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### **Why Does the Public Health Workforce Need Genomics Training?**

Recent scientific discoveries are illuminating the role of genes as risk factors for common diseases affecting the public's health. New applications of genomics to medicine are expected to become important tools for health promotion and disease prevention. The full benefits of genomics in public health will not be realized, however, without a workforce capable of interpreting and applying relevant genomic information to the practice setting.

### **What Has Been Done to Develop Genomics Training?**

To address the need for a genomically literate workforce, CDC and others have initiated efforts to train public health practitioners. Beginning in 2000, the Office of Genomics and Disease Prevention (OGDP) and Public Health Practice Program Office (PHPPO) convened working groups to outline a set of "Genomic Competencies for the Public Health Workforce". These are available online at <http://www.cdc.gov/genomics/training/competencies/>, and include a set of general competencies for all members of the public health workforce and specific competencies for each of six professional groups: administrators, clinicians, epidemiologists, health educators, laboratorians, and environmental health workers.

In 2001, CDC established three Centers for Genomics and Public Health at Schools of Public Health (<http://www.cdc.gov/genomics/activities/fund2001.htm>), which were charged with developing strategies for providing genomics training and technical assistance to the public health workforce.

### **Simple Training Strategies and Available Courses**

Practical strategies for training the public health workforce in genomics are listed in Table 1, along with specific examples used in Michigan. Ideally, local expertise should be enlisted as much as possible. While many training materials are available from various sources, including books, CD-ROMs and the Internet, nothing beats a scheduled, easy-to-attend, in-person session. Genetic counselors, medical geneticists, genetic epidemiologists, and other professionals with genetics or public health experience should be engaged in training the public health

workforce. Existing materials should be shared and utilized as much as possible to avoid “reinventing the wheel.”

**Table 1. Overview of Michigan’s Training Strategies**

Strategy	Example
1. Building a Foundation—Know Your Audience	The Genomics Workgroup at the Michigan Department of Community Health (MDCH)
2. Raising Awareness and Stimulating Interest	<i>An Introduction to Genomics for Public Health Professionals</i> developed by CDC and Centers for Genomics and Public Health at the Universities of Michigan, North Carolina, and Washington.
3. Increasing Knowledge	<i>Six Weeks to Genomic Awareness</i> developed by the Michigan Center for Genomics and Public Health and delivered to MDCH staff
4. Strengthening Skills	<i>Graduate Summer Session in Epidemiology</i> at the University of Michigan School of Public Health with scholarships sponsored by the Michigan Center for Genomics and Public Health
5. Using Evaluation to Improve Training	Evaluation by organizers, trainers and participants

### **Strategy 1: Building a Foundation—Know Your Audience**

Getting to know your target audience—who they are and what they do—is an essential first step in designing training. This might be accomplished through both formal and informal channels, such as attending conferences or workshops about public health genomics, requesting permission to sit in on staff meetings, or holding individual “orientation” meetings with program staff. A working relationship with the intended audience serves a two-fold purpose: it provides information about specific training needs and acts as a catalyst for raising awareness and stimulating interest in genomics among the intended audience.

Recognize that public health encompasses many disciplines, and that the workforce represents professionals from diverse backgrounds. Training should be either broad enough to include examples relevant to a range of public health professionals, or targeted specifically to a particular group.

### *Example: The Genomics Workgroup*

At the Michigan Department of Community Health, staff members, representing a wide range of public health programs, participate in the Genomics Workgroup. The group was originally convened in Spring 2000 as a joint effort by the state genetics coordinator and chronic disease director. Its mission is to identify and facilitate relevant opportunities for the integration of genetics into public health science and practice with a special emphasis on chronic disease prevention and control. Quarterly meetings serve several purposes, including:

- allowing program staff members who ordinarily would not work together to meet and get to know each other,
- providing an opportunity to share updates on state and national genomics initiatives,
- serving as a forum for training and education to increase the genomic competencies of the MDCH workforce,
- monitoring developments related to family history, screening and prevention of adult disorders,
- helping to identify potential funding sources for further genomics integration into various programs, and
- allowing for planning and discussion of multi-disciplinary approaches to genomics integration.

The Genomics Workgroup is also used as a “real life” learning laboratory to provide the Michigan Center for Genomics and Public Health with feedback that can be used to plan training activities. For more information about the role this workgroup has played at MDCH, contact [genetics@michigan.gov](mailto:genetics@michigan.gov).

### **Strategy 2: Raising Awareness and Stimulating Interest**

Since genomics is not yet a common word in the public health vocabulary, it is important to raise awareness and stimulate interest about the potential relevance of genomics to various programs among public health practitioners.

Basic information that will motivate public health practitioners to become genomically competent increases the odds that specific training efforts will be effective later on. Such introductory efforts may not necessarily give specific knowledge or skills to practitioners, but will begin to lay the groundwork for later training efforts.

*“However it is not only the future of genomics that warrants the attention of public health education. Because few in the current public health workforce have the level of understanding of genomics that is required today, major continuing education efforts must be undertaken to ready practicing public health professionals to use genomics effectively. Public health education programs and schools must provide their students with a framework for understanding the importance of genomics to public health and with the ability to apply genomics to the basic public health sciences.” (Who Will Keep the Public Healthy? Educating Public Health Professionals in the 21<sup>st</sup> Century, IOM, 2003)*

### *Example: An Introduction to Genomics for Public Health Professionals*

A workgroup consisting of representatives from the CDC and Centers for Genomics and Public Health at the University of Michigan, University of North Carolina, and University of Washington developed a Web-based presentation entitled *An Introduction to Genomics for Public Health Professionals*. This presentation defines basic genetic terms, provides an overview of the current and potential role for genomics in public health practice, lists recommended action steps, and reviews an example of how genomic information is currently used in public health. The presentation is meant to generate interest in and excitement about genomics and to motivate public health professionals to participate in training opportunities that would further enhance their knowledge and skills.

