

UNDERGRADUATE EDUCATION FOR PUBLIC HEALTH IN THE UNITED STATES

EDITED BY: Cheryl Lynn Addy, Daniel Shea Gerber,
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UNDERGRADUATE EDUCATION FOR PUBLIC HEALTH IN THE UNITED STATES

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Undergraduate programs in public health are growing rapidly. At colleges and universities throughout the United States, both the number of programs and the number of students have expanded greatly in the past decade. In response to this trend, the Council for Education of Public Health (CEPH) has begun to accredit undergraduate public health programs, with the first programs approved in 2014. Around the country programs exhibit wide variation, from concentrations in liberal arts colleges to pre-clinical foundations at doctorate-granting universities to undergraduate programs in accredited schools of public health. Faculty, both new and seasoned, are fully aware of the need to integrate undergraduate education in public health with graduate education—but the roadmaps of exactly how to do so are still nascent.

that the collective body of work will facilitate analysis and discussion of what makes a quality education and builds a competent workforce.

The purpose of this Research Topic is to gather articles describing this variation, with the intent

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Editorial: Undergraduate Education for Public Health in the United States

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Undergraduate education focused on public health (UGPH) has burgeoned over the past decade (1, 2). While this trend is widely acknowledged, a critical analysis of drivers, constructs, and implications is missing from the published literature. The Research Topic comprising articles on UGPH attempts to address this gap in knowledge by providing descriptions of exemplary programs, curriculum recommendations, and commentaries on career relevancy for the future workforce.

Our aim is to advance the field as more students, faculty, and universities explore how best to launch and integrate public health into the education of undergraduate college students. Moreover, we hope that those faculties and universities that have been engaged in public health undergraduate education for many years will recognize the contribution that they can make by documenting, disseminating, and re-examining their work. To the extent that we have become an evidence-driven society, the need for data is compelling. The academic enterprise would benefit from descriptive data that describe the landscape of the field as a basis for subsequent evaluation studies, research on pedagogy, and concrete information on career trajectories.

We note three caveats about this compilation. First, we limited this collection of articles to those focused tightly on undergraduate education for the general public health degree in the US. We recognize that within the sub-specialty fields of public health (e.g., environmental health, health management and policy, nutrition, health education, and others), there are long-standing undergraduate, graduate, and post-graduate degree programs. We did not include these for a variety of reasons, including that many are driven by external licensing and credentialing criteria and distinct academic accrediting bodies. Such programs unquestionably have experience and examples that contribute to the issues raised by the papers in this volume.

Second, we also recognize that public health can be taught as a secondary field of clinical disciplines, including medicine, nursing, veterinary medicine, and dentistry. This volume does not explore interrelated curricula or dual degree pedagogy. Finally, the methods by which public health is taught and practiced in the US may be quite different from how it is taught and practiced in other countries. We have left all of these expansive issues for future discussions.

Overview

The articles comprising the eBook on UGPH are organized according to four themes.

Theme I

Theme I presents articles that describe the recent history and background of undergraduate education for public health.

Riegelman, Albertine, and Wykoff, each of them a leader with direct experience in promoting UGPH, describe the initiatives that have led to the recent evolution of undergraduate education for public health in the US (3).

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With a nationwide perspective on emerging public health education, Albertine views the collaboration between academics and clinicians from across disciplines as positive (4). However, she questions if programs are not “mini MPH” degrees, then what are they, and what prior knowledge is available to guide the design of these new programs? She implores educators to be “intentional” and “thoughtful” in building curricula and to take advantage of the pedagogical tools available.

Evashwick, Tao, and Arnold present results of the search of literature on UGPH published in peer reviewed journals between 2004 and 2014, with a total of 24 articles appearing (5). They conclude with a call for increased sharing of information through professional literature, as well as the need for research and evaluation studies on UGPH.

Theme II

Theme II contains descriptions of existing programs, their exemplary features, and “lessons learned.”

Stoots and colleagues describe the undergraduate curriculum in public health that the University of East Tennessee has developed. As one of the oldest undergraduate public health programs in the US, it places particular emphasis on aligning the curriculum with the needs of the local workforce (6). White describes the undergraduate program developed at Tulane University, receiving a major push from another external force – Hurricane Katrina and its impact on the university and its students (7). The burgeoning new undergraduate program stimulated changes to the long-established graduate programs.

Griffin, DiFulvio, and Gerber describe the use of undergraduate public health peer advisers for a fast-growing undergraduate public health program at the University of Massachusetts Amherst (8). Peer advisers play a valuable role in supporting the program advisers in one of the University’s fastest growing programs, a B.S. in Public Health Sciences. Peer advisers do not replace the role of a professional academic adviser, but they can support the professionals and the students in the program. Being a peer adviser teaches leadership, communication skills, strategies for improving student success, and fosters personal and professional development.

Yeatts explains the importance of utilizing active learning strategies in an undergraduate introductory public health course (9). Covering public health disciplines such as epidemiology, biostatistics, health behavior, nutrition, maternal and child health, environment, and health policy, students develop an appreciation of these fields through practical exercises that give real world public health experiences both in and outside the classroom.

Nelson-Hurwitz and Tagorda describe a three-course capstone series that is a key component of the Bachelor of Arts in Public Health at the University of Hawaii at Manoa (10). Spread over three semesters, the course engages students in development and execution of a project to apply academic skills to a real-world problem.

Riegelman and Wilson consider the contribution of community colleges in training future public health professionals (11). They report on a two-phase study. Phase one consisted of an Expert Panel that developed a series of Foundation and Consensus

Statements that reflect what public health and community college educational organizations could do together. Phase two is the development of “prototype curricular models for Public Health: the Generalist, the Specialist, and the Health Navigator model” for community colleges.

Theme III

Theme III focuses on curriculum issues, including the relevancy of accreditation.

The seven articles address broader curriculum design, including accreditation, employment opportunities, and articulation with graduate programs. The authors reflect varied perspectives on whether undergraduate public health degrees should focus on preparing students for further study or direct entry into the public health workforce. Regardless, the authors all agree that any program needs to carefully assess its student market and the goals for the program, whether preparation for the job market or for further professional or academic study.

Friedman and Lee provide a framework for a baccalaureate curriculum in public health, including general education requirements as defined by the institution, core public health classes taken by all public health students, domain-specific classes if students can choose specific concentrations or courses offering more depth for a generalist degree, electives, and field experience (12). In the context of a professional orientation to the program, Friedman and Lee also advocate for professional skills and norms such as leadership, respect for others, cultural competency, team work, and conflict resolution.

Lee and Friedman acknowledge that undergraduate public health programs are relatively unusual in that they have evolved after graduate programs in the same discipline, noting that this history has introduced challenges in the articulation between programs (13, 14). They discuss the challenges of related content taught at graduate and undergraduate levels with varying depth, breadth, and competencies, especially for faculty teaching at both levels and students who progress from undergraduate to graduate programs. Options to address potential duplication vary by institutional policy but might include dual degree agreements (e.g., 4 + 1 or 3 + 2 programs), course waivers based on content analysis, early matriculation, enrollment in graduate courses while still an undergraduate, tailored program requirements to minimize course duplication, waiver of specific requirements, and direct matriculation to doctoral programs.

Wykoff and colleagues present results from alumni and employer surveys at East Tennessee State University to support their view that baccalaureate degrees in public health should be developed as professional degrees preparing students for the workforce (15). About one-third of the BSPH graduates found employment in a healthcare delivery organization, with nearly half reporting other employment; graduates report general satisfaction with their preparation for the workplace.

Holsinger and colleagues reviewed 19 programs from 17 accredited schools of public health offering undergraduate degrees (16). Across the 13 BA and BS programs, public health content comprised 29–30% of the typical 120 semester hours of coursework. In contrast, for the six BSPH or BPH programs, public

health content represented an average of 52 semester hours or 43% of the curriculum; the authors note that these numbers represent minimum required courses without consideration of potential electives in public health. Holsinger compares these numbers to the typical MPH curriculum, noting the interpretation must be tempered by the different levels of education, and acknowledging that the baccalaureate graduates may be competing for entry level public health jobs previously filled by MPH graduates.

From the perspective of lengthy experience with accreditation of graduate public health education, King and Petersen describe the development of accreditation criteria for baccalaureate programs not affiliated with accredited schools or programs of public health as a coordinated approach to assure quality in undergraduate public health education without restricting to professional or academic programs (17). Informing this development were multiple conversations involving public health and educational leaders to develop consensus about content and structure. Commonalities beyond public health core content include personal and social responsibility, determinants of health and disease, and experiential opportunities.

Tarasenko and Lee examine three major college directories and the Association of Schools and Programs of Public Health website to identify undergraduate degrees in public health, and then compare the specifics of the curriculum with the universities' catalogs (18). In contrast to much larger numbers reported by King and Petersen (17) and Holsinger and colleagues (16), Tarasenko and Lee identify only 54 programs that offer a general degree in public health. They contrast this with the apparent popularity of public health among universities and undergraduate students, concluding that undergraduate education for public health is still in its infancy, both in terms of curriculum development and broad marketing efforts and general awareness.

Theme IV

Theme IV offers insights into the relationship between formal academic training and careers in the public health or healthcare workforce.

Tilson, Bender, and Kronstadt describe the new accreditation for state and local public health departments, their responsibilities for "maintaining a competent workforce," and how UGPH can

work with government public health departments to cultivate the workforce for the future (19). Learning from existing collaborations among and between the academic enterprises and state, local, tribal, and territorial health departments should prove useful as accreditation is more uniformly achieved across the US.

Martin discusses how education in public health can be applied to careers in healthcare delivery settings (20). The author presents a compelling case that as health care increasingly adapts to a value-based and population-oriented delivery model, a new generation of professionals will require skills and abilities to communicate and collaborate in social systems that grow increasingly complex over time. UGPH provides a foundation for management and clinical careers, as well as those emphasizing public health.

Lee reviews the book *Career Planning in Public Health*, which identifies and examines 101 employment options within the sphere of public health (21). The author describes the strengths and weaknesses of the book, and provides useful alternate sources of information intended to complement the book review itself. Readers with an interest in navigating potential career pathways will find the article a useful orientation to the diverse and often puzzling portals of entry into a rewarding and aspirational public health career. This could well be used by university faculty, counselors, or students themselves to explore the possible careers that build upon a foundation of formal education in public health.

Conclusion

We would like to thank all of those who contributed to this Research Topic as authors, editors, review editors, and thoughtful colleagues. Practitioners, as well as academicians, participated in shaping the articles that are showcased here. Many others are working in the field as teachers, practitioners, public health leaders, and students. The need for additional data is evident; rigorous evaluation and research studies are needed. The ideas articulated here hopefully contribute to identifying the issues that warrant analysis. We are all striving to create a public health system and public health workforce that will enable the US to maximize the health status of its communities. We hope the information and ideas shared here will further this goal.

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A history of undergraduate education for public health: from behind the scenes to center stage

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The Early Years – The Growth of Specialized Degrees

Education for Public Health traces its roots to the Welch–Rose report of 1915. The Welch–Rose report defined education for public health as applied graduate education primarily for professionals such as physicians, nurses, and engineers who needed academic education and the latest research to help them take on leadership roles in governmental public health (1).

The graduate and research focus of academic public health dominated the landscape for the better part of the twentieth century. Yet behind the scenes, changes were occurring that have led in the twenty-first century to new approaches to undergraduate public health education.

The Society for Public Health Education (SOPHE) was founded in 1950. As was the practice of the era, membership required a graduate degree. A decade later, SOPHE began admitting members with an undergraduate degree and practice experience (2). Undergraduate programs supported by SOPHE have included community health and school health.

The emergence of environmental health as a distinct field led to the development of environmental health programs at the bachelor's degree level with a strong science emphasis.

In 1967, the National Environmental Health Science & Protection Accreditation Council (EHAC) was established. East Tennessee State's undergraduate environmental health program became the first accredited undergraduate program (3).

When the Association of University Programs in Health Administration (AUPHA) was founded in the late 1940s, graduate degree programs formed the basis of eligibility for membership. Undergraduate programs were gradually added. By the late part of the century, AUPHA was offering a certification process for undergraduate health administration programs (4).

During the last half of the twentieth century, undergraduate programs in public health and related fields were developed that either did not qualify for membership in SOPHE, EHAC, or AUPHA, or chose not to pursue such membership. According to the Association of Schools and Programs of Public Health (ASPPH), by 1992, there were 45 institutions that were offering one or more undergraduate degrees in a public health related field. By 2000, this number had risen to 76 (5).

These early efforts to develop specialty degrees for undergraduates not only survived but have grown over the years. At the turn of the twenty-first century, they represented the major source of undergraduate education for public health.

Undergraduate Education for Public Health – The Foundations of a New Movement

Efforts to frame education for public health as part of liberal arts education can be traced to the efforts of Abraham Lilienfeld, of Johns Hopkins. In the late 1970s, Dr. Lilienfeld wrote

articles advocating development of “epidemiology 101” (6). This approach took root at Johns Hopkins where the School of Arts and Sciences in collaboration with the School of Public Health developed a major in public health. This major grew slowly in the early years but was well positioned for rapid growth and wide recognition in the twenty-first century (7).

In 1987, David Fraser, President of Swarthmore College and former CDC epidemiologist known for work on Legionnaire’s disease, wrote a ground breaking article in the *New England Journal of Medicine* titled: *Epidemiology as a Liberal Art* (8). For many who read the original article and others who read it decades later, the article served as an intellectual launching point for new ways to think about the role of epidemiology and public health as part of liberal arts or more broadly as liberal education¹.

By the beginning of the twenty-first century, the student body for the MPH in most accredited Schools and Programs had changed dramatically. Recent bachelor’s degree graduates without any public health work experiences were enrolling in growing numbers and often made up the vast majority of MPH students. This fundamental demographic change set the stage for the full emergence of undergraduate public health education (9).

The early years of the twenty-first century saw a key turning point in the development of undergraduate education for public health. The 2003 Institute of Medicine report on the future of public health education included a key recommendation that “...all undergraduates should have access to education in public health” (10). This recommendation spawned key initiatives in 2003–2005 including the development of an Undergraduate Public Health Task Force by the then Association of Schools of Public Health (ASPH in 2013 became the ASPPH).

The growth of undergraduate public health education in accredited schools and programs proceeded rapidly in 2003–2005. By 2005, data collected by the Association of Schools of Public Health indicated that the majority of accredited Schools, which all offered graduate public health education, were also offering majors, minors, or individual public health classes for undergraduates. However, only a small fraction of all colleges and universities offered graduate education in public health, so there was still much more to do to bring education for public health to the majority of undergraduates.

The Educated Citizen and Public Health Movement

As this growth occurred, it rapidly became apparent that the interest in public health at the undergraduate level was not limited to students who intended to pursue public health graduate degrees or a career in public health. Anecdotal evidence strongly suggested that students saw within the broader term “public health” a number of subjects of interest. Course work in global health was of particular interest as part of the then emerging focus on

globalization and the importance of issues ranging from climate change to social justice.

A major turning point occurred in 2006 when the Council of Colleges of Arts and Sciences and the Association for Prevention Teaching and Research sponsored the Consensus Conference on Undergraduate Public Health (11). Key to the success of this effort was the participation of the Association of American Colleges and Universities (AAC&U) and the Association of Schools of Public Health. The Consensus Conference recommended a series of introductory “101” courses and the development of minors in public health for colleges and universities both with and without graduate programs in public health. Attendees also discussed the promise of incorporating public health courses and experiences into general education curricula that would reach virtually all undergraduates.

The participation of AAC&U coincided with the early years of AAC&U’s centennial defining initiative: Liberal Education and America’s Promise (LEAP). LEAP articulated a set of Essential Learning Outcomes delineating the best expectations for student learning in college. The ELOs, as they are known, describe the following four principal outcomes of an undergraduate education for the twenty-first century (12)².

- Knowledge of human cultures and the physical and natural world – focused on engagement with big questions both contemporary and enduring;
- Intellectual and practical skills – practiced extensively across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance;
- Personal and social responsibility – anchored through active involvement with diverse communities and real-world challenges;
- Integrative and applied learning demonstrated through the application of knowledge, skills, and responsibilities to new setting and complex problems.

Association of American Colleges and Universities leaders soon came to see undergraduate education for public health as an ideal exemplar to illustrate the potential of the ELOs to stimulate change in undergraduate education. The ELOs provided the foundation for the emergence of what came to be called the Educated Citizen and Public Health (ECPH) movement. The goals of this movement were described by Susan Albertine, Nancy Alfred Persily, and Richard Riegelman in a 2007 article titled “Back to the Pump Handle: Public Health and the Future of Undergraduate Education.” They wrote: “We need citizens who can help as individuals to change social behavior and who are aware of the need for systemic health care, good nutrition, decent housing, and sustainable urban centers. We need to rely on leaders who are able to consider benefits and harms to groups, minority as well as majority, and to engage in systems thinking, understanding how multiple factors interact. These are abilities essential to citizenship for the health of the world” (13).

¹<http://www.aacu.org/resources/liberal-education>

²<http://aacu.org/leap/essential-learning-outcomes>

Perhaps as a sign of the times, undergraduate institutions, even those without graduate public health education, rapidly adopted majors as well as minors and public health courses in general education. By 2008, when AAC&U conducted a survey of undergraduate programs, they found over 130 institutions offering undergraduate public health curricula.

The ECPH efforts led to a series of publications in national media and endorsements that have helped institutionalize the move toward undergraduate education in public health. In 2009, the American Public Health Association passed a resolution endorsing undergraduate public health education (14). *Healthy People 2020* included objectives designed to encourage the growth of undergraduate education in public health (15).

The rapid growth of majors and minors in public health was occurring in 2011 as schools and programs of public health prepared to examine the future of education for public health in preparation for the 100th anniversary of the Welch–Rose report in 2015. The ASPH Framing the Future Task Force was convened in 2011 and its first product was the ASPH Undergraduate Public Health Learning Outcomes built on the ELOs and designed for all undergraduates (16).

In 2012, the ASPH Framing the Future Task Force formed an expert panel chaired by Dean Randy Wykoff to which developed what has come to be called the Critical Component Elements (CCEs) designed for all undergraduate majors in public health and related fields (17). The CCEs have now been accepted by the Council on Education for Public Health as the basis for accreditation of undergraduate public health programs in institutions with and without graduate degree programs in public health. CCEs have also encouraged the development of a continuum of public health education extending from associate degree through to graduate public health education³.

Community Colleges and Public Health – The Newest Frontier

Growth in education for public health has occurred primarily in bachelor's degree programs. To bring community colleges into the continuum of public health education, the by then renamed ASPPH Framing the Future Task Force, in collaboration with the League for Innovation in the Community College (the League), produced the Community College and Public Health report in 2014 (18). Co-chaired by Richard Riegelman and Cynthia Wilson from the League, the report recommended two "prototype curriculum models" Public Health: Generalist & Specializations including general public health, health education, health administration, and environmental health designed for articulation with bachelor's degree programs. Health Navigator applied associate degree and academic certificate programs were also recommended to prepare students for the workforce⁴.

Key to this initiative's continuing success is ongoing collaboration with public health academic organizations including the SOPHE and the Association of Environmental Health Academic Programs (AEPHP) as well as public health practice organizations including the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO). ASPPH and AAC&U continue to play key roles in encouraging the development of education for public health in community colleges.

New Steps

A number of issues are key to the enduring impact of undergraduate education for public health. Mechanisms for articulation of associate degrees to bachelor's degrees and bachelor's degrees to the MPH have not been fully developed. The need for, and, as appropriate, the process for, "certification" of individuals who have received an undergraduate degree in a public health discipline, remains as challenging and important as it is for those receiving graduate degrees.

Finding a balance between global public health learning within general and liberal education as advocated by the ECPH movement and the emphasis on professionalizing public health degrees remains a worthy challenge. Finally, the relationship between number of jobs available and the number of individuals, receiving both graduate and undergraduate degrees in public health will need to be followed closely as will the impact of bachelor's degree graduates on the public health workforce.

Undergraduate public health education is already having an impact on the MPH. The MPH report of the ASPPH Framing the Future Task Force (19) recommends coordination of the MPH core with the bachelor's degree CCEs and recommends that the MPH include a coherent specialization. Both of these basic changes can be seen as a response to the development of undergraduate public health education.

Since 2011, ASPPH has sponsored the Undergraduate Education for Public Health Summit bringing together undergraduate faculty and administrators from institutions with and without graduate public health programs. The Summit has demonstrated the continuing need to expand the base of education for public health beyond schools and programs with graduate public health education.

These future issues may be seen as the challenges of success. Undergraduate education for public health has been a game changer influencing both undergraduate education, in general, and public health education, in particular. The emergence of undergraduate education for public health is already shaping the view of public health for a broad spectrum of educated citizens.

Supplementary Material

The Supplementary Material for this article can be found online at <http://journal.frontiersin.org/article/10.3389/fpubh.2015.00070>

A timeline of the history of undergraduate education for public health is included in the journal's supplementary materials, which accompanies this article.

³<http://www.aspph.org/educate/#educational-models>

⁴<http://www.league.org/ccph/>

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Public health learning – purposeful, progressive, global by design

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Over the past decade, we have witnessed expansive growth in numbers and diversity of undergraduate public health programs. Majors, minors, and certificates are proliferating across all institutional types. While no complete census of programs exists, a number of studies have noted the growth (1, 2) [see also the special issue of *Am J Prev Med* (2008) 35(3), on undergraduate public health education]. The popular press has picked up the story (3). Community colleges are now developing programs (4). A key indicator: CEPH is now accrediting “standalone” baccalaureate programs. This growth phase builds on foundations laid earlier by a handful of schools, colleges, and programs, and the work of thought leaders such as Lilienfeld and Fraser (5). It was accelerated by the Institute of Medicine’s publication *Who Will Keep the Public Healthy* (2003), with its call for an educated citizenry: “all undergraduates should have access to education in public health” (144). Heeding that call, the Educated Citizen, and Public Health¹ initiative has contributed in many ways to growth, in partnership with lead organizations – the Association for Prevention Teaching and Research (APTR), the Council of College of Arts and Sciences (CCAS), the Association of Schools and Programs of Public Health (ASPPH), and the Association of American Colleges and Universities (AAC&U). The recent merger of schools of public health and programs of public health, now joined in ASPPH, and growth in numbers of graduate programs overall may support further development of undergraduate public health programs.

The growth phase of public health education – a curricular movement at the undergraduate level – is a good thing. It has drawn the talents, energies, and passions of a wide array of academics, clinicians, and field practitioners. It has attracted such people as myself, a professor of American literature and English composition. Many of us see potential in the capacity of public health studies to embrace the full array of the liberal arts and general education, and offer a source of renewal and vitality to disciplines and fields under pressure in the twenty-first century. Many of us hope to see a more diverse population of students moving toward health professions through their introduction to public health. Because public health programs can offer highly applied and practical venues for learning in mathematics and the sciences, they may serve to open STEM fields to aspiring underrepresented minority students and start these students on pathways to the health professions (6). We see potential in the social and civic benefits that broader and more diverse access to education in public health can provide. I would venture to guess that few of us think any more that the word *all* in the phrase “all undergraduates” was a typo in the IOM statement.

