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Key Environmental Health Competencies for Rural Primary Care Providers

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EXECUTIVE SUMMARY

Background: Providing health care that considers environmental determinants of health, environmental impact on health, and outcomes attributed to environmental issues is complex due to the need for providers to be competent not only in social and health sciences, but also in environmental health concepts. Primary health care providers in rural communities must be able to assess community environmental needs, perform problem analysis, program planning and implementation, and develop evaluation strategies. However, few primary health care providers are trained in environmental health conditions and history taking, even though poor environmental quality is estimated to be directly responsible for a significant proportion of preventable ill health in the world. The integration of environmental health competencies into current and future entry level and professional continuing education programs for rural primary care providers will be an essential policy direction. National organizations which delineate basic practice competencies should specifically include environmental health competencies in entry level rural primary care education programs. Health issues related to environmental exposures and hazards may have nonspecific symptoms or manifest themselves as common health problems, making environmental competency vital for correct diagnosis, referral and intervention. While the degree of involvement of the rural primary care provider in environmental health issues is recognized to depend on the local community, the severity of the environmental issue, and their degree of expertise and investment, the purpose of this study was to develop a set of basic environmental health competencies that are needed by all rural primary care providers.

Methods: The development of key environmental health competencies for rural primary care providers was undertaken systematically, first through a review of discipline specific competencies developed by a variety of entities including departments of environmental and public health, professional organizations, education organizations, and others. Numerous sources were obtained through searches in a variety of databases and various search terms. Investigators used a rigorous process for reviewing all the potentially relevant abstracts using the formal study inclusion/exclusion criteria. After full evaluation of all selected papers, items of interest extracted were competencies from multiple health care disciplines including medicine, nursing, epidemiology, environmental and occupational medicine, and public health.

In March of 2009, a consensus conference was held in Washington, D.C. with 10 key experts from environmental health, public health, rural health, and specific key primary care

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disciplines to develop the *Key Environmental Health Competencies for Rural Primary Care Providers* guide. Invitees represented various organizations in rural health, environmental health, and primary care practice and education. Experts agreed that their vision was “*rural primary care providers are competent partners in helping to heal the Earth and its people*” and that their mission was “*to develop a draft set of environmental health competencies for rural primary care providers*” for future testing. A framework for organization of competencies, based on a primary care framework, was adopted by the group to organize the competencies. The experts agreed upon some common definitions (compiled from a number of sources) of terms to guide their work. A draft of the competency guide emerged at the end of this consensus conference. Additional meetings were convened using electronic mail and teleconferencing technology to resolve minor outstanding issues in the guide development.

Next, the competency guide items were tested for clarity, content validity and applicability. We used a web based survey process to validate the competency guide. Working with national organizations and associations, we released a survey to stakeholders using email blasts, newsletters, our website, and social networking media. The survey provided background on the study, the definitions developed through the consensus process, and the competency document. Each competency was able to be viewed in the document and respondents were asked to respond to questions about item clarity, content validity and applicability. To analyze the clarity, content validity, and applicability of each item in the competency guide, ratings were evaluated for percentage agreement among the respondents. The refined guide, along with the agreement statistics and comments, were then reviewed by the experts from Phase One of the study prior to dissemination. The refined competency guide that resulted from these efforts is found in this report.

Policy Implications: The integration of the key environmental health competencies into current and future entry level and professional continuing education programs for rural primary care providers will be an essential policy direction. National organizations which delineate basic practice competencies should consider adopting the results of this work for inclusion in entry level rural primary care education programs. Bodies that provide accreditation to programs preparing rural primary care providers may choose to reflect these competencies as essential elements of those training programs. Professional organizations that support rural primary care can contribute to the development of these competencies in the workforce through integration of the competencies into future professional education programs. Our Center plans to use the competencies to develop a web based guide of available resources to aid in the development of these competencies in rural primary care providers. In the future, it is our vision to develop a series of interactive regional maps linking environmental risks to geographic regions and provider resources available relative to those risks.

Future Research: Future studies will use the competency guide to develop and test provider education programs in discipline-specific or interdisciplinary programs in rural settings. Future studies may also analyze the relationship between the use of these competencies in rural health education, practice, and service delivery and health outcomes in rural areas.

ABSTRACT

Background: Providing health care that considers environmental determinants of health, environmental impact on health, and outcomes attributed to environmental issues is complex due to the need for providers to be competent not only in social and health sciences, but also in environmental health concepts.

Purpose: The purpose of this study was to develop a set of basic environmental health competencies that are needed by all rural primary care providers to direct health care and education policy.

Methods: In phase one, we used established discipline specific competencies, as well as expert stakeholder knowledge, to develop a competency guide during a consensus conference. The competencies were rigorously evaluated in phase two of the study by additional clinicians, academics and experts in the areas of clarity, content validity and applicability to the rural primary care provider. The guide was further refined through consensus of the original developers.

Results: The final competency guide delineates key environmental health competencies for rural primary care providers. A primary care framework of assessment, diagnosis, management and evaluation organizes the competencies by levels of care and influence for the rural primary care provider; the individual, the family and community, and the health care system. Key definitions of terms are provided.

Policy and Future Implications: The integration of the key environmental health competencies into current and future entry level and professional continuing education programs for rural primary care providers will be an essential policy direction. Environmental health competencies should be included in accreditation standards for all programs preparing primary care providers. Future research should test the relationship of competency development in environmental health in primary care providers to health outcomes in rural communities.

INTRODUCTION

Providing health care that considers environmental determinants of health, environmental impact on health, and outcomes attributed to environmental issues is complex due to the need for providers to be competent not only in social and health sciences, but also in environmental health concepts. Areas of the environment considered to impact health include the built environment, food, air, water, land use, and waste water. These human-made features may include direct pollution sources but may also include aspects of the larger social, economic or built environment that differentially place some portions of the rural population at greater risk than others. The combination of exposure to environmental contaminants and place-based stressors such as socioeconomic hardship increase the risk for poor health outcomes. Primary health care providers in rural communities must be able to assess community environmental needs, perform problem analysis, program planning and implementation, and develop evaluation strategies. However, few primary health care providers are trained in environmental health conditions and history taking^{1,2}, even though poor environmental quality is estimated to be directly responsible for approximately 25% of all preventable ill health in the world, and the total costs of environmentally attributable diseases in American children alone have been estimated at 54.0 billion dollars annually³.

