Public Health 101 Nanocourse: A Condensed Educational Tool for Non—Public Health Professionals

Graduate students and postdoctoral fellows—including those at the Harvard School of Public Health (HSPH)—have somewhat limited opportunities outside of traditional coursework to learn holistically about public health.

Because this lack of familiarity could be a barrier to fruitful collaboration across disciplines, HSPH postdocs sought to address this challenge. In response, the Public Health 101 Nanocourse was developed to provide an overview of five core areas of public health (biostatistics, environmental health sciences, epidemiology, health policy and management, and social and behavioral sciences) in a two half-day course format.

We present our experiences with developing and launching this novel approach to acquainting wider multidisciplinary audiences with the field of public health. (Am J Public Health. 2015;105:S50–S54. doi:10.2105/AJPH.2014.302305)

GRADUATE STUDENTS, POSTDOCTORAL FELLOWS, AND FACULTY WITHOUT DIRECT TRAINING IN PUBLIC HEALTH OFTEN HAVE LIMITED OPPORTUNITIES TO GAIN A BASIC UNDERSTANDING OF THE MULTIPLE AREAS OF STUDY WITHIN PUBLIC HEALTH AND THE ROLE EACH PLAYS IN IMPROVING HEALTH.1,2,4 WE SAW THIS AS AN OPPORTUNITY TO PROVIDE AN INTRODUCTION TO THE FIELD OF PUBLIC HEALTH FOR THE FULL HARVARD ACADEMIC COMMUNITY, NOT JUST TRAINEES.

The two-session Public Health 101 Nanocourse was launched in October 2013 to provide an overview of the five core areas of public health: biostatistics, environmental health sciences, epidemiology, health policy and management, and social and behavioral sciences.5,6 The first session featured a brief historical overview of milestones in the study of public health, focusing in particular on various epidemiological study designs (epidemiology and biostatistics), health behavior intervention research (social and behavioral sciences), and the built environment and health (environmental health). A health policy and management case-based teaching approach was used in the second session to integrate the skills and knowledge gained in the first session.

WHAT IS A NANOCOURSE?

Nanocourses were originally reported in 2008 by the Harvard Medical School Curriculum Fellows Program as a flexible way to introduce students to specialized knowledge areas in a condensed format.7 These courses are designed to bring students and other interested individuals in the academic community up to date on a particular field, to offer insight into current topics, and to provide a foundation for further study in that field in a short period of time (typically about six hours total over two days). Nanocourses are developed to be responsive to the changing nature of any scientific field and can be used to communicate new developments while taking maximal advantage of the multidisciplinary expertise of Harvard instructors. Nanocourses appeal to a wide audience—including students, postdocs, staff, and faculty—who may not participate in classes because of time or financial constraints. Members of other academic institutions facing similar challenges may likewise find this course format useful.

A nanocourse consists of two class meetings developed through close collaboration by instructors (typically faculty members) who are specialists in their fields and a curriculum fellow who assists with instructional design and logistical support. The first session is typically lecture based and is taught by two or more faculty members over approximately three hours. These lectures provide a historical background and foundational introduction to a topic so that participants can appreciate the state of the field and contextualize the subsequent material. Lectures culminate in a discussion of the current research areas, specific experimental approaches, and emerging technologies within a field. The first session is open to the entire university community.

The second session is discussion based and is intended primarily for doctoral students taking the nanocourse for academic credit, but is typically open to others as well on a space-available basis. The format of the second session is flexible and may include discussion of relevant articles, brainstorming about future research, student presentations, or an opportunity to learn a new technique.

DEVELOPMENT OF THE PUBLIC HEALTH NANOCOURSE

The impetus for developing this nanocourse was postdoctoral fellows at the Harvard School of Public Health (HSPH) who wanted to learn more about areas of public health outside of their specialized research areas but who were unable to devote the 30 to 40 hours of classroom time required for a full-length course. The HSPH Post-Doctoral Association approached the Harvard Global Health Institute—a cross-university institute that aims to build and strengthen the emerging field of global health—and the Harvard Medical School Curriculum Fellows Program for assistance in creating a short course on public health. We chose the Harvard Medical School nanocourse format because its concise, flexible course structure was appropriate for the primary target audience.
(postdoctoral fellows) and for other members of the community such as graduate students, faculty, and staff who were not directly trained in public health. The course was widely advertised to potential audiences in the Harvard community, primarily through e-mail lists and posters (Figure 1). A secondary objective of the course was to create opportunities for postdoctoral fellows interested in gaining teaching experience.