This growth phase has followed a predictable pattern. First, a flurry of interest. Then rapid activity in schools with accredited graduate programs. A few minors organized and then majors. Discovery of programs already in the field, including some in liberal arts colleges – more than had been collectively known. Then the

headlong dash to build new programs. It has been a heady and exhilarating experience to witness so much energy, hope, and achievement.

The rapid growth of programs is unquestionably a good thing, but it does bring risks. One conjures up frontier images, complete with round-ups of perceived cash cows and feed lots for graduate education or the workforce. Think of the excitement and the folly of a land rush. Some of the lawlessness of frontier conditions certainly obtains. My readers will have heard the following questions: What, exactly, are all those undergraduates studying and learning? Where, after all, will all those hundreds and thousands of undergraduates go? What will they do? Who is preparing faculty to teach them? Who will hire them? We all hear these questions. As advocates, we quickly emphasize the bigger picture and greater good, the value of the outcomes to global health and wellbeing. We can point to examples and exemplars of success that institutions are achieving as they address these questions (7). The innovation, in other words, more than offsets the risks. The field is building capacity by growing the numbers of educated citizens and future practitioners who can act to improve public and global health in a profoundly challenging era. Yet questions associated with rapid growth are nonetheless important to consider and address.

Invoking images of risk, I mean to provoke thought. Someone needs to say – many of us need to say – that the field needs to behave in a far more intentional way than it is currently doing. I mean

¹http://www.aacu.org/public_health/index.cfm

that educators on campuses need to be far more intentional, first, in developing programs designed appropriately for undergraduate learning. I also mean that educators must be more collaborative in a tough-minded, evidence-based way about the progression of student learning from high school and the beginning of college through entry into graduate programs or the workforce. Finally, I am calling for an intentional approach to learning from the associate through the baccalaureate to the graduate level that is globally attuned – and I do not mean simply “global” in content. We possess the tools and means, the principles, and philosophy for doing all of this work (8, 9). We have an opportunity to do what better-established disciplines and fields struggle to do. As we build, we carry responsibility to work wisely and well. If we believe so much depends on the life-long successes of our students – beyond our individual courses and institutional programs – then we need to take time to be purposeful. This is manifestly a challenge to leadership at the academic and administrative levels, calling for a serious investment of resources as well as vigorous advocacy.

First, may I say with respect, as a critical friend and fellow public health educator – an undergraduate program is NOT a mini-MPH. All too often, we are seeing evidence of master’s level expectations set without due reflection in undergraduate programs. Why this should be happening is not hard to guess. Too few program leaders have had the time to think about curricular scaffolding, using tools to help them design purposeful learning that is appropriate for undergraduates. Because of the shortage of faculty, programs hire instructors who have domain knowledge and experience in public health but scant acquaintance with undergraduates. I have seen assignments developed for beginning baccalaureate students that would stretch the mind of entry-level master’s students. Beginning undergraduates struggle to identify scholarly articles or to draw distinctions between scholarship and popular media – or to read

Wikipedia with a critical eye. A research assignment with a literature review pitched at the master’s level will defeat these students. If you observe this problem in your program, you should gather your faculty for an assignment exchange and a curricular design session. I have yet to see a group of faculty fail to identify the issues or to devise solutions. In fact, people typically enjoy this kind of collective work and sense that it needs to be done.

Resources are readily available. In my workshops, I use the Undergraduate Public Health Learning Outcomes and the Critical Component Elements^{2,3}. Many of us know these frameworks but have not taken the time to use them with colleagues. A group together around the table with these materials in their hands will jump start collaboration. You have to take the step from theory to practice. Such interdisciplinary frameworks as these should likewise be available to students and faculty in practice settings.

If you also introduce one or two of the AAC&U VALUE rubrics⁴, you will discover a helpful synergy. The VALUE rubrics can help you to set expectations for learning as students move from novice stages in the domain of public health toward more independent expertise. If, for example, you want to think about the way students learn to carry out independent research, you can use the integrative learning or critical thinking VALUE rubrics. Developed by teams of faculty from many disciplines and fields, the rubrics describe learning as a sequence of performances that are generally appropriate and typical at the undergraduate level. Each rubric addresses a learning outcome that appears in the well-known and widely respected AAC&U framework of Essential Learning Outcomes (ELOs)⁵. Because the Undergraduate Public Health Learning Outcomes were themselves intentionally aligned with the ELOs, the crosswalk is far easier to make than you might imagine. For example, the critical thinking VALUE rubric offers a learning progression on the use of evidence. The

progression begins with a “benchmark” assumption that undergraduates typically need to learn how to select and use information to investigate a point of view or conclusion. Undergraduates often begin by taking information from sources without any interpretation or evaluation, assuming the authority of all sources as given. By the time they graduate, we hope, they are able to take information from sources with sufficient discernment to develop a comprehensive analysis or synthesis, and to question the viewpoints of experts. The rubric suggests how students typically develop the knowledge and experience to undertake a research task. All 16 rubrics are readily applied within the content domain and methodologies of public health. VALUE rubrics are open-access tools that will make your program more coherent and purposeful, if you make the time to use them. You can also apply these rubrics to help your program increase the equity-minded and evidence-based practices that are highly effective with first-generation and multicultural students⁶.

Second, I have found it helpful to remind myself periodically that my students have come from somewhere and are going somewhere else. Teaching across generations can be challenging as students change and one’s experience builds. If you have yet to look at the Degree Qualifications Profile (DQP), you may be surprised how helpful it can be⁷. Developed by the Lumina Foundation, with leadership including AAC&U, and field tested in hundreds of colleges and universities since 2011, the DQP provides a profile of learning appropriate to the associate, baccalaureate, and master’s levels. It is aligned with the AAC&U ELOs and adds a new dimension to the ELOs and the VALUE rubrics. It actually profiles the degree as a whole. The DQP offers learning statements in five areas appropriate to both general education and major or specialized degree programs – as part of the overall progression of learning. The five are (1) specialized knowledge, (2) broad, integrative knowledge, (3)

²<http://www.aspph.org/educate/models/undergraduate-learning-outcomes/>

³<http://www.aspph.org/educate/models/undergraduate-baccalaureate-cce-report/>

⁴<http://www.aacu.org/value/index.cfm>

⁵<http://www.aacu.org/leap/vision.cfm>

⁶http://www.aacu.org/sites/default/files/files/assessinghips/AssessingHIPS_TGGrantReport.pdf

⁷<http://degreeprofile.org/download-the-dqp/>

intellectual skills, (4) applied and collaborative learning, and (5) civic and global learning. For example, in the area of learning titled specialized knowledge – pertaining to the major program or field – the profile offers a spectrum of 10 learning statements. This continuum of statements begins with what students should be expected to achieve at the associate level and progresses through the master's level. The first of these statements, at the associate level (or the undergraduate lower division): “Describes the scope of the field of study, its core theories and practices, using field-related terminology, and offers a similar explication of at least one related field.” At the bachelor's level in specialized learning: “Defines and explains the structure, styles, and practices of the field of study using its tools, technologies, methods, and specialized terms.” At the master's level, “Elucidates the major theories, research methods, and approaches to inquiry and schools of practice in the field of study, articulates their sources, and illustrates both their applications and their relationships to allied fields of study.” There are no bright lines of demarcation between the degree levels, but one observes how people are likely to grow as they learn. Even this brief extract should suggest how the DQP may be readily applied within learning domains of public health.

Third, as the DQP also suggests, global learning is not merely a content domain. It is a hugely meaningful educational context. As globalization reshapes education worldwide, we in the United States would be well advised to learn about degree frameworks that are developing in other countries, as for example in the European Union through the Bologna Process. The DQP

invites us to address learning in global context. Within the field of public health, this invitation should be particularly resonant. As we think about purposeful and progressive learning for undergraduates, we should think with equal discernment about global health and global learning. ASPPH rightly makes the case that public health is global health⁸. We ought to think about educational frameworks that are globally attuned as a way to reach the IOM goal. Further, the public health community can and should promote efforts to align undergraduate public health programs with community-based global health needs, particularly for underserved populations.

Since 2009, I have been the steward of the Educated Citizen and Public Health (ECPH) listserv [list.aacu.org/mailman/listinfo/ecph]. The list is dedicated to undergraduate liberal education in public health. Every day, using Google Alerts, I scan the top hits in public health, looking for program items to share with ECPH. The experience has erased any distinction in my mind between global and public health. The search engine makes no such distinction, and neither should we. I and we should stop thinking about U.S. students and our programs in isolation. In and of itself this is a lesson in epidemiology. Right now Ebola dominates public health news. This is the world our students will inherit. We owe it to them to make their education in public health as purposeful, progressive, and global as we possibly can. We have the tools in our hands – and we bear a tremendous responsibility to use them well.

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⁸<http://www.aspph.org/discover/>



The peer-reviewed literature on undergraduate education for public health in the United States, 2004–2014

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The education of undergraduate college students in the field of public health has burgeoned over the past decade. Professional literature in peer-reviewed journals is one indicator of the status of a field of study and its related body of knowledge. It is also a mechanism for sharing information among professionals about challenges, issues, experiences, and best practices. The purpose of the literature review conducted here was to describe the status of the peer-reviewed literature over the past decade pertaining to the education of undergraduates about the field of public health in the United States (U.S.). A literature search was conducted of three databases: PubMed, Scopus, and ERIC. Inclusion criteria were publication date from January 1, 2004 through July 31, 2014; written in the English language; pertaining to undergraduate education in the U.S.; and a focus on public health as the primary discipline. Public health was searched as an overarching discipline; articles focused on sub-disciplines or other health professions disciplines were excluded. The search resulted in 158 articles. Each of the authors reviewed the abstracts for all articles and read full articles when necessary. The result was 23 articles that were then considered in depth. The articles were categorized according to their primary theme: curriculum, courses, learning objectives ($N = 14$); evaluation of teaching method ($N = 3$); case study ($N = 3$); career path and advising ($N = 2$); accreditation ($N = 1$). Year of publication and journal were also examined. The results of the literature search lead to several observations about how the peer-reviewed literature has been used to date and how it could be used to advance the emerging field of undergraduate education for public health.

Keywords: public health pedagogy, undergraduate liberal arts education in public health, undergraduate education for public health, public health workforce education in the U.S., literature review of education for public health, peer-reviewed literature on undergraduate education for public health

Peer-reviewed literature is one indicator of the status of a field of study (1). It provides historical perspective on the evolution of theory and empirical evidence, shows the most recent threads of investigation, and showcases experts in the field. For those seeking an introduction to a field, a search of the peer-reviewed literature also provides a means to identify key themes and find best practices. The purpose of this study was to examine the peer-reviewed literature pertaining to undergraduate education for public health (UGPH) in the United States (U.S.).

Throughout this paper, the acronym UGPH is used to refer to the education of undergraduate college students *about the field of public health*, such as majors or minors in public health or courses in epidemiology or environmental health. This is not to be confused with education *about public health* intended to influence the behavior of college students, such as stop smoking or safe sex campaigns.

BACKGROUND

A brief summary of the forces driving UGPH provides a context by which to examine the literature. UGPH programs have been offered for decades, with many based in universities having

schools of public health. However, in 2003, the Institute of Medicine (IOM) recommended that all U.S. undergraduates have basic education in public health (2). Since then, the number of institutions offering UGPH majors and minors has grown dramatically, including many in community colleges, liberal arts colleges, and universities without schools or programs of public health (3).

Following the IOM report, four national associations joined together to develop the concept of “the educated citizen” as one who is knowledgeable about public health. They created the learning outcomes model, based on the liberal education and America’s promise (LEAP) framework promoted by the Association of American Colleges and Universities (AAC&U), appropriate for all undergraduate students regardless of major or minor (4).

Association of American Colleges and Universities, working with the Association for Prevention Teaching and Research (APTR), developed the first detailed set of recommendations for UGPH. These included a sample curriculum, templates for three introductory courses, and a compilation of 15 case studies from undergraduate public health programs (5). About this time,

leading publishers began to offer textbooks on public health topics aimed at undergraduates (6).

In 2012, the Association of Schools and Programs of Public Health (ASPPH) convened an expert panel to develop the critical component elements (CCEs) of an Undergraduate Major in Public Health. The CCEs describe basic, essential elements for an undergraduate major in public health while allowing considerable flexibility on how that major will be administered (7).

The Public Health Accreditation Board was launched in 2011, offering accreditation for the first time at a national level to local and state public health departments (8). Standard eight pertains to ensuring the education of the public health workforce (9). The need for UGPH has also been supported by the American Public Health Association, with a 2012 report stating the potential significance of UGPH for the public health workforce (10).

In 2014, the accrediting body Council on Education for Public Health (CEPH) added the option of accreditation for free-standing baccalaureate programs in public health (11). Previously, UGPH programs had been accredited only if they were offered by a school of public health or graduate program in public health. The growing number of free-standing public health majors prompted CEPH's action as a way to establish consistency and a baseline for quality. The CEPH accreditation standards are based on the CCEs and outline program requirements in further detail.

These aforementioned UGPH initiatives are public health-centric. The health professions fields of medicine and nursing, as well as others, have spent considerable effort examining the education of their respective disciplines, including the relevancy of public health (12). Recently, "population health" and "global health" have each received increasing attention as essential elements of the healthcare system, and thus, of healthcare professionals' education (13, 14).

A literature review by Evashwick et al. concluded that there is indeed concern within the profession about the content and quality of education for the public health workforce, but a variety of barriers prevent literature on the pedagogy of public health training from being published or searched (15). The literature review identified 464 articles published between 2000 and 2012, with 6 focused on UGPH.

This evolution in UGPH begs the question: has the growth in undergraduate academic-based programs been accompanied by discussions in the peer-reviewed literature among the engaged faculty and practitioners?

OBJECTIVE

The objective of this project was to describe the status of the peer-reviewed literature pertaining to UGPH in the U.S. over the past decade. As undergraduate educational opportunities have developed, questions have been raised by the academic and the practitioner communities about content, quality, workplace relevancy, and career progression, as well as relationship to subsequent graduate education (16) and the value of accreditation. The cohesion or disciplinary structure of the field is also in question, reflecting the debate about whether public health is a free-standing profession or a subset of another discipline (17). All of these questions have implications for academic programs at the undergraduate level.

We looked to the published peer-reviewed literature for guidance about these issues.

METHODOLOGY

A literature search was conducted of three comprehensive bibliographic databases: PubMed, Scopus, and ERIC. Collectively, these three databases were expected to capture the majority of articles pertaining to the pedagogy of UGPH. Two separate search activities were performed in each database. The first search used public health as a specific discipline, and the second search was of sub-topics within the discipline, such as environmental health, healthcare administration, nutrition, health promotion, and global health. The search terms included Public health/education; Education, Public Health Professionals; undergraduate; bachelor degree; baccalaureate degree; Environmental Health; Health Services Administration; Nutritional Sciences; Health Promotion; and Global Health.

The field of public health in the U.S., as well as in other countries, has various sub-divisions, some of which are formally recognized by the accrediting bodies, and some of which have grown up separately with parallel accreditations for academic programs. From the academic perspective, a profession that has distinct licensing or certification is likely to have an accompanying pedagogy that reflects the unique aspects of that field. Many of these sub-disciplines also have distinct undergraduate education majors in U.S. colleges and universities. Thus, in conducting the literature search, those sub-fields that have their own accreditation were considered specialties within public health. The search was constructed to find articles that emphasized the general field of public health. Although the search included the sub-disciplines, articles emphasizing *only* the sub-discipline were excluded from the search.

The "gray literature" was not combed. Examining the citations of articles published in peer-reviewed journals turned up reports, monographs, conference presentations, policy statements, and other potentially relevant material. However, in the absence of an intellectual framework or pragmatic infrastructure for searching the unpublished information in a comprehensive, systematic way, it was determined not to include gray literature in the study.

The initial search results were narrowed down to the articles that had abstracts, were published between January 1, 2004 and July 31, 2014, and written in the English language. This yielded a total of 158 articles. Each of the three authors reviewed all abstracts according to pre-determined criteria, reading the full article when the abstract was not sufficient to determine if the focus was UGPH education. Articles were eliminated for any of the following reasons:

- (1) They focused on a country other than the U.S. "Written in the English language" was used as a proxy for the U.S. as a preferable search term, but yielded articles from Britain, Australia, New Zealand, and other English-speaking countries. These were then eliminated, as their educational systems are different.
- (2) The focus was "undergraduate medical education." In the U.S. model, undergraduate medical education is post-baccalaureate and is formally graduate-level education.

- (3) Articles pertaining to the education of nurses and other health professionals, whether at the graduate or undergraduate level, were eliminated because they considered how to incorporate public health topics into existing curricula for a different health profession, rather than how to specifically shape an undergraduate curriculum with a focus on public health.
- (4) Public health and its sub-topics were only one component of or one course for other non-health undergraduate degree programs. For example, an article about teaching statistics to undergraduates met the initial criteria and appeared in the search. However, the article incorporated an example from public health but was about techniques for teaching statistics in general, not just for those students studying public health.

The total number of articles in each of the above categories is not presented, as many articles fell into more than one category. After reaching 100% agreement among all three authors, a total of 23 articles remained for review. These are displayed in the Supplementary Material.

FINDINGS

The articles were examined for their characteristics and content. The 23 articles fell into five broad categories: learning outcomes and curriculum; teaching methods; case studies of specific university programs; career paths and advising; and accreditation (Table 1). The majority were about the rationale and goals for undergraduate education in public health and recommendations for the corresponding curriculum, as well as descriptions of specific courses.

Between January 1, 2004 and July 31, 2014, some years had no articles published in peer-reviewed literature (Table 2). In 2008, 11 of the 23 articles appeared. This was in part because one journal had a supplement on UGPH.

During the 2004–2014 timeframe, articles on UGPH have appeared in seven journals (Table 3). Two journals published 65% ($n = 15$) of the articles identified in the search.

The number of individual authors was 44. Several authors had authored or co-authored multiple articles.

DISCUSSION

The peer-reviewed literature is one means of communicating key issues pertaining to an emerging or changing field, such as UGPH. During more than a decade following the IOM recommendation to educate all undergraduates about public health, very few articles have been published to indicate that those working in the field have been exchanging information through the peer-reviewed literature about how to implement this recommendation. The paucity of literature about pedagogy in public health journals is noteworthy, as it is the public health faculty who has the subject matter knowledge to train the future public health workforce. Of all the faculty engaged in teaching undergraduates about public health, whether as a major/minor or as an educated citizen, a small number over the past decade have written for the professional literature indexed in PubMed, Scopus, or ERIC.

Table 1 | Content focus of articles.

Focus	N (%)
Learning outcomes and curriculum	14 (61%)
Teaching methods	3 (13%)
Case studies	3 (13%)
Career paths and advising	2 (9%)
Accreditation	1 (4%)
Total	23

Table 2 | Number of articles published by year.

Publication year	Number of articles
2004	1
2005	0
2006	0
2007	0
2008	11
2009	0
2010	3
2011	3
2012	2
2013	3
2014	0

Table 3 | Number of articles by journal.

Journal	Number of articles
American Journal of Preventive Medicine	9
Public Health Reports	6
Education and Health (Abbingdon)	2
Journal of Public Health Management and Practice	2
Academic Medicine	1
Health Education Behavior	1
American Journal of Public Health	1
American Journal of Health Education	1

It should be noted that the peer-reviewed literature about UGPH in the U.S. is not the only indication of attention to pedagogy. Other sources of information include education journals, literature published by and about the teaching of public health in other countries, literature about the pedagogy of sub-disciplines of public health and of other health professions disciplines that incorporate public health into their curricula, and the gray literature. Additionally, ideas and experiences are shared through websites, blogs, listservs, and email exchanges. Conferences, accreditation preparation and site visits, and other in-person mechanisms are yet other means of spreading information. Nonetheless, the peer-reviewed literature can be a powerful way to present data, spark controversy, and share ideas, particularly for those who are new to the field and are searching for an introduction.

The results of the literature search lead to the following observations:

- Health professions disciplines, particularly medicine and nursing, have given extensive thought and practical evaluation to the incorporation of public health content within their curricula.
- Some sub-disciplines of public health, including environmental health, health education, nutrition, and health management and policy, have many more articles in the peer-reviewed literature on pedagogy than the general field of public health. Health administration is just one example of a facet of public health that has an entire journal devoted to its pedagogical issues, *the Journal of Health Administration Education*.
- Faculty in other countries have given considerable thought to the pedagogy of public health, including at the undergraduate level. Developing countries in particular have few graduate-level public health programs, which leads to a focus on how to train the future public health workforce at the undergraduate level.
- Some public health topics, such as tobacco control, have been examined for how to incorporate them into the education of undergraduate students in the U.S., whether in health professions disciplines or for all undergraduates. Education about public health aimed at behavior modification may offer an opportunity to expand into discussion about the broader field of public health.
- Few articles reported on rigorous evaluations of teaching methods or content pertinent to UGPH in the U.S. Of the 23 articles in the final list, only 3 were detailed assessments of teaching techniques.
- Only two articles published during the past decade related UGPH training to subsequent career choices or public health careers.
- Unlike other disciplines in the health professions, no journal has historically focused on pedagogy for training public health professionals.

The number of colleges and universities in the U.S. that currently offer public health as a major, minor, or elective is growing. Universities with schools of public health and other health professions disciplines might be able to tap experts to teach, but small liberal arts and community colleges might rely on faculty to teach public health who come from other disciplines and are less familiar with the content, or expert practitioners from the field who know the content but are less experienced with academics. The readily available published peer-reviewed literature can be an important place for faculty to turn to for guidance.

Efforts are underway in the U.S. to revise the curriculum guidelines for teaching public health professionals at the master's and doctoral levels (18). As the pedagogy for these advanced levels is evaluated and revised, considering the articulation of graduate training with undergraduate training in public health will be essential. This is the case not just for public health as an independent profession, but for other health professions disciplines as well. As the educational requirements are changed for undergraduates who are seeking specialized study in medicine, nursing, dentistry, veterinary medicine, and other health professions, will the changes contribute to, complement, or compete with

undergraduate education in public health? The published academic literature provides one easily accessed forum to exchange ideas about vertical and horizontal curricula articulation, challenges, and best practices.