Most professions have moved away from learning objectives as a framework for education and training programs and now express learning needs in the form of competency statements, an expression of what a professional should be able to do rather than an expression of what a program will provide⁴. Although there will be differences in the level of environmental competency needed for certain aspects of rural primary health care provision, basic knowledge and concepts of environmental assessment and referral, advocacy within communities, risk communication, and legislative and regulatory impact are competencies that should be shared across primary care disciplines.

Because of the risks inherent in rural communities, from the physical environment including hazards and terrain, to social and occupational risks, all primary care providers in rural areas need to be competent in basic environmental health care. Health issues related to environmental exposures and hazards may have nonspecific symptoms or manifest themselves as common health problems, making environmental competency vital for correct diagnosis, referral and intervention. While the degree of involvement of the rural primary care provider in environmental health issues is recognized to depend on the local community, the severity of the environmental issue, and their degree of expertise and investment, the purpose of this study was to develop a set of basic environmental health competencies that are needed by rural primary care providers.

METHODS

The first step in the development of key environmental health competencies for rural primary care providers was to gather existing, discipline specific competencies developed by a variety of entities including departments of environmental and public health, professional organizations, education organizations, and others. Resources were identified and compiled after an exhaustive web and literature search, as well as through key informant contacts from November 12 through December 30, 2008. Literature searches of PubMed (4563 hits), CINAHL (601 hits), Cochran Library (5464 hits), ScienceDirect (5734 hits), Social Work Abstracts (242 hits), Social Work Abstracts Plus (2 hits), MEDLINE (3011 hits), POPLINE (0 hits), and TOXNET (134 hits) were performed along with database searches on Global Health Database in OVID (7762 hits) and Lexis-Nexis (1434 hits). Google (9912 hits) and Google Scholar (3040900 hits) searches were also included. MeSH terms and keywords used included: environmental health competencies, environmental health guidelines, public health competencies, rural health competencies, rural health care, occupational health competencies,

EMT competencies, nursing competencies, dental competencies, dietetic competencies, medical competencies, and social work competencies. Through the combination of MeSH terms and keywords, (public health AND competencies, environmental health AND competencies, rural health AND competencies, rural health care AND characteristics, social work AND competencies, occupational AND environmental competencies, and environmental AND illness), we were able to narrow the search considerably. We also examined the bibliographies in existing systematic reviews for additional studies.

Data Extraction: One reviewer initially screened abstracts for possible inclusion as source materials for competency development. This initial screening used very broad criteria to ensure that all potentially relevant abstracts found during the search were included. This screening yielded 398 documents. A second investigator reviewed all the potentially relevant abstracts using the formal study inclusion/exclusion criteria which included:

- the document referred to a specific discipline of interest in this project (medicine, nursing, nurse practitioner, physician assistant) or to a field of interest (public health, environmental health, occupational health, rural health) or
- the document described assessment or evaluation of competencies within the disciplines of interest.

This screening yielded 148 documents. The full papers of the eligible abstracts were retrieved and examined in full detail. After full evaluation of all selected papers, items of interest extracted were competencies from the health care disciplines including medicine, nursing, epidemiology, environmental and occupational medicine, and public health. We further narrowed for resource materials for the consensus conference to include only documents that included competencies designed/or validated by experts. These final resource materials included 17 documents. These references are found in Appendix I.

Consensus Process

On March 20, 2009, a consensus conference was held in Washington, D.C. with 10 key experts from environmental health, public health, rural health, and specific key primary care disciplines to develop the *Key Environmental Health Competencies for Rural Primary Care Providers* guide. Invitees represented various organizations in rural health, environmental health, and primary care practice and education. We invited sixteen organizations to provide a representative to the conference. Eight organizations sent a total of ten experts to participate in this consensus process. The participating organizations included:

- American Academy of Family Physicians
- American Academy of Nurse Practitioners
- American Academy of Physician Assistants
- American Association of Colleges of Nursing
- Centers for Disease Control and Prevention/Agency for Toxic Substances & Disease Registry
- Centers for Disease Control and Prevention/National Center for Environmental Health/Environmental Services Branch
- Centers for Disease Control and Prevention/National Center for Health Statistics
- National Association of Local Boards of Health
- National Environmental Health Association
- National Rural Health Association

These experts agreed that their vision was “**rural primary care providers are competent partners in helping to heal the Earth and its people**” and that their mission was “**to develop**

a draft set of environmental health competencies for rural primary care providers” for future testing.

The consensus conference was managed by a skilled facilitator, using a consensus model⁵ (Appendix II) to guide interactions. The seventeen resource documents (Appendix I) found in the literature review stage were shared for reference materials with consensus conference participants in advance of the consensus meeting via a secure web site. In addition, these resources were available onsite to participants during the consensus meeting. A framework for organization of competencies, based on a primary care framework, was adopted by the group to organize the competencies. This framework includes the major functional areas of rural primary care providers (Assessment, Diagnosis, Management/Intervention, and Evaluation) along the vertical matrix, and the primary care foci of interest (Individuals, Communities, and Health care delivery systems) along the horizontal matrix.

