership and Management	XX	
	SPPH5310 Public Health Policy	XX	
	GSPH5311 Introduction to Biostatistics	XX	
	Community Based Methods and Practice	XX	
Tulane University	SPHL6060 Epidemiology for Public Health	XX	
	SPHL6050 Biostatistics for Public Health	XX	

	SPHL6020 Foundations in Public Health	XX	
	SPHL6080 Design Strategies for Public Health Programs	XX	
University of Alabama at Birmingham	PUH604 Programs and Policies	XX	
	PUH605 Public Health Management and Evaluation	XX	
	PUH606 Public Health Leadership	XX	
	PUH603 Quantitative Methods in Public Health	XX	
	PUH602 Community Assessment	XX	
University of Albany	PUH600 Overview of Public Health	XX	
	HPM525 Social and Behavioral Aspects of Public Health	XX	
	HBMS Biological Basis of Public Health	XX	
	EPI501 Principles and Methods of Epidemiology 1	XX	
	HPM500 Health Care Organizations, Delivery and Financing	XX	
	HSPH Professional Practice in Public Health	XX	
	EPI551 Basic Principles of Statistical Inference	XX	
University of California, Berkeley	PHW200E Health Policy and Management	XX	
University of California, Davis	EPI205 Principles of Epidemiology	XX	
	SPH210 Introduction to Public Health Informatics	XX	
	SPH273 Health Administration	XX	
	SPH290 Topics in Public Health Seminar	XX	
	SPH244 Introduction to Medical Statistics	XX	
	SPH281 Introduction to SAS	XX	
	SPH283 Program Planning and Evaluation for Public Health	XX	
	SPH245 Biostatistics for Biomedical Sciences	XX	

	SPH262 Principles of Environmental Health Sciences	XX	
	SPH222 Social and Behavioral Aspects of Public Health	XX	
	SPH297 Practicum in Public Health	XX	
University of Cincinnati	PH7010 Introduction to Biostatistics	XX	
University of Delaware	BHAN820 Social and Environmental Determinants of Health	XX	
	EPID605 Epidemiology Methods I	XX	
	SPPA 606 Environment and Public Health	XX	
	EPID603 Biostatistics for Health Sciences I	XX	
University of Florida	PHC6050 Statistical Methods for Health Science I	XX	
	PHC6052 Introduction to Biostatistical Methods	XX	
	PHC6001 Principles of Epidemiology in Public Health	XX	
	I6114 Introduction to US Health Care System	XX	
	PHC6313 Environmental Health Concepts in Public Health	XX	
	PHC6410 Psychological, Behavioral, and Social Issues in Public Health	XX	
University of Georgia	BIOS7010 Introduction to Biostatistics I	XX	
	EHSC7010 Fundamentals of Environmental Health	XX	
	EPID7010 Introduction to Epidemiology I	XX	
	HPAM7010 Introduction to Health Policy and Management	XX	
	HPRB7010 Social and Behavioral Foundations of Public Health	XX	
University of Illinois Chicago	IPHS402 Analytic and Research Methods in Public Health	XX	

	IPHS403 Public Health Systems, Community Health Methods, and Management	XX	
	IPHS404 Analytic and Research Methods in Public Health I	XX	
	IPHS Analytic and Research Methods in Public Health Part 2	XX	
	IPHS401 Determinants of Health	XX	
University of Illinois Urbana-Champaign	CHLH410 Public Health Practice	XX	
	CHLH550 Health Policy	XX	
	CHLH572 Principles of Epidemiology	XX	
	CHLH573 Biostatistics in Public Health	XX	
	CHLH469 Environmental Health	XX	
University of Maryland	SPHL 601 – Core Concepts in Public Health	XX	
	SPHL 620 – Leadership, Teams, and Coalitions: Policy to Advocacy	XX	
	SPHL 602/603 – Foundations of Epidemiology and Biostatistics	XX	
	SPHL 611 – Public Health Ethics	XX	
	SPHL 610 – Program and Policy Planning, Implementation, and Evaluation	XX	
	SPHL 603 – Public Health Data Laboratory	XX	
University of Memphis	PUBH7160 Social and Behavioral Sciences Principles	XX	
University of Michigan	BIOS531 – Applied Statistics	XX	
	PUBHLTH512 – Principles of Epidemiology for Public Health	XX	
University of Minnesota	PUBH6020 Fundamentals of Social and Behavioral Science	XX	
	PUBH6102 Issues in Environmental and Occupational Health	XX	
	PUBH6341 Epidemiologic Methods I	XX	
	PUBH6450 Biostatistics I	XX	

	PUBH6741 Ethics in Public Health: Professional Practice and Policy	XX	
	PUBH 6751 Principles of Management in Health Services	XX	
University of Nebraska Medical Center	CPH504 Epidemiology in Public Health	XX	
	CPH539 Leadership and Advocacy	XX	
	CPH514 Planning and Evaluation	XX	
	BIOS806 Biostatistics I	XX	
	CPH500 Foundations of Public Health	XX	
University of Nevada, Las Vegas	EOH707 Practice of Public Health	XX	Competencies are called "Fundamental Public Health Knowledge (FPHK)"
	EOH710 Fundamentals of Public Health	XX	
	EOH740 Fundamentals of Environmental Health	XX	
	EAB705 Epidemiology and Public Health	XX	
	HCA701 US Healthcare System: Programs and Policies	XX	
	HED720 Program Planning and Grant Writing in Health Promotion	XX	
	EAB703 Biostatistical Methods for the Health Sciences	XX	
University of New Haven	PUBH6672 Global Health	XX	
	PPUBH6615 Principles of Epidemiology	XX	
University of New Mexico	PH560- Global Health	XX	
	PH506- Environmental and Occupational Health	XX	
	PH554- Health Policy, Politics, and Social Equity	XX	
	PH538- Biostatistical Methods	XX	
	PH501- Principles of Public Health	XX	
University of North Carolina at Chapel Hill	SPHG711 Data Analysis for Public Health	XX	
	SPHG721 Conceptualizing Public Health Solutions	XX	

	SPHG713 Understanding Public Health Issues	XX	
University of North Carolina at Charlotte	HLTH6213 Health Policy and Leadership	XX	
	HADM6100 Introduction to the US Health Care System	XX	
	HLTH6200 Case Studies in Public Health	XX	
	HLTH6212 Health Promotion Program Management	XX	
	HLTH6211 Evidence-Based Methods in Public Health	XX/.	
University of North Dakota	PH504 - Planning and Management to Promote Health	XX	
	PH510 – Public Health Care Systems	XX	
	PH520 – Environmental Health		
	PH531 – Biostatistics I	XX	
	PH541 – Public Health Communication	XX	
	PH545 – Public Health Leadership Interprofessional Practice		
	PH551 – Epidemiology I	XX	
	POL552 – Health Policy	XX	
University of North Texas Health Science Center at Fort Worth	HMAP5300 – Introduction to Health Management and Policy	XX	
	EPID5300 – Principles of Epidemiology	XX	
	EOHS5300 – Environmental Determinants of Health	XX	
	BIOS5300 – Principles of Biostatistics	XX	
	BACH5300 – Theoretical Foundations of Individual and Community Health	XX	
University of Pittsburgh	PUBHLT2105 – Public Health Biology	XX	
	BIOST2011 – Principles of Statistical Reasoning	XX	
	BIOST2041 – Introduction to Statistical Methods I	XX	

	EPIDEM2110 – Principles of Epidemiology	XX	
	BCHS2509 – Social and Behavioral Sciences in Public Health	XX	
	EOH2013 – Environmental Health and Disease	XX	
	HPM2001 – Health Policy and Management in Public Health	XX	
	PUBHLT2011 – Essentials of Public Health	XX	
	PUBHLT2033 – Foundations in Public Health	XX	
	PUBHLT2034 – Public Health Communications	XX	
	PUBHLT2035 – Applications in Public Health	XX	
University of South Florida	PHC6756 Population Assessment Part 1	XX	
	PHC6757 Population Assessment Part 2	XX	
	PHC6145 Translation to Public Health Practice	XX	
	PHC6588 History and Systems of Public Health	XX	
University of Texas	PHM2612 Epidemiology I	XX	
	PHM1690 Introduction to Biostatistics in Public Health	XX	
	PHM1110 Health Promotion and Behavioral Sciences in Public Health	XX	
	PHWM2110 Public Health Ecology and the Human Environment	XX	
	PHM3715 Management and Policy Concepts in Public Health	XX	
	PHM5015 Introduction to Qualitative Research in Public Health	XX	
University of Texas Medical Branch	SPPH6403 Analytical Methods in PH	XX	
	SPPH6324 Assessment, Planning, and Evaluation	XX	

	SPPH6401 Policy and Equity	XX	Also listed as SPPH6469
	SPPH6338 Applied Public Health Leadership	XX	
University of Toledo	PUBH6950 – Integrative Learning Experience	XX	Program is listed as "School of Population Health"
	PUBH6000 – Quantitative and Qualitative Data Analysis in Public Health	XX	
	PUBH6020 – Management and Leadership in Public Health	XX	
	PUBH6090 – Issues in Public Health	XX	
	PUBH6010 – Public and Occupational Health Programs	XX	
	PUBH6900 – Interprofessional Education for Public Health	XX	
	PUBH6080 – Social Determinants of Health	XX	
University of Washington	PHI511 Foundations of Public Health	XX	
	PHI512 Analytic Skills for Public Health I	XX	
	PHI513 Analytic Skills for Public Health II	XX	
	PHI514 Determinants of Health	XX	
	PHI515 Implementing Public Health Interventions	XX	
	PHI516 Public Health Practice	XX	
Virginia Commonwealth University	EPID Foundations of the Public Health Profession	XX	
	EPID 571 Principles of Epidemiology	XX	
	BIOS543 Graduate Research Methods	XX	
	EPID 580 Public Health Ethics	XX	
	EPID693 Public Health Internship	XX	
	SBHD605 Introduction to Social and Behavioral Health	XX	
	EPID604 Principles of Environmental Health	XX	
Wright University	MBA7500 Leadership and Ethics	XX	

	PPH7410 Community Assessment	XX	
	PPH7050 Health Systems and Policy	XX	
	PPH7010 Biostatistics for Health Professionals	XX	
	PPH7040 Social and Behavioral Determinants of Health	XX	
	PPH7020 Public Health Epidemiology	XX	

Appendix C: Exemption Letter from University of South Florida Institutional Review Board

UNIVERSITY of SOUTH FLORIDA

NOT HUMAN SUBJECTS RESEARCH DETERMINATION

June 12, 2023

Christine McGuire-Wolfe
13201 Bruce B. Downs
MDC 56
Tampa, FL 33612

Dear Dr. Christine McGuire-Wolfe:

On 6/9/2023, the IRB reviewed the following protocol:

IRB ID:	STUDY005878
Title:	Building Capacity of the Public Health Workforce: An Examination of Challenges and Opportunities Related to Enhancing Infection, Prevention, and Control Eudcation and Training for Students

The IRB determined that the proposed activity does not constitute research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval is not required. This determination applies only to the activities described in the IRB submission. If changes are made and there are questions about whether these activities constitute human subjects research, please submit a new application to the IRB for a determination.

