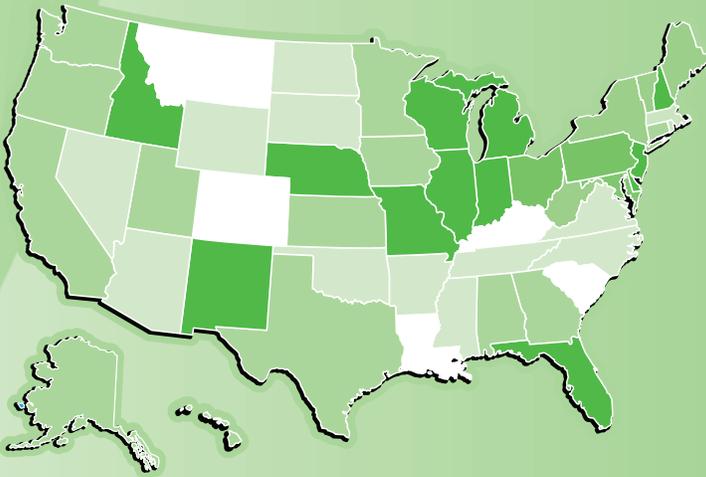
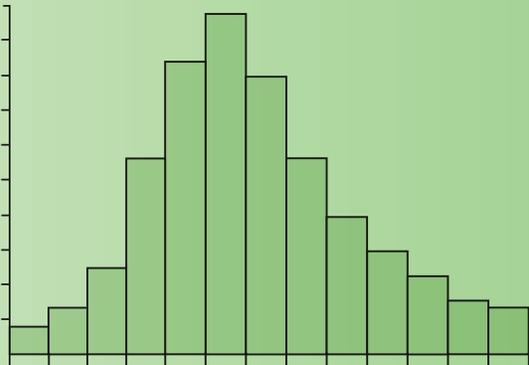


# Short Summaries

A E C s



## Applied Epidemiology Competencies



Partner organizations participating in the development of these competencies:



# Competencies for Applied Epidemiologists in Governmental Public Health Agencies

## Tier 1: Entry-Level or Basic Epidemiologist

### **Example of Functional Responsibility**

- Carries out simple data collection, analysis, and reporting in support of surveillance and epidemiologic investigations

### **Examples of Educational and Experiential Criteria**

- Newly graduated Master's degree with minimal experience but from a Master's program with a focus on epidemiology and/or analysis and assessment; or
- Bachelor's or other nonepidemiology professional degree or certification (e.g., RN, MD/DO, DDS/DMD, DVM, PhD, RS) without formal academic epidemiology training and with at least 2 years' experience performing epidemiology work under the guidance of a Tier 2 or Tier 3 epidemiologist. (Guidance can be received from an epidemiologist in the same agency or in other organizations.)

### **Competencies and Subcompetencies for Skill Domain 1—Assessment and Analysis**

- Recognize public health problems pertinent to the population
  - Recognize the existence of a public health problem
  - Collaborate with others inside and outside the agency to identify the problem
- Conduct surveillance activities
  - Identify surveillance data needs
  - Implement new or revise existing surveillance systems
  - Report key findings from the surveillance system
  - Support evaluation of surveillance systems
- Identify acute and chronic conditions or other adverse outcomes in the population
  - Assist in conducting a community health status assessment
  - Characterize investigative processes
  - Create hypotheses
  - Assist in design of investigation (e.g., disease investigations, studies, or screening programs)
  - Conduct investigation as directed
- Apply principles of good ethical/legal practice as they relate to study design and data collection, dissemination, and use
  - Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data
  - Apply relevant laws to data collection, management, dissemination, and use of data and information
  - Describe human subjects research
  - Apply Institutional Review Board processes as directed
  - Bring potential conflicts of interest to attention of senior epidemiologists
  - Apply knowledge of privacy laws to protect confidentiality, including Health Insurance Portability and Accountability Act and applicable state and local privacy laws
  - Know agency procedures for handling Freedom of Information Act requests
  - Bring potential violations of ethical principles in preparing and submitting publications to attention of senior epidemiologists
- Organize data from surveillance, investigations, or other sources
  - Assist in definition of database requirements, if indicated
  - Maintain databases
- Analyze data from an epidemiologic investigation or study
  - Use analysis plan for data
  - Conduct analysis of data
- Summarize results of the analysis, and draw conclusions
  - Identify key findings from the study
- Assist in developing recommended evidence-based interventions and control measures in response to epidemiologic findings
  - Define cultural/social/political framework for recommended interventions
- Assist in evaluation of programs
  - Collect surveillance and other data for use in tracking program objectives and outcomes
  - Assist in tracking progress toward program objectives and outcomes
  - Communicate information about progress toward program objectives and outcomes to program managers

The Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists (CSTE) convened an expert panel to develop Competencies for Applied Epidemiologists (AECs) in Governmental Public Health Agencies. The AECs were intended to improve the practice of epidemiology within the public health system. The expert panel included representatives from local, state, and federal public health agencies and schools of public health.

The AECs present a comprehensive list of competencies that define the discipline. They describe functional, analytical, and managerial competencies in four tiers—entry-level or basic, mid-level, supervisory and senior scientist/researcher. The AECs were developed within the framework of the eight skill domains of the Core Competencies for Public Health Professionals—a product of the Council on Linkages between Academia and Public Health Practice—and are consistent with the larger field of public health practice.



# Competencies for Applied Epidemiologists in Governmental Public Health Agencies

## Tier 1: Entry-Level or Basic Epidemiologist

### **Competencies for Skill Domain 2—Basic Public Health Sciences**

- Know how causes of disease affect epidemiologic practice
- Identify the role of laboratory resources in epidemiologic activities
- Use identified informatics tools in support of epidemiologic practice

### **Competencies for Skill Domain 3—Communication**

- Prepare written and oral reports and presentations that communicate necessary information to agency staff
- Recognize the basic principles of risk communication
- Incorporate interpersonal skills in communication with agency personnel, colleagues, and the public
- Use effective communication technologies

### **Competencies for Skill Domain 4—Community Dimensions of Practice**

- Provide epidemiologic input into epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level
- Participate in development of community partnerships to support epidemiologic investigations

### **Competencies for Skill Domain 5—Cultural Competency**

- Describe population by race; ethnicity; culture; societal, educational, and professional backgrounds; age; gender; religion; disability; and sexual orientation
- Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)
- Describe surveillance systems that include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)
- Conduct investigations using languages and approaches tailored to population
- Use standard population categories or subcategories when performing data analysis
- Support public health actions that are relevant to the affected community

### **Competencies for Skill Domain 6—Financial and Operational Planning and Management (Operational Planning, Financial Planning, and Management Skills)**

- Conduct epidemiologic activities within the financial and operational plan of the agency
- Describe the financial planning and budgetary process of the epidemiology program
- Implement operational and financial plans
- Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives

### **Competencies for Skill Domain 7—Leadership and Systems Thinking**

- Support the organization's vision in all programs and activities
- Use performance measures to improve epidemiology program effectiveness
- Promote ethical conduct in epidemiologic practice
- Practice professional development
- Prepare for emergency response

### **Competencies for Skill Domain 8—Policy Development**

- Support the application of epidemiologic knowledge to the development and analysis of public health policies

## Competencies for Applied Epidemiologists in Governmental Public Health Agencies Tier 2: Mid-Level Epidemiologist

### **Example of Functional Responsibility**

- Carries out simple and more complex and nonroutine data collection, analysis, and interpretation tasks and can work independently; or may supervise a unit or serve as a project leader or surveillance coordinator.

### **Examples of Educational and Experiential Criteria**

- Master's degree with a focus in epidemiology with 2 or more years' work experience in epidemiology in a public health agency; or
- Doctoral-level epidemiologist; or
- Other nonepidemiology professional degree or certification (e.g., RN, MD/DO, DDS/DMD, DVM, PhD, RS) with specific epidemiology training (e.g., MPH degree, CDC Epidemic Intelligence Service program) or at least 4 years' experience performing epidemiologic work under the guidance of a Tier 3 epidemiologist.