Throughout the consensus process, the expert group adopted the following guiding principles for their work:

1. The primary care provider role should be used as the “lens” in looking at each competency. The group used this principle to guide their decision making relative to inclusion of competencies, with the following two questions serving as practical guides in their thinking:
 - a. What is so important that it must be done at 8:00 pm after a busy day in primary care?
 - b. How do we keep primary care providers engaged given the increasing responsibilities of the PCP in rural areas?
2. Health promotion, disease prevention, wellness and health protection are essential concepts when considering competencies for rural primary care providers. Some competencies included in this document may already be standard in primary care, but may need special attention as they relate to environmental health issues. The degree of involvement of the primary care provider will depend on the local community, resources, severity of issues, and degree of expertise.
3. Linkages and referrals are essential concepts to consider as competencies are considered and developed. Knowledge of partners, larger institutions that can serve as resources at the individual, community and health care delivery systems level is critically important. Primary care providers in rural communities have experience with building connections within and outside of the community which can be used to realize desired outcomes relative to environmental health.
4. Public policy affects health care access and delivery at all levels. Hence, communities are viewed and interacted with based on their strengths and assets rather than deficits.

The experts also agreed upon some common definitions (compiled from a variety of sources) of terms to guide their work (Table 1). A draft of the competency guide emerged at the end of this consensus conference. Additional meetings were convened using electronic mail and teleconferencing technology to resolve minor outstanding issues in the guide development.

The next phase of the study tested the competency guide items for clarity, content validity and applicability. We selected a web based survey process to validate the competency guide. This portion of the study qualified as exempt from review by the West Virginia University/Charleston Area Medical Center Institutional Review Board.

In August 2009, working with national organizations and associations, we released a survey via SurveyMonkey © to stakeholders in a variety of ways. We asked organizations whose missions relate to environmental health, rural health, and primary care to participate in this phase of the study. Depending on organizational policy, these groups assisted us in the dissemination of the validation survey to their constituencies through either email invitations, providing us with access to their email lists, linking the survey to their website, or other methods

of dissemination as appropriate to the organization. Additionally we used our website and social networking media (including Twitter) to invite responses along with purchasing a mailing list from the American Medical Association for a targeted email blast to members identified as primary care providers. Invitations to participate in the survey included the purpose and intent of the study. The actual survey provided background on the study, the definitions developed through the consensus process, and the competency document. We collected brief demographics from each respondent. Each competency was able to be viewed in the document and respondents were asked to complete the following three questions for each:

1. Clarity: Is this competency clear to you?
2. Content Validity: Does this competency belong where it is placed in the framework?
3. Applicability: Is this competency essential for the rural primary care provider?

RESULTS

The validation survey was available online from August 2009 through January 2010. A total of 113 people responded to the survey during this time period. Since it is impossible to know how many potential respondents received the invitation, no response rate is calculated. Demographics of the respondents are found in Table 2. We sought to have adequate representation from each primary care discipline of interest in this study (physician, nurse practitioner, physician assistant) as well as other disciplines of interest. In addition, we sought representation from a variety of practice types and rural areas. As is evidenced in the Demographics presented in Table 2, a mix of primary care, education and public health disciplines were represented in the respondents. The respondents represented a variety of practice types, including public and private practices. The respondents reported their practice sites according to Rural Urban Continuum Codes⁸. These were evenly distributed between Metropolitan and Non Metropolitan counties. A majority of respondents had over 15 years of experience in rural primary care or related disciplines. In this sample, a majority of respondents had recent (within the last year) continuing education on environmental health topics.

To analyze the clarity, content validity, and applicability of each item in the competency guide, response frequencies to each survey item were tabulated. The quantitative rating procedure for these items used percentage agreement (frequencies) among the respondents. This method was chosen because multiple experts assessed a given item, and it is a method that can be used to screen for the final selection of content valid items⁶. The *a priori* criterion for clarity, content validity, and applicability was set at 80% agreement. This percentage agreement criteria was based on the general consensus among behavioral scientists as 70% being necessary, 80% being adequate, and 90% being good⁷. Percent agreement scores for original survey items are found in Table 3. The investigators reviewed the statistics for each item and all comments provided by respondents. This input was used to refine the competency guide. The refined guide, along with the agreement statistics and comments, were then reviewed by the experts from Phase One of the study prior to dissemination. The final, refined competency guide is found in Table 4. Identified competencies span the scope of responsibility of the primary care provider from assessment to evaluation; and are identified for all levels of care—individual, community and health care delivery systems.

POLICY IMPLICATIONS AND FUTURE RESEARCH

The integration of these competencies into current and future entry level and professional continuing education programs for rural primary care providers will be an important policy direction. In particular, national organizations which delineate basic practice competencies should adopt the results of this work for inclusion in entry level rural primary care education programs. Bodies that provide accreditation to programs preparing rural primary care providers should reflect these competencies as essential elements of those training programs.

Professional organizations that support rural primary care can also contribute to the development of these competencies in the workforce through integration of the competencies into future professional education programs. Funding priorities for development of training programs to support the development of these competencies in the rural primary care workforce should be developed. Funding mechanisms to evaluate the impact of the development of these competencies in rural primary care providers on the health of the people and communities they serve should be developed.

Our Center will use the competencies to develop a web based guide of available resources to aid in the development of these competencies in rural primary care providers. In the future, it is our vision to develop a series of interactive regional maps linking environmental risks to geographic regions and provider resources available relative to those risks. Future studies will use the competency guide to develop and test provider education programs in discipline-specific or interdisciplinary programs in rural settings. Future studies may also analyze the relationship between the use of these competencies in rural health education, practice, and service delivery and health outcomes in rural areas.

CONCLUSIONS

The competency guide that has emerged provides a basis for knowledge and competency development for rural primary care providers. As attention to environmental issues increases across the country and the globe, rural primary care providers will see an increase in the frequency of patients who present with health issues related to the environment. The experts involved in the development of these competencies agree that the primary care provider in a rural community serves as the “canary in the coal mine”, potentially discovering health issues that may be linked to the environment, developing and implementing a plan of care, mobilizing action and resources, and advocating for environmental change. Knowledge of partners, larger institutions, and the public health system that can be used as resources at the individual, community and health care delivery systems levels is critical for the rural primary care provider to assure environmentally competent care. The rural primary care provider becomes involved in health promoting activities, disease prevention, promotion of wellness, and health protection as they relate to environmental health, contributing to a healthier rural population.