While not requiring IRB approval and oversight, your project activities should be conducted in a manner that is consistent with the ethical principles of your profession. If this project is program evaluation or quality improvement, do not refer to the project as research and do not include the assigned IRB ID or IRB contact information in the consent document or any resulting publications or presentations.

Sincerely,

Bhupinder Sran
IRB Research Compliance Administrator

Institutional Review Boards / Research Integrity & Compliance
FWA No. 00001669
University of South Florida / 3702 Spectrum Blvd., Suite 165 / Tampa, FL 33612 / 813-974-5638

Appendix D: APIC's Mega Survey Report

APIC MegaSurvey 2020: N = 2,030

Q1_CHK Describe your primary role in Infection prevention and control (select only one): n =2030

# (%)	Code	Text	Open-End
1459 (71.9)	1	Front Line/Practicing IP	None
412 (20.3)	2	IP Administrator/Director	None
35 (1.7)	3	Educator or Researcher (Academic Role)	None
59 (2.9)	4	External Consultant (External) (i.e. Consulting is your primary role)	None
65 (3.2)	5	Public Health Practitioner (Federal/Legislative/Regulatory Agency)	None
0	6	Industry	None

What was your primary background/discipline prior to working in Infection Prevention/Epidemiology? n = 2030

# (%)	Code	Text	Open-End
1583 (78.0)	1	Nurse	None
96 (4.7)	2	Medical technician/Laboratory scientist	None
70 (3.5)	3	Microbiology	None
170 (8.4)	4	Public Health	None
7 (0.3)	5	Foreign medical grad	None
20 (1.0)	6	Patient Safety/Performance Improvement	None
84 (4.1)	7	Other, please specify:	

# (%)	Code	Text	Open-End
29 (44.6)	01	Acute care	None
13 (20.0)	02	Ambulatory surgical centers	None
19 (29.2)	03	Outpatient clinics	None
12 (18.5)	04	Dental practices	None
13 (20.0)	05	Dialysis	None

# (%)	Code	Text	Open-End
18 (27.7)	06	Long term care	None
19 (29.2)	07	Long term acute care	None
10 (15.4)	08	Home Health Care or Personal Care Homes	None
5 (7.7)	09	Home Infusion Care	None
34 (52.3)	10	Other, please describe:	

# (%)	Code	Text	Open-End
27 (1.4)	01	Educator	None
8 (0.4)	02	Employee Health	None
13 (0.7)	03	Epidemiologist	None
1517 (81.1)	04	Infection Prevention and Control	None
6 (0.3)	05	Infectious Disease Physician	None
3 (0.2)	06	Medical Technology	None
1 (0.1)	07	Microbiologist	None
3 (0.2)	08	Nurse Practitioner	None
95 (5.1)	09	Nursing Administrator/Executive	None
2 (0.1)	10	Public Health	None
77 (4.1)	11	Quality/Process Improvement	None
0 (0)	12	Research	None
16 (0.9)	13	Risk Management	None
4 (0.2)	14	Safety Officer	None
99 (5.3)	15	Other, please describe:	

Appendix E: APIC's Mega Survey Slides

DECEMBER 2022

2015 vs. 2020

APIC®

"Create a safer world through prevention of infection."

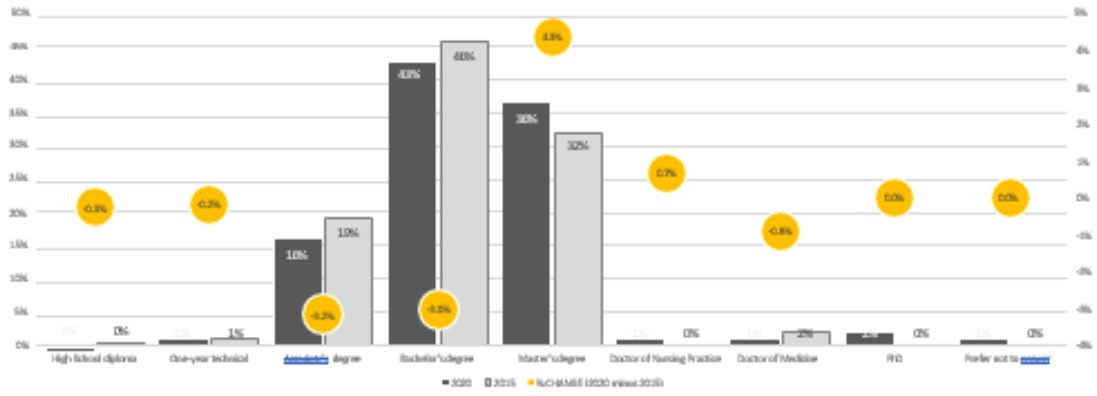
1

1

Q6 HIGHEST EDUCATION ATTAINED

Q6 What is your highest educational degree earned? (Select one)

- **From 2015 to 2020, IP staff holding a masters degree increased by 4% (from 32% to 36%) while both associate's and bachelor's degrees declined by 3% each:** Master's degrees increased the most among Director of Patient Safety, 18–25-year-olds, higher incomes, and emergency / urgent care / ambulatory services.

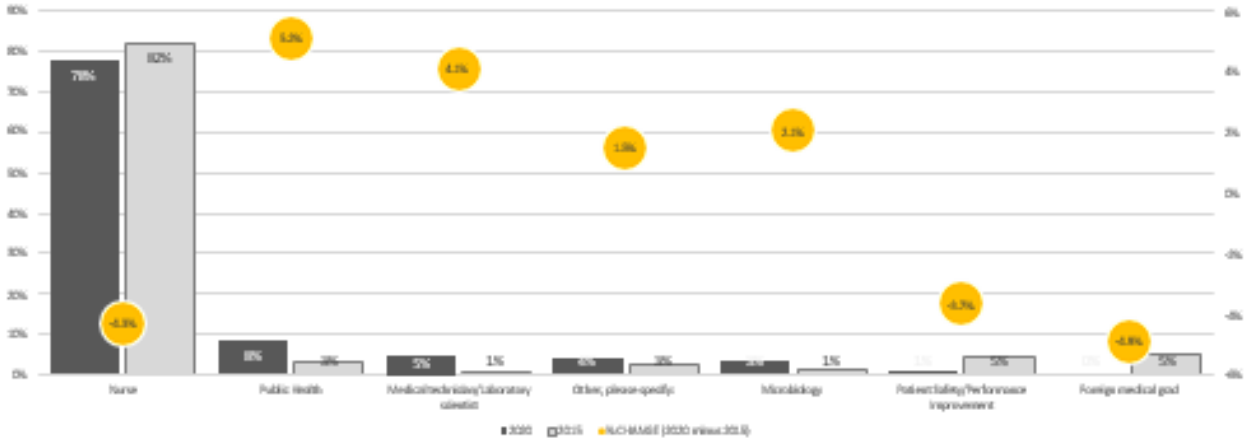


2

Q10 PRIMARY BACKGROUND PRIOR TO IP

Q10 What was your primary background/discipline prior to working in Infection Prevention/Epidemiology?

- **IPs primarily come from a nursing background**: While low overall, the share coming from public health has almost tripled since 2015 (from 3% to 8%) and they have largest stopped coming from Patient Safety/Performance Improvement or Foreign Medical Grads.
  - Those coming from public health tend to be younger, higher income, urban or have higher education.

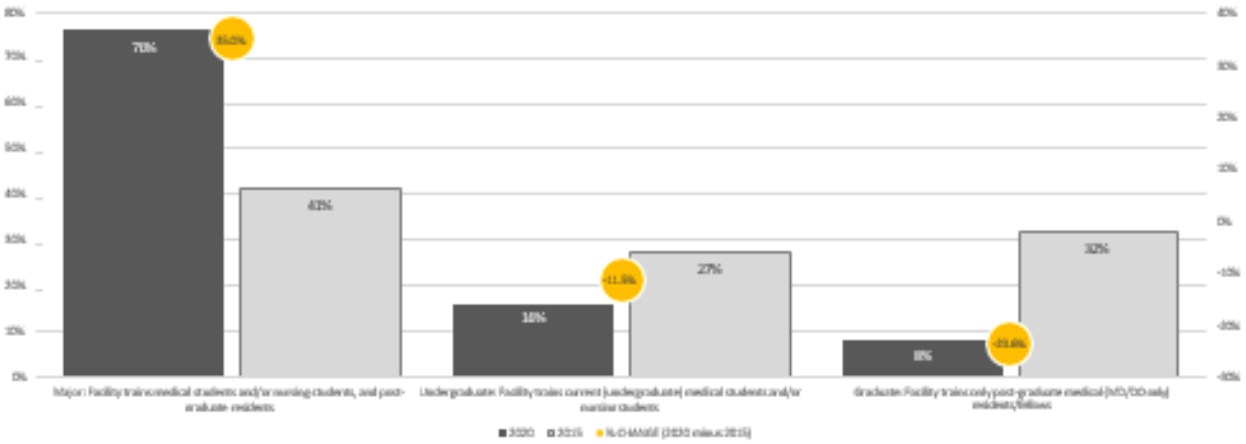


3

Q34 TYPE OF TEACHING HOSPITAL

Q34 If yes, what type:

- **The profile of teaching hospitals has undergone a dramatic shift since 2015**: Major facilities have increased to 76% (from 41% in 2015), while graduate-only facilities have shrunk to a quarter of what they were in 2015 (8% vs. 32%).

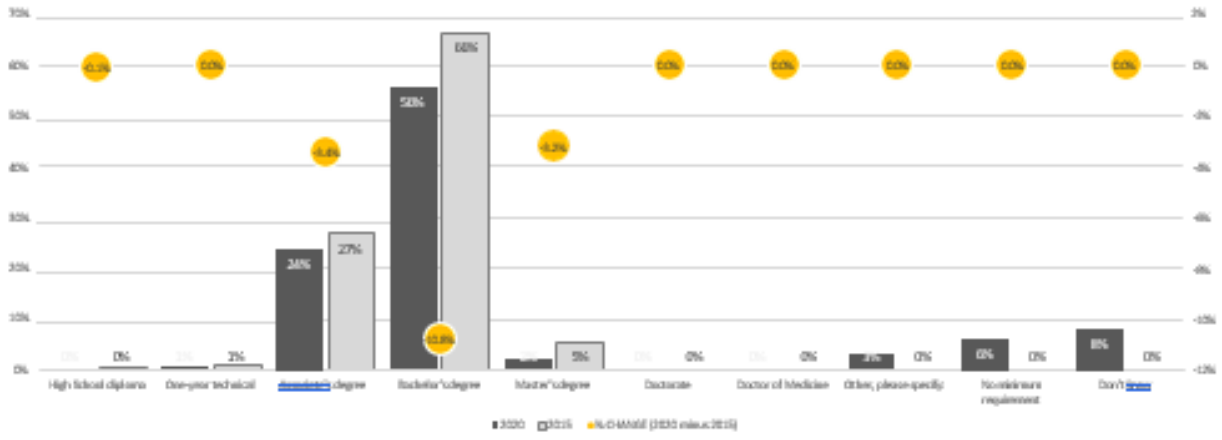


4

Q107 What education level is required for IPs in your facility or system?

Q107 EDUCATION REQUIRED FOR IPS

- **Most facilities require IPs to hold either a Bachelor's or Associate's degree**: The addition of *no minimum requirements* or *don't know* as options in 2020 give the potentially false indication that requirements may declining.