*An Introduction to Genomics for Public Health Professionals* was presented to staff at the Michigan Department of Community Health as part of a DNA Day Open House in April 2003, that was organized to commemorate the discovery of the double helix and promote awareness of genetics in public health. This presentation is expected to be available online in Summer 2004 at [www.cdc.gov/genomics](http://www.cdc.gov/genomics) (<http://www.cdc.gov/genomics/GPHP/menu.html>), and can be used by anyone desiring to raise awareness about and to stimulate interest in genomics among public health practitioners.

### **Strategy 3: Increasing Knowledge**

Although knowledge about genomics is increasing every day, most public health professionals lack an understanding of even the most basic concepts. Practitioners also find it difficult to keep up with the growing body of knowledge and to identify the most relevant information for their particular work area. Reviewing basic genetic terminology, concepts, and associated issues—as well as arming public health professionals with tools to keep up with the advances in genomics—is therefore an important step in the training process. A workforce familiar with the genomics vocabulary and the potential of genomics for public health is more likely to engage in projects and activities aimed at integrating genomics into public health.

### *Example: Six Weeks to Genomic Awareness*

The Michigan Center for Genomics and Public Health has developed a new course, *Six Weeks to Genomic Awareness*, to familiarize participants with important terms, concepts, and issues. The six sessions include:

- The Human Genome & Heredity
- Genes in Populations
- Genetic Testing
- Gene-Environment Interactions
- Ethical, Legal, and Social Issues Associated with Genomic Applications
- Genomic Resources at the State and National Levels.

The series was piloted at the Michigan Department of Community Health in May-June 2003. Expert speakers were chosen to present each topic. Seventy program staff attended at least one session and 32 attended three or more sessions. Participants included staff members from all areas of the health department, including epidemiology, laboratory, vital statistics, and chronic disease. The Centers for Genomics and Public Health are evaluating *Six Weeks to Genomic Awareness* with the goal of making the entire series available online in Summer 2004.

### **Strategy 4: Strengthening Skills**

The final step in ensuring a genomically competent public health workforce is to develop practical training opportunities that allow public health practitioners to incorporate genomics into the skill sets necessary for their particular job functions. Training efforts are needed to address integration of genomics into the skill sets of administrators, clinicians, epidemiologists, health educators, environmental health specialists, and laboratorians (see <http://www.cdc.gov/genomics/training/competencies/>). Plenty of “hands on” activities, encouraging practitioners to apply what they have learned, should be included in these efforts.

### *Example: Graduate Summer Session in Epidemiology*

The Michigan Center for Genomics and Public Health provided scholarships for several state public health personnel to attend Genetic Epidemiology courses offered through the University of Michigan *Graduate Summer Session in Epidemiology* in 2002 and 2003. Although these courses were not tailored specifically to practicing public health professionals, they did provide in-depth exposure to genetics in the context of epidemiology and allowed practitioners to apply what they had learned in problem sets and other exercises. Public health attendees, who did not necessarily have a pre-existing background in genetics, gave these courses a very favorable review and were grateful for the opportunity to participate.

### Strategy 5: Using Evaluation to Improve Training

It is very important to measure the effectiveness of existing training courses so that they can be improved and new courses can be developed. Building an evaluation component into the development of training tools is critical to evaluating and modifying training courses and tools effectively.

#### Example: Evaluation Data from Six Weeks to Genomic Awareness

Participants Who Rated Relevance to Their Work Very Good or Excellent, Currently and in the Future, as Percent of Those Who Completed Evaluations		
Material	Currently	Future
The Human Genome & Heredity	48%	77%
Genes in Populations	54%	70%
Genetic Testing	44%	69%
Gene-Environment Interactions	60%	88%
ELSI (Ethical, Legal and Social Issues)	55%	65%
Genomic Resources	40%	80%

### Lessons Learned

It is critical to involve representatives from the target audience in planning training content and format. Training opportunities should be made as convenient as possible for participants. We organized *Six Weeks to Genomics Awareness*, for example, as a brown-bag lunch series at the Michigan Department of Community Health. In addition to the foundation that had been laid to increase interest in genomics through the DNA Day event and articles in an employee newsletter, the convenient location, minimal interference with work schedules, and no cost to participants likely contributed to the large attendance at the sessions.

While strides have been made in addressing the training needs of the public health workforce over the past few years, there is still a long way to go in developing a genomically competent public health workforce.

- Current training efforts need to be extended to a broader audience. Technology should be used to make this happen. For example, Web-based distance learning courses are being planned by the Centers for Genomics and Public Health. Training resources, including slide presentations and other tools, should be shared among those interested in training the public health workforce.
- Future training efforts should be tailored to the knowledge and skills sets specific to various disciplines of public health, and should also include

practical opportunities for public health professionals to apply what they have learned.

- The effectiveness of training efforts should be assessed. The acquisition of new knowledge and skills by public health practitioners and the incorporation of this knowledge into public health programs should be measured. Coordination and collaboration among a number of public and private entities will be the key to achieving the goal of a genomically competent workforce.