Our course development team consisted of representatives from the HSPH Post-Doctoral Association, the Harvard Global Health Institute, and the Harvard Medical School Curriculum Fellows Program who had a strong background in teaching and curriculum development. We recruited and screened potential postdoc lecturers through a competitive application and interview process in which they were required to develop and discuss material they were interested in teaching. Each lecturer’s presentation consisted of two parts: a broad introduction to the public health discipline (e.g., environmental health sciences) and an introduction to a subtopic within the discipline on which the lecturer was an expert (e.g., the built environment). We worked with lecturers to provide feedback on their presentations and incorporate opportunities for audience interaction, such as multiple-choice questions for which instant feedback could be gathered with an electronic audience response system (i.e., clickers). Through practice talks and iterative feedback from the development team, the lecturers integrated the contents of the different course segments into a coherent presentation. The content for the second session came from a real public health case that integrated the various topics presented during the first session and was shaped by audience participation feedback from the first session and comments from attendee evaluation forms.

FIGURE 1—Promotional logo for Public Health 101 Nanocourse advertisements.

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DESCRIPTION OF THE NANOCOURSE

The Public Health 101 Nanocourse was taught by five postdoctoral fellow instructors and was divided into two 3.5-hour sessions. The first session was open to any member of the academic community (preregistration was optional) and included the following didactic sections:

1. A 30-minute introduction to the history of public health and a brief description of the various study areas that fall under the umbrella of public health sciences;
2. A 45-minute lecture introducing epidemiology and biostatistics titled “Posing the Research Question: How to Capture the Answer and the Art of Study Design”;
3. A 45-minute lecture introducing social and behavioral sciences with a focus on health behavior intervention research; and
4. A 45-minute lecture introducing environmental health sciences with a specific focus on the built environment and health.

This first session provided the audience with an overview of the key questions, approaches, and methods in the area of public health and illustrated those principles with a specific example from the discipline. The introductory lecture provided a historical overview of public health from ancient times through the modern era, including a description of the US public health system. In addition to the five core areas of public health, a brief overview of the specialized subdisciplines within public health that were not covered as part of the nanocourse were mentioned.

The epidemiology and biostatistics section began by contextualizing the aims of epidemiological research and the fundamental considerations that are necessary before one poses a research question and subsequently chooses the appropriate design for the research study. Participants were introduced to time perspectives of outcome follow-up (i.e., prospective vs retrospective), observational study designs, experimental research designs, systematic reviews and guideline development, capturing study outcomes with $2 \times 2$ tables, inference, reliability, validity, and hypothesis testing. This section closed with an opportunity for participants to work individually on their own research questions by incorporating the principles presented, followed by a group discussion to further refine the research ideas of selected volunteers.

The social and behavioral sciences section began with a brief overview of the discipline’s historical origins and current sub-specialties. The presentation then
focused on health behavior intervention research, beginning with a discussion of the expansion from studying individual behavior to that of groups and populations and the rationale behind various settings that have been used for research, including the worksite. This section closed with a discussion of the big questions currently being faced by researchers in this field, including the complexities of the obesity epidemic. A provocative final question was posed to the audience, which incited a lively group discussion: “In your opinion, do public health researchers have an obligation to ensure that the knowledge generated by our research is put into practice?”

The environmental health sciences section began with a brief introduction to various areas in the field, including environmental psychology. Environmental psychology theories form the fundamental assumptions of environmental behavior (e.g., Kaplan’s attention restoration theory), predict behavior and cognition patterns (e.g., oppressiveness, enclosure), and inform environmental stress models to predict how certain stimuli will affect health. The lecturer subsequently illustrated these concepts in a presentation on the built environment and health and by demonstrating the rationale and methods for conducting health impact assessments, using a few illustrative examples.

The second session was held one week after the first, and attendees were required to register through the Harvard Medical School Nanocourse Web site (https://nanosandothercourses.hms.harvard.edu/node/242). Session 2 integrated the elements of public health discussed during the first session with the health policy and management discipline. Before class, session 2 participants were required to explore an interactive online public health case study, which was the primary content source for the session. The case study, titled “Public Health Lessons of Ashland, MA: A Multimedia Case for Learning,” describes several environmental hazards in Ashland, Massachusetts; among these is an old industrial site that has raised community concerns as being the cause of a cancer cluster.8

