



# MPH Global Health Concentration Competencies Toolkit

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# Background

The Association of Schools and Programs of Public Health (ASPPH), through its Global Health Committee, undertook an evidence-based research and consensus process that produced **Global Health Concentration Competencies for the Master of Public Health (MPH) Degree** in 2018. It is important to note that these competencies are built upon the foundation of both CEPH requirements for foundational knowledge (D1) and foundational competencies (D2) for the MPH degree ([here](#)). ASPPH created this toolkit to assist faculty in incorporating the global health competencies into curricula.

## Target Population for this Toolkit

*Primary Target Population:* Faculty and staff in Council on Education for Public Health (CEPH)-accredited institutions who are involved in teaching and/or planning curricula for Master of Public Health (MPH) students concentrating in global health.

*Other Potential Users:* Faculty and staff in institutions that are not accredited nor seeking accreditation by CEPH that offer master's-level global health programs may benefit from the terms, ASPPH competencies and sample sub-competencies, and illustrative learning objectives depicted in this toolkit.

## Terms

A **competency model** offers a framework that faculty can use to guide instruction and assessment, as well as communicate the scope of the targeted teaching and learning, and that students can use to demonstrate their knowledge, skills, and attitudes.

A **domain** is a group of competencies clustered around an organizing principle (ASPPH, 2009). In a competency model, there are often multiple domains that organize sets of competencies. For example, within a public health competency model, one may expect to find communications and policy domains, among others.

A **competency** is the effective application of knowledge, psychomotor skills, and/or attitudes, grounded in theory and evidence, required for successful practice in each situation or setting. A competency includes the following components:

Action verb (measurable)	Content	Context, when necessary
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For example, one global health concentration competency is: Design (*action verb*) sustainable workforce development strategies (*content*) for resource-limited settings (*context*).

**Sub-competencies** are required behaviors that must precede a given competency and/or combine with other behaviors to demonstrate a competency.

For example, before one can become competent in designing sustainable workforce development strategies for resource-limited settings, one must be able to:

1. Synthesize the factors that contribute to the health care workforce crisis in resource-limited settings
2. Propose strategies to address the challenges related to intervening in resource-limited settings.

A **learning objective** specifies the aim of a lesson, course, or **curriculum** (the content covered in a course of study). A learning objective reveals the knowledge and skills required to fulfill a given sub-competency.

For example, with respect to the first *sub-competency* mentioned above (Synthesize the factors that contribute to the health care workforce crisis in resource-limited settings) that is nested within the sample global health concentration competency (Design sustainable workforce development strategies for resource-limited settings), five learning objectives could include:

1. Synthesize general trends and influences in the global availability and movement of health care workers
2. Validate the need for trained public health professionals in resource-limited settings
3. Propose the optimal economic, social, political, and academic conditions that can produce a strong health workforce
4. Appraise the facilitating factors that contribute to strengthening the local public health workforce in a resource-limited setting
5. Construct strategies for establishing the permanency of the health care workforce in Indigenous communities

To assist in determining sub-competencies and learning objectives appropriate to each program's unique desired learning outcomes for students in specific global health tracks, faculty may benefit from an online tool, Learning Taxonomy Levels for Developing Competencies & Learning Outcomes (for the Cognitive and Affective Domains) Reference Guide (ASPPH, 2018). This resource serves as a guide for faculty to align the taxonomy levels of the competencies', sub-competencies', and learning objectives' action verbs in two domains – cognitive and affective.

In both domains, instructional strategies are suggested for each corresponding taxonomy level, ranging in the cognitive domain from providing lectures (Level 1: Remember) to developing plans or delivering testimony (Level 5: Create). In the affective domain, an instructional strategy may consist of offering an asynchronous online forum (Level 1: Receive) to assigning a role play (Level 5: Characterize by Value). Additionally, evaluation methods such as pre-/post- tests, simulation performances, and reflection papers are recommended for each taxonomy level.

## Global Health *is* Public Health

As Fried et al. stated in 2010: “Global health and public health are indistinguishable. Both view health in terms of physical, mental, and social wellbeing, rather than merely the absence of disease. Both emphasise population-level policies, as well as individual approaches to health promotion. And both address the root causes of ill-health through a broad array of scientific, social, cultural, and economic strategies.” (Fried et al., 2010). In support of this approach, the ASPPH global health concentration competencies for the MPH degree include the following assumptions:

- Public health focuses on the health of populations, and global health is public health for the world
- The health and well-being of individuals across the globe affect the health, safety, and economic security of all nations
- Global health is a universal public good that crosses disciplines, sectors, borders, and settings.

## Global Health Competencies

Schools and programs of public health are well-positioned to prepare students interested in global health for their future careers. Many global health competency models, both within ASPPH-member schools and programs and created by individual faculty or offered by national organizations offer frameworks that educators can use to guide instruction and that students can use to demonstrate their knowledge, skills, and attitudes (Jogerst et al., 2015; Hagopian et al., 2008; Cole et al., 2011; Brown 2014; Arthur, Battat & Brewer, 2011; Howard et al., 2011) including the Association of Schools and Programs of Public Health’s (ASPPH) Global Health Competency Model Version 1.1, the first standardized global health competency model for master-level public health students that was released in 2011 (ASPPH, 2011).

To standardize critical competencies that Master of Public Health (MPH) students need to gain prior to graduation, CEPH published their 2016 Accreditation Criteria for schools of public health and public health programs (CEPH, 2016). These criteria suggest that MPH students must be grounded in foundational public health knowledge and able to demonstrate foundational competencies (Table 1).

**Table 1: CEPH 2016 Accreditation Criteria for Foundational Knowledge and Foundational Competencies for the MPH**

**CEPH’s D1. MPH Foundational Public Health Knowledge** specifies two domains (“Profession and Science of Public Health” and “Factors Related to Human Health”) and 12 foundational knowledge areas.