CONCLUSION

To the extent that peer-reviewed literature is one indication of the sophistication of an academic discipline, the field of UGPH is still emerging. The literature about the pedagogy for UGPH can be expected to grow over time. However, the more quickly information is shared, the more likely education will advance in content taught, teaching effectiveness, curriculum articulation, and the relevance of UGPH education to developing an educated citizenry and to preparing students for careers in public health and related health professions.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at <http://www.frontiersin.org/Journal/10.3389/fpubh.2014.00223/abstract>

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An undergraduate curriculum in public health benchmarked to the needs of the workforce

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East Tennessee State University (ETSU) has offered an undergraduate degree in public health for 60 years. Alumni survey data have documented that the majority of the graduates from this program enter the workforce [see accompanying commentary by Wykoff, et al. (1)]. To keep pace with ongoing changes in the workforce, the decision was made to completely review, and, as appropriate, revise and restructure the Bachelor of Science in Public Health (BSPH) curriculum.

While the specific curricular revisions were adopted to address the recognized workforce needs of the region of central Appalachia where ETSU is located, the process undertaken, and the resulting curricular outcomes could be useful models for other undergraduate programs where the majority of graduates enter the workforce upon graduation.

Consistent with the College's strategic plan, a BSPH Re-structuring Taskforce was formed including three department chairs, the academic dean, a student representative, and the BSPH coordinator (Stoots). The taskforce reviewed data from a variety of systematically collected assessments, including the annual alumni surveys, the bi-annual employer surveys, and the field preceptor evaluations, which are completed at the end of each student's mandatory internship. The taskforce also reviewed the exit survey, conducted at the time of student graduation, as well as data from the students' culminating presentations, both of which ask students to specifically comment on ways in which the program could

be improved. Throughout the process, the taskforce interfaced with faculty, staff, students, and employers.

To facilitate the interviews with the preceptors and employers, the taskforce utilized a framework that emphasized six questions:

- (1) What knowledge and skills will (your profession) require in 5 years?
- (2) What *issues* should all (your profession) graduates be able to *discuss*?
- (3) What *things* should all (your profession) graduates be able to *do*?
- (4) What *tools* should all (your profession) graduates be able to *use*?
- (5) What *problems* should all (your profession) graduates be able to *solve*?
- (6) What *characteristics* should all (your professions) graduates be able to *exemplify*?

Once all recommendations from the various sources were gathered, the taskforce conducted a comprehensive qualitative analysis using the card-sorting technique. Through their analysis they identified potential competency domains and approximately 400 desired learning objectives. (This list is posted at: <http://www.etsu.edu/cph/academics/undergraduate/bspublichealth.aspx>).

A group of faculty, staff, and students was then assembled as the Undergraduate Curriculum Workgroup and was chaired by the BSPH Coordinator. This group worked to map the identified competency domains and learning objectives, in an "introduced"

and "reinforced" format, into the coursework. This format reduced redundancy by only having a concept introduced once, and then mapping all concept reinforcements so they would build upon each other.

While this process began prior to the release of the ASPH Recommended Critical Component Elements for an Undergraduate Major in Public Health¹, the competency domains were subsequently mapped against the Critical Component Elements, and found to be congruent and comprehensive.

In addition to the identification of the competency domains and the learning objectives, four over-arching themes emerged from this process:

- (1) Employers seek graduates who are knowledgeable in their field, but who also possess cross-cutting skills related to professional and ethical behavior;
- (2) Employers value graduates who have very strong written and verbal communication skills;
- (3) Employers expect graduates to have expanded technological capabilities, particularly with Microsoft applications (e.g., Excel) and electronic health records; and
- (4) Students want more exposure to working professionals in the field, prior to their internship.

The first two themes were addressed by incorporating specific skills and projects related to professionalism and

¹<http://www.asph.org/educate/models/undergraduate-baccalaureate-cce-report/>

communication skills into each core course. The third theme was addressed by enhancing the technology-requirements of the core courses and by revising and expanding the existing “Emerging Technologies for the Health Professions” course. This course now incorporates a greater focus on software usage, spreadsheet tools, and electronic presentation in order to prepare students for the newly added technology components in the core courses.

The final theme was addressed in several ways:

- (1) First, a one-credit hour “Skills and Encounters” course was added to each of the four semesters prior to the semester-long internship. The “Skills and Encounters” courses will expose students to a range of public health workforce settings and introduce a cross-section of skills essential for workplace success, including “professionalism,” “career preparation,” and “teamwork,” among others. For example, throughout the various Skills and Encounters courses, in addition to direct on-site visits with working professionals, students will engage in a variety of scenarios with progressively challenging responsibilities related to conduct in work settings, job interviews, and professional communication.
- (2) Second, students will complete the ESSENTIALS course, a hands-on/applied course that teaches students to make a range of products required for improving health in low-resource settings (e.g., water filters, composting latrines, adobe structures). By presenting students with a range of problems that they have never faced – from using new tools to constructing items without all of the necessary supplies – ESSENTIALS requires students to work in teams, to think creatively, and to solve an array of logistical and operational challenges, while, at the same time, developing an appreciation for the realities associated with living in resource-poor environments.

Table 1 | Undergraduate public health curriculum benchmarked to the needs of the workforce.

TABLE CURRICULUM: AFTER REVISION

Public health core (46 credit hours)

Biostatistics (3 credit hours)
Emerging technologies for the health professions (3)
Principles of epidemiology (3)
Health services administration (3)
Health systems (3)
Principles and practices of public health education (3)
Environmental sanitation (3)
First aid and emergency care (3)
Public health budgeting and finance (3)
Top 5 health threats (3)
Skills and encounters I (1)
Skills and encounters II (1)
Skills and encounters III (1)
Skills and encounters IV (1)
Essentials (3)
Field experience (9)

Community health concentration (15)

Cultural competencies and spirituality in health care (3)
Community organization for health education programs (3)
Behavior change theory for public health (3)
Service grant writing (3)
Lifespan health promotion (3)

Health care administration concentration (15)

Legal and ethical issues in healthcare (3)
Health services planning (3)
Quality and utilization assurance (3)
Current issues in health services management and policy I (1)
Current issues in health services management and policy II (2)
Health informatics (3)

Minor: 18 credits (required for both concentrations)

Table 1 shows the BSPH curriculum after the revision, and includes the BSPH core courses as well as the Community Health and Health Care Administration concentrations.

The BSPH revision represents three distinct and fundamental changes. The first is the methodology used to drive the curricular revision. The processes involved all stakeholders – employers, students, preceptors, and faculty – at every juncture. Second, it was explicitly designed to prepare students for the workforce, with significantly increased focus on practical/workforce experiences, skills, and experiential learning for the students. The third outcome is the nature of the change in the curriculum – with a greater focus on professionalism, communication skills, technological, and cultural competence. These changes reflect a commitment to assuring that graduates are prepared, as well as possible, for entry into the local health workforce.

While the specific curricular outcomes may vary in different parts of the country, we believe that this systematic, workforce-oriented, approach, should be relevant for many undergraduate public

health programs, especially those where the majority of students enter the workforce upon graduations.

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Success of the undergraduate public health at Tulane University

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Tulane University School of Public Health and Tropical Medicine launched the Bachelors of Science in Public Health (BSPH) in 2005. The BSPH has steadily grown and comprises one-third of the total enrollment in the school. A review of the organizational structure demonstrates that direct responsibility for undergraduate education by a school of public health is advantageous to the success of the program. The competency and skills-based curriculum attracts students. Outcome measures show the enrollment is steadily increasing. The majority of the BSPH graduates continue onto competitive graduate and professional degree programs. Those who seek jobs find employment related to their public health education, but outside of the traditional governmental public health agencies. The combined BSPH/masters of public health (MPH) degree is a pipeline for students to pursue a MPH and increases the likelihood students will pursue careers in public health. The range and depth of study in the bachelors program is continually examined. Topics once within the purview of graduate education are now being incorporated into undergraduate courses. Undergraduate public health is one of a number of factors that is influencing changes in the MPH degree.

Keywords: public health education, undergraduate public health education, job placement, undergraduate students, public health educational programs

INTRODUCTION

The 2003 Institute of Medicine (IOM) report, “Who Will Keep the Public Healthy?” examined issues for the education of public health professionals for the twenty-first century (1). The report called for greater access to public health education, including undergraduate studies (1–3). Since this report, the public health community has put forth visions on the purpose and content of undergraduate degrees (3–6). Colleges and universities across the country have accelerated the development of new undergraduate public health programs and the vast majority of programs are outside of Council of Education for Public Health (CEPH) accredited schools of public health (3, 5, 7). The Framing the Future Initiative led by the Association of Schools and Programs of Public Health (ASPPH) has developed recommendations for the critical components for the undergraduate public health major (8). In addition to undergraduate degree programs, the IOM report led collaborations with liberal arts and science to promote the “Educated Citizen” in public health (2–4). The 2006 Consensus Conference on Undergraduate Public Health Education recommended the development of public health courses for an educated citizenry within liberal arts education (2–4).

Tulane University School of Public Health and Tropical Medicine (SPHTM) launched the Bachelors of Science in Public Health (BSPH) in 2005. The BSPH degree has rapidly grown into a vibrant and thriving program. Founded in 1834 to combat yellow fever epidemics in New Orleans, Tulane has a long public health history. The School of Tropical Medicine and Hygiene was established in 1912 to advance population and laboratory science to fight tropical disease, a precursor of evidence-based public health. In 1947, Tulane began conferring the masters of public health (MPH)

and the master of public health in tropical medicine (MPH&TM) degrees and initiated public health doctoral degrees in 1950. The BSPH degree accepted its first students in 2005. Undergraduate public health education is now a valuable component in the spectrum of degrees offered to students.

APPROACH AND METHODS

Since its inception, the Tulane BSPH degree program has grown rapidly. The objective of this assessment is to examine: internal factors that have contributed to its growth; outcome measures to assess the BSPH program; and the influence of the BSPH program on the MPH at Tulane.

The assessment examines internal factors that support the growth of the BSPH program. The review first examined the organizational structure for undergraduate education and admissions policies. In 2006, the University underwent a substantial administrative reorganization for rebuilding after Hurricane Katrina under the Renewal Plan. The second factor examined elements of the BSPH curriculum that attract students into the program.

Program outcome measures are examined to gage the program's progress. Measures include (1) Annual number of students enrolled as majors in the BSPH program; (2) Annual registration in two introductory public health courses as an indicator of the “educated citizenry” in public health; (3) Job placement rates; and (4) Percent of graduates that enter the BSPH/MPH combined degree. Methods for program measures are:

Annual enrollment in BSPH from 2006 to 2014: the number of students enrolled in the BSPH program each year is obtained from the university official enrollment reports.

BSPH enrollment is the number of students who have formally declared public health as a major field of study in the fall semester of each academic year. Students with declared minors in public health are not included. Annual BSPH enrollment is tracked from 2006 to 2014.

Enrollment in the introductory public health courses: the percent of first year students registered in one of the first year introductory public health courses is an indicator of the reach of public health in undergraduate education across Tulane that contributes to the educated citizen in public health (2, 3). Two introductory courses are offered for first year students that fulfill general education distribution requirements in the University core curriculum. The first course, "Introduction to Public Health" provides a general overview of history, philosophy, and concepts of public health and population science and serves as a social science general distribution course. This course includes a service learning component whereby students are able to work in community settings demonstrating the principles in practical applications. The other course is "cells, individuals and communities" that presents the biological basis of human health and diseases across the life course and fulfills a general distribution requirement for a biological science. The percent of freshmen enrolled in one of the two courses were calculated using the total # students enrolled in at least one of the two courses/total # freshmen enrolled in the university in an academic year. Students were counted only once if they took both courses.

Job placement rates: SPHTM surveys seniors just prior to graduation to determine the number who have jobs or are continuing their education in graduate or professional schools. Those reporting not being employed or pursuing graduate education are resurveyed at 6 and 12 months following graduation. The status of those who do not respond is sought through telephoning or social media, such as Facebook and LinkedIn. Job placement rates are calculated according to the method prescribed by CEPH: job placement rate the number employed and pursuing further education within 1 year of graduation over total graduates ($\# \text{ further education} + \# \text{ employed} / \# \text{ graduates}$). Those unknown are not included.

Enrollment in BSPH/MPH combined degree program: the BSPH/MPH combined degree serves as a pipeline to the MPH degree. BSPH students with a GPA of at least 3.0 may apply during their junior year. Those accepted may take up to 12 credits of MPH core courses in their senior year that will apply to both degrees. The percent is the number of students accepted into the BSPH/MPH each year divided by the total number of graduating students.

The third assessment is a review of the influence of the undergraduate program on the MPH program. Factors considered include faculty teaching, curriculum issues, and changing characteristics in students in the MPH.

RESULTS OF ASSESSMENT OF THE BSPH PROGRAM

FACTORS CONTRIBUTING TO GROWTH OF THE PROGRAM

Tulane university organizational setting

The BSPH program opened with five freshmen in the Fall, 2005, 1 week before Hurricane Katrina hit New Orleans. Tulane

University closed for the Fall, 2005 semester and reopened in January, 2006. All of the five BSPH students returned. Facing monumental damages, Tulane instituted the Renewal Plan that included the reorganization of undergraduate education. The renewal plan reorganized and streamlined the structure of schools and rearranged most undergraduate departments into the School of Liberal Arts or the School of Science and Engineering. Under this organizational structure, the BSPH program was placed in SPHTM. Newcomb-Tulane College was formed as an umbrella unit to coordinate undergraduate student functions and centralize recruitment and admissions and student services.

The organizational structure created by the renewal plan supports the growth of the BSPH program. Locating the BSPH degree program in SPHTM gives the school full responsibility for undergraduate public health education. SPHTM faculty set program requirements, determine the curriculum, teach the courses, and advise students. The prior organization had limited the BSPH program to a total of 50 students; the new organizational structure essentially dissolved this cap since all undergraduates students accepted into the university are eligible to declare any major, including public health. It also removes bureaucratic barriers in managing the curriculum. SPHTM has the ability to update requirements and develop additional courses to meet student demand without going through several layers of external committees. The SPHTM receives undergraduate tuition revenue to support the program.

The coordination of undergraduate functions by Newcomb-Tulane College enhances the students' undergraduate experience while relieving the academic schools of the management of administrative student service functions. SPHTM is able to focus effort and resources on developing the academic the public health program. Newcomb-Tulane College handles all undergraduate recruitment and admissions, general advising, student services, oversight of the university-wide undergraduate core curriculum, and special programs. Public health students are able to participate in study abroad, the Honors Program, residential colleges, and all other aspects student life that enrich the undergraduate experience.

Newcomb-Tulane College recruits and admits undergraduate students into the University. Admission to Tulane University is highly competitive and enrolls exceptionally well-qualified students. Students may enter the university without declaring a major and have up to three semesters to decide upon a field of study. This flexibility has proven to be advantageous to the BSPH program. Many students are unaware of public health. The first year introductory courses stimulate interest and allow students to explore a new field and its opportunities. The pool of students without a declared major provides the BSPH program with an influx of very well-qualified students that bolster enrollment in the program.

The renewal plan also created the Center for Public Service (CPS) and a requirement for all undergraduates to participate in community service. The public service requirement aligns well with public health's service learning and community focus. CPS has engaged many community partners that provide internships for BSPH students. The start of the BSPH program in the midst of the upheaval of Hurricane Katrina provided a stimulus that could not have been anticipated. While life in post-Katrina New

Orleans was difficult, the recovery attracted altruistic students who wanted to help rebuild New Orleans and brought an enthusiasm for community service. Students are attracted to public health as a way to work in the community and participate in the rebuilding of New Orleans. The intensity of the recovery instilled a culture of civic and social responsibility into the public health program. This appeals to students and persists as a hallmark of the BSPH program.

Competency- and skills-based curriculum

The professional skills-based focus of the public health curriculum draws students to the BSPH program. When questioned about the reason for choosing public health major on a student satisfaction survey, over 90% indicated interest and opportunities in public health. Further discussion at dean’s hours and student meetings articulated a demand for professional skills that would be used in the workplace. Other discussions with parents indicate that preparation for careers and graduate education is a priority.

The BSPH is an academic public health degree built upon a liberal arts and science education foundation. All Tulane undergraduate students fulfill the university-wide undergraduate general education distribution requirements that include courses selected from humanities and fine arts, social sciences, and science and mathematics. The BSPH curriculum has three tiers: (1) introduction to public health concepts and the biological basis of health and disease; (2) public health foundation through core courses; and (3) synthesis and integration of concepts in a seminar course and the capstone. The BSPH course work encompasses the five core areas of public health and the critical components of undergraduate public health outlined by the Framing the Future (8) initiative. **Table 1** outlines the BSPH required courses and the programmatic skills embedded within the BSPH curriculum. Students gain skills by working on projects and group assignments, applying statistics to datasets, and doing exercises or group projects that apply public health concepts. Students present projects to develop oral communication skills. Writing intensives linked to specific courses develop written communication skills.

The synthesis and integration of concepts occurs in the senior seminar “Formulation of Public Health Policy” and the capstone project, which integrates concepts from across the entire curriculum. The seminar course coaches students to integrate knowledge and use critical thinking skills to develop policy statements and the use of policy as a public health intervention.

The capstone serves as an integrating experience where students apply public health principles to a topic and setting that complements their studies and future goals. Faculty advisors mentor students in independent research, honors theses, and study abroad projects including developing learning objectives and identifying outcomes and products. Service learning opportunities allow student to apply the principles while providing community service (9). Students in service learning internships compile experiences and reflections in a journal and participate in a seminar where they discuss their experiences and relate them to public health principles. Students in the study abroad program present their projects at the International Scholars Symposium hosted by the BSPH program and open to the entire university. Those conducting honors research projects present their work at Research Days.

Table 1 | BSPH required curriculum and program skills.

BSPH required courses	Programmatic skills
Introductory	
Introduction to public health (values/concepts)	Population health approaches and interventions
Cells, individual, and community (human health and disease)	Community and population dynamics Cultural competency
Public health core areas	
Biostatistics in public health	Determinants of health (env/social/econ/behavior)
Foundations of epidemiology	Quantitative methods (data use and analysis)
Social and behavioral perspectives in public health	Qualitative methods (interviewing, focus groups)
Foundations in environmental health	Evidence-based approaches: locate, use, evaluate, and synthesize information
Foundations in health care systems	Project planning, implementation, and evaluation Communication, written, and oral skills
Synthesis and integration	
Formulation of public health policy	Critical thinking and analysis
Community service/field experience	Formulate questions and solve problem
Capstone	Synthesis and analysis of complex information

In the last few years, public health students have been recognized in university-wide forums for outstanding work in honors theses and study abroad.

The public health curriculum attracts students who migrate from classical liberal arts to professional and skills-based programs. The national debate on the value of higher education (10), the difficult job market for many college graduates and large student debt (11, 12) draws students to public health. Discussions with prospective students and their parents indicate a search for programs that prepare students for careers, produce marketable skills, and provide a pathway to professional education. Prospective students scrutinize programs and ask hard questions regarding the preparation for future careers and the job market. Students are drawn to the competence-based public health curriculum, which includes elements of general liberal arts and sciences education (university requirements) while also providing professional skills. The BPSH has emerged as a degree that prepares students for the job market.

The interdisciplinary nature of the public health also appeals to students. The public health program provides a unifying concept that integrates diverse topics and makes the interdisciplinary approach work. While other interdisciplinary programs allow students the option to pursue a wide range of interests, few are able to coalesce the variety of study into career tools.

The flexibility of the undergraduate curriculum makes dual majors feasible and allows student to combine the practical aspects

of public health with liberal arts and sciences interests. Common dual majors with public health include pre-med, cell and molecular biology, psychology, sociology, anthropology, French, Spanish, and political science. An example of a creative dual major is the combination of public health and fine arts in dance; one graduate applied her talents in dance to promote physical exercise in public health programs.

PROGRAM OUTCOMES MEASURES

Annual enrollment in the BSPH degree program

The Tulane BSPH program has grown steadily in enrollment, faculty teaching the program and number of course offerings each year since it was established. **Figure 1** shows the increase in enrollment from 5 students in 2005 to 523 in 2014. An additional 80 students selected public health as a minor. The growth shows demand beyond 2004 enrollment cap of 50 students. The reorganization under the *Renewal Plan* opened the doors to the program and allowed students to explore disciplines before declaring a major. A steady influx of first and second year students select public health as their major, which swells program enrollment each year. Approximately two-thirds of the BSPH students entered the University as undeclared majors and subsequently chose public health. The BSPH has been the fastest growing undergraduate major at

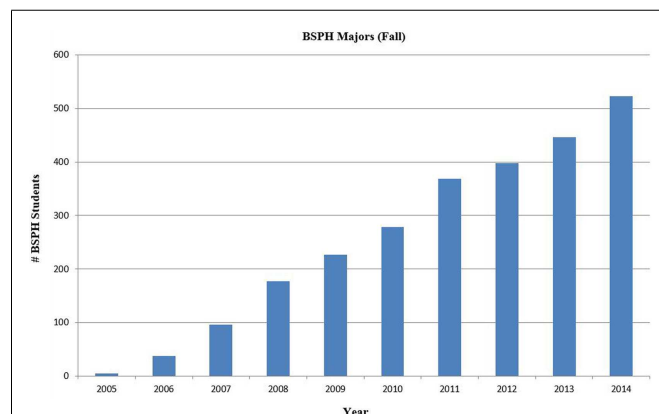


FIGURE 1 | Increase in the number of student enrolled in the BSPH program from 2005 to 2014. The BSPH program has had a steady increase in enrollment since it began in 2005.

Tulane since its inception. Tulane awarded its first 3 BSPH degrees in 2009 and awarded 118 BSPH degrees in May, 2014.

By Fall, 2007 the enrollment nearly doubled the original 50 student limit. In the last 5 years, the increase in enrollment in the BSPH degree averages 20.8%/year. The BSPH program comprises 11% of Tulane University undergraduates in 2014 and is one of its most vibrant programs. The increase in BSPH enrollment parallels growth in undergraduate public health programs nationally. ASPPH reports that from 2008 to 2012 undergraduate degree conferrals have increased by 18% (7). Nationally, public health is ranked as the 10th fastest growing area in undergraduate education in 2012 (7).

Significance of public health in the university

The demand for seats in the two freshman level introductory public health courses has expanded far beyond the BSPH majors for whom it was originally intended. First year students from across the university register in the courses and the number of seats in the two courses has expanded to nearly 800/year. The courses provide an awareness of public health and contribute to the education of the citizenry in public health put forth by the IOM (1) and highlighted by Riegelman and Albertine (2–4). These two introductory courses count as general distribution requirements in social science and biological science in the university undergraduate core curriculum.

The demand for the courses is high with a long wait list for every section of the two courses every semester. SPHTM has steadily increased availability from one section of each course in 2010 to three sections of each course for the fall and spring semesters. In the 2010–2011 academic year, 14.7% of first year students took one of the introductory public health courses; in the 2014–2015 academic year, 38.6% of freshmen registered in at least one of the two introductory public health courses. Further increases will depend upon faculty availability to open additional sections of the courses. The courses are serving to bring greater awareness of public health issues and concepts to the general student population.