Table 1: Definitions for terms found in the *Key Environmental Health Competencies for Rural Primary Care Providers* guide*

Assessment: the systematic and continuous collection, validation and selection of data from a variety of sources.
Collaboration: a process where two or more people or organizations work together toward an intersection of common goals by sharing knowledge, learning and building consensus. Collaboration is the process of various individuals, groups, or systems working together but at a significantly higher degree than through coordination or cooperation.
Community: the geographical area served with consideration given to social, cultural, economic, and political populations.
Diagnosis: the identification or determination of the nature and cause of a disease or injury.
Environmental competence: the ability of both public and private health providers and policymakers to be sensitive and appropriately responsive to the constellation of physical, social, and economic environments in which patients and populations live.
Environmental health literacy: the ability of an individual to access, understand, and use environmental

health-related information and services to make appropriate health decisions.
Environmental health resources: sources of environmental health information, support or aid that can be readily drawn upon when needed, including but not limited to education programs, materials, data, and human expertise. Examples may include local health departments, water testing services, community assessment data, etc.
Environmental health variations: health patterns or aberrations (examples include illness or injuries) in a clinical presentation that may be attributed to the environment.
Environmental literacy: the range of knowledge, skills and abilities that enable people to understand the information needed to lessen environmental risk and take positive corrective actions.
Environmental reality: recognition that where a patient lives and works (city, county, mountains, etc.) as well as culture and lifestyle may affect the practical implementation and follow-up of such health care.
Environmental risk communication: the ability of health professionals to communicate with those they serve, so they hear, understand, embrace, and put into action the information and science providers share with them, so they will make good choices for their health and safety.
Evaluation: the measurement of plan goals and expected results.
Health care delivery systems: a continuum of care made up of collaborations and partnerships strategically in place by intentional design. Members may include: Hospitals, PCP's, Specialty care, EMS/first responders, Long Term Care/Assisted living, Educational institutions, Communities, Hospice, Public Health, Other partners (NIOSH, EPA, CDC, etc), Mental Health, Dental Care, Public Works, Environmental Health.
Infrastructure: the basic structure, capital, or features of a system or organization needed for the functioning or the services and facilities necessary for a community, society, or economy to function and that have a direct impact to the quality of life
Individuals/Patients: participants in the health care system for the purpose of receiving therapeutic, diagnostic, or preventive procedures who for the purpose of this project are considered to include individuals, family, significant others, friends as a unit who will benefit from environmentally competent care by rural primary care providers.
Management/Intervention: the development and implementation of the plan of care based on specific diagnoses or identified needs.
Rural primary care provider: a practitioner who sees people for common health problems, to provide preventive care and teach healthy lifestyle choices; identify and treat common medical conditions; assess the urgency of health problems and make referrals to specialists when necessary. For the purpose of this work, rural primary care providers include physicians, nurse practitioners and physician assistants.
Rural environmental risk: human-made or natural features of the rural landscape that expose rural populations to health risks. Areas of the environment considered to impact health include the built environment, food, air, water, land use, and waste water. These features may include direct pollution sources but may also include aspects of the larger social, economic or built environment that differentially place some portions of the rural population at greater risk than others. The combination of exposure to environmental contaminants and place-based stressors such as socioeconomic hardship increase the risk for poor health outcomes.
<i>*compiled from a variety of sources</i>

Table 2: Demographics of respondents

	Number	Percent
Primary Discipline		
Primary Care	18	16.5%
Other Health Professions	8	7.3%
Faculty	24	22.0%
Public Health	59	54.1%
<i>Within Primary Care Discipline</i>		
Family Medicine Physician	9	50.0%
General Internal Medicine Physician	1	5.6%
Physician Assistant	2	11.1%
Nurse Practitioner	5	27.8%
Other	1	5.6%
<i>Within Other Health Professions Discipline</i>		
Other Advanced Practice Nurse	2	28.6%
Health Administrator	1	14.3%
Other	4	57.1%
<i>Within Faculty Discipline</i>		
Medicine	6	25.0%
Nursing	7	29.2%
Environmental Health	11	45.8%
<i>Within Public Health Discipline</i>		
Administrator	6	10.2%
Nurse	3	5.1%
Environmental Health Specialist	28	47.5%
Sanitarian	11	18.6%
Educator	3	5.1%
Epidemiologist	1	1.7%
Environmental Health Inspector	4	6.8%
Environmental Health Technician	2	3.4%
Other	1	1.7%
Primary Practice or Employment Sector		
Private Practice - Primary Care	5	4.8%
Private Practice - Specialty Care	1	1.0%
Clinic Practice - Rural Health Clinic	1	1.0%
Clinic Practice - Federally Qualified Health Center	2	1.9%

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Clinic Practice - Other	2	1.9%
Public Health - State Health Department	7	6.7%
Public Health - County Health Department	26	24.8%
Public Health - Local Health Department	18	17.1%
Hospital - Critical Access	0	0%
Hospital - Community	4	3.8%
Hospital - Academic Medical Center	3	2.9%
Hospital - Other	1	1.0%
College - Public	22	21.0%
College - Private	3	2.9%
Other	10	9.5%
Location of Practice/Employment (By Rural Urban Continuum Codes) ⁸		
Metropolitan Counties		
County in a metropolitan area with 1 million population or more	12	12.3%
County in a metropolitan area with 250,000 to 1 million population	20	20.4%
County in metropolitan area of fewer than 250,000 population	18	18.4%
Total	50	51.1%
Non Metropolitan Counties		
Urban area with a population of 20,000 or more and is adjacent to a metropolitan area	12	12.2%
Urban area with a population of 20,000 or more and is NOT adjacent to a metropolitan area	10	10.2%
Urban area with a population of 2,500-19,999 and is adjacent to a metropolitan area	2	2.0%
Urban area with a population of 2,500-19,999 and is NOT adjacent to a metropolitan area	10	10.2%
Completely rural area or area that has less than 2,500 urban population that is adjacent to metropolitan area	3	3.1%
Completely rural area or area that has less than 2,500 urban population and is NOT adjacent to metropolitan area	11	11.2%
Total	48	48.9%
Years of Total Employment Experience in Primary Discipline		
Less than 5	17	17.3%
Between 6-10	20	20.4%
Between 11-15	8	8.2%
Between 16-20	13	13.3%
More than 20	40	40.8%