*Profession & Science of Public Health*

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services\*
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population’s health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
6. Explain the critical importance of evidence in advancing public health knowledge

*Factors Related to Human Health*

7. Explain effects of environmental factors on a population’s health
8. Explain biological and genetic factors that affect a population’s health
9. Explain behavioral and psychological factors that affect a population’s health
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
11. Explain how globalization affects global burdens of disease
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)

\*Institutions outside the US may replace the 10 Essential Services with content appropriate to the nation/region.

**CEPH's D2. MPH Foundational Competencies** mandates eight domains and 22 foundational competencies.

*Evidence-based Approaches to Public Health*

1. Apply epidemiological methods to the breadth of settings and situations in public health practice
2. Select quantitative and qualitative data collection methods appropriate for a given public health context
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
4. Interpret results of data analysis for public health research, policy or practice

*Public Health & Health Care Systems*

5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings
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 societal levels

*Planning & Management to Promote Health*

7. Assess population needs, assets and capacities that affect communities' health
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs
9. Design a population-based policy, program, project or intervention
10. Explain basic principles and tools of budget and resource management
11. Select methods to evaluate public health programs

*Policy in Public Health*

12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations
15. Evaluate policies for their impact on public health and health equity

### Leadership

- 16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making
- 17. Apply negotiation and mediation skills to address organizational or community challenges

### Communication

- 18. Select communication strategies for different audiences and sectors
- 19. Communicate audience-appropriate public health content, both in writing and through oral presentation
- 20. Describe the importance of cultural competence in communicating public health content

### Interprofessional Practice

- 21. Perform effectively on interprofessional teams

### Systems Thinking

- 22. Apply systems thinking tools to a public health issue

CEPH's knowledge and competency requirements for the MPH are also available ([here](#)).

As ASPPH's Global Health Competency Model Version 1.1 was created in 2011, prior to the publication of CEPH's 2016 Accreditation Criteria, it is not reflective of CEPH's current requirements for MPH students seeking a global health concentration from a CEPH-accredited school or program of public health. As a result, the 2011 model is no longer applicable to CEPH-accredited schools and programs of public health. The major reason for the Global Health Competency Model Version 1.1 becoming obsolete is that it used the 2009 ASPPH-produced MPH Competencies as its base, whereas the 2018 ASPPH Master of Public Health's Global Health Concentration Competencies were built on top of CEPH's 2016 accreditation criteria. See Table 2 for a comparison of the two competency models.



**Table 2: Comparison of Two ASPPH Global Health Competency Models**

	<b>Old Model</b>	<b>New Model</b>
<b>Name</b>	ASPPH's Global Health Competency Model Version 1.1	ASPPH's Master of Public Health's Global Health Concentration Competencies
<b>When Released</b>	2011	2018
<b>Goal</b>	To promote population health, safety, and well-being at local and global levels by enhancing the global health competence of students	
<b>Target Audience</b>	Master's level students specializing in global health (could include MPH, MS, MSPH, etc.)	Master of Public Health (MPH) students specializing in global health
<b>Competency Structure</b>	Seven domains, 38 competencies	Six concentration competencies
<b>Built on Top of What Foundation</b>	2009 ASPPH-produced MPH Competencies	2016 CEPH-produced accreditation criteria (foundational knowledge, foundational competencies for the MPH)
<b>Supporting Materials</b>	None	Toolkit and mechanisms (e.g. webinar) to advance the new model

Although the utility of the ASPPH's Global Health Competency Model Version 1.1 may now be inadequate for public health schools and programs, it may still be used as a framework for other master's-level students in global health programs and/or for institutions that are not accredited nor seeking accreditation by CEPH.

When CEPH released the 2016 Accreditation Criteria, many of the previously developed global health competencies and competency models, including ASPPH's Global Health Competency Model Version 1.1, arguably became sub-competencies to CEPH's Foundational Knowledge and Foundational Competencies. An attempt to organize these global health competencies under the CEPH Foundational Knowledge and Foundational Competencies can be found in the Appendix to this toolkit. This resource can assist public health faculty in integrating competency-based global health-specific content within core or elective Master of Public Health classes.

# Competencies for an MPH Global Health Concentration

According to CEPH's 2016 Accreditation Criteria, in addition to the Foundational Knowledge and Foundational Competencies, the MPH student can be expected to demonstrate competence in an MPH concentration. For each concentration, CEPH requires assurance that the MPH student demonstrates at least five competencies that are distinct from the foundational knowledge and competencies. The school or program is at liberty to select concentration competencies that relate to the school or program's mission and/or to their area(s) of concentration for review by CEPH.

To assist faculty in identifying global health concentration competencies that are distinct from CEPH's foundational knowledge and foundational competencies, ASPPH surveyed and interviewed global health experts, examined additional global health competencies, and vetted a draft competency product with global health experts.

On July 26, 2018, ASPPH published the final product of this effort, the *Global Health Concentration Competencies for the Master of Public Health (MPH) Degree*. This companion toolkit is designed for faculty to assist in operationalizing the concentration competencies. The ASPPH competencies, sub-competencies, and learning objectives in this toolkit are for *voluntary* use. Schools/programs may adopt none to all of the competencies in their current condition, and any of the competencies may be adapted to better address schools' and programs' needs.

## The ASPPH Master of Public Health's Global Health Concentration Competencies

The global health competencies developed are *instructional* (not workplace) competencies. Accordingly, these competencies serve as a framework for global health learning experiences and are meant to be acquired through structured learning activities in an academic setting. The academic setting is not restricted to a traditional classroom, as online learning is included as well as field or practice-based experiences that may be undertaken as part of fulfilling learning requirements for the concentration.