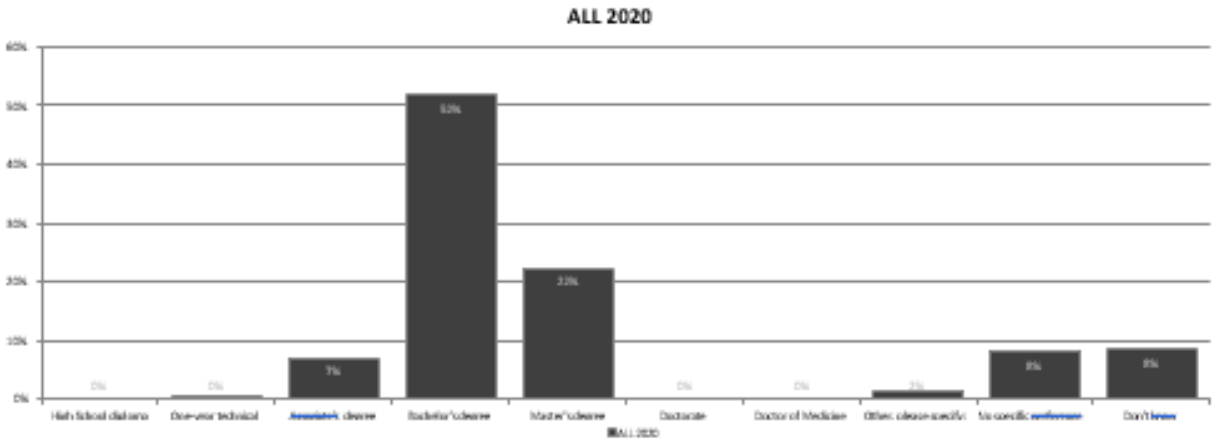


5

Q108 What education level is preferred for IPs in your facility or system?

Q108 EDUCATION PREFERRED FOR IPS

- **IPs that hold a Master's degree are significantly over-developed**: They represent 36% of respondents, while just 2% indicate it is required and 22% indicate it is preferred.

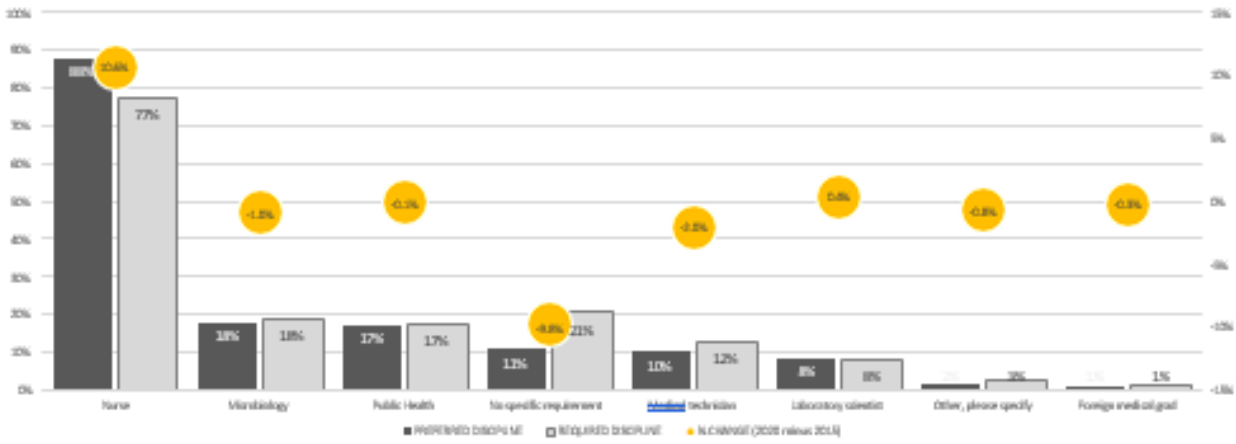


6

Q109: PRIMARY DISCIPLINE REQUIRED vs. PREFERRED FOR IPs

Q109 What primary discipline is preferred for IPs in your facility or system? (Select all that apply). VS. Q109 What primary discipline is preferred for IPs in your facility or system? (Select all that apply).

- **A nursing background is both the most required and only discipline even more likely to be preferred:** All other discipline are equally likely to be required or preferred.



7

Appendix F: IP Competencies and Domains Compared with MPH Knowledge and Training[42]

IP competencies and domains compared with MPH knowledge and training

2013 APIC competency self-assessment[22] IP competency categories, integrating both the APIC and CBIC domains	IP practice areas as identified in CBIC practice analysis	Addressed by MPH core knowledge area or foundational competency?			*Council on Education for Public Health 2016 accreditation requirements*[20] MPH foundational area
		Yes	Partially addressed	No	
Identification of infectious disease processes (CBIC)	1. Differentiate among colonization, infection, and contamination		X		Epidemiology core knowledge area
	2. Identify occurrences, reservoirs, incubation periods, periods of communicability, modes of transmission, signs and symptoms, and susceptibility associated with the disease process		X		Epidemiology core knowledge area
	3. Interpret results of diagnostic/lab reports			X	Not covered
	4. Recognize limitations and advantages of types of tests used to diagnose infectious processes		X		Biostatistics core knowledge area
	5. Recognize epidemiologically significant organisms for immediate review and investigation		X		Epidemiology core knowledge area
	6. Differentiate among prophylactic, empiric, and therapeutic uses of antimicrobials			X	Not covered
	7. Identify indications for microbiologic monitoring			X	Not covered
Surveillance and epidemiologic investigation (CBIC)	1. Design of surveillance systems	X			Epidemiology foundational competencies
	2. Collection and compilation of surveillance data		X		Biostatistics core knowledge area
	3. Outbreak investigation		X		Epidemiology core knowledge area
Future-oriented domain (APIC): technical	Example: electronic surveillance systems, access to/use of electronic databases/electronic data warehouse, other related applications, algorithmic detection and reporting processes, clinical decision support, infection prevention within the electronic health record	X			Biostatistics, health services administration foundational competencies
Preventing/controlling the transmission of infectious agents (CBIC)	1. Develop and review IPC policies and procedures	X			Foundational competencies
	2. Collaborate with public health agencies in planning community responses to biologic agents		X		Epidemiology core knowledge area and foundational public health knowledge
	3. Identify and implement IPC strategies according to specific topics:	X			Foundational public health knowledge
	• Hand hygiene		X		Social and behavioral sciences core knowledge area
	• Cleaning, disinfection, and sterilization		X		Environmental health sciences core knowledge area
	• Specific direct and indirect care settings			X	Not covered
	• Therapeutic and diagnostic procedures and devices			X	Not covered
	• Product/equipment recall procedures			X	Not covered
	• Use of solation/barrier precautions when indicated		X		Social and behavioral sciences core knowledge area
	• Patient placement, transfer, discharge		X		Health services administration core knowledge area
	• Environmental hazards	X			Environmental health sciences foundational public health knowledge
	• Use of patient care products and medical equipment			X	Not covered
	• Patient immunization programs		X		Epidemiology core knowledge area and foundational public health knowledge
	• Construction and renovation	X			Environmental health sciences foundational public health knowledge
	• Influx of patients with communicable diseases		X		Epidemiology core knowledge area

Appendix G: Recruitment E-mail

USF HEALTH COLLEGE OF PUBLIC HEALTH UNIVERSITY OF SOUTH FLORIDA

our practice is our passion.

In consultation with the National Network of Public Health Institutes (NNPHI), the COPH collaborates to assess, implement, and support infection control and prevention (IPC), healthcare-associated infections (HAI), and antibiotic resistance (AR) content in existing curriculum within graduate public health programs throughout the US and Puerto Rico. To be part of this project and help develop infection control policy, please complete **one** of the following surveys:

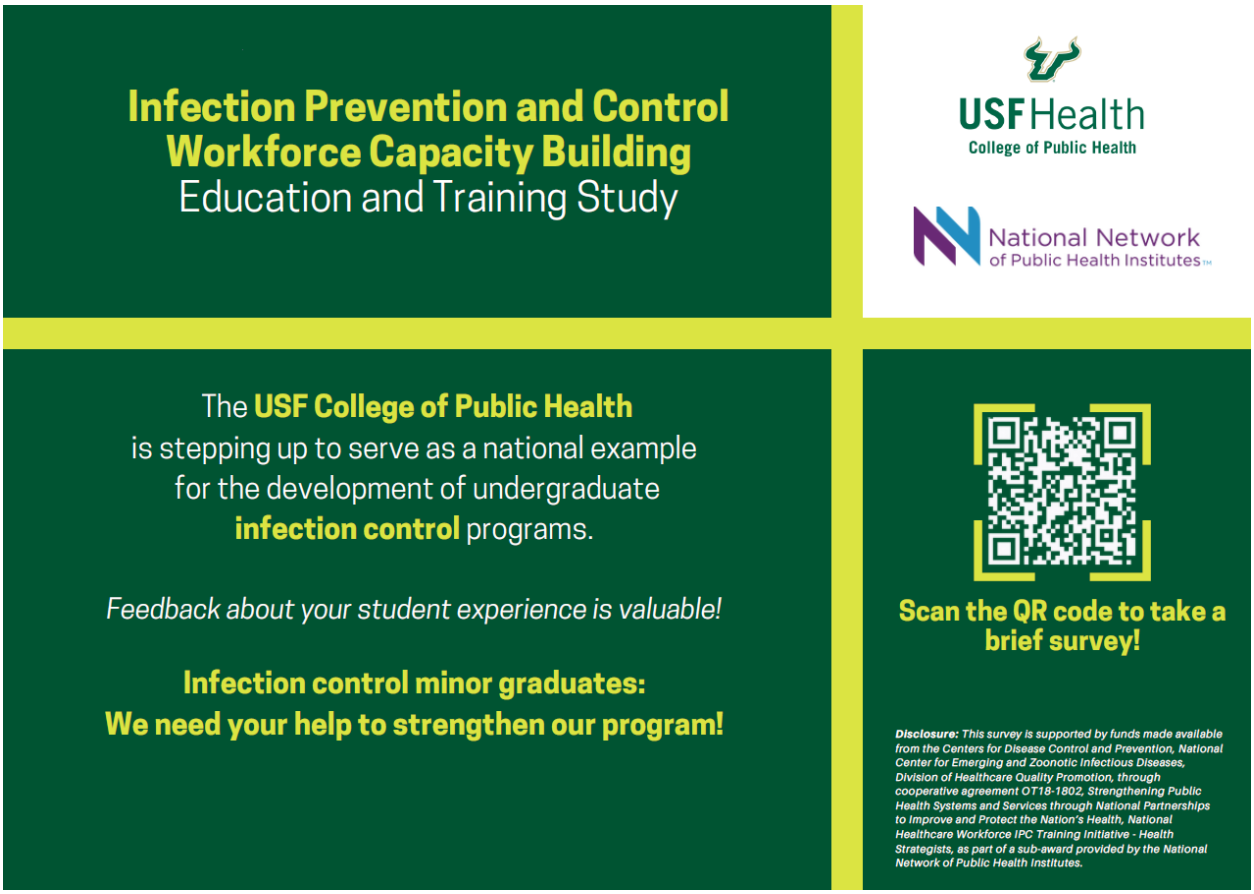
- **USF Only - Undergraduates Infection Control Minor**
- **MPH Graduates/Professionals Infection Control**
- **Public Health Instructors/Curriculum Designers**