### **Competencies and Subcompetencies for Skill Domain 1—Assessment and Analysis**

- Identify public health problems pertinent to the population
  - Use critical thinking to determine whether a public health problem exists
  - Articulate the need for further investigation or other public health action on the basis of results of literature review and assessment of current data
  - Collaborate with others inside and outside the agency to identify the problem and form recommendations
- Conduct surveillance activities
  - Design surveillance for the particular public health issue under consideration
  - Identify surveillance data needs
  - Implement new or revise existing surveillance systems
  - Identify key findings from the surveillance system
  - Conduct evaluation of surveillance systems
- Investigate acute and chronic conditions or other adverse outcomes in the population
  - Conduct a community health status assessment
  - Recommend priorities of potential public health problems to be addressed
  - Select investigative processes
  - Assist in design of investigation (e.g., disease investigations, studies, or screening programs)
  - Use investigation techniques consistent with the public health problem
- Ensure study design and data collection, dissemination, and use follow ethical/legal principles
  - Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data
  - Apply relevant laws to data collection, management, dissemination, and use of data and information
  - Describe differences between public health practice and public health research
  - Describe human subjects research
  - Apply Institutional Review Board processes as necessary
  - Manage conflicts of interest as necessary
  - Apply knowledge of privacy laws to protect confidentiality, including Health Insurance Portability and Accountability Act and applicable state and local privacy laws
  - Know agency procedures for handling Freedom of Information Act requests
  - Apply ethical principles in preparing and submitting publications
- Manage data from surveillance, investigations, or other sources
  - Define database requirements, if indicated
  - Manage databases
- Analyze data from an epidemiologic investigation or study
  - Create analysis plan for data
  - Conduct analysis of data
- Summarize results of the analysis, and draw conclusions
  - Apply knowledge of epidemiologic principles and methods to make recommendations regarding the validity of epidemiologic data
  - Assess need for special analyses, including survival analyses, cost-effectiveness/cost benefit/cost utility analyses
  - Identify key findings from the study
- Recommend evidence-based interventions and control measures in response to epidemiologic findings

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The AECs present a comprehensive list of competencies that define the discipline. They describe functional, analytical, and managerial competencies in four tiers—entry-level or basic, mid-level, supervisory and senior scientist/researcher. The AECs were developed within the framework of the eight skill domains of the Core Competencies for Public Health Professionals—a product of the Council on Linkages between Academia and Public Health Practice—and are consistent with the larger field of public health practice.



## **Competencies for Applied Epidemiologists in Governmental Public Health Agencies Tier 2: Mid-Level Epidemiologist**

- Establish cultural/social/political framework for recommendations or interventions
- Use scientific evidence in preparing recommendations for action or interventions
- Evaluate programs
  - Assist in development of measurable and program-relevant goals and objectives
  - Assist in development of program logic models and theories of action
  - Identify surveillance and other data for use in tracking program objectives and outcomes
  - Record progress toward program objectives and outcomes
  - Communicate information about progress toward program objectives and outcomes to program managers and staff for use in program planning and modification

### ***Competencies for Skill Domain 2—Basic Public Health Sciences***

- Use current knowledge of causes of disease to guide epidemiologic practice
- Use laboratory resources to support epidemiologic activities
- Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice

### ***Competencies for Skill Domain 3—Communication***

- Prepare written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public
- Demonstrate the basic principles of risk communication
- Incorporate interpersonal skills in communication with agency personnel, colleagues, and the public
- Use effective communication technologies

### ***Competencies for Skill Domain 4—Community Dimensions of Practice***

- Provide epidemiologic input into epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level
- Participate in development of community partnerships to support epidemiologic investigations

### ***Competencies for Skill Domain 5—Cultural Competency***

- Describe population by race; ethnicity; culture; societal, educational, and professional backgrounds; age; gender; religion; disability; and sexual orientation
- Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)
- Design surveillance systems to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)
- Conduct investigations using languages and approaches tailored to population
- Use standard population categories or subcategories when performing data analysis
- Use knowledge of specific sociocultural factors in the population to interpret findings
- Recommend public health actions that would be relevant to the affected community

### ***Competencies for Skill Domain 6—Financial and Operational Planning and Management (Operational Planning, Financial Planning, and Management Skills)***