To reiterate, the target audience for the ASPPH Master of Public Health's Global Health Concentration Competencies is MPH students concentrating in global health upon graduation from a Council on Education for Public Health (CEPH)-accredited school or program of public health. They build upon CEPH's MPH Foundational Public Health

Knowledge and Foundational Competencies and are six in number, as follows:

1. **Analyze** the roles, relationships, and resources of the entities influencing global health
2. **Apply** ethical approaches in global health research and practice
3. **Apply** monitoring and evaluation techniques to global health programs, policies, and outcomes
4. **Propose** sustainable and evidence-based multi-sectoral interventions, considering the social determinants of health specific to the local area
5. **Design** sustainable workforce development strategies for resource-limited settings
6. **Display** critical self-reflection, cultural humility, and ongoing learning in global health

Target audience  
for the ASPPH Master of  
Public Health's  
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Concentration  
Competencies

MPH students  
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#### ASPPH'S GLOBAL HEALTH CONCENTRATION COMPETENCIES FOR THE MPH

- 1 Analyze the roles, relationships, and resources of the entities influencing global health
- 2 Apply ethical approaches in global health research and practice
- 3 Apply monitoring and evaluation techniques to global health programs, policies, and outcomes
- 4 Propose sustainable and evidence-based multi-sectoral interventions, considering the social determinants of health specific to the local area
- 5 Design sustainable workforce development strategies for resource-limited settings
- 6 Display critical self-reflection, cultural humility, and ongoing learning in global health

CEPH'S D2  
MPH Foundational Competencies

CEPH'S D1  
MPH & DrPH Foundational Public Health Knowledge

# Developing Sub-Competencies and Learning Objectives

When developing competencies, sub-competencies, and learning objectives, faculty are encouraged to remain mindful of the mastery level sought. Bloom’s Taxonomy, or a revision (Anderson et al., 2011), is often used as a tool to develop competencies, sub-competencies, and learning objectives. It is difficult to overemphasize the importance of the verb selected as the verb directs the level of mastery expected of the student, whether cognitive or affective. See ASPPH’s helpful reference guide [Learning Taxonomy Levels for Developing Competencies & Learning Outcomes \(for the Cognitive and Affective Domains\) Reference Guide](#). You may note that ASPPH’s reference guide omits the psychomotor domain of learning experience and behaviors as public health teaching and learning relies far less on psychomotor skills than fellow schools and programs in the clinical health professions.

In translating competencies into teaching and learning strategies, a basic approach is to check that the behavior sought for the student to demonstrate, upon completion of the educational experience, fits the competency. For example, a competency focused on “analysis,” such as “Analyze the roles, relationships...” (Level 4 of Bloom’s Taxonomy) must not require students to demonstrate mastery at the level of evaluation (Level 5 of Bloom’s Taxonomy). Similarly, the operationalization of an analysis (Level 4 of Bloom’s Taxonomy)-focused learning objective must surpass and otherwise subsume the recall of facts (Level 1 of Bloom’s Taxonomy).

The table below illustrates a *sample* of how learning objectives could be used to fulfill each of the six ASPPH global health concentration competencies and proposed sample sub-competencies. As with the concentration competencies, schools/programs may adapt and/or adopt the sub-competencies and learning objectives to fit their unique academic aims and the specific outcomes desired for their students.

ASPPH Global Health Concentration Competencies for the MPH	Sample Sub-Competencies	Sample Learning Objectives
<b>1. Analyze the roles, relationships, and resources of the entities influencing global health (Associations of Schools of Public Health, 2011; Jogerst et al., 2015)*</b>	Analyze the roles and resources of the entities influencing global health	Identify the major global funders influencing global health
		Classify the function of entities influencing global health
		Examine the impact of entities influencing global health
		Identify major public health efforts to reduce disparities in global health (such as Millennium Development Goals and Global Fund to Fight AIDS, TB, and Malaria) (Jogerst et al., 2015)*
	Analyze relationships among entities that impact global health	Describe the interactions among political and economic history, power, participation, and engagement globally (Cole et al., 2011)*
		Analyze the interrelationship of foreign policy and health diplomacy (Associations of Schools of Public Health, 2011)*
		Analyze the impact of transnational movements on population health (Associations of Schools of Public Health, 2011)
		Examine the role of transnational networks and global institutions in the adoption and enforcement of international laws, conventions, agreements, and standards that affect health and safety (e.g. trade, labor, food supply, the environment, pharmaceuticals, international aid, human rights, and conflict) (Hagopian et al., 2008)*
		Explain how the global economy impacts public health in different countries and different regions within countries

		Appraise how internal political and cultural conflicts shape communities' public health problems
<b>2. Apply ethical approaches in global health research and practice</b>	Apply ethical approaches in global health research (Akbar et al., 2005)*	Discuss the fundamental principles of international standards for the protection of human subjects in diverse cultural settings (Associations of Schools of Public Health, 2011)*
		Apply reliable, valid, and ethically sound research to identify innovative solutions for international health problems (Hagopian et al., 2008)
		Demonstrate leadership in serving as a bridge between the global health research and practice settings (Yale, 2018)*
	Apply ethical approaches in global health practice (Associations of Schools of Public Health, 2011)*	Identify broad ethical issues as they relate to equity globally (Jackson & Cole, 2013)*
		Apply ethical approaches appropriate for specific international, country, or local projects (Jackson & Cole, 2013)*
		Employ strategies to resolve common ethical issues and challenges that arise when working within diverse economic, political, and cultural contexts (Jogerst et al., 2015)*
		Identify the mechanisms used to hold international organizations accountable for public health practice standards (Associations of Schools of Public Health, 2011)*
		Demonstrate leadership in serving as a bridge between the global health research and practice settings (Yale, 2018)*

<b>3. Apply monitoring and evaluation techniques to global health programs, policies, and outcomes (UNC Gillings School of Global Public Health, n.d)*</b>	Apply formative monitoring and evaluation techniques to global health programs, policies, and outcomes	Arrange strategies to overcome the unique challenges of conducting evaluation of global health programs, policies, and outcomes
		Describe participatory strategies in setting priorities, assessing, developing, implementing, monitoring, and evaluating at all stages
		Use monitoring and evaluation project data to inform evidence-based decision-making in the development of new programs and continuous quality improvement efforts (Boston University School of Public Health, n.d)*
	Apply summative monitoring and evaluation techniques to global health programs, policies, and outcomes	Apply analytic methods to evaluate the costs of programs, policies, and outcomes (Boston University School of Public Health, n.d)* Apply analytic methods to evaluate programs and policies in relation to their quality, utility, and impact on global public health (Association of Schools of Public Health, 2006)*
<b>4. Propose sustainable and evidence-based multi-sectoral interventions, considering the social determinants of health specific to the local area</b>	Propose sustainable, evidence-based interventions to meet internationally established health targets (ASPPH, 2011)*	Translate research findings into evidence-based interventions that solve public health problems in specific settings
		Prioritize successful aspects of interventions for consideration in scaling up efforts/outreach (ASPPH, 2011)*
		Propose methods that are designed to ensure program sustainability <i>IMPORTANT NOTE :Program sustainability must be directed toward the benefit of the local community and considering evidence-based findings and not to advance interests of funders or other external parties</i>