Job placement of graduates

Over the last 3 years, 95–98% of BSPH graduates find a job within 1 year of graduation or pursue graduate education (**Table 2**). The majority of graduates (66–82%) enter a graduate or professional degree program. BSPH graduates are accepted into very competitive graduate programs in public health, medical schools, nursing,

Table 2 | Job placement of graduates of the BSPH program.

Graduation year	May, 2011		May, 2012		May, 2013	
	(%)	Placement rate	(%)	Placement rate	(%)	Placement rate
Further education	75.00	95.20%	66.66	98.40%	82.19	98.62%
Employed	20.80		31.74		16.43	
Seeking employment	2.08		1.58		1.38	
Not seeking employment	2.08		1.58		–	
Unknown	7		5.80		5.52	

Job placement rates include employment or further education within 1 year of graduation using the formula prescribed by CEPH.

dietetics programs, law schools, and graduate programs at major universities. Approximately 30% of each graduating class enters public health masters programs at SPHTM through the combined degree program. The large percentage who proceeds to graduate education demonstrates the strength of the undergraduate public health curriculum and the value of the BSPH degree in preparing students for graduate and professional education.

Our employment survey indicates that the BSPH graduates who seek employment after graduation find jobs. Less than 2% (1 student/year) report not finding a job or pursuing graduate education within 1 year of graduation. Those seeking employment find jobs in an array of settings, such as public health programs at non-profit organizations, health care organizations, health education programs, health and wellness programs in businesses/industry, patient advocate groups, fitness organizations, and in health divisions of other sectors. The 2013 graduates who found employment reported salaries ranging from \$35,000 to \$52,000. It is interesting to note that most students find jobs related to their public health education, but outside of traditional governmental public agencies.

The results of our job placement survey are consistent with responses about future career plans from a 2013 student satisfaction survey of BSPH majors. The majority (63.4%) of those responding reported they intended to work in public health and another 21.5% indicated they intended to work in a health-related field. Only 3.2% reported they would seek careers outside of public health or health-related fields; 11.8% were unsure of their plans. The career plans reported during their studies are consistent with their actual post-graduation destinations.

Enrollment in the BSPH/MPH combined degrees

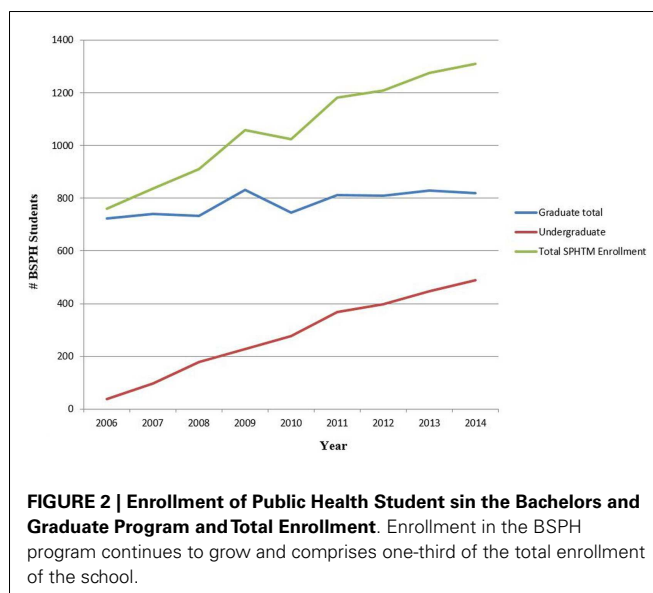
Tulane SPHTM offers a BSPH/MPH combined degree that provides a seamless pathway to MPH programs at SPHTM. The combined degree results in a savings of approximately 25% time (one semester) and tuition in completing the MPH. Of the 118 students who graduated in May, 2014, 45 (38%) proceeded onto one of the SPHTM master's programs as a part of the combined degree. For the last 5 years, approximately one-third of the BSPH graduates enrolled in the combined degree program. The combined degree provides a pipeline to advance students through public health education and prepare the future leaders in the field.

INFLUENCE OF UNDERGRADUATE PUBLIC HEALTH ON THE MPH CURRICULA AT SPHTM

The growing undergraduate program exerts influence on the MPH curricula. In 2014, undergraduate students comprise a third of the total SPHTM enrollment. The undergraduate program continues to grow while enrollment in the master's programs has been stable. **Figure 2** shows the enrollment of the BSPH program in relation to the graduate programs. To support this growth, faculty, program management staff, and advisers have taken on responsibilities in the undergraduate program. The program revenues support the faculty and administrative support.

Refocus of faculty teaching

As undergraduate enrollment increases, the demand for additional courses and sections of core courses also increases. SPHTM expectations for faculty teaching now include undergraduate courses as



well as teaching in the master's and doctoral programs. SPHTM faculty are research-oriented and experienced in graduate level education; the change to undergraduate teaching is both a methodological and cultural shift for many faculty. Many faculty enjoy undergraduate teaching and find the enthusiasm of the undergraduates invigorating, but not all faculty are suited or able to teach undergraduates. Undergraduate teaching requires different teaching methods and approaches and greater course structure than graduate classes or seminars. The Center for Learning and Teaching offers faculty development workshops for learning methods and techniques for undergraduate teaching. In addition, experienced BSPH faculty have compiled teaching tips and guides to help colleagues adjust to undergraduate teaching.

Impact on the MPH curriculum

The BSPH degree is designed to provide a foundation in public health while the MPH provides advanced study in a public health discipline or topic. Although SPHTM has defined the different objectives and competencies for the BSPH and MPH, the details of developing the BSPH curriculum highlights challenges in determining its scope and depth. SPHTM faculty debate, which content and what level is appropriate for the BSPH. Tulane undergraduate public health students are academically well prepared and capable of tackling complex concepts and materials. Care was taken during the development of the undergraduate core curriculum to avoid overlap between BSPH and MPH courses. However, BSPH courses are consistently introducing materials from the MPH. Topics that were once within the purview of graduate education are now incorporated into undergraduate courses. Students are mastering statistical packages such as SPSS, learning field survey techniques, and utilizing health education methods. Introducing these topics in undergraduate courses poses challenges and is forcing changes in the MPH curriculum. Nationally, the overall educational milieu has experienced a knowledge shift whereby complex materials are introduced earlier in the educational ladder; for example, high school sciences classes include materials once taught in college

courses. The same shift is occurring in public health education. As the MPH degrees become more specialized as recommended in the ASPPH Framing the Future MPH report (13), undergraduate public health will absorb some of the MPH materials.

Impact of shifting student characteristics

School of Public Health and Tropical Medicine has offered the MPH degree since 1947. In 1990s, the typical public health student was midcareer practitioners who had a prior professional degree and/or practical experience. Now, 75–80% of MPH students enter with bachelor's degrees directly from undergraduate school and has no public health work experience. Faculty are geared to teaching midcareer professionals who are focused on applying their practice experience within a theoretical context. Faculty must adjust their teaching methods and supplement discussions to include the practice framework as well as infusing professionalism. At the same time, midcareer students in the same course feel constrained in class discussions when basic elements of practice must be explained. In this context, the practicum gains even greater importance to provide practice experiences. Faculty and preceptors find they must provide a greater structure and guidance for the practicum and increase mentoring of students to cultivate practice perspectives and professionalism.

Since many students enter the MPH with undergraduate public health degrees, they come with knowledge of basic concepts equal to or above that of introductory MPH courses. To accommodate these students, SPHTM has instituted challenge exams to assess student knowledge and provide a mechanism to demonstrating mastery of the topic. This allows students to avoid redundant coursework and allows them to proceed on to more advanced MPH course work.

DISCUSSION AND LESSONS LEARNED

The BSPH program has become an integral and exciting component of public health education at Tulane. The growth of the program parallels the national growth in undergraduate public health education (7). Assessment of the BSPH program shows that it is successful in attracting students and preparing them for the job market and graduate education.

The organizational model for undergraduate education created by the post-Katrina Renewal Plan has proven to be advantageous for the BSPH program. The BSPH is a part of SPHTM, which gives the school direct responsibility for program management and the curriculum. This organizational structure streamlines the bureaucracy for updating and adding to the public health curriculum. At the same time, the University core curriculum generates synergy between the competency-based public health approach and liberal arts and education. While there are numerous organizational models for undergraduate public health programs in universities, our experiences demonstrate that direct responsibility for undergraduate education by a school of public health is conducive to the growth of the program.

Since many students enter college without a clear idea of their goals and little knowledge of public health, the policy to admit undergraduate students into Tulane University without declaring a major creates a cadre of well-qualified students who later select the BSPH program. Nearly two-thirds of the BSPH majors entered

the university without declaring a major. Two popular introductory public health courses not only attract students to the BSPH but also promote awareness of public health contributing to the educated citizenry movement.

The BSPH program is accomplishing its goals. Enrollment shows undergraduate interest in selecting public health as a field of study. Ninety-eight percent of graduates either find a job or advance to graduate or professional education. The large percentage of BSPH graduates entering very competitive graduate and professionals schools is an indicator of the caliber of education of the program. While the percent of those continuing to graduate education may not be typical of other undergraduate programs, it reflects the expectations of Tulane undergraduate students to obtain advanced degrees. The combined BSPH/MPH degree is a pipeline for students to pursue a MPH and increases the likelihood students will pursue careers in public health. It is notable that graduates who seek jobs find them and a further indication of the level of preparation the BSPH provides. The types of jobs graduates report reflect the expanding reach of public health into health care, implementation of the Affordable Care Act, and in non-traditional areas as businesses, law firms, insurance companies, and other organizations that need public health expertise. This is a reflection of the changing face of public health.

Undergraduate public health is one of a number of factors that is driving changes to the MPH degree. The "Framing the Future" reports from the Association of Schools and Programs of Public Health (ASPPH) have put forth a framework for undergraduate public health education (8) and for the MPH of the twenty-first century (13) that provide a general roadmap for undergraduate and MPH education. However, there still needs to be further articulation of the interface between undergraduate and graduate public health education. The BSPH program has opened debate at SPHTM on the scope and depth of undergraduate program. While SPHTM has articulated different competencies for the BSPH and MPH, topics and content from the MPH are being incorporated in undergraduate courses. The growth of the BSPH will continue to draw from the MPH curriculum and stimulate the next generation of public health education. This debate is indicative of the challenges associated with the rapid expansion of undergraduate programs.

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Developing leaders: implementation of a peer advising program for a public health sciences undergraduate program

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Peer advising is an integral part of our undergraduate advising system in the Public Health Sciences major at the University of Massachusetts Amherst. The program was developed in 2009 to address the advising needs of a rapidly growing major that went from 25 to over 530 majors between 2007 and 2014. Each year, 9–12 top performing upper-level students are chosen through an intensive application process. A major goal of the program is to provide curriculum and career guidance to students in the major and empower students in their academic and professional pursuits. The year-long program involves several components, including: staffing the drop-in advising center, attending training seminars, developing and presenting workshops for students, meeting prospective students and families, evaluating ways to improve the program, and collaborating on self-directed projects. The peer advisors (PAs) also provide program staff insight into the needs and perspectives of students in the major. In turn, PAs gain valuable leadership and communication skills, and learn strategies for improving student success. The Peer Advising Program builds community and fosters personal and professional development for the PAs. In this paper, we will discuss the undergraduate peer advising model, the benefits and challenges of the program, and lessons learned. Several methods were used to understand the perceived benefits and challenges of the program and experiences of students who utilized the Peer Advising Center. The data for this evaluation were drawn from three sources: (1) archival records from the Peer Advising Center; (2) feedback from PAs who completed the year-long internship; and (3) a survey of students who utilized the Peer Advising Center. Results of this preliminary evaluation indicate that PAs gain valuable skills that they can carry into their professional world. The program is also a way to engage students in building community within the major.

Keywords: advising, peer mentor, undergraduate, student success, benefits, program

INTRODUCTION

For most of its history, public health education focused on graduate studies. Over the last 10 years there has been a surge across the country of undergraduate public health education programs in response to both student interest and a need to develop a strong public health workforce. At the University of Massachusetts Amherst (UMass), School of Public Health and Health Sciences (SPHHS), a new undergraduate major in Public Health Sciences (PHS) was approved in 2007 to meet this growing demand. Starting with 25 students, the major has increased to over 530 students in 7 years and continues to be one of the fastest growing majors on campus. Meeting the advising needs of these 530 undergraduate students is a significant challenge, especially for a program that historically focused on advising graduate students. Additionally, students must navigate a complex set of major and university requirements and career preparation alternatives. To meet these needs, the Department of Public Health at the UMass instituted a peer advising program to help meet the growing need for student advising, provide peer mentorship for students, and provide students with leadership development opportunities in public health.

Several authors report positive outcomes for both the mentor and mentee from peer advising and other peer mentoring programs (1–5). Positive outcomes include increased retention (6) and overall general satisfaction with their academic program (7–10), as well as positive impact on the peer advisors (PA) (11–13). While such research exists, the value of such programs in the discipline of public health has not been explored.

The purpose of this paper is to discuss the Department of Public Health undergraduate peer advising model, including the benefits and challenges of the program, and lessons learned. Our primary guiding question was the following: What are the perceived benefits and challenges of the program from the perspective of the PA? A secondary question focuses on the benefits of the PA program for advisees based on preliminary findings from a survey of students who utilized the Peer Advising Center.

BACKGROUND AND RATIONALE

UNIVERSITY OF MASSACHUSETTS PUBLIC HEALTH SCIENCES AND PEER ADVISING MODEL

The PHS Undergraduate Program is housed in the Department of Public Health within the CEPH accredited SPHHS. The program

has a part-time Faculty Director and one full-time Undergraduate Advisor. The Undergraduate Program Director is responsible for the overall curriculum, faculty development, study abroad and internship opportunities, and meeting with students that have more complex issues. The Program Advisor is responsible for the Peer Advising Program and advising undergraduate students. For the most part, juniors and seniors are strongly encouraged to make an appointment with the Undergraduate Program Advisor or the Undergraduate Program Director to make sure they are on track to graduate. Students may also meet with faculty to explore future career opportunities and graduate school. In addition to staff and faculty advising, peer advising is an essential part of our undergraduate advising system in the PHS major.

Two tracks are available within the PHS major: social science and science. Both tracks prepare students for entry-level public health positions and graduate school. The required public health courses in each track are designed to introduce students to five public health core competencies: community health education, health policy and management, environmental health sciences, epidemiology, and biostatistics. In addition, students in both tracks must complete a collateral requirement of 18 credits from courses of their choice that are related to the study of public health. Examples of proposed courses of study for the collateral field include public policy, sociology, biology, and psychology. Engaging students to think critically and discover his/her own passions is a key element of the program. In this process of self-discovery, students are encouraged to ask questions about how they foresee themselves making an impact in public health.

Public health is an interdisciplinary field, bringing together aspects of science, medicine, economics, sociology, politics, and social justice. Given the interdisciplinary nature of the major and diversity of the public health field, it is essential that students are provided regular access to an advisor who can provide guidance on the many paths that a student can take. It is the program's goal that each student is aware and encouraged to take advantage of opportunities outside of the classroom to further their learning and prepare them for the public health workforce. Furthermore, being at a University with over 20,000 students, the advisors can help advisees navigate the large institution. An advisor serves as a resource to help direct students toward these opportunities.

PUBLIC HEALTH SCIENCES' PEER ADVISING MODEL

The UMass Peer Advising Program was initiated in 2009 to address the advising needs of a rapidly growing major. A major goal of the program is to provide curriculum and career guidance to students in the major, build community among students within the major, and empower students in their academic and professional pursuits. The year-long program is delivered and supervised by the Undergraduate Program Advisor. Course material was developed in consultation with the Undergraduate Program Director who is a faculty member and oversees the Undergraduate Program Advisor including course delivery. The course involves several components, including: staffing the drop-in advising center, attending training seminars, developing and presenting workshops and events for students, meeting prospective students and families, evaluating

ways to improve the program, and collaborating on self-directed projects. The PAs also serve as advisors to the administrators of the program, providing insight into the needs and perspectives of students in the major. In turn, the model is designed to provide PAs with valuable leadership, communication skills, and strategies for improving their own success as well as the success of other students within the major.

RECRUITMENT AND TRAINING

Each year, 9–12 upper-level students are chosen through an intensive application and interview process. In addition, to having a passion for public health, a desire to help other students, and excellent interpersonal and listening skills, PAs must meet specific eligibility requirements to apply for the position (Table 1). Selected prospective PAs must complete an application and meet with the Undergraduate Program Advisor and several PAs for an interview.

The PAs are hired, trained, and supervised by the PHS Undergraduate Program Advisor. Once a PA is accepted in the spring, he/she must complete the Family Education Rights and Privacy Act (FERPA) training. FERPA is the main law that protects the confidentiality of students' records in an academic setting. During the summer, the PAs receive a manual including information about the PHS major, PHS careers, University and department resources and policies, advising rules, and opportunities within and outside the major. The students are expected to review the material and take an exam on the material during the first week of school. Additionally, they must attend an all-day training session during the first week of school and participate in community-building activities.

Two experienced PAs serve as mentors to the new PAs and oversee various responsibilities and public health events. These two Head PAs work closely with the Undergraduate Program Advisor to coordinate events, identify needs for projects, provide feedback about the new PAs, and facilitate seminars. Each new PA shadows a Head PA during the spring semester (after they are selected) and during the first week of school.

There are two primary avenues by which the PAs receive training. First, all PAs must attend an all-day training at the beginning of the fall semester. Second, all PAs attend a weekly 2.5-h seminar throughout the fall and a weekly 2-h seminar in the spring. The objectives of the seminar are diverse, providing PAs information on various components of the public health field and major, academic policies, diversity in higher education, advising techniques, communication skills, group dynamics, event planning, and community-building.

Objectives of the Peer Advising Program state that PAs will be able to:

Table 1 | Eligibility for peer advising.

1. Be a rising junior or senior
2. Have completed at least one full year as a public health major
3. Commit to completing a second semester of peer advising after the fall seminar
4. Have and maintain a cumulative GPA of 3.2 while serving as a PA

- Define Public Health and identify the five domains of public health: Community Health, Policy and Management, Biostatistics, Epidemiology, and Environmental Health.
- Describe the highly interdisciplinary nature of the field.
- Articulate major requirements, career choices, and public health opportunities outside of the classroom.
- Help students identify courses and additional opportunities that are linked with their interests.
- Articulate the impact of social determinants on college students' academic success.
- Develop and practice appropriate strategies in working with culturally diverse populations.
- Examine and articulate one's own identity, values, mental models, and biases.
- Examine and articulate how mental models affect advising interactions.
- Demonstrate and integrate key concepts of coaching and motivational interviewing in peer advising.
- Identify traits and skills of successful leaders.
- Identify different modes of successful communication.
- Identify strategies to improve the PHS major.
- Identify strategies to build community among the major.

RESPONSIBILITIES AND ASSESSMENT

Peer advisors receive three internship credits in the fall and two in the spring. The Head PAs receive an additional credit each semester. The PAs are assessed on the completion of their responsibilities, including:

- Attending weekly seminars and assigned office hours.
- Conducting information sessions for majors and prospective majors.
- Visiting PH classes to introduce themselves.
- Attending open house to meet prospective students and families.
- Attending PHS club.
- Volunteering at SPHHS events.
- Completing test and quizzes.
- Completing weekly reflections and responses on their advising experience.
- Completing departmental service project.
- Assisting Head PAs on different projects.
- Writing a short article about public health for the PHS weekly newsletter.
- Completing a final reflection paper.

The goal is to have the peer advising drop-in center open 30–40 h per week. Each PA is expected to staff the center 3 h per week. The PAs are trained to provide PHS majors academic advising and guidance to meet department and University requirements. Before each advising session, advisees have to sign a form giving permission to the PAs to review their academic requirement report and discuss courses. Advisees are allowed to decline permission for the PA to view their academic information if they only want to ask questions. After each advising session, the PA must complete an advising log stating whom they spoke to (name of student, student ID number, year, major, and track), the reason for the visit, advice that was provided, actions taken, and referrals. The logs are

reviewed on a weekly basis to ensure the correct information was provided. PAs are required to write a weekly online post about their experience in the Peer Advising Center. The posts provide a place for students to discuss and resolve issues, create cohesiveness with shared experiences, and increase feeling of support.

ROLE OF A PA IN ONE-TO-ONE ADVISING SESSIONS

In meeting with advisees, PAs provide guidance in the following areas:

- Understanding the field of public health and career options.
- Understanding how the major requirements help create a solid foundation for entry into the field or graduate school.
- Applying to the major.
- Course selection and/or sequencing, including appropriate courses for the collateral field.
- How to use and read academic requirements report.
- Registration procedures, add/drop deadlines, and withdrawing from courses before and after the mid-semester date.
- Obtaining and filling out collateral field and course exception forms.
- Internship, study abroad, volunteering, and Five College opportunities.
- Helping students figure out if they are completing all the necessary program and University requirements for graduation.
- Resources available to students.

Each PA must contribute to the Department, PHS student body, community, and/or SPHHS through a departmental service project. PAs have the option to collaborate with other PAs or create their own project/event. A proposal must be submitted and approved before the start of the project. Due to the success, many of the projects are repeated the following year (**Table 2**). Another component of the PA program is to engage in the community

Table 2 | Peer advisor departmental service projects.

1. Created and managed social media pages on Twitter and Facebook to communicate advising information, upcoming events, and job/internship opportunities
2. Created and led an undergraduate PHS student advisory committee to provide feedback to the faculty and staff
3. Created a networking and orientation workshop for new majors
4. Organized a PHS professor panel for students to meet their faculty and learn about their research
5. Re-formatted and edited advising forms
6. Created workshops on opportunities in the major, such as internships, studying abroad, and strategies to get involved in public health and the community
7. Created workshops on various PH issues, such as food insecurity, healthy relationships, stress reduction, and violence prevention
8. Organized events for National Public Health Week
9. Organized volunteers to visit local nursing homes and a rehabilitation center

through the PHS club. The PAs are required to attend at least three PHS Club events and/or meetings each semester.

METHODS

Several methods were used to understand the perceived benefits and challenges of the program and experiences of students who utilized the Peer Advising Center. The data for this evaluation were drawn from three sources:

- (1) Archival records from the Peer Advising Center.
- (2) Reflection papers from one cohort of PAs who completed the year-long internship.
- (3) A survey of students who utilized the Peer Advising Center.

ARCHIVAL RECORDS

The PAs completed a record of each visit. The total number of student visits during the 2013–2014 academic year and the reason for the visit was summarized.