- Conduct epidemiologic activities within the financial and operational plan of the agency
- Assist in developing a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency
- Implement operational and financial plans
- Assist in preparation of proposals for extramural funding
- Use management skills
- Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives

### ***Competencies for Skill Domain 7—Leadership and Systems Thinking***

- Support the epidemiologic perspective in the agency strategic planning process
- Promote the organization's vision in all programs and activities
- Use performance measures to evaluate and improve epidemiology program effectiveness
- Promote ethical conduct in epidemiologic practice
- Promote workforce development
- Prepare for emergency response

### ***Competencies for Skill Domain 8—Policy Development***

- Bring epidemiologic perspective in the development and analysis of public health policies

For more information and for the complete competency set, including all subcompetencies for all domains, see [www.cdc.gov/od/owcd/cdd/aec](http://www.cdc.gov/od/owcd/cdd/aec) or [www.cste.org/competencies.asp](http://www.cste.org/competencies.asp).

# Competencies for Applied Epidemiologists in Governmental Public Health Agencies

## Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager

### **Example of Functional Responsibility**

- Supervisor, manager, and/or director of a major section, program, or bureau in a public health agency.

### **Examples of Educational and Experiential Criteria**

- Master's degree with a focus in epidemiology with 4 or more years' work experience in epidemiology in a public health agency; or
- Doctoral-level epidemiologist with at least 2 years' work experience at a Tier 2 epidemiologist level; or
- Other nonepidemiology professional degree or certification (e.g., RN, MD/DO, DDS/DMD, DVM, PhD, RS) with specific epidemiology training (e.g., MPH degree, CDC Epidemic Intelligence Service program) and at least 4 years' work experience at a Tier 2 epidemiologist level.

### **Competencies and Subcompetencies for Skill Domain 1—Assessment and Analysis**

- Ensure identification of public health problems pertinent to the population
  - Ensure that critical thinking is used to determine whether a public health problem exists
  - Decide whether to conduct further investigation or other public health action on the basis of results of literature review and assessment of current data
  - Lead collaborations with others inside and outside the agency to identify the problem and form recommendations
- Oversee surveillance activities
  - Approve surveillance for the particular public health issue under consideration
  - Decide on surveillance data needs
  - Supervise or manage implementation of new or revision of existing surveillance systems
  - Synthesize key findings from the surveillance system and other pertinent information for use by decision-makers
  - Ensure evaluation of surveillance systems
- Ensure investigation of acute and chronic conditions or other adverse outcomes in the population
  - Oversee a community health status assessment
  - Decide on priority of public health problems to be addressed
  - Approve selection of investigative processes
  - Verify hypotheses
  - Oversee design of investigations (e.g., disease investigations, studies, or screening programs)
  - Ensure use of investigation techniques consistent with the public health problem
- Ensure study design and data collection, dissemination, and use follow ethical/legal principles
  - Examine ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data
  - Communicate to staff legal expectations, limitations, and implications of collection, management, dissemination, and use of data and information
  - Obtain decision on whether investigation involves public health practice or public health research
  - Ensure legal and ethical conduct of human subjects research
  - Ensure application of necessary Institutional Review Board processes
  - Ensure that conflicts of interest do not interfere with research or investigations
  - Ensure application of privacy laws to protect confidentiality, including Health Insurance Portability and Accountability Act and applicable state and local privacy laws
  - Know agency procedures for handling Freedom of Information Act requests
  - Ensure application of ethical principles in preparing and submitting publications
- Ensure management of data from surveillance, investigations, or other sources
  - Approve database requirements
  - Ensure database management
- Evaluate analysis of data from an epidemiologic investigation or study
  - Approve analysis plan for data
  - Approve data analysis
- Evaluate conclusions and interpretations from investigation
  - Assess the validity of the epidemiologic data, taking into consideration bias and other study limitations
  - Assess need for special analyses, including survival analyses, cost-effectiveness/cost benefit/cost utility analyses
  - Validate key findings from the study
- Determine evidence-based interventions and control measures in response to epidemiologic findings

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## Competencies for Applied Epidemiologists in Governmental Public Health Agencies Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager

- Approve interventions on the basis of understanding of cultural/social/political framework for consideration
- Ensure that scientific evidence is used in preparing recommendations for action or interventions
- Ensure evaluation of programs
  - Approve measurable and program-relevant goals and objectives
  - Decide on program logic models and theories of action
  - Approve surveillance and other data for use in tracking program objectives and outcomes
  - Monitor progress toward program objectives and outcomes
  - Incorporate information about progress toward program objectives and outcomes in decisions on program planning and modification

### **Competencies for Skill Domain 2—Basic Public Health Sciences**

- Use current knowledge of causes of disease to guide epidemiologic practice
- Ensure the use of laboratory resources to support epidemiologic activities
- Ensure application of principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice
- Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices

### **Competencies for Skill Domain 3—Communication**

- Ensure preparation of written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public
- Ensure that the basic principles of risk communication are followed in all communication of epidemiologic findings
- Model interpersonal skills in communication with agency personnel, colleagues, and the public
- Ensure utilization of effective communication technologies

### **Competencies for Skill Domain 4—Community Dimensions of Practice**

- Lead epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level
- Develop community partnerships to support epidemiologic investigations

### **Competencies for Skill Domain 5—Cultural Competency**

- Differentiate special populations by race; ethnicity; culture; societal, educational, and professional backgrounds; age; gender; religion; disability; and sexual orientation
- Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)
- Ensure that surveillance systems are designed to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)
- Ensure that investigations use languages and approaches tailored to population
- Ensure that standard population categories or subcategories are used for data analysis
- Use knowledge of specific sociocultural factors in the population to interpret findings
- Ensure that actions are relevant to the affected community

### **Competencies for Skill Domain 6—Financial and Operational Planning and Management (Operational Planning, Financial Planning, and Management Skills)**

- Create operational and financial plans for future epidemiologic activities
- Formulate a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency
- Oversee implementation of operational and financial plans
- Develop requests for proposals for extramural funding to support additional epidemiologic activities and special projects
- Use management skills
- Promote collaborations, strong partnerships, and team building to accomplish epidemiology program objectives

### **Competencies for Skill Domain 7—Leadership and Systems Thinking**

- Promote the epidemiologic perspective in the agency strategic planning process
- Lead the creation of epidemiology program's vision in the context of the agency's plan
- Use performance measures to evaluate and improve epidemiology program effectiveness
- Promote ethical conduct in epidemiologic practice
- Ensure professional development of epidemiology workforce
- Lead epidemiology unit in preparing for emergency response

### **Competencies for Skill Domain 8—Policy Development**

- Bring epidemiologic perspective in the development and analysis of public health policies

# Competencies for Applied Epidemiologists in Governmental Public Health Agencies

## Tier 3b: Senior Scientist/Subject Area Expert

### **Example of Functional Responsibility**

- Senior scientist/subject area expert in an epidemiologic focus area.

### **Examples of Educational and Experiential Criteria**

- Master's degree with a focus in epidemiology with 4 or more years' work experience in epidemiology in a public health agency; or
- Doctoral-level epidemiologist with at least 2 years' work experience at a Tier 2 epidemiologist level; or
- Other nonepidemiology professional degree or certification (e.g., RN, MD/DO, DDS/DMD, DVM, PhD, RS) with specific epidemiology training (e.g., MPH degree, CDC Epidemic Intelligence Service program) and at least 4 years' work experience at a Tier 2 epidemiologist level.