		(Associations of Schools of Public Health, 2011; Jogerst et al., 2015; UNC Gillings School of Global Public Health, n.d)*
	Propose interventions that consider the unique social determinants of health specific to the local area	Illustrate how social determinants of health are incorporated into interventions
		Structure interventions to consider a “health in all policies” approach for solving a local public health problem
		Develop strategies to reduce the greatest health inequities in the local area
	Develop the elements necessary for multi-sectoral interventions to ensure reciprocal, productive, and supportive relationships	Describe strategies to create space for stakeholders, especially historically marginalized populations (Cole et al., 2011)*
		Promote state-of-the-art and localized practices for partnering with Indigenous populations
<b>5. Design sustainable workforce development strategies for resource-limited settings</b>	Synthesize the factors that contribute to the health care workforce crisis in resource-limited settings (Jogerst et al., 2015)*	Present general trends and influences in the global availability and movement of health care workers (Jogerst et al., 2015)*
		Analyze the gaps and related requirements for training public health professionals in resource-limited settings
		Propose the optimal economic, social, political, and academic conditions that can produce a strong health workforce (Hagopian et al., 2008)*
		Appraise the facilitating factors that contribute to strengthening the local public health workforce in a resource-limited setting
		Construct strategies for establishing the permanency of the health care workforce in Indigenous communities
	Propose strategies to address the challenges	Critique barriers to recruitment, training, and retention of competent



	related to intervening in resource-limited settings (Yale School of Public Health, n.d.)*	human resources in low to middle-income countries (Hagopian et al., 2008)*
		Generate interventions that build on the assets available in resource-limited settings
<b>6. Display critical self-reflection, cultural humility, and ongoing learning in global health</b>	Demonstrate critical self-reflection through the integration of academic learning with “real-world” experiences (Bruno & Dell'Aversana, 2018)*	Employ self-reflection to evaluate beliefs, values, feelings, and implicit assumptions that are used in identifying and solving a problem (Mezirow, 1991)*
		Practice self-reflection to evaluate one’s own social location prior to responding to others in their diverse locations (Cole et al., 2011)*
		Use self-reflection to evaluate the impact of one’s practice (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012)*
	Display cultural humility (ASPPH Interviewee)*	Promote the practice of considering perspectives of other professionals and persons from other cultures or contexts
		Uphold integrity, regard, and respect for others in all aspects of professional practice (Jogerst et al., 2015)*
	Display ongoing learning in global health (Cole et al., 2011)*	Incorporate new developments in public health and planetary health into ongoing global health practice
		Exemplify self-guided, ongoing learning in relation to global health policies, focus regions and/or countries, and topical areas of interest (Brown, 2014)*
		Develop strategies to communicate with those who do not speak your language (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012)*

\* indicates the original content has been modified from the source

# From Learning Objectives to Coursework

Faculty select various approaches in creating coursework to operationalize learning objectives and to assure their students can demonstrate the desired behaviors or competencies. Regardless of the approach used by faculty toward this end, their goals are consistent, to:

1. ***Introduce students to current, objective-relevant resources.*** This step may require faculty to provide resources or for students to locate them. Materials must be current and from reputable sources. Consider journal articles, videos, websites, book chapters, guest speakers, and more.
2. ***Ensure students demonstrate that each component of the objective has been met.*** Exposure to the specified content is insufficient to assume proficiency of a competency. One or more deliverables must accompany the course curriculum that is specific to a given objective. Deliverables may vary (e.g. essays, literature reviews, oral presentations, slide decks, discussion board posts, worksheets, and infographics).
3. ***Measure (grade) students using an objective, consistent structure.*** Measurement of learning objectives and competency attainment can occur through various assessments within the progression of a course or a degree program. Ultimately, the faculty must develop a rubric to determine – and help the student to determine – whether the learning objective has indeed been met. The use of consistent grading criteria establishes clear benchmarks for meeting objective components.

# Sample Curriculum Content

This sample curriculum framework and related content illustrate the potential use of the concentration competencies, sub-competencies, and learning objectives.

<b>Competency:</b> Analyze the roles, relationships, and resources of the entities influencing global health
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<b>Sub-competency:</b> Analyze the roles and resources of the entities influencing global health
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<b>Learning objective:</b> Examine the function of entities influencing global health
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*Instructional strategies* for faculty members could include some of the following options:

1. Viewing the following video: <https://www.coursera.org/lecture/global-health/who-are-the-key-actors-in-global-health-part-2-xei0z> (Boyd, 2018)
2. Reading the following papers:
  - a. CDC Global Health Strategy.  
<https://www.cdc.gov/globalhealth/strategy/pdf/cdc-globalhealthstrategy.pdf> (CDC, n.d.)
  - b. McCoy, D., Chand, S., & Sridhar, D. (2009). Global health funding: How much, where it comes from and where it goes. *Health policy and planning*, 24(6), 407-417.
  - c. Salve, S., Harris, K., Sheikh, K., & Porter, J. D. (2018). Understanding the complex relationships among actors involved in the implementation of public-private mix (PPM) for TB control in India, using social theory. *International journal for equity in health*, 17(1), 73.
  - d. Frenk, J., Gómez-Dantés, O., & Moon, S. (2014). From sovereignty to solidarity: a renewed concept of global health for an era of complex interdependence. *The Lancet*, 383(9911), 94-97.
3. Conducting an exercise in class with students receiving notecards about the primary function and funding sources of each global health entity and assigned to represent each entity in a round-robin format.