Years Employed in Current Position		
Less than 5	39	39.8%
Between 6-10	22	22.4%
Between 11-15	12	12.2%
Between 16-20	9	9.2%
More than 20	16	16.3%
Currently Providing Direct Patient Care in a Rural Primary Care Setting		
Yes	13	13.3%
No	85	86.7%
<i>Within direct patient care - Years of experience providing direct patient care in a rural primary care setting</i>		
Less than 5	3	23.1%
Between 6-10	2	15.4%
Between 11-15	1	7.7%
Between 16-20	3	23.1%
More than 20	4	30.8%
Ever Received Continuing Education/Professional Development Training on Environmental Health Issues		
Yes	83	85.6%
No	14	14.4%
Length of Time since Receiving Continuing Ed/Professional Development Training on Environmental Health Issues		
Less than 1 year	66	79.5%
Between 1-3 years	8	9.6%
Between 4-6 years	5	6.0%
Between 7-10 years	2	2.4%
More than 10 years ago	2	2.4%
Currently Employed in an Environmental Health Specialist/Sanitarian Role		
Yes	51	52.6%
No	46	47.4%
<i>Within Environmental health specialist/sanitarian role - Years employed</i>		
Less than 5	16	32.7%
Between 6-10	9	18.4%
Between 11-15	6	12.2%
Between 16-20	6	12.2%
More than 20	12	24.5%

<i>Within Environmental health specialist/sanitarian role - Area of environmental health services spend majority of time</i>		
General Environmental Health Services	12	23.5%
Food Protection	14	27.5%
Wastewater inspection	10	19.6%
Solid and Hazardous waste inspection	1	2.0%
Potable water inspection	2	3.9%
Institutions and licensed establishment inspections	1	2.0%
Swimming pool and recreational facility inspections	1	2.0%
Housing inspections	0	0
Hazardous materials inspection	0	0
Radiation protection	0	0
Occupational safety and health	2	3.9%
Air quality and noise inspections	2	3.9%
Disaster sanitation and emergency planning	1	2.0%
Biomonitoring	0	0
Other	5	9.8%

Table 3: Original “Key Environmental Health Competencies for Rural Primary Care Providers” guide with percent agreement scores

Competency	Percent Agreement
<i>Assessment / Individual Competency #1</i>	
<i>Integrate environmental health questions into a comprehensive history-social history/review of systems.</i>	
Clarity: Is this competency clear to you?	90.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	96.7% Yes
<i>Assessment / Individual Competency #2</i>	
<i>Recognize environmental health variations.</i>	
Clarity: Is this competency clear to you?	81.7% Clear
Content Validity: Does this competency belong where it is placed in the framework?	88.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	95.0% Yes
<i>Assessment / Individual Competency #3</i>	
<i>Recognize importance of PCP role in first discovery of health issues that may be linked to the environment.</i>	

Clarity: Is this competency clear to you?	96.6% Clear
Content Validity: Does this competency belong where it is placed in the framework?	93.2% Yes
Applicability: Is this competency essential for the rural primary care provider?	95.0% Yes
<i>Assessment / Individual Competency #4</i> <i>Know how and where to access information/data or personnel resources related to environmental hazards and health.</i>	
Clarity: Is this competency clear to you?	94.8% Clear
Content Validity: Does this competency belong where it is placed in the framework?	89.8% Yes
Applicability: Is this competency essential for the rural primary care provider?	98.3% Yes
<i>Assessment / Individual Competency #5</i> <i>Analyze information provided by resources in order to develop differential diagnoses and plan.</i>	
Clarity: Is this competency clear to you?	93.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	89.8% Yes
Applicability: Is this competency essential for the rural primary care provider?	98.3% Yes
<i>Assessment / Individual Competency #6</i> <i>Possess an awareness of individual's occupational/environmental risks.</i>	
Clarity: Is this competency clear to you?	93.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	96.6% Yes
Applicability: Is this competency essential for the rural primary care provider?	94.9% Yes
<i>Assessment / Individual Competency #7</i> <i>Possess an awareness of cultural influences into an individual's environmental risks.</i>	
Clarity: Is this competency clear to you?	86.4% Clear
Content Validity: Does this competency belong where it is placed in the framework?	91.4% Yes
Applicability: Is this competency essential for the rural primary care provider?	86.2% Yes
<i>Assessment / Community Competency #1</i> <i>Access key environmental assessment data at community level in rural areas.</i>	
Clarity: Is this competency clear to you?	90.6% Clear
Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes

Applicability: Is this competency essential for the rural primary care provider?	84.6% Yes
<i>Assessment / Community Competency #2 Identify environmental resources including local, county, state, federal and tribal and compile and gather relevant and appropriate information when needed to improve rural health.</i>	
Clarity: Is this competency clear to you?	94.3% Clear
Content Validity: Does this competency belong where it is placed in the framework?	98.1% Yes
Applicability: Is this competency essential for the rural primary care provider?	81.1% Yes
<i>Assessment / Community Competency #3 Use information technology to access data as needed relative to environmental risk in rural communities.</i>	
Clarity: Is this competency clear to you?	94.3% Clear
Content Validity: Does this competency belong where it is placed in the framework?	94.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	88.7% Yes
<i>Assessment / Community Competency #4 Possess an awareness of community environmental health risks and infrastructure.</i>	
Clarity: Is this competency clear to you?	90.6% Clear
Content Validity: Does this competency belong where it is placed in the framework?	96.2% Yes
Applicability: Is this competency essential for the rural primary care provider?	92.5% Yes
<i>Identify current health care delivery systems resources. a. Use tools to gain general environmental literacy ("information technology") b. Access public health and others to gain specific environmental information</i>	
Clarity: Is this competency clear to you?	77.4% Clear
Content Validity: Does this competency belong where it is placed in the framework?	92.5% Yes
Applicability: Is this competency essential for the rural primary care provider?	88.7% Yes
<i>Assessment / Health care delivery systems Competency #2 Recognize health variations that may be attributed to the environment that require collaborations with public health and others.</i>	
Clarity: Is this competency clear to you?	92.5% Clear
Content Validity: Does this competency belong where it is placed in the framework?	94.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	98.1% Yes