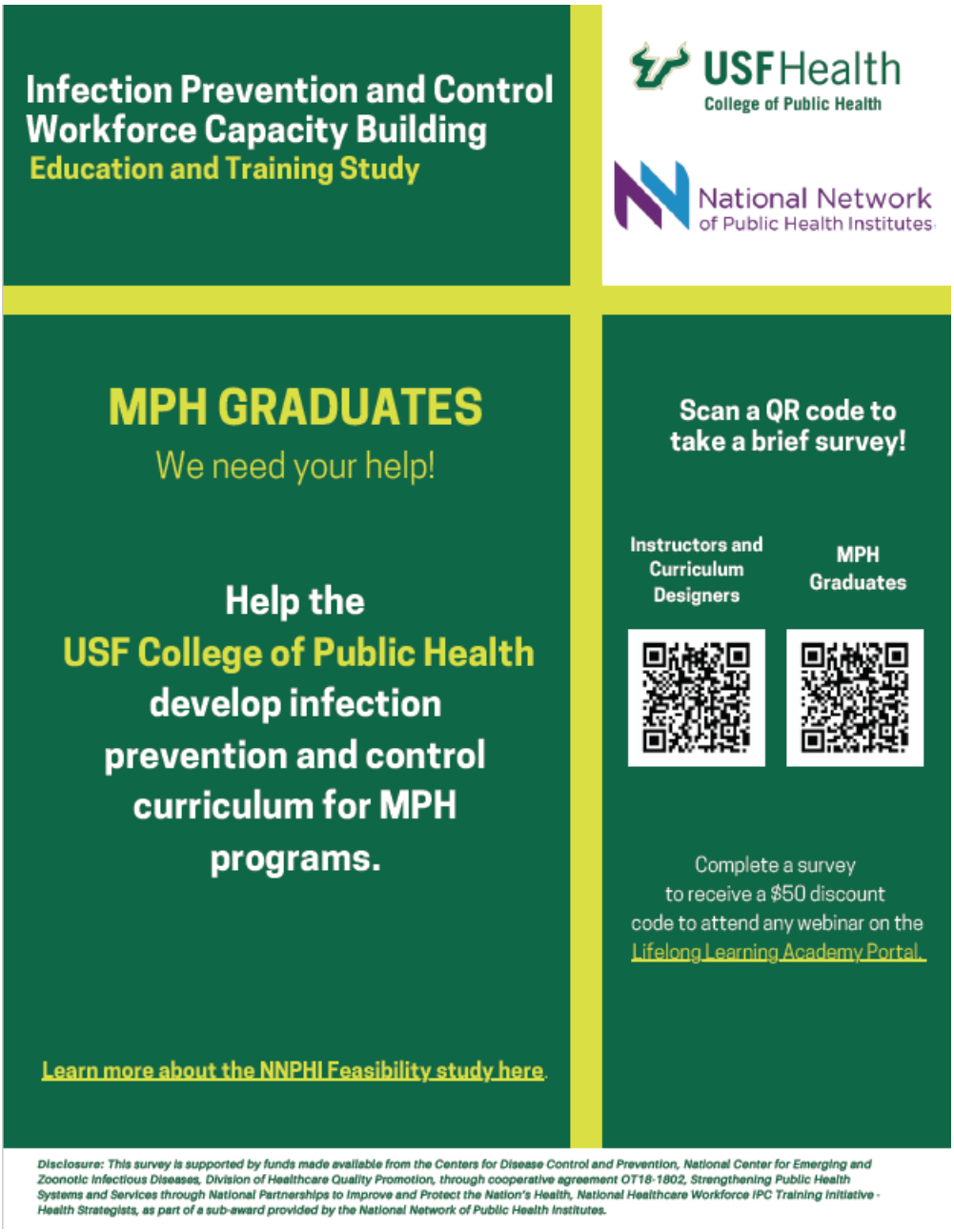
These surveys are anonymous, and you will not be identified individually in any of the information we get from this survey or in any materials we may publish. This information will be solely used to improve the current understanding of IPC/HAI/AR education and training.

Compensation: Upon completion of the survey, you will receive a discount code (worth up to $50) to attend any webinar on the USF College of Public Health Lifelong Learning Academy portal.

Disclosure: This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.

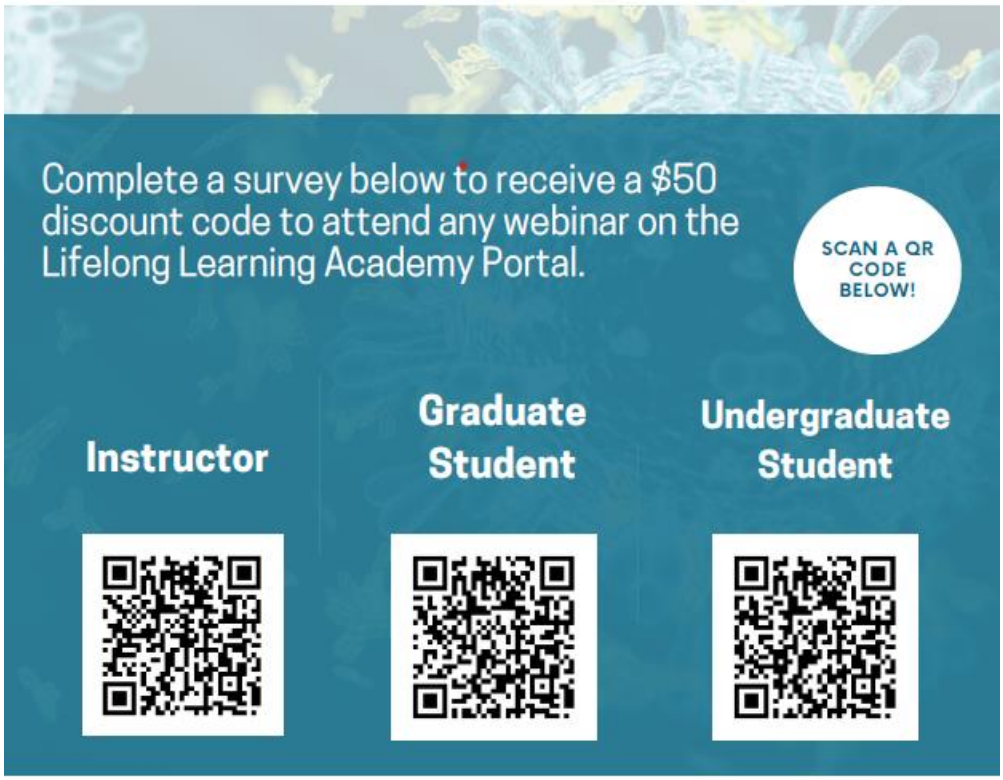
Appendix H: Recruitment Flyers




Infection Prevention and Control Workforce Capacity Building
Education and Training Study
USF Health
College of Public Health
National Network of Public Health Institutes
MPH GRADUATES
We need your help!
Help the USF College of Public Health develop infection prevention and control curriculum for MPH programs.
Learn more about the NNPHI Feasibility study here.
Scan a QR code to take a brief survey!
Instructors and Curriculum Designers
MPH Graduates
Complete a survey to receive a $50 discount code to attend any webinar on the Lifelong Learning Academy Portal.
Disclosure: This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.

Infection Prevention and Control Workforce Capacity Building

Education and Training Study



Disclosure: *This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.*

USF Health
College of Public Health
Lifelong Learning Academy

Appendix I: Recruitment Surveys (delivered via Qualtrics)

1. *Undergraduate Recruitment Survey*

Undergraduate Perceptions of Infection Prevention Control, Healthcare-Associated Infections, and Antibiotic Resistance

You are invited to participate in this quality improvement study being conducted by the University of South Florida College of Public Health. The purpose of this survey is to examine your perceptions of healthcare infection prevention control, healthcare-associated infections, and antibiotic resistance (IPC/HAI/AR) curriculum and training at the undergraduate level and your interests in expanding learning pathways at the graduate level and beyond. Your participation in this survey is entirely voluntary and you may withdraw at any time.

This survey is anonymous, and you will not be identified individually in any of the information we get from this survey or in any materials we may publish.
By completing this survey, you hereby give consent to participate in this survey. This information will be solely used to improve the current understanding of IPC/HAI/AR education and training.

Compensation: If you complete this survey, you will receive a discount code worth **$50** to attend any webinar on the USF College of Public Health Lifelong Learning Academy portal.

Disclosure: This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.

2. *Graduate Recruitment Survey*

Graduate Perceptions of Infection Control Prevention, Healthcare-Associated Infections, and Antibiotic Resistance

You are invited to participate in this quality improvement study being conducted by the University of South Florida College of Public Health. This study aims to examine your perceptions of healthcare infection prevention control, healthcare-associated infections, and antibiotic resistance (IPC/HAI/AR) curriculum and training at the undergraduate level and your interests in expanding learning pathways at the graduate level and beyond. Your participation in this survey is entirely voluntary and you may withdraw at any time. This survey is anonymous, and you will not be identified individually in any of the information we get from this survey or in any materials we may publish. By completing this survey, you hereby give consent to participate in this survey. This information will be solely used to improve the current understanding of IPC/HAI/AR education and training.

Compensation: If you complete this survey, you will receive a discount code worth $50 to attend any webinar on the USF College of Public Health Lifelong Learning Academy portal.

Disclosure: This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.

3. *Instructor Recruitment Survey*

Instructor Perceptions of Infection Prevention Control, Healthcare-Associated Infections, and Antibiotic Resistance

You are invited to participate in this quality improvement study being conducted by the University of South Florida College of Public Health. This study aims to examine your perceptions of healthcare infection prevention control, healthcare-associated infections, and antibiotic resistance (IPC/HAI/AR) curriculum and training at the graduate level and your interests in expanding learning pathways at the graduate level and beyond. Your participation in this survey is entirely voluntary and you may withdraw at any time. This survey is anonymous, and you will not be identified individually in any of the information we get from this survey or in any materials we may publish. By completing this survey, you hereby give consent to participate in this survey. This information will be solely used to improve the current understanding of IPC/HAI/AR education and training.

Compensation: If you complete this survey, you will receive a discount code worth $50 to attend any webinar on the USF College of Public Health Lifelong Learning Academy portal.

Disclosure: This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative - Health Strategists, as part of a sub-award provided by the National Network of Public Health Institutes.

Appendix J: Survey Data

1. Undergraduate NNPHI Survey Results
2. Graduate NNPHI Survey Results
3. Instructor NNPHI Survey Results

Appendix K: Raw Tracking Form for Syllabi Review

Schools yellowed out have provided syllabi for their entire MPH core. Courses greyed out did not have IPC content or clear inclusion points.