Additional instructional strategies to facilitate students in analyzing could include: case studies, critical incidents, essays, interviews, panel discussions, mapping, audio/visuals, multi-media activities, computer-based tutorials, root cause analysis, needs and assets assessments, and asynchronous online forums.

*Evaluation/Assessment* of the learning objective could be conducted through a pre-defined rubric that the instructor would apply to the students' pre-defined deliverable. For instance, after (1) watching the video, (2) reading the listed papers, and/or (3) participating in the round-robin exercise, students could write a paper outlining each entity's primary function and funding sources, comparing, contrasting, and critiquing each global health entity including, but not limited to:

- WHO
- UN
- CDC
- UNICEF
- World Bank
- Global Fund
- Gates Foundation
- UNAIDS

Additional assessments may include: pre-/post-tests, standardized assessments, presentations, essays, case studies, simulation performance, actual performance, interviews, portfolios, debates, blogs, theses, self-reports, reflection papers, self-evaluations, peer evaluations, and more.

# Sample Resources by Competency

## 1. Analyze the roles, relationships, and resources of the entities influencing global health

- 2030 Agenda for Sustainable Development: <https://sustainabledevelopment.un.org/post2015/transformingourworld>
- Dhillon, R. S., & Karan, A. (2018). The Blind Men and the Elephant—Aligning Efforts in Global Health. *New England Journal of Medicine*, 378(15), 1374-1375.
- Frenk, J., Gómez-Dantés, O., & Moon, S. (2014). From sovereignty to solidarity: a renewed concept of global health for an era of complex interdependence. *The Lancet*, 383(9911), 94-97.
- The Global Fund: <https://www.theglobalfund.org/en/>
- McCoy, D., Chand, S., & Sridhar, D. (2009). Global health funding: how much, where it comes from and where it goes. *Health policy and planning*, 24(6), 407-417.
- The Millennium Project: <http://www.un.org/millenniumgoals/bkgd.shtml>
- Moss, K. (2014). NGO Engagement in U.S. Global Health Efforts: U.S. Based NGOs Receiving USG Support Through USAID, (The Henry J. Kaiser Family Foundation, December 2014).
- National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Global Health; Committee on Global Health and the Future of the United States. Global Health and the Future Role of the United States. Washington (DC): National Academies Press (US); 2017 May 15. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK458474/> doi: 10.17226/24737
- Salve, S., Harris, K., Sheikh, K., & Porter, J. D. (2018). Understanding the complex relationships among actors involved in the implementation of public-private mix (PPM) for TB control in India, using social theory. *International journal for equity in health*, 17(1), 73.
- Szlezák, N. A., Bloom, B. R., Jamison, D. T., Keusch, G. T., Michaud, C. M., Moon, S., & Clark, W. C. (2010). The global health system: actors, norms, and expectations in transition. *PLoS Medicine*, 7(1), e1000183.

## 2. Apply ethical approaches in global health research and practice

- Arya, A. N., & Evert, J. (Eds.). (2017). *Global Health Experiential Education: From Theory to Practice*. Routledge.
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# Appendix

## Sample of Sub-Competencies and Learning Objectives to Supplement CEPH's Accreditation Criteria for Foundational Knowledge and Foundational Competencies for the MPH Degree

### D1 MPH Foundation Knowledge

#### 1 Explain public health history, philosophy and values

- a. Understand definitions, concepts, and principles of the evolving concept of global health, and the policies and processes that underlie its historic development and contemporary context (University of Michigan School of Public Health, n.d.).

#### 2 Identify the core functions of public health and the 10 Essential Services

#### 3 Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health

- a. Conduct formative research (Association of Schools & Programs of Public Health [ASPPH], 2011).
- b. Conduct a situation analysis across a range of cultural, economic, and health contexts (ASPPH, 2011; Jogerst et al., 2015).
- c. Identify the relationships among patterns of morbidity, mortality, and disability with demographic and other factors in shaping the circumstances of the population of a specified community, country, or region (ASPPH, 2011).
- d. Explain economic analyses drawn from socio-economic and health data (ASPPH, 2011).
- e. Implement a community health needs assessment (ASPPH, 2011).
- f. Conduct a community health needs assessment (Jogerst et al., 2015).
- g. Validate the health status of populations using available data (e.g., public health surveillance data, vital statistics, registries, surveys, electronic health records, and health plan claims data) (Jogerst et al., 2015).
- h. Conduct a situational analysis: the ability to analyze a situation in-depth so as to intervene successfully (Auer & Espinel, 2011).\*
- i. Illustrate current and emerging public health priorities for specific regions or nations based on available evidence (Emory University Rollins School of Public Health, 2018).

#### **4 List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program**

- a. Identify the relationships among patterns of morbidity, mortality, and disability with demographic and other factors in shaping the circumstances of the population of a specified community, country, or region (ASPPH, 2011).
- b. Identify how demographic and other major factors can influence patterns of morbidity, mortality, and disability in a defined population.
- c. Describe the major causes of morbidity and mortality around the world, and how the risk for disease varies with regions (Jogerst et al., 2015).
- d. List major social and economic determinants of health and their effects on the access to and quality of health services and on differences in morbidity and mortality between and within countries (Jogerst et al., 2015).
- e. Describe the burden of the most important health problems contributing to excess morbidity and mortality in developing countries, including their magnitude and distribution (Hagopian et al., 2008).
- f. Describe how cultural context influences perceptions of health and disease (Jogerst et al., 2015).
- g. Analyze context-specific causal pathways for the global burden of disease, health interventions, and health system platforms, to set and monitor priorities for action (NYU College of Global Public Health, n.d.).
- h. Describe historical, economic, political, social, and cultural factors that influence the health of populations around the world (Leon et al., 2015).
- i. Culture, social system, social development, and health (Karkee, Comfort, & Alfonso, 2015).
- j. Describe cross-national determinants of health based on courses selected from the five perspectives on public health: biomedicine; epidemiology; psychosocial/social and behavioral/anthropology; development/political economy; ethics/history/humanities. Explain how those determinants vary by age, gender, income quintile within countries, and country income group (Yale School of Public Health, n.d.).\*
- k. Identify relevant sources for quantitative and qualitative data to analyze the global burden of disease (NYU College of Global Public Health, n.d.).
- l. Analyze causes, risk factors, interventions and bottlenecks for the global burden of disease in different contexts (NYU College of Global Public Health, n.d.).
- m. Select relevant data sources to assess the global burden of disease, health interventions, and health system platforms (NYU College of Global Public Health, n.d.).
- n. Analyze global health problems taking into account their social, political, economic, legal, and human rights dimensions (Yale School of Public Health, n.d.).