PEER ADVISORS' REFLECTION PAPER

Reflection papers from nine of the PAs (female = seven and male = two) were analyzed. Each of the PAs were required to submit a 5–10-page paper at the end of both fall and spring semesters reflecting on their experience as a PA. They were asked to reflect upon their experiences broadly, including skills learned and suggestions for departmental, advising, and training improvements (Table 3). A codebook was developed and modified as analyses progressed to reflect emerging themes or to merge thematically equivalent codes. On completion of coding, patterns in the data were identified. Recurrent themes were summarized into several broad categories. The reflection papers were also reviewed for key quotes that highlighted their experiences in the internship.

UTILIZATION OF THE PEER ADVISING CENTER

In April 2014, an electronic survey was sent to 507 undergraduate public health students for input into their experiences as a Public Health major. The survey included demographics of the participants' class year and major track. Two questions from this survey focused on their experience of using the Peer Advising Center. The first question was "How often do you seek Public Health advising with peer advisors?" Participants could select "never, once a semester, two-to-three times per semester, over four times per semester." The second question was "Based on your last advising session with a PA, how would you rate your experience on a scale 1–5 with 1 = not good and 5 = excellent?"

RESULTS

ARCHIVAL RECORDS

In the 2013–2014 academic year, the PAs had a total of 573 one-to-one meetings with students in the Peer Advising Center. Of the 573 visits, sophomores visited the office most frequently ($n = 195$), followed by juniors ($n = 130$), seniors ($n = 86$), first years ($n = 86$), and unclassified ($n = 76$). The three most common reasons that students visited the Peer Advising Center were questions about course selection, applying to the major, and collateral field.

Table 3 | Questions PAs were requested to address in their reflection papers during fall and spring semesters 2013–2014.

1. Describe your experience as a peer advisor
 - a. What was a highlight of being a peer advisor? How did your work engage and enlighten you?
 - b. Comment on what did and did not work, barriers, and successes
2. What new public health knowledge and skills did you acquire during your internship experience?
3. What were some highlights of the training day before the semester started? Do you have any specific suggestions for next year?
4. What are at least three suggestions to improve the course and better prepare you for being a Peer Advisor?
 - a. What additional classroom knowledge might have been useful?
 - b. Do you have any specific topics that you would like to include or exclude? Please explain why
5. Provide a critique of one of our guest speakers from this past year. Describe what you thought was most helpful, what could be changed, or be removed
6. Provide feedback on the supervision/assistance you received
 - a. What type of assistance was the most helpful to you?
 - b. Was the supervision/assistance adequate?
 - c. How would you like the supervision to change in the future?
 - d. How did you like having head PAs?
7. Comment on your participation in and out of class. What was a project that you worked on? What are you most proud of accomplishing?
8. How do you think that you can improve as a peer advisor? What are some steps that you could take to achieve your goal?
9. In what ways have you grown from your experience as a peer advisor? What specific skills or knowledge have you acquired that you plan to apply to your future career, relationships, and/or lifestyle?
10. Include any additional suggestions or comments about the peer advising team and class

PEER ADVISORS' REFLECTION PAPER

Perceived benefits of the Peer Advising Program

Peer advisors identified several benefits that the Peer Advising Program had on their personal development.

Skill building. Peer advisors identified a wide variety of skills obtained from their peer advising experiences with interpersonal communication skills ($n = 9$), organizational and time management skills ($n = 6$), and presentation skills ($n = 6$) most frequently identified. With more experiences, PAs ($n = 7$) gained more confidence in their ability to make presentations and conduct one-to-one advising sessions. The following quotes from PAs' reflection papers illustrate the variety of skills they obtained from their peer advising experiences.

I have seen myself transform over the course of the year as I learned to take control over my own projects and ideas, feel confident in a role of support for fellow students and be a valuable member of a productive team.

I enjoy asking students about their interests within Public Health, and bouncing ideas off each other about possible career options, course offerings, or extracurricular opportunities. The most rewarding aspect of advising students is when they feel a sense of relief; students leave the office feeling somewhat less stressed and profoundly grateful for my help. When students express their gratitude after brainstorming a solution together, it feels like I made a difference.

Instead of giving a student the answer to his/her question, I try to provide the tools, resources, and information necessary for the student to find the answer. This instills a sense of responsibility and self-efficacy in the student.

I have been told by professors after [a] presentation that I come off to the class [in] a very professional way, I can attribute this to the skill developed as a peer advisor.

Feeling valued and supported. Many PAs reported that they felt valued ($n=6$) and made a difference ($n=9$) in improving the major and in one-to-one sessions with advisees.

I think the best part about being a peer advisor is that we have the ability to make changes within the major based on students' interests. We are somewhat like ambassadors for the other public health students. Friends and peers alike come to us with their issues. We analyze them, speak up when necessary, and advocate for change.

Peer advisors feel that they add a valuable insight to being a successful student that a staff or faculty member may not be able to offer.

As undergraduate students, we have a current experience of the public health major that faculty members don't necessarily have, making us able to better understand the questions and attitudes of students. Some students also find us more approachable as peers their own age and level while they might find an adult to be someone they have to impress or be over-prepared to talk to.

Peer advisors expressed a sense of pride ($n=8$) when referring to their creation and implementation of departmental projects, representing the department, and identifying strategies to improve major and students' experience in the major.

Now that I have worked to make the school more functional for the student body, I want to see it succeed even further. I feel an obligation to work to make the major the best it can be.

Two PAs reported students approaching them outside of the Peer Advising Center for academic advice and resources. PAs found their work to be rewarding ($n=7$). They felt that they made positive changes in the major and ability to provide academic resources and strategies to get involved in public health outside of the classroom ($n=8$).

Engaged in the community. A major goal of the PA program was to emphasize teamwork and build community. Consequently, PAs were required to regularly work together in event planning and

conducting workshops. The PAs commented on their increased ability to work well with others ($n=7$), and their strong sense of community within the major ($n=7$).

The public health peer advising internship has been one of the most defining and influential experiences of my time here at UMass. The role has made an incredible impact on the UMass community I have worked with and been a part of, and I'm so fortunate to have been given the opportunity to make such a difference and have a strong voice within it.

Without this internship, I would have never found this amazing support system.

Gained knowledge of the public health field, major, and University. Peer advisors reported that their PA experiences provided them increased knowledge about academic and professional resources ($n=8$) that were beneficial to their advisees and themselves. PAs reported an increased understanding of the public health field and careers ($n=6$), major ($n=5$), and University.

Now that peer advising has ended and I move on from college to a new chapter in my life, I am going to take everything I have gained through this internship and at UMass with me on my journey. I am going to take my excellent interpersonal, time management, organizational, and networking skills along with so many other acquired skills to my new career in public health. I am leaving this internship with so much more knowledge around public health and how the different domains all come together. I have a much clearer view on what I want out of my career and my life and I am confident I have gained the skills and knowledge necessary to be successful.

Becoming a peer advisor this semester was an amazing experience that enhanced my understanding of the public health major and connected me more with the public health community at UMass Amherst.

Cultural competency. Four PAs highlighted their increased knowledge of cultural competency and diversity from the internship. It encouraged them to be non-judgmental and more understanding of other students' experience. One PA commented on a guest speaker who talked about diversity on campus:

[The guest speaker's] talk really opened my eyes to all the factors that make students diverse. Race and culture tend to be better-known areas of diversity since they are more apparent, but things regarding sexual orientation and learning disabilities, among others that tend to be forgotten, are equally important when it comes to recognizing diversity among students. . . This kind of information and perspective was great for becoming a better-rounded peer advisor since we come in contact with so many students and its important to recognize that not everyone is a cookie-cutter student.

Perceived challenges of the program

Peer advisors also highlighted several challenges with the program, including: (1) low attendance rates for large advising sessions, (2) difficult advising scenarios, (3) not knowing all of the answers, and (4) variable workload throughout the semester.

Low attendance rates for large advising sessions. Since the implementation of the program, PAs have conducted large advising sessions that are tailored to the advising needs of specific class years within the PHS major. For example, at the sophomore advising sessions, PAs share information on study abroad programs, and at the junior advising event, the PAs would talk about volunteer, research, and internship opportunities. Several PAs ($n=3$) expressed their frustration with the low attendance rates at these advising sessions and possible reasons for low turnout.

Getting a very low attendance at [large advising sessions] demonstrated that this might not be the best approach to getting information to students and also that students prefer to meet with advisors one on one. It was noticed that students are using the advising office more and more.

Increase role-play for difficult advising scenarios. Peer advisors ($n=5$) suggested that they would have benefited from more role-plays especially as it related to dealing with difficult student situations. For example, PAs identified the need for more training related to working with: (1) students who discovered they will not be graduating on time, (2) students who were angry about departmental issues such as a lack of class availability, (3) students who were not motivated, and (4) students who expressed concern over having a lower GPA than required for graduate school.

Not knowing all of the answers. Five PAs reported it was difficult when they did not know all of the answers. Several PAs were especially nervous at the beginning of the internship when they were still learning. Further, several of the PAs had not yet taken all of the core public health courses, making it difficult to fully describe each of the courses to advisees. PAs suggested several strategies for this situation, including: (1) referring the student to the Undergraduate Program Advisor or Director, (2) accessing the manual or online material, and (3) telling the student that they would find the answer and email them later in the day.

Variable workloads. Four PAs commented on their variable workloads in meeting the departmental and student demands throughout the semester. Departmental events tend to be concentrated during the semester and advising needs are especially high at the beginning of each semester and enrollment periods when there is a large influx of students in the Peer Advising Center. Additionally, many of the PAs are our top students who are often involved in a multitude of extracurricular activities. One PA commented, “*I did learn a great lesson from this semester; do not overcommit yourself.*”

SURVEY

Ninety-nine of the 507 majors completed the survey (response rate = 20%). Respondents represented various class years with seven freshman (8%), 29 sophomores (14%), 30 juniors (39%), and 33 seniors (39%). A slightly higher amount of PHS majors on the social science track (59%) responded to the survey compared to those on the science track (41%). Of the respondents, 17% never visited the Peer Advising Center, 49% visited the center once a semester, 29% visited two-to-three times per semester, and 5% visited more than four times per semester. The average rating for

their last advising session was 3.8 ($n=82$) distributed across the following scores 1 (not good) = 1%, 2 = 9%, 3 = 29%, 4 = 34%, and 5 (excellent) = 27%.

DISCUSSION

The archival records provided data on the undergraduates' utilization of the Peer Advising Center. The high rate of sophomore ($n=195$) and juniors ($n=130$) visiting the center may be related to students wanting information about switching into the PHS major. It is unclear why so few seniors ($n=86$) accessed the Peer Advising Center. Perhaps, seniors were utilizing other resources on campus that were more relevant to their advising and career needs, such as meeting with Career Services, the Program Advisor and Director, or the Graduate Admissions Staff. Although 83% of the respondents used the advising center one or more times, we do not know how representative that is of all the PHS majors. It is estimated that over 70% of the majors used the Peer Advising Center, but records do not provide the means to determine the exact number. In the future, staff will utilize a different method to better track students who visit the center.

While the program was implemented to assist with the advising load, the evaluation results indicate that there are benefits for both PA and advisees. The PAs gained valuable leadership skills, such as communication, public speaking, organization, and working with others. Although not a main focus for all PAs, learning about cultural competency and applying the skills in practice is important for student success. Thus, we plan to expand our PA training to emphasize meeting the advising needs of students from diverse backgrounds, such as students of color and first generation, international, and LGBTQ students.

All the PAs described having a stronger connection to their major and feeling supported in their role. PAs identified that their ability to participate in leadership roles in the department (i.e., serving on the Undergraduate Faculty Advisory Board, executive committee of PHS Club, and Undergraduate Student Advisory Board) provided them with a voice to make change. Having a stronger connection to the department motivates them to encourage other students to become involved. As they identify department needs, they propose and implement projects to meet these needs.

Helping students select courses and providing students with information about the public health major were two of the top reasons students sought advising services. Consequently, PA training includes much information about the public health field and careers. This training not only benefits the students being advised, but also helps the PAs increase their own career readiness and understanding of career options.

In addition to the required PA reflection paper at the end of each semester, we plan to develop a survey tool that evaluates the specific skills gained and achievement of program objectives to evaluate the impacts of the Peer Advising Program on the PAs. The PAs would complete the survey in the beginning, middle, and end of the internship to identify what skills had been acquired and improved, and to identify additional skills PAs needed to work on. PAs will also receive more one-to-one feedback from both the Head PAs and Program Advisor following each survey.

In general, survey responses across campus continue to be low as students receive surveys from multiple offices and programs on campus. Our response rate of 20% was low, but not atypical for student surveys on campus. In the future, we aim to increase the response rate by offering incentives for survey completion and sending an anonymous electronic survey to students within 30 days after their appointment.

Survey participation across the class years was similar for sophomore, juniors, and seniors with approximately 30% for each class year. In contrast, only 7% of survey participants were freshman. The response rate from freshman was low because most students typically enter the PHS major as sophomores and juniors, so there are relatively few freshmen in the PH major.

Due to students being surveyed at the end of an academic year, recall about their experience may be difficult. To better assess the students' experiences, we plan to initiate a monthly electronic survey of students who used the center. We believe this will increase respondent rates, and respondents will be better able to assess their experiences because of the shortened duration of time between the advising session and survey. The questions would provide information about what was helpful in the advising session and what needed to be improved. Further, the timely feedback will allow PAs to better identify what they need to work on to improve future advising sessions.

Student satisfaction with advising in general has been an area in need of attention since the number of students began to increase rapidly. The Peer Advising Program was implemented as a way to improve overall satisfaction. The PAs' unique perspective has been a resource in identifying strategies to improve students' experience in the PHS major. Student satisfaction with peer advising averaged a 3.8 out of a 5.0 scale. While we hope to see this average improve over the coming years, it is notable that approximately 90% of students who used the Peer Advising Center rated their experience as a 3 (average) or above, and approximately 60% rated it as 4 (very good) or 5 (excellent). More investigation is needed to understand the benefits of peer advising for advisees and factors that make for a positive peer advising interaction for students.

CONCLUSION

The Peer Advising Program is a useful program to implement to meet the growing demands of undergraduate public health programs. Results of our work with PAs indicate that PAs gain valuable skills that they can carry into their professional world. The program is also a way to engage students in building community within the major. While this program has many benefits, it also requires intensive training and mentoring by a staff person to prepare students for this role. While these results are preliminary, future program evaluation will more thoroughly assess the

perception of student satisfaction with the Peer Advising Program for undergraduate students enrolled in the major. We will also be exploring the role of peer advising in student retention within the major.

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Active learning by design: an undergraduate introductory public health course

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Principles of active learning were used to design and implement an introductory public health course. Students were introduced to the breadth and practice of public health through team and individual-based activities. Team assignments covered topics in epidemiology, biostatistics, health behavior, nutrition, maternal and child health, environment, and health policy. Students developed an appreciation of the population perspective through an “experience” trip and related intervention project in a public health area of their choice. Students experienced several key critical component elements of a public health undergraduate major; they explored key public health domains, experience public health practice, and integrated concepts with their assignments. In this paper, course assignments, lessons learned, and student successes are described. Given the increased growth in the undergraduate public health major, these active learning assignments may be of interest to undergraduate public health programs at both liberal arts colleges and research universities.

Keywords: undergraduate, public health, introductory, active, learning

INTRODUCTION

GROWING INTEREST IN THE UNDERGRADUATE PUBLIC HEALTH MAJOR

A recent report by Leider et al. (1) shows a dramatic increase (750%) in undergraduate degree public health conferrals from 759 in 1992 to 6,464 in 2012. With the growth in the undergraduate public health major, there will be an increase in demand for introductory public health courses. In this paper, an introductory public health course designed using active learning principles and Liberal Education and America's Promise (LEAP) outcomes (2, 3) is described. The assignments may be of interest to a range of institutions offering or planning to offer an undergraduate public health major.

UNDERGRADUATE PUBLIC HEALTH CRITICAL CORE COMPONENTS

In 2003, the IOM called for incorporating public health into undergraduate education. Since that time, AAPH and Association of Liberal Arts Colleges developed critical component elements (CCEs) of a public health education and the Association of American Colleges and Universities LEAP outcomes (2, 4–6). LEAP learning outcomes (2, 5, 6) include intellectual and practical skills such as inquiry and analysis, critical and creative thinking, written and oral communication, quantitative literacy, information literacy, teamwork, and problem solving. The CCEs include a broad education with liberal arts, a breadth of understanding of public health domains, and experiential knowledge of the field (4). LEAP principles and the CCEs both encompass personal and social responsibility as well as integrative learning (4, 6).

More than 20 years ago, Barr and Tagg (7) elegantly described the shift from an “Instruction Paradigm” to a “Learning Paradigm” with respect to learning theory. Active learning, is defined as “any instructional method that engages students in the learning process” and is in contrast to students receiving information passively from the instructor (8). Reviews of the literature on active

learning by Michael (9) and Prince (8) make several key points. First, active learning works across disciplines of physics, biology, and chemistry and engineering (8, 9). Most recently in 2014, Freeman (10) showed that students learned better in an active learning environment compared with a passive lecture format in engineering, mathematics, and natural sciences (10).

One facet of active learning is collaborative team-based learning “individuals are more likely to learn more when they learn with others than when they learn alone” (9). Collaborative efforts fit well with Fink's detailed descriptions of creating significant learning experiences (11). Team learning in pharmacy (12) and nursing (13) has shown increased levels of engagement and enhanced critical thinking. While literature in the public health field is more limited, Kjellgren (14) and Goldman (15) provide evidence that active learning techniques such as reflective journals and blogging led to students increased questioning of their own understanding and reporting of enriched learning on course topics.

INTEGRATING ACTIVE LEARNING WITH COURSE OBJECTIVES

In this course, students are provided with multiple opportunities to apply and integrate concepts. The course objectives listed in **Table 1** were created in consideration of current undergraduate public health domains and LEAP learning outcomes (2, 4, 5, 16). These domains and learning outcomes include inquiry and analysis, critical and creative thinking, written and oral communication, quantitative literacy, information literacy, teamwork, and problem solving (2–6, 16).

TARGET AUDIENCE

Our target audience for this course is composed of undergraduate honors students ranging from freshmen to seniors. Students from all majors are welcome to take the course. In the first 3 years, the diverse group of majors ranged from biology and chemistry to

Table 1 | List of course objectives.

A. Recognize local to global aspects of public health and appreciate the field's breadth and core values
B. Describe key events in the history of public health and their influence on the development of today's public health approaches
D. Identify and describe major health-related needs of populations using evidence-based data
C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course
F. Critically evaluate public health interventions for evidence for relevance, application, and evaluation
G. Describe how the characteristics and organizational structures (including health policies, regulations, ethics, and economics) of health systems contribute to public health issues in the US and other countries
H. Value the ethical considerations in human subject research
I. Effectively communicate public health concepts

anthropology, business, and English. In terms of course recruitment, information on the course offering is circulated each summer by the Honor's Program Associate Director of Curriculum. In the future, we would like to open the course to all undergraduate students.

COURSE STRUCTURE AND CONTENT

Overview

The course is structured with two major components. The first component comprises a series of team-based activities; the second component comprises an experience trip and intervention project. In **Table 2**, we illustrate how team and individual assignments align with various course objectives. The first course component incorporates team activities that explore various public health disciplines in greater depth. In the second course component, students select and visit a local public health organization, and then use their experience to inform their final project examining a public health intervention. The activities for each of the two components are described in more detail below.

Component 1-team activities

Throughout the semester, students engage in a series of team assignments that allow them to actively learn about the various public health disciplines. Students are introduced to a wide range of different disciplines and topics within the field of public health-including environmental science, nutrition, health behavior, maternal and child health, biostatistics, epidemiology, and health policy. As the course progresses, students discuss protecting the public's health from different aspects including behavioral education, environment, and policy.

Population perspective. Students use Hans Rosling's Gapminder, <http://www.gapminder.org/>, to investigate at a global level how population health varies by place, time, and macro-level factors

such as a country's Gross Domestic Product (GDP) or health care accessibility. This tool helps to clarify the ecologic study design and its contribution to generating hypotheses. With the free online data visualization tool, we explain the population perspective and contrast this with the biomedical perspective of health. Students are able to link health outcomes such as infant mortality with historic events such as droughts, famine, or war. For example, we discuss the Great Famine (1958–1961) in China and the large increase in infant and total mortality during this time period.

Supertasters. Students are introduced to concepts and tools of human health data collection. The super taster activity is designed to engage students in epidemiological concepts of measurement and screening test sensitivity and specificity. Students compare the sensitivity and specificity of two different tests with a “gold standard” for identifying “Supertasters,” individuals who “experience the five basic tastes with greater intensity” (<http://www.bbc.co.uk/science/0/22941835>). The first test, a strip of propylthiouracil (PROP), is our “gold standard” because of its ease of use and apparent objectivity. The second test is a short questionnaire; the third test is a count of the number of papillae on the tongue in 1 cm area. In teams, students collect data from their own team members, and then build a dataset for the entire class. Students are introduced to human subject research concepts of confidentiality, and deductive disclosure in a discussion of the privacy of their own test results. Students use the data set to calculate sensitivity and specificity of two tests compared to the gold standard.

Social media campaign. Each team selects a health behavior (such as hand washing) or an organization that promotes healthy behavior. Teams then define a target population and formulate a specific message for their population. Next, teams create a social media video with the message to encourage/support a behavioral change. Using digital media, each team produces a video and publishes the campaign online. For example, a student team chose proper hand washing technique¹, targeting the student population at UNC Chapel Hill. Another student team promoted the use of a campus organization “Safe Walk,” which provides safety to students walking home late at night.

Clean or contaminated water? Students learn about environmental health through environmental water sampling. Each team selects and defines a different water sampling location (bathroom in dorm, kitchen in apartment, office, airport bathrooms, local creek, University Lake, etc.). Each team receives a low cost water testing kit; some teams test microbial contamination, other teams test chemical contamination. Students also identify their local watershed and drinking water source. Results are presented in class and students discuss variations in sampling sites and results.

Health care race. Students gain personal experience with the user end of the health care system. Teams are assigned a specific rural county and a description of a person with a health issue as well as financial/access restrictions. Teams identify local medical providers in the county, and record how long it would take

¹<https://www.youtube.com/watch?v=oRshGys7AU5>

Table 2 | Class assignment alignment with course objectives.