School	Core PH	AR	HAI	IPC	Inclusion Point for IPC	Inclusion Point under more general PH concepts
Florida International University	PHC6410 Health Behavior and Public Health				XX	
	PHC6052 Biostatistics I					
Indiana University	SPHX660 Population Health Determinants			XX	XX	XX
	SPHX610 MPH Professional Development Seminar 1					XX
	SPHX685 Public Health Policy and Politics				XX	XX
	SPHX611 Professional Development Seminar: Leadership					XX
	SPHX650 Evidence-based Approaches to Public Health			XX	XX	
George Mason University	GCH611 Health Program Planning and Evaluation					XX
	GCH712 Introduction to Epidemiology			XX	XX	
Georgia State University	PHPH7017 Fundamentals of Biostatistics 1					
	PHPH7011 Epidemiology for Public Health			XX	XX	

	PHPB7140 Health Promotion, Planning, Administration, and Evaluation					XX
	PHPH7010 Foundations of Public Health			XX		
	PHPB7160 Fundamentals of Health Systems, Leadership, and Policy		XX	XX		
Georgia Southern University	PUBH 6534 Health System, Policy, and Leadership in Public Health			XX		
	PUBH6530 Quantitative Applications for Evidence-Based Public Health			XX	XX	
	PUBH6531 Community Assessment Application in Public Health				XX	
	PUBH6532 Environment, Population, and Health	XX	XX	XX		
	PUBH6510 Introduction to Public Health		XX	XX		
Kent State University	BST 52019 Biostatistics in Public Health					
	EPI 52017 Fundamentals of Public Health Epidemiology		XX	XX	XX	
	HPM 52016 Public Health Administration					
	HPM 53010 Community Health Needs Assessment				XX	
	SBS 54634 Social Determinants of Health					
New York University	GPH-GU-2106/5106 Epidemiology		XX	XX		
	GPH-GU-2110/5100 Health Care Policy					

	GPH-GU-2112/5112 Public Health Management						
	GPH-GU-2140/5140 Global Issues in Social and Behavioral Health			XX	XX	XX	
	GPH-GU-2153/5153 Global Environmental Health			XX			
	GPH-GU-2190/5190 Essentials of Public Health Biology	XX	XX	XX	XX		
	GPH-GU-2995/5995 Biostatistics for Public Health						
	GPH-GU-5171 Global Health Informatics Workshop						
	GPH-GU-5175 Readings in the History and Philosophy of Public Health			XX			
	GPH-GU-5180 Readings in the History and Philosophy of Public Health						
	GPH-GU-5185 Readings in the History and Philosophy of Public Health			XX			
North Dakota State University	PH789 - Integrative Learning Experience						
Northeastern University	PHTH5202 – Introduction to Epidemiology			XX	XX		
	PHTH5210 – Biostatistics in Public Health						
	PHTH5212 – Public Health Administration and Policy				XX	XX	
	PHTH5214 – Environmental Health			XX			
	PHTH5540 – Health Education and Program Planning					XX	
	PHTH6204 – Society, Behavior, and Health			XX			

Ohio State University	PUBHTLH6001 – Methods in Quantitative Data Analysis				
	PUBHTLH6002 – History, Values, and Essential Services of the US Public Health System	XX	XX		
	PUBHTLH6003 – Methods in Public Health Planning and Evaluation		XX		
	PUBHTLH6004 – Essentials of Population Health			XX	
Oregon State University	H513 – Integrated Approach to Public Health	XX	XX		
Rutgers University	PHCO0501 – Health Systems and Policy				
	PHCO0502 – Principles and Methods of Epidemiology		XX		
	PHCO0503 – Introduction to Environmental Health		XX	XX	
	PHCO0504 – Introduction to Biostatistics				
	PHCO0505 – Social and Behavioral Health Sciences			XX	
	PHCO0513 – Leadership and Management Essentials				
Texas Tech University	GSPH5307 Introduction to Epidemiology	XX	XX		
	SPPH5310 Public Health Policy				
	GSPH5311 Introduction to Biostatistics				
	GSPH 5334 Community Based Methods and Practice		XX		
	GSPH5313 Introduction to Public Health	XX	XX		

Tulane University	GSPH 5315Organizational Leadership and Management				
	SPHL6060 Epidemiology for Public Health				XX
	SPHL6050 Biostatistics for Public Health				
	SPHL6020 Foundations in Public Health		XX	XX	
	SPHL6080 Design Strategies for Public Health Programs				
University of Alabama at Birmingham	PUH604 Programs and Policies			XX	
	PUH605 Public Health Management and Evaluation				XX
	PUH606 Public Health Leadership				XX
	PUH603 Quantitative Methods in Public Health				
	PUH602 Community Assessment			XX	
	PUH600 Overview of Public Health			XX	XX
	PUH601 This is Public Health			XX	
University of Albany	EHS590 Introduction to Environmental Health		XX	XX	

	HPM525 Social and Behavioral Aspects of Public Health				XX	XX
	HBMS Biological Basis of Public Health	XX		XX	XX	
	EPI501 Principles and Methods of Epidemiology 1			XX		XX
	HPM500 Health Care Organizations, Delivery and Financing					XX
	HSPH Professional Practice in Public Health					
	EPI551 Basic Principles of Statistical Inference					
University of Arkansas	HBHE5104 Health Behavior and Health Education					
	ENV51003 Environmental and Occupational Health			XX	XX	
	COPH5003 Introduction to Public Health			XX	XX	
	HPMT5103 The Health Care System					
University of California, Berkeley	PHW200E Health Policy and Management				XX	
University of California, Davis	EPI205 Principles of Epidemiology			XX		
	SPH210 Introduction to Public Health Informatics					
	SPH273 Health Administration					XX
	SPH290 Topics in Public Health Seminar			XX	XX	
	SPH244 Introduction to Medical Statistics					
	SPH281 Introduction to SAS					
	SPH283 Program Planning and Evaluation for Public Health					XX
	SPH245 Biostatistics for Biomedical Sciences					
	SPH262 Principles of Environmental Health Sciences				XX	XX

	SPH222 Social and Behavioral Aspects of Public Health					XX
	SPH297 Practicum in Public Health					XX
University of California, Irvine	PH204 Biostatistics I					
	PH206A Principles of Epidemiology			XX		
	PH222 Health Policy and Management			XX		
	PH200 Foundations of Public Health		XX	XX		
	PH204B Biostatistics II					
	PH264 Introduction to Environmental Health Science			XX		XX
	PH291/PH191 Advances and Challenges in Public Health		XX	XX		XX
	PH244 Health Behavior Theory		XX	XX		
University of Cincinnati	PH7010 Introduction to Biostatistics					
University of Delaware	BHAN820 Social and Environmental Determinants of Health					XX
	EPID605 Epidemiology Methods I	XX	XX	XX		
	SPPA606 Environment and Public Health			XX		
University of Florida	EPID603 Biostatistics for Public Health					
	PHC6050 Statistical Methods for Health Science I					
	PHC6052 Introduction to Biostatistical Methods					
	PHC6001 Principles of Epidemiology in Public Health			XX		
	I6114 Introduction to US Health Care System					

	PHC6313 Environmental Health Concepts in Public Health		XX	
	PHC6410 Psychological, Behavioral, and Social Issues in Public Health	XX	XX	
University of Georgia	BIOS7010 Introduction to Biostatistics I			
	EHSC7010 Fundamentals of Environmental Health		XX	
	EPID7010 Introduction to Epidemiology I	XX	XX	
	HPAM7010 Introduction to Health Policy and Management			
	HPRB7010 Social and Behavioral Foundations of Public Health		XX	
University of Hawaii	PH681 Environmental Determinants of Health	XX	XX	
	PH600 Public Health Foundations		XX	
	PH663 Principles of Epidemiology I	XX	XX	
	PH655 Biostatistics I			
	PH623 Health Promotion Theory and Methods			XX
University of Illinois Chicago	IPHS402 Analytic and Research Methods in Public Health	XX		
	IPHS403 Public Health Systems, Community Health Methods, and Management		XX	

University of Illinois Urbana-Champaign	IPHS404 Analytic and Research Methods in Public Health I		XX	XX	
	IPHS Analytic and Research Methods in Public Health Part 2		XX	XX	
	IPHS401 Determinants of Health			XX	
	CHLH410 Public Health Practice			XX	XX
	CHLH550 Health Policy				XX
	CHLH572 Principles of Epidemiology		XX	XX	
	CHLH573 Biostatistics in Public Health				
University of Kansas	CHLH469 Environmental Health		XX	XX	
	PRVM827 Public Health Administration			XX	
	PRVM875 Management of Public Health Data				
	PRVM877 Health Communication			XX	XX
	PRVM830 Environmental Health		XX	XX	
	PRVM800 Principles of Epidemiology		XX		
	PRVM804 Community Health Assessment, Intervention, and Advocacy				XX
	PRVM861 Leadership in Public Health				XX
University of Maryland	SPHL 601 – Core Concepts in Public Health		XX	XX	

	SPHL 620 – Leadership, Teams, and Coalitions: Policy to Advocacy		XX	XX
	SPHL 610 – Program and Policy Planning, Implementation, and Evaluation	XX	XX	
	SPHL 602/603 – Foundations of Epidemiology and Biostatistics		XX	
	SPHL 611 – Public Health Ethics		XX	
	SPHL 603 – Public Health Data Laboratory		XX	
University of Memphis	PUBH7160 Social and Behavioral Sciences Principles	XX	XX	
University of Michigan	BIOS531 – Applied Statistics			
	PUBHLTH512 – Principles of Epidemiology for Public Health	XX	XX	
University of Minnesota	PUBH6020 Fundamentals of Social and Behavioral Science	XX		
	PUBH6102 Issues in Environmental and Occupational Health	XX	XX	
	PUBH6341 Epidemiologic Methods I	XX		
	PUBH6450 Biostatistics I		XX	
	PUBH6741 Ethics in Public Health: Professional Practice and Policy			
	PUBH 6751 Principles of Management in Health Services	XX	XX	
University of Nebraska Medical Center	CPH504 Epidemiology in Public Health	XX	XX	
	CPH539 Leadership and Advocacy			XX

	CPH514 Planning and Evaluation			XX
	BIOS806 Biostatistics I			
	CPH500 Foundations of Public Health	XX	XX	
University of Nevada, Las Vegas	EOH707 Practice of Public Health			
	EOH710 Fundamentals of Public Health	XX	XX	
	EOH740 Fundamentals of Environmental Health			
	EAB705 Epidemiology and Public Health	XX	XX	
	HCA701 US Healthcare System: Programs and Policies		XX	
	HED720 Program Planning and Grant Writing in Health Promotion		XX	
	EAB703 Biostatistical Methods for the Health Sciences			
	PUBH6672 Global Health			
	PPUBH6615 Principles of Epidemiology			
University of North Carolina at Charlotte	HLTH6213 Health Policy and Leadership	XX	XX	
	HADM6100 Introduction to the US Health Care System			XX
	HLTH6200 Case Studies in Public Health	XX	XX	

	HLTH6212 Health Promotion Program Management			XX	XX
	HLTH6211 Evidence-Based Methods in Public Health				
University of Toledo	PUBH6950 – Integrative Learning Experience				
	PUBH6000 – Quantitative and Qualitative Data Analysis in Public Health				
	PUBH6020 – Management and Leadership in Public Health				
	PUBH6090 – Issues in Public Health		XX	XX	
	PUBH6010 – Public and Occupational Health Programs		XX	XX	
	PUBH6900 – Interprofessional Education for Public Health				
	PUBH6080 – Social Determinants of Health			XX	
University of New Haven	PUBH6672 Global Health		XX	XX	
	PPUBH6615 Principles of Epidemiology			XX	
University of New Mexico	PH560- Global Health		XX	XX	
	PH506- Environmental and Occupational Health				
	PH554- Health Policy, Politics, and Social Equity				
	PH538- Biostatistical Methods				
	PH501- Principles of Public Health			XX	
University of North Carolina	SPHG711 Data Analysis for Public Health				
	SPHG713 Understanding Public Health Issues		XX	XX	