<p align="center"><i>Diagnosis / Individual Competency #1</i></p> <p><i>Use individual environmental data to aid in diagnosis of disease, conditions, and health problems in rural primary care patients.</i></p> <p align="center"> <i>a. Occupational</i> <i>b. Recreational</i> <i>c. Social</i> <i>d. Home</i> <i>e. Community(e.g., air, water)</i> </p>	
Clarity: Is this competency clear to you?	87.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	93.6% Yes
Applicability: Is this competency essential for the rural primary care provider?	95.7% Yes
<p align="center"><i>Diagnosis / Individual Competency #2</i></p> <p><i>Utilize/mobilize resources for confirmation, consultation, and/or referrals as necessary.</i></p>	
Clarity: Is this competency clear to you?	91.5% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.7% Yes
Applicability: Is this competency essential for the rural primary care provider?	89.4% Yes
<p align="center"><i>Diagnosis / Community Competency #1</i></p> <p><i>Use community, local, state, federal and tribal level environmental data to aid in diagnoses in rural primary care.</i></p>	
Clarity: Is this competency clear to you?	91.3% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.7% Yes
Applicability: Is this competency essential for the rural primary care provider?	91.3% Yes
<p align="center"><i>Diagnosis / Community Competency #2</i></p> <p><i>Use relevant environmental, occupational, and clinical data, expertise, evidence and resources (including community, local, state, federal and tribal) to aid in diagnosis of disease, conditions and health problems to improve rural community health.</i></p>	
Clarity: Is this competency clear to you?	91.3% Clear
Content Validity: Does this competency belong where it is placed in the framework?	91.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	93.5% Yes
<p align="center"><i>Diagnosis / Health care delivery systems Competency #1</i></p> <p><i>Collaborate with health care delivery system resources/partners to make best diagnosis of environmental health issues.</i></p>	
Clarity: Is this competency clear to you?	95.7% Clear

Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	93.5% Yes
<i>Management / Intervention / Individual Competency #1 Ensure reporting of known or suspected hazards to appropriate agencies.</i>	
Clarity: Is this competency clear to you?	97.8% Clear
Content Validity: Does this competency belong where it is placed in the framework?	93.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	95.5% Yes
<i>Management / Intervention / Individual Competency #2 Consider ethical, socioeconomic, political, and legal implications of diagnoses of environmental disease.</i>	
Clarity: Is this competency clear to you?	95.5% Clear
Content Validity: Does this competency belong where it is placed in the framework?	88.4% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.9% Yes
<i>Management / Intervention / Individual Competency #3 Consider opportunities for the prevention of environmental disease.</i>	
Clarity: Is this competency clear to you?	93.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	93.0% Yes
<i>Management / Intervention / Individual Competency #4 Provide education (e.g., prevention) and counseling regarding environmental health risks (current and future), diseases, and contributors.</i>	
Clarity: Is this competency clear to you?	100.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.5% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.9% Yes
<i>Management / Intervention / Individual Competency #5 Develop and implement plan of care for rural patients, considering impact of patient, family, occupational, and community environmental risks.</i>	
Clarity: Is this competency clear to you?	100.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.7% Yes

<i>Management / Intervention / Individual Competency #6 Possess an awareness of barriers to implementation of a plan and identify alternatives that might also reduce the environmental risk (Develop a "Plan B").</i>	
Clarity: Is this competency clear to you?	86.4% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.5% Yes
Applicability: Is this competency essential for the rural primary care provider?	88.1% Yes
<i>Management / Intervention / Individual Competency #7 Access and mobilize resources for the plan and establish resources/linkages.</i>	
Clarity: Is this competency clear to you?	88.6% Clear
Content Validity: Does this competency belong where it is placed in the framework?	90.9% Yes
Applicability: Is this competency essential for the rural primary care provider?	84.1% Yes
<i>Management / Intervention / Community Competency #1 Collaborate with relevant community partners to plan and implement rural community change for better environmental health.</i>	
Clarity: Is this competency clear to you?	100.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	81.8% Yes
<i>Management / Intervention / Health care delivery systems Competency #1 Access/Consult health care delivery system resources to address environmental health problems/concerns in rural areas (surveillance and monitoring).</i>	
Clarity: Is this competency clear to you?	90.7% Clear
Content Validity: Does this competency belong where it is placed in the framework?	97.7% Yes
Applicability: Is this competency essential for the rural primary care provider?	88.4% Yes
<i>Management / Intervention / Health care delivery systems Competency #2 Effectively communicate environmental risk/concerns and exchange information with partners and stakeholders.</i>	
Clarity: Is this competency clear to you?	97.7% Clear
Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.9% Yes
<i>Evaluation / Individual Competency #1 Evaluate patient outcomes considering environmental reality in rural areas.</i>	