Activity	Type		Course objectives addressed
	Team	Individual	
Population perspective: students use Hans Rosling's Gapminder, http://www.gapminder.org/ , to investigate at a global level how population health varies by place, time, and macro-level factors such as a country's Gross Domestic Product (GDP) or health care accessibility	x		A. Recognize local to global aspects of public health and appreciate the field's breadth and core values B. Describe key events in the history of public health and their influence on the development of today's public health approaches D. Identify and describe major health-related needs of populations using evidence-based data
Supertasters: students are introduced to concepts and tools of human health data collection	x		D. Identify and describe major health-related needs of populations using evidence-based data H. Value the ethical considerations in human subject research I. Effectively communicate public health concepts
Market basket assignment: students are given a "basket of food" that they price at various food outlets to compare the cost of eating healthy vs. un-healthy		x	C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course D. Identify and describe major health-related needs of populations using evidence-based data
Social media campaign: each team selects a health behavior (such as hand washing) or an organization that promotes healthy behavior. Teams then define a target population and formulate a specific message for their population. Next, teams create a social media video with the message to encourage/support a behavioral change	x		A. Recognize local to global aspects of public health and appreciate the field's breadth and core values C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course I. Effectively communicate public health concepts
Clean or contaminated water: students learn about environmental health through environmental water sampling and mapping	x		A. Recognize local to global aspects of public health and appreciate the field's breadth and core values C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course I. Effectively communicate public health concepts
Health care race: students gain personal experience with the user end of the health care system	x		C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course G. Describe how the characteristics and organizational structures (including health policies, regulations, ethics and economics) of health systems contribute to public health issues in the US and other countries H. Value the ethical considerations in human subject research I. Effectively communicate public health concepts
Ecosystem of health care: students are asked to draw a diagram with interactions among various entities in the health care system, including patients, insurers, and industry	x		G. Describe how the characteristics and organizational structures (including health policies, regulations, ethics, and economics) of health systems contribute to public health issues in the US and other countries
Experience trip reflection: students engage in a public health activity outside of the classroom and reflect the goal of the program or activity, what they observed and how it fits with public health concepts learned in class		x	A. Recognize local to global aspects of public health and appreciate the field's breadth and core values C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course F. Critically evaluate public health interventions for evidence for relevance, application, and evaluation

(Continued)

Table 2 | Continued

Activity	Type		Course objectives addressed
	Team	Individual	
Final project. students examine or propose an intervention related to their experience trip topic		x	A. Recognize local to global aspects of public health and appreciate the field's breadth and core values C. Identify the determinants of health (socioeconomic, behavioral, biological, environmental, etc.) that affect health of individuals and populations across the life course F. Critically evaluate public health interventions for evidence for relevance, application, and evaluation I. Effectively communicate public health concepts

appointment with a health care provider. They also search for transportation options if the person did not have their own transportation. Students answer the question “In a rural area, how long would it take for an elderly person with a pressing health issue to see doctor?” Each team reports on both successes and challenges.

Ecosystem of health care. Students are asked to draw a diagram with interactions among various entities in the health care system, including patients, insurers, and industry. They reflect upon how the Affordable Care Act is starting to change the medical care system at the state and federal levels.

Introduction to local public health related organizations/programs. While the large majority of the classes are with one professor, occasionally speakers come from local organizations involved with public health issues. Organizations range from those that help young mothers (Durham Connects, Horizons) to those that increase healthy food availability to low income families and change organic local food market networks (Farmer Food-share), to those that help individuals lift themselves out of poverty (Community Empowerment Fund).

Component 2 – experience trip and final project

We follow Wykoff et al.'s (4) recommendation that “students should be exposed to local-level public health professionals and/or agencies that engage in population health practice.” This assignment integrates course concepts with public health practice in a two-part assignment. First, students conduct an “experience trip.” Then, for their final project students examine or propose an intervention connected with their experience trip topic.

The experience trip is designed for students to come into contact with public health practice. Students are asked to select a local organization (or with a local branch) or program that either directly or indirectly deals with public health. Students are asked to observe, ask questions, and find out about this organization and its activities. The experience takes about 1–3 h. Students write a reflection on their experience trip and answer questions on the goals of the organization, why they chose this topic, their observations, how it fits with public health concepts learned in class, and what they learned from the experience.

We would like students to have a “direct encounter with the phenomena being studied rather than merely thinking about the

encounter, or only considering the possibility of doing something about it” (17, 18). By visiting an organization that deals with a public health issue, students have the opportunity to meet individuals that are engaged in giving or receiving some type of intervention and see the environment in which the intervention is conducted. Thus, students can be introduced to a “complex problem in a complex setting, rather than simplified problems in isolation” (17). Their reflection encourages students to synthesize their practical experience with theoretical knowledge.

For the final project paper, students examine an intervention related to their experience trip topic. For example, some students visited local organizations, which deal with increasing nutritional food availability to impoverished primary schoolchildren. Then, for their final project, the students examined existing interventions dealing with food insecurity. Students review the literature related to the intervention, and outline the factors that define the problem the intervention is designed to address. Next, they describe how the intervention was implemented, and explain relevant policies, regulations, ethics, and economics that influence the selected problem and intervention being explored. Lastly, they communicate their analysis in the form of a written report and an in class presentation to their classmates.

RESULTS AND DISCUSSION

INCREASING INTEREST IN PUBLIC HEALTH

The UNC Gillings School of Global Public Health has four strong undergraduate BSPH programs—with approximately 215 students enrolled in biostatistics, environmental health, health policy and management, and nutrition. However, with a total of approximately 18,350 UNC undergraduates, there are many UNC undergraduates who have no exposure to the public health field or the School. This course aimed to begin addressing that lack of exposure. In the first 2 years of the course offering, on average 27% of the students who took the introductory public health course applied to the UNC BSPH programs. Of the students who applied, 90% were accepted.

Student feedback on the course demonstrated increasing student excitement and interest in public health. For example, students expressed their appreciation of the experience trip/final project assignment:

“[the professor] gave us the freedom to choose any local organization that addresses a public health issue, and she provided

plenty of ideas and resources for us to get started. This final project allowed me to learn about TABLE and the issue of local childhood hunger, which I am now passionate about.” “As my cumulative project, I got to research food deserts and food insecurity, and learned that this is something I am very passionate about.”

LESSONS LEARNED

Understanding the population perspective

One lesson learned from teaching the course in the first 2 years was the need to foster and encourage students to approach their experience trip and public health topics from the a population perspective. For example, attending an Alcoholics Anonymous meeting, several students struggled with stepping out of a biomedical perspective; they only saw the individual's addiction being the result of their own actions, and were initially not able to recognize additional social–ecological influences on patterns of behavior. For these students, the biomedical perspective was entrenched. With faculty encouragement, the students worked hard to understand the population perspective.

Sometimes students approach community agencies, organizations, and self-help groups without an adequate understanding of the population that the organization serves. For instance, AA and NA are designed for recovering alcoholics and addicts; these are social recovery programs, and provide social support in obtaining and maintaining sobriety. These programs do not aspire to be medical model approaches. Students often miss this subtlety. Likewise, a community garden intended to serve an immigrant population would want to plant crops that appeal to their consumer population, rather than follow dietary principles taught in nutrition class. Students need to learn to articulate a client view, rather than a provider view, of the organization and service.

Student creativity

One strength of the course, has been the student's creativity with the focal “experience trip” and final project assignment. Students demonstrated creativity with regards to the selection of an organization or program for their experience trip. For example, one student delved into the problems of youth violence and programs that address issues of school suspensions and restorative justice. Her interest led her to a local organization Boomerang² which focuses on teaching resiliency skills to suspended middle and high school students. She began volunteering with the organization, and subsequently took a position working with the organization the next semester.

Another student used a fall break service-learning trip to a migrant farm camp to investigate migrant worker health issues. The problem she said, after she returned, was which problem to select from all the issues facing the migrant worker community. She chose to focus on pesticide exposures among farm workers and their families; she described a lay health advisor education program targeted to both the parents and children to help reduce pesticide exposures. Allowing the students to pick an organization or program that fits their interest gives them the opportunity to explore new topics and integrate public health issues

in ways that substantially extend course learning. As noted by Cashman (17), public health practice lends itself to experiential learning.

Reflections on achieving LEAP learning outcomes

Graded team and individual projects throughout the semester provide evidence of students achieving LEAP outcomes. As described above, the completed assignments illustrated systematic inquiry and analysis on a variety of public health topics. Critical and creative thinking was evident on the team assignments, as well as on the student experience trip reflections and final projects. Students practiced written and oral communication throughout the semester in their team assignments and class presentations. Students also worked on problem solving and developing information literacy in their assignments. Next steps will include a more formal evaluation of changes in LEAP outcomes of intellectual and practical skills.

Scalability/community capacity

This class was designed as honors seminar with a class size of 24 students. With the current course structure, there are some limitations of scalability. Some institutions have large programs with hundreds of students interested in an introduction to public health. The course presented here, with some reorganization and redesign, could be scaled up. Community capacity needs to be considered. In order for each student to successfully complete their project, there must be enough community resources for all to have an experience trip without overburdening community resources. This may be more challenging for schools that are in geographically isolated areas. However, in 2012 the majority (73%) of students receiving an undergraduate public health degree lived in cities (1).

It is possible to increase the number of visitation sites in several ways: for example, there are often multiple AA and NA meetings throughout the week. There may be local agencies with multiple programs, and there may be sites, such as a community garden, that can accommodate any number of students. Despite this challenge, in the future, we would like to incorporate a larger service-learning component.

Given the increasing rise of the undergraduate public health major, these active learning assignments may be of interest to undergraduate public health programs at institutions ranging from liberal arts colleges to research universities. The advantage of a broad introductory course like this one is providing the next generation of students with basic public health literacy. Additional benefits include capturing student interest early on in their professional development, and introducing them to potential previously unrecognized career options. Yet, while only a small proportion of students may become public health professionals, the course promotes the values of protecting the public's health to all students. The ultimate benefit is increased awareness and support of public health in our global society.

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Developing an undergraduate applied learning experience

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To foster student development, critical thinking, and application skills among public health students at the University of Hawai'i at Mānoa, a three-course capstone series was developed as a key component of the public health Bachelor of Arts degree program. Over the course of 1.5 academic years students are actively involved in developing an interdisciplinary project proposal, then executing and presenting an independent, supervised, applied learning project. In the first course, students are introduced to a diverse range of public health projects and methods while working to develop their own project proposal – the foundation for the applied learning experience. The project execution course is designed to allow students to execute their proposed applied learning projects. This experience focuses on the application and integration of public health knowledge, skills, and practice acquired during the bachelor's degree course of study. Finally, students will be involved in reflecting on, finalizing, and sharing their completed projects in an undergraduate capstone seminar. Through implementation of this series, the program hopes to provide students with the opportunity to actively apply academic skills to real-world application.

Keywords: bachelors of public health, curriculum, undergraduate capstone, undergraduate public health education, undergraduate research

BACKGROUND

It has been recommended by several entities that undergraduate programs, particularly those focused on public health, include opportunities for integrative and experiential learning (1–4). Experts have also recommended bachelor degree programs specifically include a capstone experience, promote inquiry-based learning, and better involve students in research activities, specifically at research universities¹ (5–7). Furthermore, the Institute of Medicine (8) recommended public health as an essential part of training for citizens – a proposal supported by the Association of American Colleges and Universities (6) as well as several other academic organizations (3).

During the development of the Bachelor of Arts degree in Public Health at the University of Hawai'i at Mānoa (a research university and land-, sea-, and space-grant institution), a three-course integrative learning experience capstone was created so as to provide students with an opportunity to apply course knowledge and skills to a real-world issue, develop a passion for a topic of personal interest, and gain experience working with collaborators (possibly in the community). This capstone series has been named the applied learning experience.

DEVELOPMENT OF CAPSTONE SERIES

The three-course applied learning experience was initially developed and proposed by a departmental committee comprises faculty, staff, and a student representative, formed to develop the B.A. Public Health program for the University of Hawai'i at Mānoa (UHM). The need for a capstone experience was supported during preliminary meetings with both local community members,

many of who would be potential employers of our graduates, and key on-campus stakeholders. The UHM Honors Program initially inspired the three-course progression, where students are guided through development of a project proposal in one semester then execute the project in subsequent semesters. The process was further refined to reflect the needs of students, faculty, and community members as identified from past experiences with the Master of Public Health (MPH) practicum and subsequent MPH capstone course.

APPLIED LEARNING EXPERIENCE PROGRAM STRUCTURE

The intent of the culminating experience in the B.A. program is to provide students the opportunity to actively apply classroom knowledge and associated skills to real-world application in the public health field. This is facilitated by a three-course series required for graduation with the B.A. Public Health degree: PH480 Application of Public Health Principles in Research and Practice, PH485 Applied Learning Experience, and PH489 Public Health Undergraduate Capstone Seminar.

Student project selections may have either a research or practice-based focus, depending on the preference of the individual student, as well as their post-graduation plans. For example, a student interested in employment with a non-profit organization following graduation may prefer a service-learning oriented experience with a local non-profit, whereas a student applying for a graduate program may be more interested in working with, or designing their own, research project. Examples of selected student topics are included in **Table 1**.

Throughout the applied learning experience each course instructor evaluates students on performance and competence through class assignments and class activities. The student's selected, and approved mentor or advisor additionally assesses

¹ Council on Undergraduate Research. Faculty-Undergraduate Collaborative Research and Publishing (2003).

Table 1 | Examples of selected applied learning experience projects.

Research-based project examples	Service-learning oriented project examples
Key factors in obstetric decision-making among women with limited English proficiency	Exploring methods to reduce substance abuse in Hawai'i (partnership with Gregory House Programs Hawai'i)
Evaluating the effectiveness of home visiting on maternal-child health	Increasing awareness of kidney disease in Hawai'i (partnership with National Kidney Foundation – Hawai'i Chapter)
Methods of using social media to promote physical activity among college students	Enhancing nutrition education and healthy eating in Hawai'i Public Schools (partnership with Hawai'i Department of Health and Hawai'i Department of Education)
Developing an approach to improving access to health care among Oahu's homeless population	Health, fitness, and academic achievement among youth in Hawai'i Public Schools (partnership with Hawai'i Department of Health and Hawai'i Department of Education)

the execution of the applied learning experience during PH485. Additional Public Health departmental faculty members, other University of Hawai'i at Mānoa faculty, or approved community experts are encouraged to serve as advisors and mentors to specific applied learning experience projects, as appropriate to the student-selected topics.

UNDERGRADUATE PUBLIC HEALTH SUMMIT

The Undergraduate Public Health Summit is a semi-annual, open, public forum, and a vital opportunity for students to interact with faculty (in public health and other disciplines), program alumni, and other community resources. Students participate in the Undergraduate Public Health Summit twice during their capstone series. First, they are involved in presenting their applied learning experience project proposals as poster presentations within the last 2 weeks of PH480. Students are also required to present their final applied learning experience projects (experiences and any results or analyses) as both poster and oral presentations during the last weeks of the PH489 capstone seminar. This experience provides students with practice presenting their projects and outcomes in a professional format and both interacting and receiving feedback from a range of forum participants.

PH480: APPLICATION OF PUBLIC HEALTH PRINCIPLES IN RESEARCH AND PRACTICE

This course is typically taken during the first semester of a student's third (junior) year of the Bachelor of Arts degree program, and is the students' first introduction to the applied learning experience. The purpose of PH 480 is to prepare students for an independent, supervised, integrated learning project to be performed as part of the public health undergraduate capstone experience. The course begins with career counseling and post-graduation preparation in a group setting. By focusing on both short- and long-term personal objectives students are better able to create an experience that will support their future goals. This course also exposes students to common research tools and practices, including writing a literature review, creating a written and oral project proposal, designing a poster for public presentation, seeking external funding, ethics education, and working with an Institutional Review Board.

PH480 additionally introduces students to a diverse range of public health projects and associated methods. Throughout the

semester, students are exposed to short, 10-min research and practice profiles called "Public Health in Action Profiles." Profiles are presented by program faculty as well as community partners and provide a brief overview of current public health projects, what responsibilities the presenter's specific role entails. Profiles are intended to provide undergraduate students with ideas of what public health research looks like in practice and also provide inspiration as students work toward developing their own applied learning experience proposals. For some students, meeting faculty and community partners during presentations also serves as a valuable networking opportunity. Student feedback to Public Health in Action Profiles has been overwhelmingly positive.

At the conclusion of PH480, students will have a written proposal for an applied learning experience project, as well as experience presenting their project proposals at an open, public forum – the Undergraduate Public Health Summit.

EXPERIENCE PROPOSAL GUIDELINES

Essential components of experience proposals include (1) project objective, (2) project abstract, (3) significance of study or experience, (4) background and literature review, (5) proposed research or experience methodology, (6) expected deliverables, outcomes, or results, (7) proposed collaborators, partners, and next steps, and (8) references. Optional components include an itemized budget, estimate of costs, description of host organization or host research project, and Institutional Review Board application, as appropriate to the specific project.

These components are written in draft form and submitted throughout the semester (roughly four months) of PH480. Feedback is provided for each section, and the final versions of individual components are compiled as a complete project proposal submitted as the final product of the PH480 course. Generally, completed proposals range from 8 to 12 pages (excluding references). Additional research tools developed (e.g., a proposed survey or qualitative research tools) are included as appendices as appropriate.

PH485: PUBLIC HEALTH APPLIED LEARNING EXPERIENCE

Based on each student's individual applied learning project proposal, developed during PH480, students are involved in independent research projects under the supervision of both a course instructor and an appropriate, approved project mentor or advisor.

Mentors and advisors may be university faculty or approved community experts in a student's identified research or practice area.

The applied learning experiences take place over the course of a full semester, and involve roughly 100–125 hours of project execution. Students who are executing research-based projects primarily spend their time conducting a more thorough literature review and, in most cases, working to collect data and/or conduct supervised data analyses. Students with practice-focused projects spend the majority of their specified time actively working within an organization under a service-learning format.

Finally, students will be involved in reflecting on, finalizing, and presenting their completed applied learning experience projects throughout an Undergraduate Capstone Seminar (PH489).

PH489: PUBLIC HEALTH UNDERGRADUATE CAPSTONE SEMINAR

The Public Health Undergraduate Capstone Seminar is taken near the completion of the B.A. degree program. It focuses on integration of public health knowledge, skills, and practice acquired during the course of study. Students will be involved in assessing their level of achievement of educational degree objectives, develop professional goals, and reflect on, finalize, and present their applied learning experience projects. This course also summarizes key content and skills applied throughout the B.A. public health degree program, prepares students for a higher level of learning (either in graduate school or as a working professional), and addresses pragmatic post-graduation skills (e.g., resume/C.V. writing and career planning). Key deliverables following completion of this course include an applied learning reflection paper, a final applied learning experience report, and a final oral and poster presentation delivered at the Undergraduate Public Health Summit.

CULMINATING EXPERIENCE EVIDENCE

The instructor of the PH489 course and the Undergraduate Program Chair make the final assessment of the undergraduate capstone experience jointly. The undergraduate culminating expectations include the following:

- Address a key issue, concern, or research problem related to the field of public health;
- Apply knowledge and skills accumulated through public health course work to address the selected issue/problem;
- Demonstrate integration and practical application of public health concepts; and
- Demonstrate appropriate written and oral communication skills.

Concrete evidence of successful completion of culminating experience include the following:

- Written project proposal for applied learning experience;
- Poster presentation of applied learning experience project proposal at Undergraduate Public Health Summit;
- Completion and submission of signed mentor/advisor agreement form;
- Completion and submission of final applied learning experience assessment of advisor or mentor;

- Completion and submission of applied learning reflection paper;
- Completion and submission of final applied learning project report; and
- Oral presentation of final applied learning project at Undergraduate Public Health Summit.

Students must also complete and obtain passing grades (above “C–”) in all required and elective coursework associated with the B.A. in Public Health degree as evaluated by faculty instructors indicating mastery of the content and competency.

DISCUSSION

The applied learning experience serves as a capstone to the B.A. Public Health degree program at the University of Hawai'i at Mānoa. Through a three-course series, students engage in inquiry-based learning centered on a topic of interest of their choosing. As previously discussed, there are two potential tracks for Applied Learning Experience projects – research or practice based, so as to allow students to select which type of experience would be most suitable to their academic needs and future plans. Both tracks provide an opportunity for integrative and experiential learning through slightly variable approaches. The research-based track exposes students to the inner workings of academic investigation, whereas the practice-based track provides real-world work experience. Both tracks include continuous application of critical thinking skills and student reflection, particularly throughout the execution of the applied learning experience in keeping with a service-learning framework.

Preliminary feedback from B.A. students who are currently participating in the applied learning experience has been very positive overall. The primary adjustment made based on student feedback has been to place more emphasis on advising of students preparing for the undergraduate culminating experience during mandatory advising session. The intent of this emphasis would be to help students begin thinking about possible projects and to increase awareness of the three-course series in the context of their full undergraduate degree program.

Through the applied learning experience, this program hopes to better prepare undergraduate public health students for both public health practices in the workforce, improve transition into graduate programs, and more broadly, fully embrace application of the educated citizen framework (8).

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Community colleges and public health: an integral part of the continuum of education for public health

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INTRODUCTION AND BACKGROUND

Undergraduate education for public health has grown rapidly in the last decade since the Institute of Medicine recommended that "...all undergraduates should have access to education in public health." Despite the growth of undergraduate education for public health in 4-year institutions, public health education in community colleges is at an early stage of development. In a comprehensive 2011–12 web-based catalog search of community colleges, only seven associate degree programs in public health or related fields could be identified (1, 2).

Public health organizations are encouraging growth of education for public health in community colleges as well as 4-year colleges. The American Public Health Association has endorsed undergraduate public health education at both community colleges and 4-year colleges (3). Healthy People 2020 includes objectives to substantially increase the number of community colleges as well as 4-year institutions offering undergraduate public health education (4).

As part of the Framing the Future Task Force, convened by the Association of Schools and Programs of Public Health, the Community Colleges and Public Health (CC&PH) project, has been developed and co-sponsored by the League for Innovation in the Community College (the League), which represents over 800 of the 1100

community colleges. The CC&PH is co-chaired by the two authors of this article. The mission of the CC&PH project is to fully include community colleges in the continuum of public health education. The Community Colleges and Public Health Report (5) is expected to be a component of the final report of the Framing the Future Task Force (6).

The CC&PH project has included two phases, a first phase consisting of an Expert Panel, which developed a series of Foundation and Consensus Statements that reflected what public health and community college educational organizations could do together (5). The second phase, recommended by the Expert Panel, focused on development of "prototype curricular models" designed for associate degrees and academic certificate programs in community colleges. Two basic models, (1) Public Health: Generalist and Specialization and (2) Health Navigator,¹ were chosen after consultations with community colleges, project and Task Force leadership, and public health practice organizations (ASTHO and NACCHO), as well as academic associations in disciplines, which offer related bachelor's degree programs (SOPHE, AUPHA, and AEHAP²).

The CC&PH report recommends that Public Health associate degrees should be built on fundamental skills including writing, oral communications, and

quantitative skills consistent with the Association of American Colleges and Universities (AAC&U) LEAP initiative (7) and VALUE Rubrics (8). Associate degrees and academic certificate programs are also encouraged to incorporate ASPPH Undergraduate Public Health Learning Outcomes. (9).