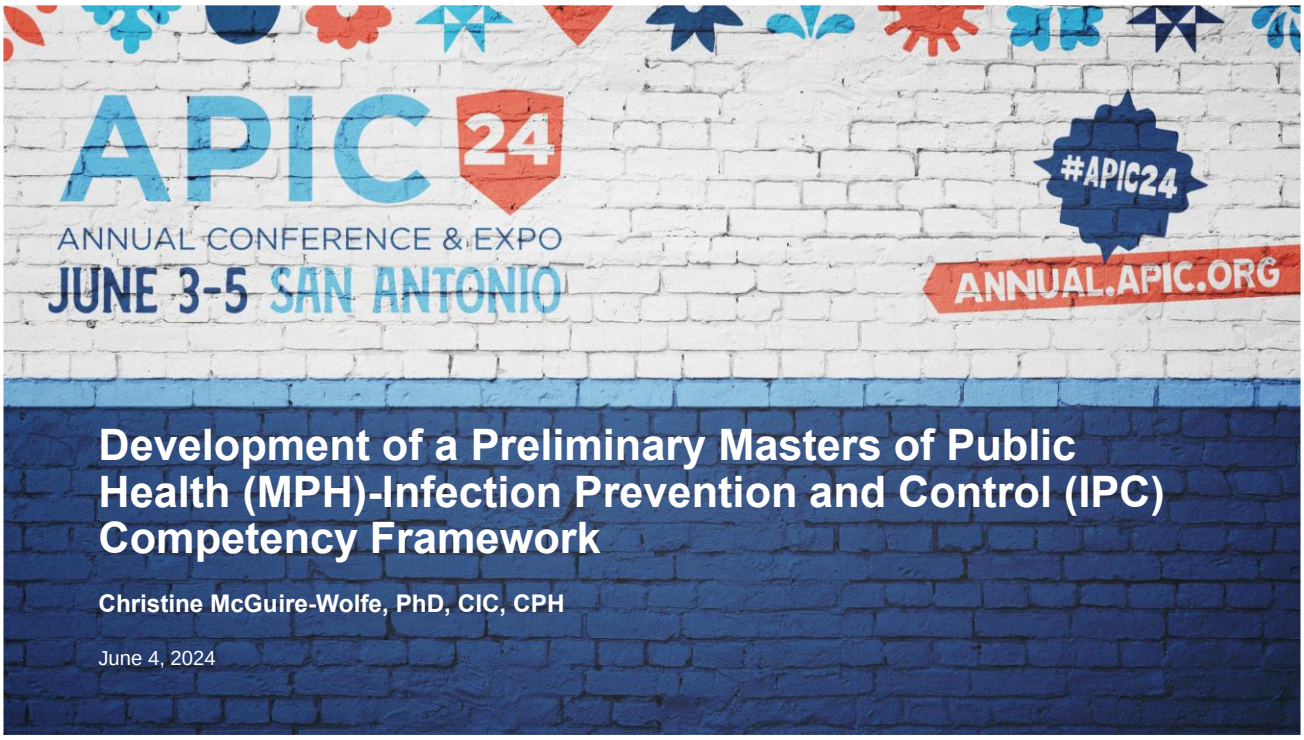
	SPHG721 Conceptualizing Public Health Solutions		XX	
University of North Texas Health Science Center at Fort Worth	HMAP5300 – Introduction to Health Management and Policy			XX
	EPID5300 – Principles of Epidemiology		XX	XX
	EOHS5300 – Environmental Determinants of Health		XX	XX
	BIOS5300 – Principles of Biostatistics		XX	XX
	BACH5300 – Theoretical Foundations of Individual and Community Health			XX
University of North Dakota	PH504 - Planning and Management to Promote Health		XX	
	PH510 – Public Health Care Systems			
	PH531 – Biostatistics I			
	PH541 – Public Health Communication		XX	
	PH551 – Epidemiology I	XX	XX	
	POL552 – Health Policy			
University of Pittsburgh	PUBHLT2105 – Public Health Biology	XX	XX	
	BIOST2011 – Principles of Statistical Reasoning			
	BIOST2041 – Introduction to Statistical Methods I			
	EPIDEM2110 – Principles of Epidemiology	XX	XX	
	BCHS2509 – Social and Behavioral Sciences in Public Health	XX		

	EOH2013 – Environmental Health and Disease		XX	
	HPM2001 – Health Policy and Management in Public Health		XX	
	PUBHLT2011 – Essentials of Public Health		XX	
	PUBHLT2033 – Foundations in Public Health	XX	XX	
	PUBHLT2034 – Public Health Communications	XX		
	PUBHLT2035 – Applications in Public Health			
University of South Florida	PHC6756 Population Assessment Part 1	XX	XX	
	PHC6757 Population Assessment Part 2	XX	XX	
	PHC6145 Translation to Public Health Practice		XX	
	PHC6588 History and Systems of Public Health			
University of Texas	PHM2612 Epidemiology I	XX	XX	
	PHM1690 Introduction to Biostatistics in Public Health			
	PHM1110 Health Promotion and Behavioral Sciences in Public Health			XX
	PHWM2110 Public Health Ecology and the Human Environment			
	PHM3715 Management and Policy Concepts in Public Health	XX	XX	
	PHM5015 Introduction to Qualitative Research in Public Health			

University of Texas Medical Branch	SPPH6403 Analytical Methods in PH				
	SPPH6324 Assessment, Planning, and Evaluation				
	SPPH6401/6469 Policy and Equity	XX			
	SPPH6338 Applied Public Health Leadership		XX		
University of Washington	PHI511 Foundations of Public Health		XX		
	PHI512 Analytic Skills for Public Health I	XX	XX		
	PHI513 Analytic Skills for Public Health II	XX	XX		
	PHI514 Determinants of Health		XX		
	PHI515 Implementing Public Health Interventions		XX		
	PHI516 Public Health Practice	XX	XX		
Virginia Commonwealth University	EPID Foundations of the Public Health Profession			XX	
	EPID 571 Principles of Epidemiology	XX	XX		
	BIOS543 Graduate Research Methods				
	EPID 580 Public Health Ethics			XX	
	EPID693 Public Health Internship				
	SBHD605 Introduction to Social and Behavioral Health		XX	XX	
	EPID604 Principles of Environmental Health		XX		
Wright University	MBA7500 Leadership and Ethics		XX	XX	
	PPH7410 Community Assessment		XX	XX	
	PPH7050 Health Systems and Policy				
	PPH7010 Biostatistics for Health Professionals			XX	

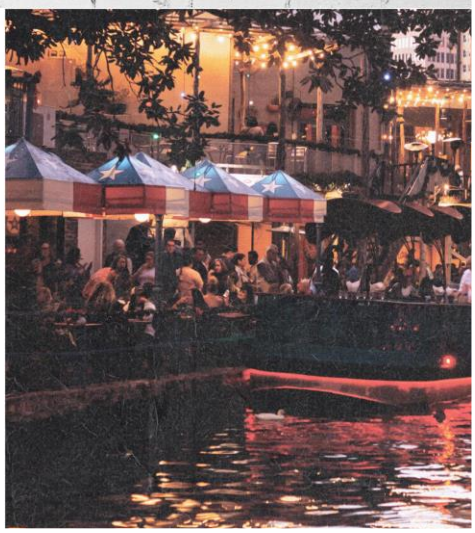
PPH7040 Social and Behavioral Determinants of Health	XX	XX
PPH7020 Public Health Epidemiology	XX	

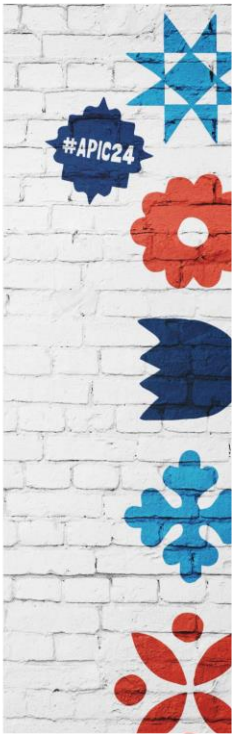
Appendix L: APIC 2024 Presentation



No Disclosures

None of the faculty or planners for this activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.





Disclosure and Partnership:

This survey is supported by funds made available from the Centers for Disease Control and Prevention, National Center for Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, through cooperative agreement OT18-1802, Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health, National Healthcare Workforce IPC Training Initiative – Health Strategies, as part of a sub-award provided by the National Network of Public Health Institutes.

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Learning Objectives

- Identify similarities between APIC's IP Competency Model & ASPPH's Core Competency Model for the MPH degree
- Explore a proposed hybrid MPH-IPC Competency Framework
- Consider how a proposed MPH-IPC Competency Framework can serve as an impetus for discussions with stakeholders regarding development of MPH-IPC programs

Mission from National Network of Public Health Institutes

Building Capacity of the Public Health Workforce: An Examination of Challenges and Opportunities related to Enhancing Infection Prevention, and Control Education and Training for Students

- Conduct feasibility study
- Determine the potential for inclusion of IPC, HAI, AR curricula
- Public Health students at academic institutions
- Develop educational & training criteria to be used in academic setting

Background

Value of diverse backgrounds on IPC teams: laboratory sciences, public health, microbiologists, foreign medical graduates

"The skill sets that MPH graduates bring to the table are an asset to any IP program…"[1]

"MPH graduates are particularly strong in the future-oriented domains of the APIC-competency model: leadership & program management, IPC technology, and performance improvement/implementation science."[1]

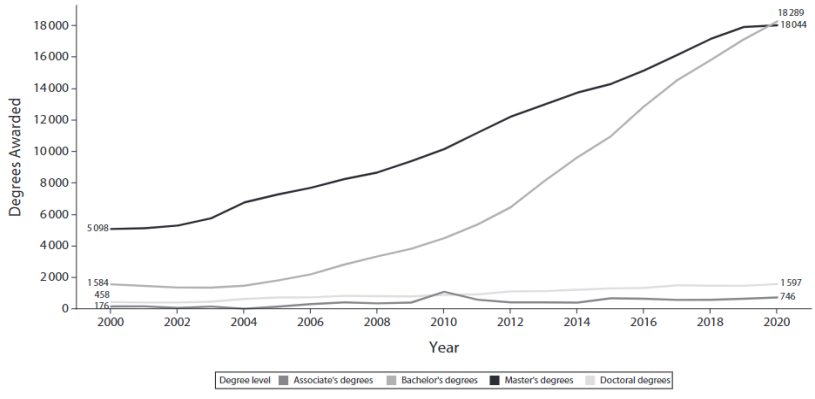
Background

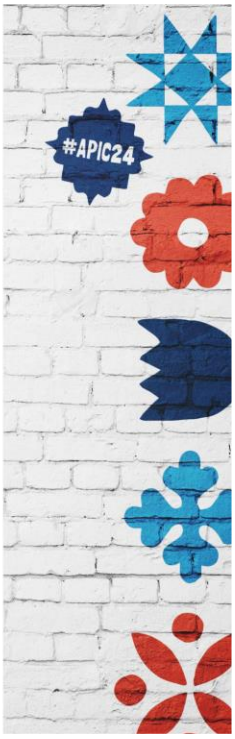
Vassallo & Boston[1]