- o. Describe the major underlying and proximate determinants of adverse health in developing countries (Hagopian et al., 2008).
  - p. Describe upstream socioeconomic and environmental determinants of health (training people in the social determinants of health; shifting the balance of training from cleaning up after inequities to understanding and addressing the social conditions that produce them (Leon et al., 2015).
- 5 Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.**
- a. Discuss prevention strategies in low-resource settings” (ASPPH Interviewee)\*
- 6 Explain the critical importance of evidence in advancing public health knowledge**
- a. Describe both value and limitation of evidence-based literature on understanding the health of individual and communities (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
  - b. Apply scientific evidence throughout program planning, implementation, and evaluation (ASPPH, 2011).
  - c. Propose evidence-based solutions to the key health problems affecting maternal, newborn and child health; adolescent health; and the health of adults (Yale School of Public Health, n.d.).
- 7 Explain effects of environmental factors on a population's health**
- 8 Explain biological and genetic factors that affect a population's health**
- a. Describe public health biology and physiology in how climate, lack of sanitation, geography, and population genetics influence infectious diseases (e.g. neglected tropic diseases) directly or indirectly (e.g., vectors, immune system responses) (ASPPH Interviewee)\*
  - b. Discuss epidemiology, pathology, and case management of diseases (Akbar et al., 2005).\*
- 9 Explain behavioral and psychological factors that affect a population's health**
- 10 Explain the social, political and economic determinants of health and how they contribute to population health and health inequities**
- a. “Describe determinants of health and their link to disparities” (ASPPH Interviewee).\*
  - b. Describe disparities in health status by gender, race, ethnicity, rural/urban status and economic class (Hagopian et al., 2008).
  - c. Analyze distribution of resources to meet the health needs of marginalized and vulnerable groups (ASPPH, 2011).

- d. Describe cross-national determinants of health based on courses selected from the five perspectives on public health: biomedicine; epidemiology; psychosocial/social and behavioral/anthropology; development/political economy; ethics/history/humanities. Explain how those determinants vary by age, gender, income quintile within countries, and country income group (Yale School of Public Health Global Health, n.d.).\*
- e. Conduct a situation analysis across a range of cultural, economic, and health contexts (ASPPH, 2011).
- f. Identify the relationships among patterns of morbidity, mortality, and disability with demographic and other factors in shaping the circumstances of the population of a specified community, country, or region (ASPPH, 2011).

#### **11 Explain how globalization affects global burdens of disease**

- a. Discuss globalization and health (Karkee, Comfort, & Alfonso, 2015).\*
- b. Analyze the growing complexities and interrelatedness of globalization, environmental change, economic development, and political forces that influence global health (Drain et al., 2017).
- c. Describe the political economy of global health issues (Jackson & Cole, 2013).\*
- d. “Describe how globalization is changing the decision-making capacity of governments, regarding trade agreements for example” (ASPPH Interviewee).\*
- e. Describe how global trends in health care practice, commerce and culture, multi-national agreements, and multinational organizations contribute to the quality and availability of health and health care locally and internationally (Jogerst et al., 2015).
- f. Describe how travel and trade contribute to the spread of communicable and chronic diseases (Jogerst et al., 2015).

#### **12 Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)**

- a. Describe the relationship between access to and quality of water, sanitation, food, and air on individual and population health (Jogerst et al., 2015).
- b. Describe the linkages between local and global health problems (Cole et al., 2011).\*
- c. Identify how recent cultural, political-economic, and environmental trends shape health both locally and globally (University of Michigan School of Public Health, n.d.).\*



## **D2 MPH Foundation Competencies**

### **1 Apply epidemiological methods to the breadth of setting and situations in public health practice**

- a. Demonstrate a mastery of epidemiologic and biostatistical approaches to public health issues (Evert, Drain & Hall, 2014)
- b. Discuss epidemiology, pathology, and case management of diseases (Akbar et al., 2005).\*
- c. Describe cross-national determinants of health based on courses selected from the five perspectives on public health: biomedicine; epidemiology; psychosocial/social and behavioral/anthropology; development/political economy; ethics/history/humanities. Explain how those determinants vary by age, gender, income quintile within countries, and country income group (Yale School of Public Health Global Health, n.d.).\*

### **2 Select quantitative and qualitative data collection methods appropriate for a given public health context**

### **3 Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate**

- a. Utilize the many global health data sets available in the public domain (University of Michigan School of Public Health, n.d.).\*
- b. “Discuss the global burden of disease database, the IHME (Institute for Health Metrics and Evaluation) database. ” (ASPPH Interviewee).\*

### **4 Interpret results of data analysis for public health research, policy or practice**

- a. Analyze health literature critically (Hagopian et al., 2008).\*
- b. Interpret relevant literature from the sciences, social sciences, and humanities (Brown, 2014).\*
- c. Identify contextually relevant qualitative and quantitative information from the sciences, social sciences, and the humanities to inform global health work (Brown, 2014).\*
- d. Explain economic analyses drawn from socio-economic and health data (ASPPH, 2011).

### **5 Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings**

- a. Compare and contrast systems of care and the social production of health and well-being in different settings (Brown, 2014).\*
- b. Compare approaches used to address global health issues at global, national, and community levels (Emory University Rollins School of Public Health, 2018).