The Community Colleges and Public Health Project report recommends academic programs in Public Health: Generalist and Specializations designed for transfer to bachelor's degree programs in general public health, health education, health administration, or environmental health. It also recommends Health Navigator academic certificate and associate degree programs. The CC&PH report also recommends specific courses and provides recommended content outlines: <http://www.league.org/league/projects/ccph/>.

The remainder of this article summarizes the two prototype curricular models and discusses next steps in implementation.

PUBLIC HEALTH: GENERALIST AND SPECIALIZATION – RECOMMENDATIONS

These associate degree programs are designed as transfer degrees to enable students to enroll in the rapidly growing bachelor's degree programs in public health (generalist), as well as the specializations

¹ The term Health Navigator is intended to be a generic term to describe the academic certificate or degree program. It is not designed as a job title and it is not intended to imply a connection with the Affordable Care Act.

² Association of State and Territorial Health Officials (ASTHO), National Association of County and City Health Officials (NACCHO), Society for Public Health Education (SOPHE), Association of University Programs in Health Administration (AUPHA), and the Association of Environmental Health Academic Programs (AEHAP).

of health education, health administration, and environmental health. Specializations have been designed in collaboration with SOPHE, AUPHA, and AEHAP. The involvement of these organizations should facilitate but not ensure transferability of the recommended course work to bachelor's degree programs.

Associate degrees designed for transfer to a bachelor's degree are encouraged to include 30 semester credit hours of public health related course work, including experiential practice-based learning, out of a 60 semester credit hour degree program. To optimize student transfer and student mobility to 4-year programs, the associate degree programs are encouraged to teach associate degree courses that meet baccalaureate degree expectations.

Public Health: Generalist and Specialization – the 30 semester hours of public health and related coursework in a 60 semester credit hour associate degree program should include the following.

FOUNDATIONAL

Human Health/Personal Health and Wellness – 3 semester credit hours.

Students need an introduction to the underlying science of human health and disease including opportunities for promoting and protecting health across the lifespan and including principles of population health and determinants of health.

PUBLIC HEALTH CORE

Overview of Public Health – 3 semester credit hours.

Health Communications – 3 semester credit hours.

Coursework should be consistent with the ASPPH Undergraduate Baccalaureate Critical Component Elements (CCEs) Report.

REQUIRED COURSES

Health Education – 3 semester credit hours.

Health Administration – 3 semester credit hours.

Environmental Health – 3 semester credit hours.

Alternatively, nine semester credit hours in one of these three disciplines may be substituted utilizing content outlines for

three coordinated courses developed in collaboration with the corresponding academic association and designed for transfer to a bachelor's degree. Detailed content outlines developed in collaboration with SOPHE, AUPHA, and AEHAP are available at <http://www.league.org/league/projects/ccph/>.

EXPERIENTIAL LEARNING

Experiential learning – 3 semester credit hours.

Supervised curriculum with learning outcomes and opportunities for reflection.

ELECTIVES

Six to nine credit hours including a course in Public Health Preparedness as well as such courses as Prevention and Community Health, Health and Diversity, Global Health, etc.

Together the foundation and core public health courses should provide an introduction to at least the following CCEs: introduction to the biological and life sciences and the concepts of health and disease; overview of public health; health communications; identifying and addressing population health challenges; determinants of health; and overview of the health system (10): <http://www.aspph.org/educate/models/undergraduate-baccalaureate-cce-report/>.

Specific bachelor's degree programs may require additional course work. Students are advised to consult the specific requirements of the bachelor's degree program to which they wish to transfer. The development of the recommended content outlines in collaboration with SOPHE, AUPHA, and AEHAP is expected to facilitate transfer of these courses to bachelor's degree programs. Community colleges may want to develop articulation agreements with bachelor's degree programs to ensure transferability.

HEALTH NAVIGATOR PROGRAMS – RECOMMENDATIONS

Health Navigator associate degree programs are designed primarily as applied degrees intended to respond to the rapidly growing job market for assisting individuals to navigate the increasingly complex public health, health care, and health

insurance systems. The rapid increase in employment opportunities as Community Health Workers, patient care navigators, and health insurance navigators increasingly requires professionalization of the field.

In addition to employment opportunities immediately upon graduation, the Society for Public Health Education (SOPHE) has endorsed the development of Health Navigator associate degrees designed for transfer to a bachelor's degree in Health Education. SOPHE has encouraged the development of transfer programs and articulation of degrees with the large number of bachelor's degree programs in Health Education as part of the continuum of public health education.

Academic certificate programs may also be offered for those with the work experience or previous academic degrees. In addition, those enrolled in other associate degree programs in the health professions and human services fields may find a Health Navigator academic certificate program is a valuable addition to their degree. All academic certificate programs should include the four required Health Navigator courses described below using the content outlines included in the CC&PH report: <http://www.league.org/league/projects/ccph/>.

The recommendations for Health Navigator degree and academic certificate programs are intentionally designed to provide community colleges with flexibility to meet local needs and state certificate requirements where applicable. In addition, the electives offered by each institution may be tailored to the needs of the local workforce.

New funding mechanisms as part of Medicaid and the Medicare 30-day hospital re-admission policy, as well as the Affordable Care Act have dramatically increased the interest in developing the types of paid positions requiring academic Health Navigator education. The Labor Department estimates that the positions for Community Health Workers, the only Health Navigators job classification tracked by the Labor Department, will increase over 20% by 2022 (11).

Thirty public health and related semester credit hours are recommended as part of a 60 semester credit hour Health Navigator associate degree program. These should incorporate many of the Association of

Schools and Programs of Public Health's Undergraduate Baccalaureate CCEs. Additional general education courses including those that focus on written and oral communication skills and basic quantitative skills are key to student success.

FOUNDATIONAL

Human Health/Personal Health and Wellness – 3 semester credit hours.

PUBLIC HEALTH CORE

Overview of Public Health – 3 semester credit hours.

Health Communications – 3 semester credit hours.

REQUIRED COURSES

Accessing and Analyzing Health Information – including searching for health information and evaluating its validity – 3 semester credit hours.

Prevention and Community Health – 3 semester credit hours.

Health Care Delivery – 3 semester credit hours.

Health Insurance – 3 semester credit hours.

EXPERIENTIAL LEARNING

Experiential Learning in Community Health, Health Care Delivery and/or Health Insurance – 3 semester credit hours.

The experience needs to address outreach methods and strategies; client and community assessment; support, advocacy and coordination of care for clients; and community capacity building, including supervised curriculum with learning outcomes and opportunities for reflection.

ELECTIVES

Six semester credit hours addressing state and local regulations and job markets. These may include specific diseases such as diabetes, cancer, cardiovascular disease, HIV, defined populations such as the elderly, maternal, and child, and/or population issues such as health and diversity, as well as global health. A public health preparedness course should also be offered.

Additional courses, Introduction to Health Education and the Public Health Advocacy and Leadership in Action courses, designed

by SOPHE for transfer to bachelor's degree programs in Health Education should be taken by students who intend to transfer to a Health Education bachelor's degree program. Content outlines for these courses can be found at <http://www.league.org/league/projects/ccph/>.

Health navigator education is in the early phase of development and is likely to undergo rapid growth and change. Growth is likely to be very rapid in the remaining years of this decade as the need for team-based delivery of health services gains momentum and the new funding mechanisms for paid positions become established.

Note that the Foundation course and the two core public health courses are the same for all associate degree programs recommended in the CC&PH report. This should allow students enrolled in community colleges with multiple public health related programs to initially pursue foundational and core public health courses before selecting between available associate degree offerings.

The recommended programs are not the only possible public health programs that may be offered in community colleges. For instance, the CC&PH report recognizes the potential for health information management programs with a public health focus. Community colleges may identify additional public health programs that meet their mission and the needs of the local workforce. In addition, community colleges may play an important role in the continuing education of the public health workforce, especially entry-level employees and those without prior education for public health.

NEXT STEPS AS RECOMMENDED IN THE COMMUNITY COLLEGES AND PUBLIC HEALTH REPORT

The commitment of public health education and practice organizations provides opportunities to fully develop the continuum of public health education from community colleges through graduate education. Based on the extraordinarily diverse student body represented in many community colleges, this collaboration also provides unique opportunities to develop a diverse public health workforce, which

reflects the current and future populations of the United States.

The principles outlined in the report should help local and state health departments and other employers address the educational needs and aspirations of the public health workforce of the future. These programs should be accessible to entry-level employees.

As a key component of the next steps, the League for Innovation in the Community College seeks to work closely with the national practice and academic organizations collaborating in this report to identify funding to support demonstration projects. These demonstration projects should provide opportunities for community colleges to fully develop curricula complete with learning outcomes/competencies, assessments tools, etc. The League also intends to develop community college recognition awards for excellence in planning education for public health.

The ongoing collaboration of public health academic and professional organizations with the League for Innovation in the Community College bodes well for the future of community college education for public health.

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Undergraduate public health education: is there an ideal curriculum?

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This commentary speaks to the need to design a curriculum that best meets the needs of students who are enrolled in Bachelor of Science in Public Health (BSPH) degree programs. The past 10 years has witnessed a dramatic growth in the number and size of these programs. While several of these degrees are housed within schools and colleges of public health, many are located in colleges of arts and science, allied health, medicine, and many other academic homes. It is difficult to determine the actual number of BSPH programs (or similar type degrees but with different names) due to a lack of national accrediting standard. The number of students in these programs varies widely with as few as 25 to as many as 600. In addition to stand-alone BSPH degrees, there are a number of what is known in the field as three plus two programs where a student spends 3 years completing their undergraduate courses and then an additional 2 years of study that completes both their BS degree in addition to their Master of Public Health (MPH).

The point here is that there is a significant demand for the BSPH degree on the part of students and universities are more than happy to meet that demand. A legitimate question that we have is what career or education paths do students pursue once they complete their BSPH degrees. Evidence suggests that the largest fraction of BSPH students use the degree as pre-professional preparation for entry into advanced clinical training including medicine, nursing, physical therapy, physician assistant, pharmacy, and other specialty

areas. Given the implementation of the Affordable Care Act and the movement toward population health, it is critical that future clinicians know and can potentially apply core public health principles into their practices.

A second path for BSPH graduates is into MPH degree programs. Once the spark is ignited during their undergraduate education, students see that they can make a profound difference in public health practice but know that the MPH is the degree of choice for a large number of employers. In our companion commentary ("Undergraduate Public Health, Lessons Learned from Undergraduate Health Administration Education"), we ask whether courses taken in the BSPH degree might have the capacity to either transfer into the MPH or perhaps students should be waived out of one or more of the core courses and instead be allowed to take additional electives. If this practice were to become commonplace, prospective MPH students might see an opportunity to better tailor their graduate education.

In addition to preparation for clinical education or entry into an MPH program, current BSPH students sometimes move directly into Public Health related jobs at the entry level where they obtain important work experience before advancing to an MPH degree. There are also students who upon graduation go into a whole variety of other education or work related opportunities including Peace Corps or Teach for America. Given the four paths that BSPH graduates can potentially take, it is

important to clearly understand where students go once they depart our programs and how our curricula can add value to the career options for graduates. Toward that end, does it make sense to craft a single unified BSPH curriculum that provides a rigorous preparation in public health and at the same time is flexible enough to accommodate the multiple career paths of graduates? Although various frameworks have been proposed (AAC&U, ASPPH, and CEPH), no model has been developed in sufficient detail to consider the challenges of implementing a truly well-articulated program. Do we as a field wish to develop a BSPH curriculum that mirrors the current CEPH requirement for accredited MPH degrees with a required core and multiple program tracks? If this is the option selected, what differentiates the BSPH from the MPH? As noted in our companion commentary, graduates from AUPHA certified undergraduate health administration programs compete successfully for entry level management jobs with graduates from CAHME accredited MHA programs. Regardless of how we design our BSPH curriculum, programs need to keep in mind what is in the best interest of their students.

As programs think about either designing a BSPH curriculum *de novo* or modifying an existing curriculum, there are four important elements to keep in mind:

- Begin with a market analysis of alumni and prospective employers. It is vital for BSPH programs to have a good handle on where graduates are going and then

determining how well they are preparing students to enter the market. One commonly used strategy is to regularly survey alumni to determine where their first jobs take them.

- What are the competencies that are needed for the commonly taken career paths of alumni? Public health education has been steadily moving toward providing students with competencies that address what they can do rather than just what they know. In this case, programs will need to speak with the employers of graduates to get a well-defined sense of required competencies. A good approach here is to create an external advisory committee made up of practitioners and alumni to advise program faculty on the most appropriate competencies.
- What are your unique programmatic strengths and how can those strengths create market opportunities for graduates? Given the sorts of resource constraints that are part of virtually every college and university, programs cannot afford to be everything to everyone. Choose a few areas that are particularly strong and build a curriculum around those. One thing a program might do is a SWOT analysis in which an assessment of programmatic strengths, weaknesses, opportunities, and threats is performed. Given that information the program faculty are better equipped to create a market sensitive curriculum.
- Michael Porter at the Harvard Business School talks about creating value as a way of standing out in a competitive environment. How do programs bring value to students and why should they enroll in your program rather than your local or national competitors? What brand recognition does your university or program possess? For potential employers of graduates, why should they hire your students rather than from competing BSPH programs or undifferentiated BA/BS graduates? What sorts of activities can be done that helps to allow your program to stand out?

Once the program has gone through the hard work of looking at the market for graduates and the forces exerted by competitors, it is time to think about the nuts and bolts of the curriculum. In

general, the authors recommend the following five criteria – all of which are influenced by your global university undergraduate requirements and the outcome of your market analysis, competency decisions, programmatic strengths/weaknesses, and value determination.

- University general education requirements – whether called the GE, Baccalaureate Core, or some other name, virtually all BA/BS students need to complete these classes (typically) before their upper division courses begin. One good way of recruiting new students is to make sure that one or more public health courses are part of the general education requirement.
- Common Public Health classes – sometimes referred to as the public health core, these are the classes that all BSPH students are required to complete early in their career. Given that most schools require students to declare a major by the start of their junior (third) year, it is recommended that this common core be made available for second and third year students.
- Required domain specific classes – at this point, important decisions need to be made. If the program decides to offer a couple of common public health domains (e.g., health promotion, environmental health, and health policy) it is then up to the faculty to determine which classes are needed to fulfill the requirements for each of the domains. Alternatively, the decision might be made to offer a generalist BSPH that does not divide into distinct domains. In this case, the program will still want to make available a set of required Public Health classes beyond the common core.
- Electives – the authors strongly recommend that an opportunity be provided for BSPH students to take a number of elective credits to enhance their depth of understanding of public health domains of particular interest.
- Field experience – it is essential that all BSPH students be given the opportunity to apply what they have learned in the classroom to a real-time field experience. While many schools are embracing service learning as part of the classroom experience, this is (in our estimation) not adequate. An ideal field experience

would be a semester/quarter long. The field experience (or some other name) should be supervised by an experienced public health practitioner and would be a required, credit bearing experience.

In addition to the outline that has been detailed here, there are a number of other important attributes to a highly effective BSPH curriculum. Students need the opportunity to develop their skills as professionals. What are the professional norms in the field and how are these transmitted to students? While some of these professional norms will be organization dependent, others are cross-cutting across public health including respect for others, dignity, enhancing diversity, and building cultural competence. For those of us in faculty roles, let us never forget that we too serve as role models for our students and if we want our students to behave in a professional manner, we need to do the same thing.

Leadership is another critical skill for BSPH students to develop. Leadership is not confined to persons holding executive management positions and should be part of the educational preparation of all public health students. It is not enough to attend a lecture about leadership or to read the latest leadership book. Students must get out and practice being a leader – and along with this learn what it is like to fail. Student led clubs and organizations are an ideal way for students to begin to hone their skill and talent in leadership. Faculty mentoring will be a critical part of any student led activity.

Public health is a team sport and BSPH students need to be given the opportunity to work in teams throughout the curriculum. Most students dread this experience but it is vital that they learn how to work effectively with diverse team members who possess differential skills and varying levels of motivation and commitment. Through group work, perhaps most importantly, students learn how to deal with group conflict.

Finally, identify alumni and other local public health leaders who are willing to come in and talk with students about the breadth of opportunities in the field and provide an insider's perspective on their work. Sometimes called Executives in Residence (EIR's), these people can help with

mock interviews, resume reviews, and can serve as mentors to current students.

In conclusion, the authors are “bullish” on the future of the BSPH degree. We believe that the demand for this degree will only get stronger in the years to come. Given this level of confidence, it is important to recognize that your students are pursuing multiple pathways after graduation. In order to be most closely aligned with the needs of the market, you will need to develop, implement, and continuously evaluate a set of competencies for program graduates. Along with the competencies, answer the value proposition question – why should students study with you and why should employers hire your graduates? In order to do this, you can craft a

curriculum that simultaneously provides flexibility, rigor, and practical value to your students.

AUTHOR NOTE

The authors who presently serve in administrative leadership positions in graduate education have both previously served as directors of undergraduate programs in health administration as well as on committees and the Board of the Association of University Programs in Health Administration and as site visitors for Council on Accreditation in Health Management Education.

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Undergraduate training in public health should prepare graduates for the workforce

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There has been a rapid growth in the number of programs awarding undergraduate degrees in public health and the number of students receiving such degrees (1). There has not, however, been a significant discussion of the purpose of such degree programs. What, if anything, are the recipients of these degrees being trained to do? What careers, if any, are they being prepared to enter? Is the degree designed primarily to prepare students to enter graduate training in public health or some other graduate or health professional programs? Alternatively, does the degree exist because “an understanding of public health is a critical component of good citizenship and a prerequisite for taking responsibility for building healthy societies”? (2).

While a reasonable case could be made for all of these purposes, we strongly believe that the undergraduate degree in public health should be seen primarily as a professional degree that is designed to prepare students to enter a well-defined and vital career track.

Our perspective is informed by a 60-year history of providing undergraduate training in public health and by a long-standing relationship with alumni, preceptors, and employers who regularly provide quantitative survey data to us. While our specific experience reflects our long history and our geographic location in a relatively rural area of central Appalachia, we believe that our “lessons learned” are relevant to any program currently or potentially providing undergraduate education in public health.

Specifically, it is helpful for any program to seek to understand its market and its students; tailor its competencies and curriculum to match the needs of its employers; and continuously evaluate its performance by seeking input from students, alumni, employers, and other stakeholders. As seen below, those processes and self-assessment tools have been key to the success and longevity of our program.

East Tennessee State University (ETSU) has been offering undergraduate training in public health for well over 60 years. In 1933, the State Teacher’s College, Johnson City (the predecessor of ETSU) began offering a concentration in Health within the degree that was then known as Physical Education and Health. A minor in Health was first offered in 1950, and the School of Health was created in 1955. It included the newly formed Department of Health Education¹ and offered, for the first time, a BS in Health Education. The Department of Environmental Health was created and first offered the Bachelor of Science in Environmental Health (BSEH) in 1965. The Bachelor of Science in Health Science (BSHS) was also first offered in 1965. In 1969, the BSEH became the first undergraduate program in the United States accredited by the National Accreditation Council for Undergraduate Curricula in Environmental Health. In 1973, a concentration in Health Administration was offered by the Department of Health Education and, in 1978, the School of Public and Allied Health² was established.

Masters degrees were added in Environmental Health (MSEH in 1971) and Public Health (MPH in 1986). In 2000, ETSU was accredited by the Council on Education for Public Health (CEPH) as a graduate program in public health and, in 2009, was accredited as the first school of public health in Tennessee and the first to be located in central Appalachia. By definition, with full accreditation as a school of public health, all academic programs in the college, including the undergraduate degrees, were part of the CEPH-accredited unit. This chronology makes ETSU one of the few accredited schools of public health in the country that started with undergraduate training and added graduate programs at a later date.

Today, the ETSU College of Public Health, in addition to a full complement of graduate degrees and certificates, offers five undergraduate degrees – BS Public Health (BSPH) with concentrations in Community Health and Health Care Administration; BSHS with concentrations in Microbiology and Human Health; and the BSEH. In the 25 years between 1989 and 2014, ETSU awarded over 1,500 undergraduate degrees from what became the College of Public Health – 722 BSPH degrees, 530 BSEH degrees and 294 BSHS degrees.

This article addresses recent data generated by the alumni, preceptors, and employers of the BSPH graduates. According to the ASPPH interactive website, in the first 5 years reported (1992–1996), ETSU was the fifth most productive

¹ The name of this department was changed to Public Health in 1995.

² By 2007, Departments in the College of Public and Allied Health that were split off in the forming of the College of Public Health included Dental Hygiene, Radiography, Cardiopulmonary, Speech and Language Pathology, and Physical Therapy.

Table 1 | Reported placement data: BSPH alumni survey (2009/2010, 2010/2011, 2011/2012 alumni) (65 responders: response rate 69.5%).

Placement	Number	Percent ^a
Hospital or healthcare delivery organization	21	34.4
Non-profit organization	6	9.8
Local, state, or federal government	4	6.6
Proprietary organization	3	4.9
University	2	3.3
School system	2	3.3
Other	10	16.4
Unemployed: looking for work	2	3.3
Unemployed: not looking for work	4	n/a
Student	11	18.0

^aExcludes those unemployed: not looking for work.

program in the country. In the most recent 5 years (2009–2013), despite having awarded 18% more degrees than in the first 5 years, ETSU's relative position has dropped to 29th nationally, reflecting the rapid growth in number and size of other programs (3).

In 2009/2010, 2010/2011, and 2011/2012, 65 BSPH graduates have responded to our alumni survey, conducted each year about 18 months after graduation (Table 1).

It is clear, from these data that our BSPH graduates are most likely to enter the workforce, especially into positions with hospitals and healthcare delivery organizations. They are relatively less likely to enter into the “traditional” public health careers in local, state, and federal government organizations. Only about a fifth directly enter graduate school. This latter finding is consistent with the findings of Leider et al. that report that fewer than 10% of graduates from undergraduate programs in public health apply to medical school or graduate programs in public health.

Results from our alumni survey also indicate that these graduates felt adequately prepared for their careers. Of those 65 BSPH graduates who responded to the 2011, 2012, and 2013 alumni surveys, 97% reported being “very satisfied” or “somewhat satisfied” with their overall academic experience and 95% said that they would recommend the college to others.

Their perspectives are supported by the College's employer surveys and field preceptor surveys. Every other year, the college surveys employers who report hiring

one or more graduates from the College. Of the 107 employers who responded to the 2011 and 2013 surveys (in some cases, the same employers responded to both surveys), 96 employers identified the academic degrees of their recent employees, and of those, 53 (55%) reported hiring one or more BSPH graduates. Because the same employer often hires graduates of multiple degree programs, we are not able to report results specifically for employers of BSPH graduates. However, 102 of 107 (95%) employers ranked the College's graduates as “high” or “highest” in “overall competence of graduates in their field of practice”; 98% for “ability to understand and use technical information”; 89% in “knowledge of public health”; and 93% reported “likelihood of hiring future College graduates.”