Clarity: Is this competency clear to you?	93.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.5% Yes
Applicability: Is this competency essential for the rural primary care provider?	93.2% Yes
<i>Evaluation / Individual Competency #2 Conduct an analysis of processes (was what was requested done and did it work?).</i>	
Clarity: Is this competency clear to you?	79.5% Clear
Content Validity: Does this competency belong where it is placed in the framework?	92.9% Yes
Applicability: Is this competency essential for the rural primary care provider?	86.0% Yes
<i>Evaluation / Individual Competency #3 Provide recommendations and/or assist in implementation for action/change.</i>	
Clarity: Is this competency clear to you?	93.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	90.9% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.7% Yes
<i>Evaluation / Individual Competency #4 Ensure follow-up and that environmental data/evaluations were received and placed in the patient record.</i>	
Clarity: Is this competency clear to you?	100.0% Clear
Content Validity: Does this competency belong where it is placed in the framework?	95.3% Yes
Applicability: Is this competency essential for the rural primary care provider?	90.9% Yes
<i>Evaluation / Community Competency #1 Provide input to the effectiveness or performance of rural community interventions and programs considering health variations that may be attributed to the environment.</i>	
Clarity: Is this competency clear to you?	90.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	88.6% Yes
<i>Evaluation / Community Competency #2 Provide input to refine management of current initiatives and plan for future environmental health initiatives.</i>	
Clarity: Is this competency clear to you?	93.2% Clear

Content Validity: Does this competency belong where it is placed in the framework?	100.0% Yes
Applicability: Is this competency essential for the rural primary care provider?	83.7% Yes
<p><i>Evaluation / Health care delivery systems Competency #1</i> <i>Recognize gaps in current health care delivery system resources related to environmental health.</i> <i>a. Impact on care</i> <i>b. Impact on information</i> <i>c. Impact on policy</i></p>	
Clarity: Is this competency clear to you?	88.6% Clear
Content Validity: Does this competency belong where it is placed in the framework?	97.7% Yes
Applicability: Is this competency essential for the rural primary care provider?	81.8% Yes
<p><i>Evaluation / Health care delivery systems Competency #2</i> <i>Provide input/feedback to health care delivery systems relative to environmental health resource gaps to drive change.</i></p>	
Clarity: Is this competency clear to you?	93.2% Clear
Content Validity: Does this competency belong where it is placed in the framework?	97.7% Yes
Applicability: Is this competency essential for the rural primary care provider?	84.1% Yes

Table 4: Final “Key Environmental Health Competencies for Rural Primary Care Providers” guide

	<p>Individual – defined as: participants in the health care system for the purpose of receiving therapeutic, diagnostic, or preventive procedures who for the purpose of this project are considered to include individuals, family, significant others, friends as a unit who will benefit from environmentally competent care by rural primary care providers.</p>	<p>Community – defined as: the geographical area served with consideration given to social, cultural, economic, and political populations.</p>	<p>Health Care Delivery Systems – defined as: a continuum of care made up of collaborations and partnerships strategically in place by intentional design. Members may include: Hospitals, PCP’s, Specialty care, EMS/first responders, Long Term Care/Assisted living, Educational institutions, Communities, Hospice, Public Health, Other partners (NIOSH, EPA, CDC, etc), Mental Health, Dental Care, Public Works, Environmental Health.</p>
<p>Assessment: The systematic and continuous collection, validation and selection of data from a variety of sources.</p>	<ol style="list-style-type: none"> 1. Integrate environmental health questions into a comprehensive history-social history/review of systems. 2. Recognize individual health variations attributable to the environment. 3. Recognize the importance of PCP role in first discovery of health issues that may be linked to the environment. 4. Know how and where to access information/data or personnel resources related to environmental hazards and health. 5. Analyze information provided by resources in order to develop differential diagnoses and plan. 6. Possess an awareness of individual’s occupational/environmental risks. 7. Possess an awareness of cultural influences into an individual’s environmental risks. 	<ol style="list-style-type: none"> 1. Obtain environmental assessment data at the community level in rural areas. 2. Develop an awareness of environmental resources (including local, county, state federal and tribal) to provide relevant information when needed to improve rural health. 3. Use information technology to access data as needed relative to environmental risk in rural communities. 4. Possess an awareness of community environmental health risks and infrastructure. 	<ol style="list-style-type: none"> 1. Identify current health care delivery systems resources (including information technology and other expert sources) to gain environmental literacy. 2. Recognize health variations that may be attributed to the environment that require collaborations with public health and others.

	<p>Individual – defined as: participants in the health care system for the purpose of receiving therapeutic, diagnostic, or preventive procedures who for the purpose of this project are considered to include individuals, family, significant others, friends as a unit who will benefit from environmentally competent care by rural primary care providers.</p>	<p>Community – defined as: the geographical area served with consideration given to social, cultural, economic, and political populations.</p>	<p>Health Care Delivery Systems – defined as: a continuum of care made up of collaborations and partnerships strategically in place by intentional design. Members may include: Hospitals, PCP’s, Specialty care, EMS/first responders, Long Term Care/Assisted living, Educational institutions, Communities, Hospice, Public Health, Other partners (NIOSH, EPA, CDC, etc), Mental Health, Dental Care, Public Works, Environmental Health.</p>
<p>Diagnosis: The identification or determination of the nature and cause of a disease or injury.</p>	<ol style="list-style-type: none"> 1. Use individual environmental data to aid in diagnosis of disease, conditions, and health problems in rural primary care patients <ol style="list-style-type: none"> a. Occupational b. Recreational c. Social d. Home e. Community (e.g., air, water) 2. Utilize/mobilize resources for confirmation, consultation, and/or referrals as necessary. 	<ol style="list-style-type: none"> 1. Use community, local, state, federal and tribal level environmental data to aid in diagnoses in rural primary care. 2. Use relevant environmental, occupational, and clinical data, expertise, evidence and resources (including community, local, state, federal and tribal) to aid in diagnosis of disease, conditions and health problems to improve rural community health. 	<ol style="list-style-type: none"> 1. Collaborate with health care delivery systems resources/partners to make best diagnosis of environmental health issues.