- c. Describe different national models or health systems for provision of health care and their respective effects on health and health care expenditure (Jogerst et al., 2015).
  - d. Conduct comparative analyses of health systems (ASPPH, 2011).
- 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 societal levels**
  - a. Assess social justice from a standpoint of public health” (ASPPH Interviewee).\*
  - b. Contribute to improving health equity at multiple levels, through systems changes (Cole et al., 2011).
  - c. Demonstrate commitment to global equity, social justice, and sustainable development (Cole et al., 2011).
- 7 Assess population needs, assets and capacities that affect communities' health**
  - a. Conduct formative research (ASPPH, 2011).
  - b. Conduct a situation analysis across a range of cultural, economic, and health contexts (ASPPH, 2011; Jogerst et al., 2015).
  - c. Conduct a situational analysis: the ability to analyze a situation in-depth so as to intervene successfully (Auer & Espinel, 2011).
  - d. Implement a community health needs assessment (ASPPH, 2011); Conduct a community health needs assessment (Jogerst et al., 2015).
  - e. Validate the health status of populations using available data (e.g., public health surveillance data, vital statistics, registries, surveys, electronic health records, and health plan claims data) (Jogerst et al., 2015).
  - f. Analyze illness conditions and health outcomes of concern at the patient and community levels (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012)
  - g. Illustrate current and emerging public health priorities for specific regions or nations based on available evidence (Emory University Rollins School of Public Health, 2018).
  - h. Assist host entity in assessing existing capacity (ASPPH, 2011).
  - i. Collaborate with a host or partner organization to assess the organizations operational capacity (Jogerst et al., 2015).
- 8 Apply awareness of cultural values and practices to the design or implementation of public health policies or programs**
  - a. Exhibit interpersonal communication skills that demonstrate respect for other perspectives and cultures (ASPPH, 2011).

- b. Exhibit interprofessional values and communication skills that demonstrate respect for, and awareness of, the unique cultures, values, roles/responsibilities and expertise represented by other professionals and groups that work in global health (Jogerst et al., 2015).
- c. Analyze context-specific policy making processes that impact health (ASPPH, 2011).
- d. Appreciate natural, cultural, and human diversity (Brown, 2014).\*
- e. Conduct culturally appropriate risk and asset assessment, management, and communication with patients and populations (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- f. Adapt methods to be sensitive to cultural differences in local contexts (Jackson & Cole, 2013).
- g. Assess the impact of acculturation, assimilation, and immigration on health care and wellness (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).

## **9 Design a population-based policy, program, project or intervention**

- a. Plan, implement, and evaluate an evidence-based program (Jogerst et al., 2015).
- b. Apply scientific evidence throughout program planning, implementation, and evaluation (ASPPH, 2011).
- c. Propose evidence-based solutions to the key health problems affecting maternal, newborn and child health; adolescent health; and the health of adults (Yale School of Public Health, n.d.).
- d. Design context-specific health interventions based upon situation analysis (ASPPH, 2011;Jogerst et al., 2015).
- e. “Evaluate the effectiveness of disease control interventions by using the DCP3 (Disease Control Priorities – third volume)” (ASPPH Interviewee).\*
- f. Design program work plans based on logic models (ASPPH, 2011).
- g. Design global health approaches affecting the health status of individuals, communities, and populations around the world (Leon et al., 2015).\*
- h. Apply a determinants-of-health and population health perspective to problem analysis, policy development and project design (Cole et al., 2011).\*
- i. Develop the capacity to influence policies and strategies conducive to life and human health (Auer & Espinel, 2011).\*
- j. Advocate for cost-effective policies and strategies to accelerate progress towards the health related SDGs (NYU College of Global Public Health, n.d.).

- k. Analyze context-specific policy making processes that impact health (ASPPH, 2011).
- l. Critique policies with respect to impact on health equity and social justice (ASPPH, 2011).
- m. Describe multi-agency policy-making in response to complex health emergencies.

## **10 Explain basic principles and tools of budget and resource management**

- a. Develop investment cases for maximum health returns on investment of intervention policies, implementation and financing strategies (NYU College of Global Public Health, n.d.).
- b. Develop proposals to secure donor and stakeholder support (ASPPH, 2011).
- c. “Identify cost-effective intervention strategies and platforms to improve public health outcomes” (ASPPH Interviewee).\*
- d. Identify cost-effective interventions, strategies and platforms to accelerate context-specific progress towards the health related SDGs (NYU College of Global Public Health, n.d.).
- e. Develop financial management skill to mobilize funds, construct and maintain budgets, and align budgets with health needs and country, organizational, and donor requirements (Pfeiffer et al., 2013).\*

## **11 Select methods to evaluate public health programs**

- a. Apply scientific evidence throughout program planning, implementation, and evaluation (ASPPH, 2011).

## **12 Discuss multiple dimensions of the policy-making process, include the roles of ethics and evidence**

- a. Analyze local and global health problems through an appreciation of the impacts on health of economic factors, trade policy, environmental policy, culture, politics, and other dimensions of globalization (UNC Gillings School of Public Health, n.d.).
- b. Apply a determinants-of-health and population health perspective to problem analysis, policy development and project design (Cole et al., 2011).\*
- c. Develop the capacity to influence policies and strategies conducive to life and human health (Auer & Espinel, 2011).\*
- d. Analyze context-specific policy making processes that impact health (ASPPH, 2011).
- e. Describe multi-agency policy-making in response to complex health emergencies.

- f. Critique policies with respect to impact on health equity and social justice (ASPPH, 2011).

### **13 Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes**

- a. Build coalitions and work in partnership with the NGO sector and local community organizations (Cole et al., 2011).
- b. Describe the role of community engagement in health care and wellness (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- c. Engage community partners in actions that promote a healthy environment and healthy behaviors (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- d. Promote inclusion of representatives of diverse constituencies in partnerships (ASPPH, 2011).
- e. Value commitment to building trust in partnerships (ASPPH, 2011).