- 2013 APIC competency self-assessment components, IP practice areas, MPH core knowledge areas/foundational competencies, and Council of Education for Public Health (CEPH) 2016 accreditation requirements
- 78% (29/37) of IP practice areas covered by MPH foundational competencies[1]
- "Only 8 of the practice areas are not addressed by the typical MPH program."[1]

Trends in Public Health Conferment[2]

Opportunities to leverage MPH holders to address IP workforce shortages



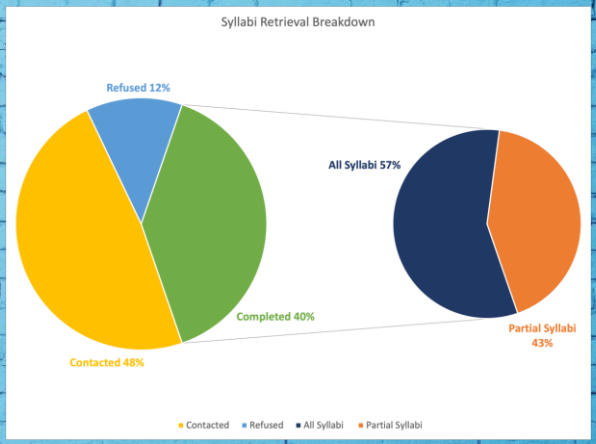


Methods

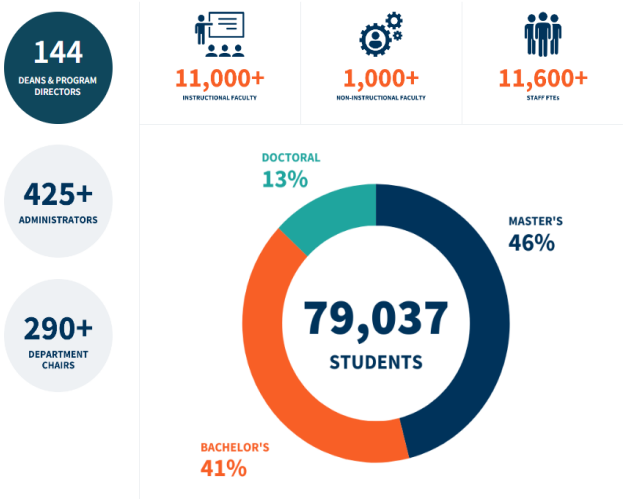
- January 2023 – March 2024
- IRB exemption
- Collection of syllabi from CEPH-accredited schools of PH
- Core MPH courses (not concentrations)
- Syllabi reviewed for inclusion of IPC, HAI, and AR content
- Existing competencies identified and aligned with APIC's IP Competency Model & ASPPH's Core Competency Model for the MPH degree

Syllabi Obtained

- 137 schools contacted
- 54 schools provided syllabi (40%)
- 17 schools declined (12%)
- Those 54 schools provided a total of 256 syllabi for analysis
  - 31 complete inventories of their MPH core



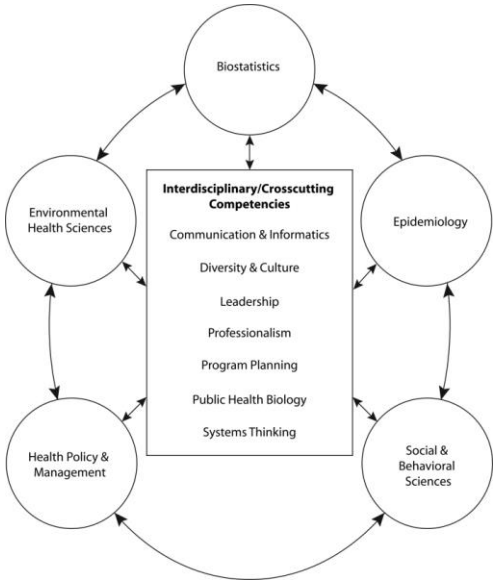
ASPPH & CEPH Accreditation



- The Council on Education for Public Health (CEPH)
- Nationally recognized accrediting body
- Independent agency
- Recognized by US Dept. of Education
- Accredits schools of public health & PH programs outside of schools of public health

https://aspph.org/about/

ASPPH Core Competency Model for the MPH Degree[3]



Domains:

- Biostatistics
- Epidemiology
- Social & Behavioral Sciences
- Health Policy & Management
- Environmental Health Sciences

Interdisciplinary/Crosscutting Competencies:

- Communication/Informatics
- Leadership
- Professionalism
- Program Planning
- Public Health Biology
- Systems Thinking

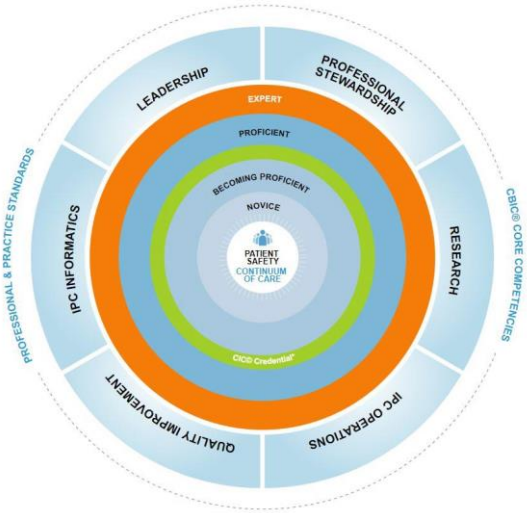
APIC's Infection Preventionist Competency Model

Domains:

- Leadership
- Professional Stewardship
- Research
- IPC Operations
- Quality Improvement
- IPC Informatics

Framed by:

- Professional & Practice Standards
- CBIC Core Competencies



Source: https://apic.org/professional-practice/infection-preventionist-ip-competency-model/

APIC Domains & CEPH Competencies

APIC Domains	CEPH
1. Leadership	7, 8, 10, 13, 16, 17, 18, 19, 21
2. Professional Stewardship	5, 7, 8, 9, 10, 14, 21, 22
3. Research	1, 2, 3, 4
4. IPC Operations	1, 2, 3, 4, 7, 9, 18, 19
5. Quality Improvement	1, 2, 3, 4, 8, 22
6. IPE Informatics	3, 18

[1]Apply Epi methods to settings/situations in PH practice.

[2]Select quan/qual data collection methods appropriate for a given PH context.

[3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software.

[4]Interpret results of data analysis for public health research, policy or practice.

[5]Compare the organization, structure, & function of health care, PH, & regulatory systems across national/international settings.

[7]Assess pop needs, assets, & capabilities that affect communities' health.

[8]Apply awareness of cultural values/practices to the design, implementation or critique of PH policies or programs.

[9]Design a pop-based policy, program, project, or intervention.

[10]Explain basic principles/tools of budget & resource management.

[13]Proposed strategies to identify stakeholders and build coalitions/partnerships for influencing PH outcomes.

[16]Apply leadership and/or management principles to address a relevant issue.

[17]Apply negotiation & mediation skills to address organizational/community challenges.

[18]Select communication strategies for different audiences & sectors.

[19]Communicate audience-appropriate PH content, both in writing & through oral presentation.

[21]Integrate perspectives from other sectors/professions to promote & advance population health.

[22]Apply a systems thinking tool to visually represent a PH issue in a format other than standard format.

CBIC Competencies & CEPH Overlap

CBIC Competencies	CEPH
1. Identification of Infectious Diseases	1, 2, 4
2. Surveillance and Epidemiologic Investigation	1, 2, 3, 4
3. Preventing/Controlling the Transmission of Infectious Agents	
4. Employee/Occupational Health	1, 9, 11, 18, 19
5. Management and Communication	7, 9, 10, 11, 17, 18, 19
6. Education and Research	7, 9, 16, 18, 19
7. Environment of Care	
8. Cleaning, Disinfection, Sterilization of Medical Devices and Equipment	

[1]Apply Epi methods to settings/situations in PH practice.
[2]Select quan/qual data collection methods appropriate for a given PH context.
[3]Analyze quan/qual data using biostatistics, informatics, computer-based programming, & software.
[4]Interpret results of data analysis for public health research, policy or practice.
[7]Assess pop needs, assets, & capabilities that affect communities' health.
[9]Design a pop-based policy, program, project, or intervention.
[10]Explain basic principles/tools of budget & resource management.
[11]Select methods to evaluate PH programs.
[16]Apply leadership and/or management principles to address a relevant issue.
[17]Apply negotiation & mediation skills to address organizational/community challenges.
[18]Select communication strategies for different audiences & sectors.
[19]Communicate audience-appropriate PH content, both in writing & through oral presentation.

ASPPH's Framing the Future Task Force

"Key considerations for a 21st century MPH degree"[4]

- MPH degree should be clearly distinguished from the BSPH & DrPH.[4]
- MPH education should be rigorous, applied, & skills-based.[4]
- MPH should be designed as an advanced degree focused on specialist education → responsive to student and employer needs.[4]
- Content in MPH curricula should be aligned with the knowledge, skills, & attitudes that employers expect in graduates.[4]

ASPPH's Framing the Future Task Force

- PH is inherently interdisciplinary & interprofessional →MPH grads must be prepared to function increasingly in these roles/settings.[4]
- MPH education must be competency-based (competencies should be updated on a regular basis).[4]
- MPH degree is a professional degree → education must have strong connections to *applied PH practice*.[4]

Proposed MPH-IC Competency Framework

IPC Domains:

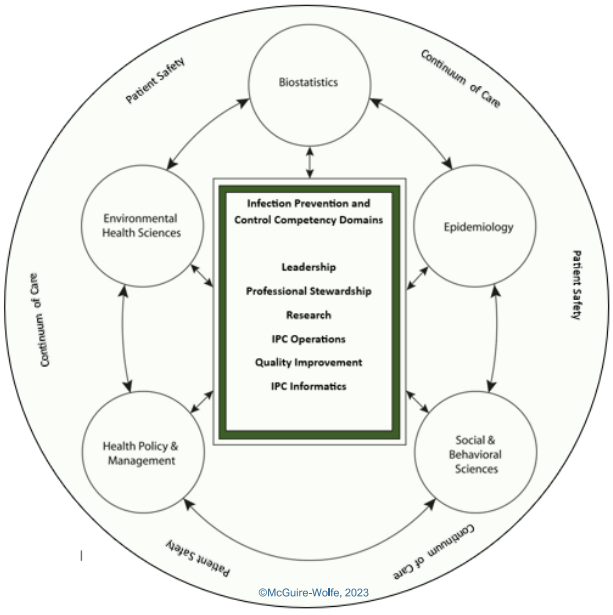
Leadership
Professional Stewardship
Research
IPC Operations
Quality Improvement

MPH Domains:

Epidemiology
Social & Behavioral Sciences
Health Policy & Management
Environmental Health Sciences
Biostatistics

Guided by:

Continuum of Care
Patient Safety



The proposed MPH-IPC framework should be used as a tool to begin discussions with stakeholders regarding the structure and organization of MPH-IPC programs.