	<p>Individual – defined as: participants in the health care system for the purpose of receiving therapeutic, diagnostic, or preventive procedures who for the purpose of this project are considered to include individuals, family, significant others, friends as a unit who will benefit from environmentally competent care by rural primary care providers.</p>	<p>Community – defined as: the geographical area served with consideration given to social, cultural, economic, and political populations.</p>	<p>Health Care Delivery Systems – defined as: a continuum of care made up of collaborations and partnerships strategically in place by intentional design. Members may include: Hospitals, PCP’s, Specialty care, EMS/first responders, Long Term Care/Assisted living, Educational institutions, Communities, Hospice, Public Health, Other partners (NIOSH, EPA, CDC, etc), Mental Health, Dental Care, Public Works, Environmental Health</p>
<p>Management/Intervention: The development and implementation of the plan of care based on specific diagnoses or identified needs.</p>	<ol style="list-style-type: none"> 1. Ensure reporting of known or suspected hazards to appropriate agencies. 2. Consider ethical, socioeconomic, political, and legal implications of diagnoses of environmental disease. 3. Consider opportunities for the prevention of environmental disease. 4. Provide education (e.g., prevention) and counseling regarding environmental health risks (current and future), diseases, and contributors. 5. Develop and implement plan of care for rural patients, considering impact of patient, family, occupational, and community environmental risks. 6. Possess an awareness of barriers to implementation of a plan and identify alternatives that might also reduce the environmental risk (Develop a “Plan B”). 7. Assist in the mobilization of resources to implement the plan of care. 	<ol style="list-style-type: none"> 1. Collaborate with relevant community partners to plan and implement rural community change for better environmental health. 	<ol style="list-style-type: none"> 1. Access/Consult health care delivery systems resources to address environmental health problems/ concerns in rural areas (surveillance and monitoring). 2. Effectively communicate environmental risk/concerns and exchange information with partners and stakeholders.

	<p>Individual – defined as: participants in the health care system for the purpose of receiving therapeutic, diagnostic, or preventive procedures who for the purpose of this project are considered to include individuals, family, significant others, friends as a unit who will benefit from environmentally competent care by rural primary care providers.</p>	<p>Community – defined as: the geographical area served with consideration given to social, cultural, economic, and political populations.</p>	<p>Health Care Delivery Systems – defined as: a continuum of care made up of collaborations and partnerships strategically in place by intentional design. Members may include: Hospitals, PCP’s, Specialty care, EMS/first responders, Long Term Care/Assisted living, Educational institutions, Communities, Hospice, Public Health, Other partners (NIOSH, EPA, CDC, etc), Mental Health, Dental Care, Public Works, Environmental Health</p>
<p>Evaluation: The measurement of plan goals and expected results.</p>	<ol style="list-style-type: none"> 1. Evaluate patient outcomes considering environmental reality in rural areas. 2. Provide recommendations and/or assist in implementation for action/change. 3. Ensure follow-up and that environmental data/evaluations were received and placed in the patient record. 	<ol style="list-style-type: none"> 1. Provide input to the effectiveness or performance of rural community interventions and programs considering health variations that may be attributed to the environment. 2. Provide input to refine current and plan for future environmental health initiatives. 	<ol style="list-style-type: none"> 1. Recognize gaps in current health care delivery systems resources related to environmental health and the impact on care and policy. 2. Provide input/feedback to health care delivery systems to drive change relative to environmental health resource gaps.

Appendix I: References Provided to Consensus Conference Participants

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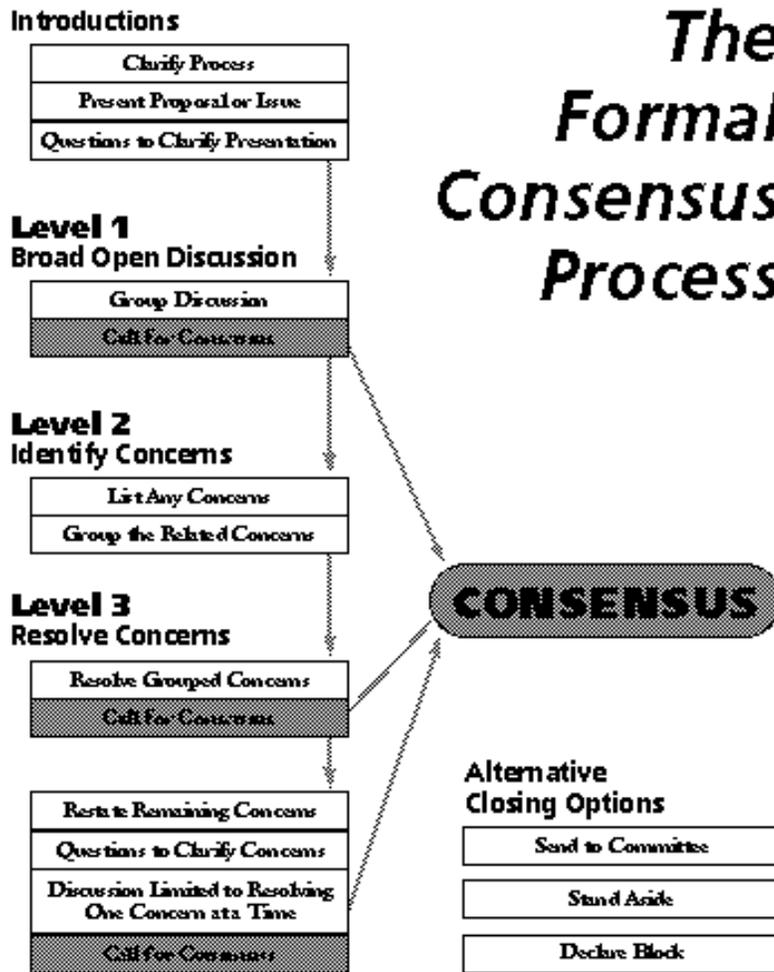
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Appendix II: The Formal Consensus Process⁵



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Additional Information

See the Full Report that corresponds to this Brief for more detailed methods and findings from this study at: <http://wvrhrc.hsc.wvu.edu/projects/2009/persily/>