### **14 Advocate for political, social or economic policies and programs that will improve health in diverse populations**

- a. Develop negotiation and advocacy strategies to understand and direct change processes in relation to a given problem or challenge that is shared by different groups or institutions (Auer & Espinel, 2011).
- b. “Advocate for the allocation of resources for a context-specific public health problem” (ASPPH Interviewee).\*
- c. “Advocate for cost-effective policies through the allocation of resources using the most current data/databases to improve public health outcomes in specific geographies” (ASPPH Interviewee).\*
- d. Design health advocacy strategies (ASPPH, 2011).
- e. Advocate for the importance of global health (Emory University Rollins School of Public Health, 2018).
- f. Use collaborative and culturally relevant leadership skills to advocate for evidence-based policies and plans to solve health problems in international settings (Hagopian et al., 2008).

### **15 Evaluate policies for their impact on public health and health equity**

- a. Analyze context-specific policy making processes that impact health (ASPPH, 2011).
- b. Apply a determinants-of-health and population health perspective to problem analysis, policy development and project design (Cole et al., 2011).\*
- c. Develop the capacity to influence policies and strategies conducive to life and human health (Auer & Espinel, 2011).\*

- d. Critique policies with respect to impact on health equity and social justice (ASPPH, 2011).

**16 Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making**

- a. Apply necessary leadership skills to serve as bridges between the global health research and practice settings (Yale School of Public Health, n.d.).
- b. “Construct respectful partnerships where there are power differentials” (ASPPH Interviewee).\*
- c. Integrate self-determination, empowerment, and community participation in [global health] contexts (Cole et al., 2011).\*
- d. Implement strategies to engage marginalized and vulnerable populations in making decisions that affect their health and well-being (ASPPH, 2011; Jogerst et al., 2015).
- e. Cocreate strategies with the community to strengthen community capabilities, and contribute to reduction in health disparities and improvement of community health (Jogerst et al., 2015).
- f. Demonstrate shared decision making (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- g. Value commitment to building trust in partnerships (ASPPH, 2011).
- h. Demonstrate willingness to be mentored across borders (Cole et al., 2011).
- i. Mentor others and develop long-term relationships of trust locally and globally (Cole et al., 2011).
- j. Develop strategies that strengthen community capabilities for overcoming barriers to health and well-being (ASPPH, 2011).
- k. Communicate lessons learned to community partners and global constituencies (ASPPH, 2011).
- l. Collaborate with a host or partner organization to assess the organization’s operational capacity (Jogerst et al., 2015).
- m. Apply (community) constituent/patient-centered principles to earn trust and credibility (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- n. Develop project management strategies to establish relationships and research collaborative agreements that are mutually beneficial in order to achieve specific objectives (Auer & Espinel, 2011).\*
- o. “Develop collaborative learning strategies so partners can impart their deep knowledge of the community and context” (ASPPH Interviewee).\*

## **17 Apply negotiation and mediation skills to address organizational or community challenges**

- a. Develop negotiation and advocacy strategies to understand and direct change processes in relation to a given problem or challenge that is shared by different groups or institutions (Auer & Espinel, 2011).

## **18 Select communication strategies for different audiences and sectors**

- a. Communicate effectively across disciplines and cultures (Cole et al., 2011).
- b. Communicate global health issues, causes, and solutions to diverse stakeholders including practitioners, lay audiences, policy staff, media, and scientists (Yale School of Public Health, n.d.)\*
- c. Apply, as a member of inter-disciplinary team, communication strategies to advocate for intervention policies, system strengthening, equitable strategies, or investments (NYU College of Global Public Health, n.d.).\*

## **19 Communicate audience-appropriate public health content, both in writing and through oral presentation**

- a. Apply communication skills (negotiation, mentoring, conflict resolution, advocacy, and liaison (Akbar et al., 2005).\*
- b. Communicate innovative information about international health (Auer & Espinel, 2011).\*
- c. Formulate an argument and communicate it effectively to key stakeholders in order to achieve a desired outcome (Auer & Espinel, 2011).\*
- d. Communicate lessons learned to community partners and global constituencies (ASPPH, 2011); Communicate joint lessons learned to community partners and global constituencies (Jogesrt et al., 2015).
- e. Communicate with colleagues, patients, families, and communities about health disparities and health care disparities

## **20 Describe the importance of cultural competence in communicating public health content**

- a. Communicate in a culturally competent manner with patients, families, and communities (Expert Panel on Cultural Competence Education for Students in Medicine and Public Health, 2012).
- b. Exhibit interpersonal communication skills that demonstrate respect for other perspectives and cultures (ASPPH, 2011).



## **21 Perform effectively on interprofessional teams**

- a. Adopt interprofessional values and communication skills that demonstrate respect for, and awareness of, the unique cultures, values, roles/responsibilities and expertise represented by other professionals and groups that work in global health (Jogerst et al., 2015).\*
- b. Articulate shared goals, ethics, and values within diverse teams (Brown, 2014).
- c. Assess global health issues from an interdisciplinary perspective, including public health disciplines, medicine, international relations, environmental studies, political science, law, anthropology, economics and others (Yale School of Public Health, n.d.).
- d. Partner with interprofessionals to optimize the potential of one's scope of practice within the context of a team (Brown, 2014).\*
- e. Apply leadership practices that support collaborative practice and team effectiveness (Jogerst et al., 2015).
- f. Integrate the core public health disciplines into team-based problem identification and solution-finding (Emory University Rollins School of Public Health, 2018).
- g. Propose serving an interprofessional team through consultation or advisory skills (Akbar et al., 2005).\*

## **22 Apply systems thinking tools to a public health issue**

- a. Contribute to improving health equity at multiple levels, through systems changes (Cole et al., 2011).
- b. "Incorporate systems thinking with planning, management, leadership, health systems, policy, and multi-sectorial partnerships, and many other things" (ASPPH Interviewees).\*
- c. Integrate health in a systemic way within and beyond the health sector by addressing upstream determinants that affect health (Pfeiffer et al., 2013).\*
- d. Consider structural interventions where community-level interventions are more appropriate than at the individual level (Evert, Drain & Hall, 2014)
- e. Contribute to improving health equity at multiple levels, through systems changes (Cole et al., 2011).