Additional Recommendations

- Involvement of Stakeholders
- Use of Integrated Learning Experience & Applied Practice Experience as internship placements
- Adherence to ASPPH MPH programs recommendations

[1]Vassallo A. & Boston KM. The master of public health graduate as an infection preventionist: Navigating the landscape of infection prevention. *Am J Infection Ctrl.* 2019; 47:201-207.

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INFECTION PREVENTION AND CONTROL

INCLUSION OF INFECTION PREVENTION AND CONTROL CONCEPTS

In consultation with NNPHI, USF has developed tools to help you, as an instructor, incorporate concepts related to Infection Prevention and Control (IPC), Healthcare Associated Infections (HAI), and Antimicrobial Resistance (AR) into existing MPH curricula.

INSTRUCTOR PRIMER

The **instructor primer** will provide guidance and essential information to instructors or educators who are interested in incorporating IPC, HAI, and AR examples in existing public health courses. It serves as a foundational resource to help instructors effectively deliver content and facilitate learning experiences for their students. Access to PowerPoint slides, quiz questions, readings, and other lesson materials can be accessed through the instructor primer.

LEARNING OBJECTIVES

Learning objectives serve as a foundational element of effective teaching and learning, providing direction, focus, and accountability throughout the educational process. They focus the learning process by clearly defining what students should know or be able to do by the end of a lesson, course, or program.

Objectives ensure alignment between instructional content, activities, and assessments.

LEARNING OBJECTIVES

1

Apply public health prevention strategies (primary, secondary, and tertiary) to infection prevention and control challenges, through scenario-based learning.

2

Identify opportunities for public health intervention in prevention and control of healthcare-associated infections (HAIs).

3

Demonstrate the importance of prevention strategies to mitigate the risk and minimize the impact of antibiotic resistance.

COURSE COMPETENCIES

Competencies outline the specific knowledge, skills, and abilities that students are expected to develop throughout a course. They provide clarity on what students should be able to demonstrate by the end of the course. Competencies help students understand the relevance of their learning to real-world contexts and future endeavors.

COURSE COMPETENCIES

1

Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc.

2

Identify and provide examples of primary, secondary, and tertiary prevention.

3

Analyze how primary, secondary, and tertiary prevention is used in the design and implementation of population health interventions.

4

Define the three core functions of public health and explain how each contributes to a primary, secondary, and tertiary prevention of disease in different settings.

PRE AND POST TESTS

Pre-tests assess students' existing knowledge, skills, and understanding related to the topic or subject area before instruction begins. This allows educators to gauge students' starting points and tailor instruction to meet their needs.

Post-tests assess students' learning and mastery of the content after instruction has taken place.

SAMPLE PRE AND POST TESTS

By comparing pre-test and post-test results, educators can evaluate the effectiveness of their teaching methods and the extent to which students have achieved the intended learning outcomes.

View and download a sample pre/post test here. The document can be edited to fit your instructional needs.

INSTRUCTIONAL MATERIALS

Creating slides for teaching using real-world examples can be an effective way to engage learners and illustrate abstract concepts with practical applications.

View and download a sample presentation here.
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SCENARIO-BASED QUESTIONS

Scenario-based questions offer a dynamic and effective approach to teaching and assessment, fostering deeper understanding, critical thinking, and application of knowledge in authentic contexts.

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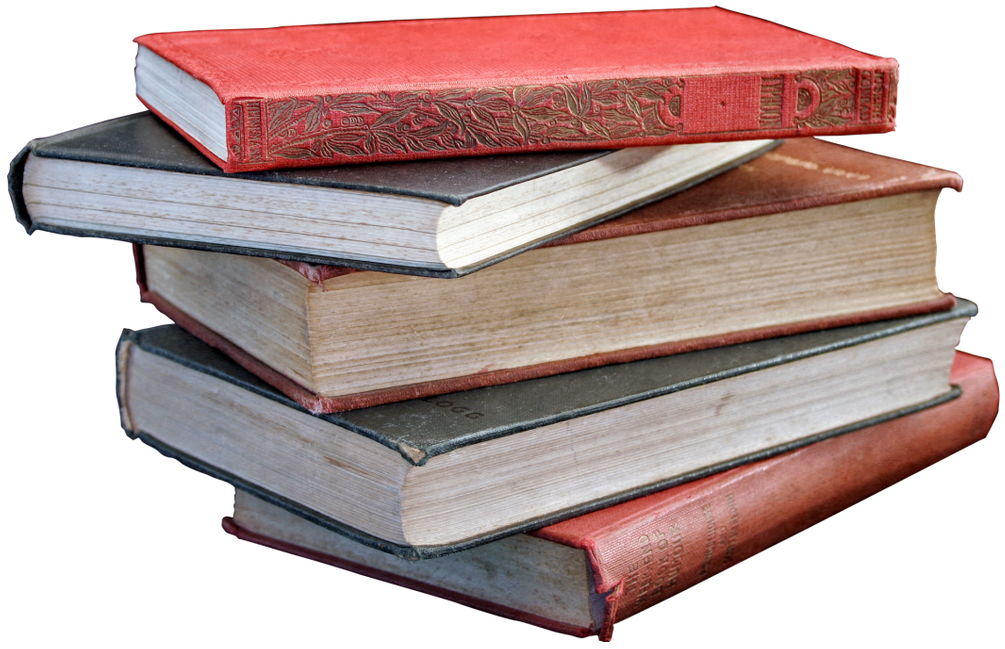
READINGS

Readings provide students with an in-depth understanding of the subject matter beyond what can be covered in lectures or discussions. They offer detailed explanations, examples, and different perspectives on the topic.



SAMPLE READINGS AND RESOURCES

Click on the titles below to view/download readings and resources.

- **Sepsis is a preventable public health problem**
- **Hepatitis B Virus Infection and it's prevention among the general Ghanian population: Using the public health model of prevention approach**
- **Break the Chain of Infection**

EVALUATION

Course evaluations provide valuable feedback to instructors about various aspects of the course, including teaching methods, course materials, assignments, and overall organization. This feedback helps instructors identify strengths and weaknesses, allowing them to make improvements for future iterations of the course.

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Objectives ensure alignment between instructional content, activities, and assessments.

LEARNING OBJECTIVES

1

Define at least three factors of globalization that impact the global burden of infectious disease morbidity and mortality.

2

Analyze an infectious disease outbreak, epidemic, or pandemic scenario to identify opportunities for prevention, response, or containment.

3

Upon review of a case example, discuss the interaction between globalization and burden of disease on a population.

COURSE COMPETENCIES

Competencies outline the specific knowledge, skills, and abilities that students are expected to develop throughout a course. They provide clarity on what students should be able to demonstrate by the end of the course. Competencies help students understand the relevance of their learning to real-world contexts and future endeavors.

COURSE COMPETENCIES

1

Explain how globalization affects global burdens of disease.

PRE AND POST TESTS

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SCENARIO-BASED QUESTIONS

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The document can be edited to fit your instructional needs.

The readings that accompany the scenario-based questions are available here.

READINGS

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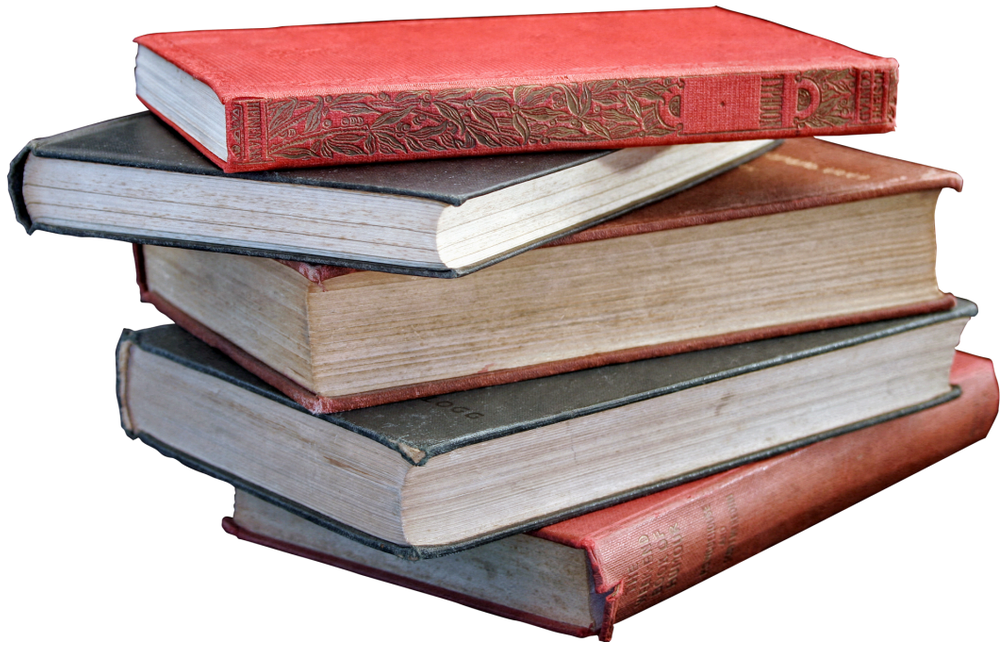

SAMPLE READINGS AND RESOURCES

Click on the titles below to view/download readings and resources.

Changing Patterns of Emerging Zoonotic Diseases in Wildlife, Domestic Animals, and Humans Linked to Biodiversity Loss and Globalization

Ecology Letters

Infectious disease in an era of global change

A Prospective Study on the Impact and Out-of-Pocket Costs of Dengue Illness in International Travelers

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Use this link to download the pre and post test. You can download the document and edit, as needed.

INSTRUCTIONAL MATERIALS

Creating slides for teaching using real-world examples can be an effective way to engage learners and illustrate abstract concepts with practical applications.

Use this link to download the Tool Kit 1 slides. You can download the slides and edit, as needed. You can also work with an Instructional Designer to turn the slides into an interactive presentation.

Instructor Primer

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READINGS

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Course evaluations provide valuable feedback to instructors about various aspects of the course, including teaching methods, course materials, assignments, and overall organization.

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Use this link to download the pre and post test. You can download the document and edit, as needed.

INSTRUCTIONAL MATERIALS

Creating slides for teaching using real-world examples can be an effective way to engage learners and illustrate abstract concepts with practical applications.

Use this link to download the Tool Kit 2 slides. You can download the slides and edit, as needed. You can also work with an Instructional Designer to turn the slides into an interactive presentation.

Instructor Primer

SCENARIO-BASED QUESTIONS

Scenario-based questions offer a dynamic and effective approach to teaching and assessment, fostering deeper understanding, critical thinking, and application of knowledge in authentic contexts.

Use this link to download the scenario-based questions. You can download the document and edit, as needed.

READINGS

Readings provide students with an in-depth understanding of the subject matter beyond what can be covered in lectures or discussions. They offer detailed explanations, examples, and different perspectives on the topic.

Use this link to view and download the readings.

EVALUATION

Course evaluations provide valuable feedback to instructors about various aspects of the course, including teaching methods, course materials, assignments, and overall organization.

Use this link to download a sample evaluation. You can download the document and edit, as needed.

REFERENCES

Articles cited from course syllabi are listed below with information provided in those syllabi and have not been independently confirmed.

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