After an initial review of the case’s facts and a short activity to illustrate the complexities of crafting and delivering effective public health messages, the three session 1 lecturers each led 45-minute lessons that expanded on their session 1 material in the context of the Ashland case and highlighted intersections with the health policy and management discipline as appropriate. Participants were provided additional background on the environmental health sciences discipline as a whole in response to session 1 feedback and were educated on environmental factors that contribute to exposure in preparation for a team-based role-play; the theme was how the key players in the Ashland case (i.e., members of community, the Massachusetts Department of Public Health, and representatives from the industrial site) would respond to residents’ concerns about a possible cancer cluster. Learners were led through a review of fundamental epidemiology and biostatistics concepts and then given the opportunity to practice calculating incidence and prevalence, develop a study question for the Ashland case incorporating study design considerations taught in session 1, and determine the appropriate measure of association between exposure and outcome. For social and behavioral sciences, the participants were asked to consider smoking as a possible alternative hypothesis for the cancer cluster and tasked with developing and arguing for an effective, targeted antismoking campaign in the Ashland community on a limited budget. Session 2 closed with an opportunity for participants to reflect on their experience and provide oral and written feedback.

Lecture slides and learning objectives for session 1 as well as recommended readings for sessions 1 and 2 are available on the Public Health 101 Nanocourse Web site. Additional materials for session 2 are available on request.

ATTENDEES AND COURSE EVALUATION

We analyzed data collected from attendee registration forms and audience evaluations. We captured frequencies and summarized them as count data, expressed as mean and standard deviation or median where appropriate. We performed analyses using JMP Pro 11.0 (SAS Institute Inc., Cary, NC).

Before the start of the nanocourse, 84 people registered online. Registrants were asked to assess (on a scale ranging from 1 to 10) their prior level of familiarity with public health, where 1 represented “no familiarity” and 10 represented “very familiar.” Mean familiarity was 4.5 (SD = 2.2), with 8% expressing “no familiarity” and 4% expressing “very familiar.” On the basis of the number of clickers distributed for session 1, we estimated that 60 individuals attended the first session, of whom 43 completed evaluation forms. Among these respondents, 70% (n = 30) reported that they did not have any formal training in public health. Only 47% (n = 20) of respondents reported HSPH affiliations, of whom most (n = 17) were postdocs or staff members. The non-HSPH-affiliated attendees were affiliates of graduate programs across Harvard (including Harvard Business School and the Harvard Graduate School of Design), area hospitals, and local health nonprofits.

When we asked attendees to rate how useful they found the first session on a scale ranging from 1 to 7 (1 = “not at all,” 7 = “extremely useful”) the mean was 5.4 (SD = 0.9), with almost all (n = 40) reporting that they were interested in learning more about public health. For a summary of quantitative survey data from sessions 1 (n = 43) and 2 (n = 6), please refer to Table 1. The qualitative comments were grounded in three main themes: the presenters, the course structure, and suggestions for improvements. Overall, the audience enjoyed interacting with the lecturers: “Excellent speakers . . . a great discussion of experts from a variety of fields . . . passionate speakers.” Attendees also wrote positive comments regarding the structure of the course:

I like the module structure . . . Good overview of key topics . . . Highlighted diversity and interdisciplinary nature of the fields of public health. . . . Brief, informative, a quick way to know what public health is all about . . . Well organized, clearly presented, interactive . . . Crisp slides, well thought-out presentations.

When we asked participants how we could improve the course, some of the suggestions included

1. making the presentations more interactive by increasing the use of electronic audience polling,
2. providing paper handouts to go along with the presentations,
3. illustrating concepts using more examples and case studies,
4. offering follow-up nanocourses devoted to specific public health subfields (i.e., epidemiology, health behavior, and so on) so that they could explore specific topics in greater depth (as of October 2014, five follow-up nanocourses in the Public Health 101 Series have been offered), and

5. having speakers share their personal research areas, how they got to where they are today, and what they did to establish their public health research and practice niche.

**CONCLUSIONS**

On the basis of the diversity of participants enrolled and overwhelmingly positive feedback received, we consider the Public Health 101 Nanocourse to have been a successful pilot. Using our experiences and participant suggestions to guide enhancements, we plan to offer the Public Health 101 Nanocourse again in the future. In the next iteration, we intend to develop and implement methods to better assess both short-term and long-term learning promoted directly and indirectly through nanocourse participation. We consider a few items necessary in organizing a Public Health 101 Nanocourse:

- **Central nanocourse director**: Identify an individual or well-coordinated team that provides instructors with the administrative support to execute the nanocourse (for example, registration of attendees, standardizing slide decks across presenters, securing audience response system clickers, and administering and tabulating postcourse survey evaluation forms).
- **Active mentorship by faculty and administrators**: The Public Health 101 Nanocourse was conceptualized, designed, and implemented by postdoctoral fellows, who would not have been able to execute the course on campus without the mentorship of senior faculty and the support of sympathetic administrators.
- **Content covered**: It is very important to allow learners to sample content across the core areas of public health, distributed as evenly as possible. If time permits, including content from the cross-cutting areas of public health (e.g., decision science) would be helpful. The first lecture should definitely include a broad overview of the public health field (in terms of disciplines, organizational structures, and function in the United States) and a brief historical overview of its evolution over time.
- **Audience response system (e.g., clickers)**: Public health is about community engagement and participation, and the classroom setting is no different. Especially for a larger group of diverse learners, an audience response system that allows users to be polled in real time during the presentation increases audience engagement and alertness—and ultimately, we hope—learning. We found this to be a very positive feature of the course for both instructors and attendees. Although our institution was able to provide clickers for use in this nanocourse, it is worth noting that many audience response systems are currently available, including free Web-based tools that do not require specialized hardware.
- **Practice runs for instructors with sufficient time to incorporate feedback**: This is critical for testing interactive questions and activities, addressing consistency in formatting and style across presenters, and identifying important omissions (e.g., undefined acronyms) or unproductive redundancy. It is also helpful to note places at which strategic reinforcement of key learning points by different presenters may be beneficial to enhance student understanding and retention.

Among the lessons learned from our experience in administering the Public Health 101 Nanocourse, we offer the following observations:

- **Optimize the balance between breadth and specialization in the material covered for session 1**: For each of the areas of public health covered in depth in session 1 (epidemiology and biostatistics, social and behavioral sciences, environmental health), presenters aimed to provide an overview of the field as well as more specific examples related to their area of expertise. In some cases, more time should have been dedicated to the broad overview than to the specialty area. We attempted to supplement knowledge gaps in session 2 but in the future would likely modify the content in session 1 to benefit a greater number of participants, most of whom will only attend the first session, which is open to the public.

- **Provide time for speakers to share their personal experiences**: Allowing this time can help attendees see how theory ties to real-world experience, opportunities, and entry points for potential future involvement.

We are in the process of rolling out a follow-up series of nanocourses in specific public health topic areas (e.g., Social and Behavioral Sciences 101, Chronic Disease Epidemiology 101) and exploring the possibility of adapting the Public Health 101 Nanocourse to an online learning environment. Regardless of whether and when we do create an online version of the Public Health 101

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**TABLE 1—Fall 2013 Public Health 101 Nanocourse Evaluation Summary (n=43)**

<table>
<thead>
<tr>
<th>Session 1: Course Content</th>
<th>Session 1: Instructor</th>
<th>Session 2: Section Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>Introduction</td>
<td>5.5 ±1.0</td>
<td>5.6 ±1.1</td>
</tr>
<tr>
<td>Epidemiology and biostatistics</td>
<td>6.0 ±1.0</td>
<td>6.3 ±0.9</td>
</tr>
<tr>
<td>Social and behavioral sciences</td>
<td>5.1 ±1.3</td>
<td>5.2 ±1.4</td>
</tr>
<tr>
<td>Environmental health</td>
<td>5.2 ±1.3</td>
<td>5.2 ±1.2</td>
</tr>
<tr>
<td>Overall</td>
<td>5.4 ±0.9</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>5.7 ±1.2</td>
<td></td>
</tr>
</tbody>
</table>

*Evaluated on a Likert rating scale ranging from 1 (poor) to 7 (excellent).*
Nanocourse, we stress that part of the value this course offered to the academic community (and which those reading this article may likewise be able to offer their communities) was a living, interactive space that lowered the barrier to learning about these topics in a manner not previously available to our attendees, even considering any online tools that might achieve similar aims. We hope that our experience developing the Public Health 101 Nanocourse is useful to those at other schools and programs of public health who are interested in sharing the study of public health sciences and its practical implications with a wider audience in their communities.

**About the Authors**

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**Contributors**

C. L. Ramirez, Z. K. Z. Gajdos, U. Kanjee, and A. J. Caban-Martinez initiated the development of the nanocourse and assisted with instructional design. C. Kreatsoulas, M. Afeiche, M. Asgurzadeh, C. C. Nelson, and A. J. Caban-Martinez developed content-specific sessions and taught the nanocourse. C. Kreatsoulas analyzed and interpreted survey data. U. Kanjee led survey development. C. L. Ramirez and A. J. Caban-Martinez are the senior authors of this project and both led the writing and revision of the article. All authors contributed to writing and editing the article.

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**References**