### **Competencies and Subcompetencies for Skill Domain 1—Assessment and Analysis**

- Validate identification of public health problems pertinent to the population
  - Synthesize key findings from the critical thinking process to determine whether a public health problem exists
  - Evaluate need for further investigation or other public health action on the basis of results of literature review and assessment of current data
  - Lead collaborations with others inside and outside the agency to identify the problem and form recommendations
- Organize surveillance
  - Evaluate validity of conducting surveillance for the particular public health issue under consideration
  - Evaluate surveillance data needs
  - Implement new or revise existing surveillance systems
  - Synthesize key findings from the surveillance system and other pertinent information for use by decision-makers
  - Design and conduct evaluation of surveillance systems
- Design investigation of acute and chronic conditions or other adverse outcomes in the population
  - Design a community health status assessment
  - Recommend priorities of potential public health problems to be addressed
  - Determine investigative processes
  - Verify hypotheses
  - Design investigations (e.g., disease investigations, studies, or screening programs)
  - Design investigation techniques consistent with the public health problem
- Synthesize principles of good ethical/legal practice for application to study design and data collection, dissemination, and use
  - Integrate ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data
  - Design data collection, management, and dissemination and use of data and information to comply with relevant laws
  - Verify conclusions that have been reached regarding distinction between public health practice and public health research
  - Ensure legal and ethical conduct of human subjects research
  - Ensure application of Institutional Review Board processes
  - Ensure that conflicts of interest do not interfere with research or investigations
  - Incorporate privacy laws into study design to protect confidentiality, including Health Insurance Portability and Accountability Act and applicable state and local privacy laws
  - Know agency procedures for handling Freedom of Information Act requests
  - Apply ethical principles in preparing and submitting publications
- Manage data from surveillance, investigations, or other sources
  - Define database requirements, if indicated
  - Manage databases
- Evaluate data from an epidemiologic investigation or study
  - Create analysis plan for data
  - Evaluate data
- Evaluate results of the analysis, and interpret conclusions
  - Assess the validity of the epidemiologic data, taking into consideration bias and other study limitations
  - Assess need for special analyses, including survival analyses, cost-effectiveness/cost benefit/cost utility analyses
  - Synthesize key findings from the study

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## Competencies for Applied Epidemiologists in Governmental Public Health Agencies Tier 3b: Senior Scientist/Subject Area Expert

- Formulate new interventions on the basis of evidence when available, and control measures in response to epidemiologic findings
  - Examine cultural/social/political framework to develop recommendations or interventions
  - Design recommendations using scientific evidence or interventions
- Evaluate programs
  - Develop measurable and program-relevant goals and objectives in collaboration with program staff
  - Develop program logic models and theories of action in collaboration with program staff
  - Synthesize surveillance and other data to allow tracking of program objectives and outcomes
  - Critique progress toward program objectives and outcomes
  - Evaluate progress toward program objectives and outcomes for program managers and staff to aid in program planning and modification

### **Competencies for Skill Domain 2—Basic Public Health Sciences**

- Use current knowledge of causes of disease to guide epidemiologic practice
- Develop processes for using laboratory resources to support epidemiologic activities
- Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice
- Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices

### **Competencies for Skill Domain 3—Communication**

- Organize preparation of written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public
- Create messages that follow the principles of risk communication
- Model interpersonal skills in communication with agency personnel, colleagues, and the public
- Use effective communication technologies

### **Competencies for Skill Domain 4—Community Dimensions of Practice**

- Lead epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level
- Develop community partnerships to support epidemiologic investigations

### **Competencies for Skill Domain 5—Cultural Competency**

- Differentiate special populations by race; ethnicity; culture; societal, educational, and professional backgrounds; age; gender; religion; disability; and sexual orientation
- Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)
- Ensure that surveillance systems are designed to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)
- Organize investigations that use languages and approaches tailored to population
- Ensure that standard population categories or subcategories are used for data analyses
- Use knowledge of specific sociocultural factors in the population to interpret findings
- Recommend actions that will be relevant to the affected community

### **Competencies for Skill Domain 6—Financial and Operational Planning and Management (Operational Planning, Financial Planning, and Management Skills)**

- Conduct epidemiologic activities within the financial and operational plan of the agency
- Describe the financial planning and budgetary process of the agency
- Implement operational and financial plans for assigned projects
- Prepare proposals for extramural funding for review and input from managers
- Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives

### **Competencies for Skill Domain 7—Leadership and Systems Thinking**

- Promote the epidemiologic perspective in the agency strategic planning process
- Promote the organization's vision in all programs and activities
- Use performance measures to evaluate and improve epidemiology program effectiveness
- Promote ethical conduct in epidemiologic practice
- Promote workforce development
- Prepare for emergency response

### **Competencies for Skill Domain 8—Policy Development**

- Bring epidemiologic perspective in the development and analysis of public health policies