The other source of information suggesting that BSPH graduates are ready to enter the job market comes from the students' preceptors. Prior to graduation, all BSPH students must complete an internship (culminating experience) that includes at least 400 service-learning hours at a relevant organization, and under the supervision of a qualified preceptor. At the conclusion of each internship, the College formally surveys the students' preceptors.

In 2011/2012, 2012/2013, and 2013/2014, 155 BSPH students received preceptor evaluations. Using a 5.0 scale, preceptors are asked to evaluate students for a range of concentration-specific competencies (which vary by concentration) and for six cross-cutting competencies (work ethic; reliability; self confidence

and interpersonal skills; systems thinking and innovation; inquisitiveness and desire to learn; and ability to manage multiple assignments simultaneously). Over the 3 years, the average score for the cross-cutting competencies was 4.80 and the average score for the concentration-specific competencies was 4.71.

While the curriculum for the BSPH has been recently revised (see accompanying article by Stoots et al.), it retains the key elements that have defined the degree for its more than half century of history – notably its commitment to preparing students to enter the workforce.

CONCLUSION

The current shortage of trained professionals in public health has heightened potential interest in undergraduate training for public health.

Data from our program, and recently reported national data, document that graduates from undergraduate programs in public health are overwhelmingly entering the workforce upon graduation. In our experience, most students enter a health-related job in hospitals, medical practices, nursing homes, or other healthcare industries, though the job destinations may vary in other job markets. The students' own reports, the evaluations from their internship preceptors, and the evaluations from their employers all suggest that these students are well-prepared and successful in meeting the needs of the workforce.

While recognizing that a minority of students do enter graduate school upon graduation (and presumably more do, sometime later) and while recognizing that training in public health is valuable preparation for many career tracks, the fact that the vast majority of undergraduate public health graduates enter the workforce leads, we believe, to three major conclusions:

- (1) Undergraduate degree programs in public health should be designed, delivered, modified, and evaluated primarily with the understanding that they are preparing students for the workforce. Specific attention should be given to assuring that students are “exposed to local level public health professionals and/or to agencies that engage in population health practice” (4), and that they acquire the practical

and applied skills necessary for success in the workforce. To achieve these ends, we strongly believe that students should complete a substantial internship in the public health workforce prior to graduation.

- (2) Undergraduate programs in public health should be carefully and regularly benchmarked against the needs of local employers. This necessitates regular collection and analysis of data from alumni, preceptors, and employers, as well as periodic re-evaluation of future trends and directions in the needs and expectations of employers. We require each of our programs to undergo such a review every 4 years. An additional source of useful data can be collected from students when they return from their internships. We routinely ask these students to identify areas where their preparation could have been improved.
- (3) Institutions offering undergraduate degrees in public health also have an obligation to assure that there is a job market for their graduates. As in any other field, an “over supply” of graduates, or the production of graduates who lack the skills necessary for success in the job market, serves neither the best interests of the field

nor the best interest of the graduates. New programs should grow slowly, assuring that the supply of graduates does not exceed the “carrying capacity” of the local job market. A close relationship between the schools and local employers is essential in this process.

We believe that to treat the degree as one that provides only a basic level of understanding of the field is to deny students the quality of training that is essential to protect the public’s health in the future. Undergraduate-trained engineers build bridges and buildings. Why would not undergraduate – trained public health professionals have a comparable level of expertise and skill?

For years academia has recognized the Master of Public Health degree as a “professional” degree designed and executed to prepare students to enter the workforce. The undergraduate degree should be seen in no different light.

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Undergraduate public health education: does it meet public health workforce needs?

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INTRODUCTION

The professional bachelor's degree [Bachelor of Public Health (BPH) or Bachelor of Science (BS) in Public Health] provides a cadre of trained individuals to fill entry-level positions in American public health agencies. The traditional Bachelors of Arts or Science degrees with majors in public health produce an informed citizenry, but may not provide sufficient public health course content to enable graduates of such programs to effectively enter the public health workforce.

BACKGROUND

The 2003 report of the Institute of Medicine (IOM) Committee on Educating Public Health Professionals for the twenty-first century anticipated that developing broad undergraduate public health education would result in a cadre of trained individuals to enter the public health workforce as well as provide a "public health perspective" to their worksite (1). The report also called training in public health an essential part of the education of an informed citizenry. These concepts have been the underlying themes on which undergraduate public health education has developed over the last decade. As a result, Riegelman and Albertine have stated: "undergraduate public health at 4-year institutions: it is here to stay" (2).

The need for additional members of the public health workforce at all levels is expected to reach 250,000 by 2020 (3, 4). These estimates, made in 2008, have been confounded by the recession of 2008–2010 and by a projected retirement eligibility rate of 29% among public health practitioners (5). To meet the required

workforce projections, the graduation rate from Association of Schools and Programs of Public Health (ASPPH) schools needs to triple (3, 4). Arnold and Schneider have postulated that public health undergraduates completing their degrees and entering the workforce have the potential of relieving the pressure on graduate programs by providing entry-level practitioners (6).

Although bachelor's degree prepared individuals may help to reduce the projected shortage of public health practitioners, the variety of bachelor's degree programs and their variability may impede these efforts. A pilot review of programs at colleges and universities with established schools of public health was conducted to determine whether there were significant differences between bachelor's degree programs at these institutions. It should be noted that a number of the new undergraduate programs are being developed in universities without schools of public health, including liberal arts and community colleges, and such institutions may not possess the breadth and depth of faculty expertise to produce entry-level public health practitioners, although they may certainly produce graduates that meet the recommendation for producing citizens well informed concerning public health issues. As a consequence, some institutions will produce the "educated citizen" (academic), while others will educate practitioners for the public health "workforce" (professional).

Undergraduate degree programs with public health majors are based on the various public health core disciplines (administration, epidemiology, biostatistics, environmental health, and health behavior) as well as general public health.

These academic majors may occur as either BA or BS degrees. The BPH degree is a professional degree functioning at the undergraduate equivalent of the Masters of Public Health (MPH). The Bachelor of Science in Public Health (BSPH), although technically an academic degree, functions as the undergraduate equivalent of the Master of Science in Public Health (MSPH).

REVIEW OF BACHELOR DEGREES IN TOP RANKED PUBLIC HEALTH PROGRAMS

In an effort to gain a better understanding of the undergraduate public health degrees currently being offered at colleges and universities with established public health programs, a general, preliminary review of the course content of university-based undergraduate public health degree programs was conducted. Owing to its ready availability, a convenience sample from the U.S. News top 25 schools of public health was utilized as the study set (7). A total of 28 institutions' websites (3 institutions tied for the 25th place) were searched for undergraduate degree curricula containing public health content.

Of the 28 schools reviewed, 17 (60.7%) offered undergraduate public health programs, with 2 institutions offering public health majors in both BA and BS degree programs. Two institutions were not considered due to offering combined undergraduate and graduate programs. A total of 19 programs from 17 schools were considered, and 3 groups of degree programs emerged: public health majors in BA degree programs, public health majors in BS degree programs, and a combination

of the 5 BSPH programs and the single BPH program, the latter 2 functioning as professional degree programs. The curriculum requirements listed on the websites for each of the 19 programs were reviewed by at least two authors to determine public health content. Public health content courses included general public health courses, courses in any of the five public health core disciplines, public health practicum requirements, student research projects, and any other courses considered by the program to contain public health content.

This review demonstrated that the six BA degree programs contained an average total of 120 hours of coursework with public health content consisting of an average of 34.50 semester hours or 28.8% of the total degree hours. For the majors in the seven BS degree programs, the average total degree program hours was 120.86 with public health content representing an average of 35.86 semester hours or 29.7% of the total hours. The BPH/BSPH degree programs averaged a total of 120 semester hours with 51.83 semester hours of public health content representing 43.2% of the total. Thus, the BPH/BSPH programs contained a statistically significant 47% more public health content than BA and BS degree programs with public health majors ($p < 0.0001$) (see **Table 1**).

This review of bachelor degree programs in public health provides a preliminary picture of the variability between these programs. However, this is not meant to be a comprehensive analysis of these programs or their course content, but rather it should be considered a starting point for future study. A limitation of this analysis includes the number of public health

specific credit hours being deduced from reviewing online bachelor program curricula. In undergraduate education, some freedom is given to students to choose additional courses as electives. Some students obtaining BA, BS, BPH, or BSPH degrees could choose to focus their additional electives on public health courses. Thus, the calculation of credit hours here only reflects what is minimally required of students to complete the degree, but the actual exposure of students to public health courses may be higher. Similarly, undergraduate students may have other opportunities to gain experience in the field of public health during their education such as working with a faculty member in the school of public health on research or a special project or participating in voluntary internships or shadowing opportunities.

In order to fully evaluate the current state of undergraduate education in public health, bachelor degree programs from accredited schools of public health, accredited programs of public health, and colleges and universities without accredited schools or programs of public health should be evaluated. Further, a more detailed analysis of course content, the public health competencies addressed, and learning outcomes of the curricula need to be considered.

DISCUSSION

In order to effectively fill the projected vacancies in the public health workforce, adequately prepared practitioners will be required. Undergraduate public health degree programs may be a solution to this problem. However, if graduates of such programs are to be capable of filling entry-level public health practitioner

positions previously filled by individuals with an MPH degree, a level of academic content such as is found in graduate degree programs will be required. Currently, the Council on Education in Public Health (CEPH) requires that accredited MPH programs consist of at least 42 credit hours. As shown in this preliminary review, the average number of public health content credit hours in BA and BS programs fall below the MPH requirement, while the BPH and BSPH programs on average meet it. Unlike BA and BS programs, the BPH and BSPH programs mirror the content found in graduate MPH and MSPH degree programs, but at an undergraduate level.

Using the current credit hour requirements of an MPH degree as a benchmark, a BA or BS degree with a public health major may provide a level of understanding appropriate to an informed citizenry as called for in the 2003 IOM report (1, 8). These degree programs will certainly provide students with an understanding of public health issues that can then be utilized in the workforce or graduate level studies. However, if undergraduate degree prepared individuals are to effectively replace individuals completing an MPH degree and fill entry-level public health practitioner positions, the two professional degree programs offered by American universities, the BPH and BSPH degrees, which provide nearly 47% more content than that found in BA and BS degree programs with public health majors, preliminarily appear to offer a more suitable level of training. As the university-based schools of public health possess the faculty expertise, the time has come for their undergraduate public health programs to produce

Table 1 | Public health content hours by degree type.

Degree type	Number of schools	Public health content hours				Mean of total credit hours (SD)	Percentage of public health content hours (%)	Comparison of mean public health content hours to BPH/BSPH	
		Mean (SD)	25th percentile	Median	75th percentile			t	p-Value
BA	6	34.50 (6.41)	30	35	36	120 (0)	28.80	-5.10	0.0005
BS	7	35.86 (7.95)	30	33	42	120.86 (22.7)	29.70	-4.18	0.0015
BA/BS	13	35.32 (7.01)	30	35	36	120.46 (16.6)	29.30	-5.13	<0.0001
BSPH/BPH	6	51.83 (5.31)	48	49	57	120 (0)	43.20	-	-

well-trained practitioners for the public health “workforce” to meet the nation’s needs in 2020 and beyond.

Future studies should be conducted to look in depth at the course content of all public health bachelor’s degree programs in order to determine their specific course content as well as reviewing the actual experiences of recent graduates. Obtaining a better understanding of the students’ preparation for becoming part of the public health workforce will also provide important information for developing effective education programs for public health practitioners.

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Undergraduate public health, lessons learned from undergraduate health administration education

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[†]The authors who presently serve in administrative leadership positions in graduate education have both previously served as directors of undergraduate programs in health administration as well as on committees and the Board of the Association of University Programs in Health Administration and as site visitors for Council on Accreditation in Health Management Education. While there are published reports addressing components of the establishment and incorporation of undergraduate programs into health administration education, there is not a complete formal history and a great deal of the experience that follows is anecdotal and unpublished.

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INTRODUCTION

The rapid growth in the number of undergraduate programs in public health reflects a similar earlier experience in health administration education in North America and offers a set of experiences that we may both learn from and contribute to. In a similar fashion to the public health discipline first awarding the MPH degree, the entry level health administration credential began as a masters degree in 1933, and subsequent degrees followed awarding the Master of Health Administration (MHA) and similar degrees. In the 1970s, undergraduate programs in health administration began to proliferate, and the graduate programs were “initially very cautious about establishing formal relationships” (1) requiring consideration of a set of questions about the relationship between baccalaureate and masters degree education in the discipline. This experience may be beneficial in addressing the more recent undergraduate/graduate degree relationship in public health. While there are numerous issues to consider, this commentary will address several of the most important issues. In 1975, Andrew Patullo, then Senior Vice-President of the W. K. Kellogg Foundation noted that “in light” of health administration being associated with graduate education, the development of undergraduate education presented a perplexing development, and nonetheless, the establishment of baccalaureate programs was seen as a “logical sequential development” (2) **Table 1** presents a series of key events in the evolution of baccalaureate education

in health administration, and a surprisingly similar set of parallel events in the more recent evolution of public health education. While it is not a certainty that parallel events will continue, the authors believe that anticipating subsequent issues from health administration will facilitate the maturation of undergraduate public health education.

PATHWAYS FOR GRADUATES

As noted in our companion papers (11, 12), undergraduate programs in public health have been described as a pathway for several alternatives, liberal education for an informed citizenry, undergraduate education for professional programs including law or medicine, preparation for masters degrees in the discipline, and preparation for entry level positions in the profession. In health administration education, programs typically followed the same pattern and many students selected the opportunities for entry level and frequently midlevel career positions such as hospital department heads and associate administrators. These opportunities were enhanced by the fact that many recent masters level graduates had no more work experience than their baccalaureate graduate counterparts, had higher target incomes, and were less interested in positions in rural and underserved areas. Similar opportunities may well exist for the baccalaureate public health graduate. However, as MHA programs proliferated, their graduates have displaced many baccalaureate graduates for these opportunities and the MHA has

frequently become the entry level credential repositioning baccalaureate graduates away positions that they previously pursued. This degree escalation has resulted in many health administration baccalaureate graduates returning to graduate education for credentials that they may not have planned to pursue in order to obtain positions they desire. In a similar fashion, concurrent to the growth in undergraduate public health education, there has also been rapid growth in graduate public health education. A similar phenomenon may affect public health.

INTRODUCTORY COURSEWORK AT BOTH DEGREE LEVELS

There is a common and somewhat unique characteristic to education in each of the two disciplines as baccalaureate education was preceded by entry level graduate education and curriculum was then “reverse engineered” from the established graduate education that preceded it. This contrast, with many other professions where completing an undergraduate curriculum, is a prerequisite to graduate education in the discipline. For example, a Bachelor of Science in Nursing (BSN) degree is almost a universal expectation of applicants to a Master of Science in Nursing (MSN) program. While an undergraduate business degree is not a universal requirement for Master of Business Administration (MBA) programs, many programs have some undergraduate introductory course prerequisite requirements in areas such as accounting and economics.

Table 1 | Comparable events in the development of undergraduate health administration and public health education.

Undergraduate health administration education	Undergraduate public health education
Undergraduate Programs in public health were offered as early as the 1920s (1) 1980, establishment of the AUPHA Undergraduate Task Force (2)	Undergraduate programs in public health began in the 1970s (3) 2007, establishment of ASPH Task Force on undergraduate public health education (4)
In 1970, AUPHA found that more than 100 Colleges and Universities in the U.S. and Canada were offering “some kind of work in the field of health administration at the baccalaureate level” (5)	A 2008 survey by the AAC&U identified 137 members with public health majors, minors, or concentrations (6)
1975, The Commission on Education for Health Administration recommends health administration education be offered in a variety of settings with diverse educational strategies including undergraduate programs (5)	2003, The Committee on Educating Public Health Professionals for the twenty-first century recommends that all undergraduates should have access to education in public health (7)
1975, Undergraduate Education for Health Services Administration: Proceedings of the First Undergraduate Faculty Institute (2).	2012, ASPH <i>Recommended Critical Component Elements of an Undergraduate Major in Public Health</i> Full Educational Model and Report (13)
1980, Establishment of the AUPHA Certification, Undergraduate Review Committee (8)	2006, Consensus Conference on Undergraduate Public Health Education, sponsored by the Association for Prevention Teaching and Research, the Association of Schools of Public Health (ASPH), and the Council of Colleges of Arts and Sciences (CCAS).(8)
1985, First published report: <i>Baccalaureate Health Administration Education: Curriculum Models and Issues</i> (8)	2014, Establishment of CEPH Standalone Baccalaureate Program Accreditation (9)
	2007, First published report: <i>The Educated Citizen and Public Health: A Consensus Report on Public Health and Undergraduate Education</i> (10)

As there are rarely prerequisite areas or specific degree requirements in both graduate health administration and public health, introductory courses in disciplinary content are a norm in both MHA and MPH degree curricula.

This is noteworthy as introductory disciplinary coursework is a most unusual component in graduate curricula. As undergraduate programs in public health proliferate, graduate admissions are likely to include a mix of students with undergraduate introductory public health course content and degrees, and those with other undergraduate majors without the relevant undergraduate introductory coursework. In the absence of MPH programs requiring undergraduate coursework or degrees, it will be impossible to remove these introductory courses from graduate education. The mix of backgrounds of matriculating MPH students creates a complication for the graduates of baccalaureate programs, and curriculum design for the graduate programs. Waiving or substituting these courses for baccalaureate graduates presents an interesting question for the graduate programs in assessing the difference between an undergraduate “introduction to . . .” course and a graduate “introduction to . . .” course. In

some cases noting this, undergraduate health administration students choose a different graduate degree such as business or public administration. These degrees frequently led the baccalaureate health administration graduates to careers in other disciplines such as banking or government and excellent people were lost to health administration careers.

In other cases as undergraduate health administration faculty, the authors have experienced calls from undergraduate students in health administration expressing concern for their choice in pursuing an MHA degree as they were using the same textbooks in courses with similar titles, and earning high test grades without studying. While this typically resolved itself as students move beyond the introductory courses, the overlap does present issues related to best use of time and money for the health administration baccalaureate graduate as well as the public health undergraduate.

DUPLICATION OF CURRICULUM CONTENT

Frequently, faculty teaching at both the undergraduate and graduate levels in health administration speaks to the importance of considering variations in

depth, breadth, and competencies to differentiate courses at the two levels, and the need to carefully consider alternatives if a graduate course were to be waived. Faculty in public health needs to be aware of this issue and carefully consider it in course and curriculum design as subsequent coursework will rely on introductory course competency. Experience in health administration education also demonstrates that undergraduate advisors must play a careful role in addressing this issue for their students considering graduate education and selecting appropriate programs in the same discipline. Undergraduate advisors in public health need to be aware of these issues in counseling their students.

PROGRAM LOCATION AND FACULTY

Achieving excellence is also an issue that is shared by the two disciplines. While some undergraduate programs are co-located in the same unit as a graduate program with faculty teaching at both levels, some undergraduate programs are located in other disciplinary units. In the case of health administration, this included allied health, political science, nursing, business, or the humanities. Health administration faculty in some of these settings previously focused on teaching other

subjects. In some instances, the faculties were educated in other disciplines retraining themselves to teach health administration courses. Public health programs share similar units and similar issues based on rising interest in public health and in some cases declining interest in other majors.

Young health administration programs typically had small faculties, in some cases, as few as two instructors each offering eight diverse course preparations in an academic year. Teaching was complemented by substantial advising responsibilities and the establishment and supervision of student field placements and career planning. This also appears to be the case in public health with programs in a variety of academic units and recent demand resulting in summer short courses to prepare existing faculty to teach public health courses. As health administration has matured, faculty credentials better reflect curriculum content, and the same may be the case in public health. However, the role of disciplinary research and teaching must also be considered for faculty engaged in large and diverse teaching responsibilities.

CLASS SIZE

An additional consideration in health administration is class size. Undergraduate students are searching for careers and frequently change majors based upon something that excites them. In some years, the health administration discipline has been extremely popular based upon awareness initiated by a public event or the media, resulting in very high demand by students for the major. The same may be true in public health based upon world events or a popular movie with a public health focus. In some health administration, programs enrollment is open and not capped in size. However, in others, based upon limits on capacity and/or efforts to select the best students, there are formal requirements for admission including application, prerequisite coursework, minimum grade point averages, work experience, and interviews. The same issue may apply to undergraduate public health. For example, the current attention to Ebola may increase interest and demand for undergraduate degrees and exceed program enrollment capacity.

ACADEMIC PROGRAM CREDENTIALING AND ASSOCIATION MEMBERSHIP

In health administration, the Association of University Programs in Health Administration (AUPHA) was established as an organization of graduate programs. Following the establishment of a critical mass of undergraduate programs, AUPHA needed to consider its relationship with the undergraduate programs. In a similar fashion, the accrediting body, the Council on Accreditation in Health Management Education (CAHME) needed to evaluate its role in undergraduate education. Following initial resistance, AUPHA revised its bylaws to permit undergraduate programs full membership in the association including seats on its governing board, and many undergraduate faculty have served as board chair. This was at least in part based on a decision that a single organization would be preferable to the undergraduate programs creating a second organization. External program review is important to quality improvement. For 25 years, AUPHA and CAHME have chosen “Undergraduate Program Certification” as the undergraduate program credentialing mechanism through an AUPHA panel review process as an alternative to “accreditation.” This on-site panel review takes place at AUPHA’s annual meetings as an alternative to CAHME site visits offering a more financially affordable and inclusive strategy.

In a similar fashion, the Association of Schools and Programs in Public Health (ASPPH) and the Council on Education in Public Health (CEPH) represent public health education. ASPPH will potentially need to consider its relationship with undergraduate programs as they proliferate or potentially risk the development of a parallel undergraduate program association. In 2013, CEPH approved offering “Standalone Baccalaureate Program” accreditation, which may be more exclusive due to the high cost of site visits. It will be interesting to watch the evaluation of these two credentialing processes and the number of participants as they evolve.

CREDENTIALING OF GRADUATES

In the area of personal credentialing of professionals each discipline has alternative professional associations and

credentialing bodies. The American College of Healthcare Executives (ACHE) is the leading professional affiliation for students and graduates in health administration practice. At a point in the past, ACHE affiliation required an MHA for membership, this requirement has now been removed and baccalaureate graduates are eligible for affiliation. ACHE also offers examination-based board certification in healthcare management; however, a graduate degree is required for the examination. In public health, the American Public Health Association (APHA) is the largest membership association and has no academic requirement for membership. The National Board of Public Health Examiners (NBPHE) was established in 2005 as the public health professional certification body. Although requests have been made in regard to baccalaureate eligibility, eligibility for the examination presently requires a graduate degree from a CEPH-accredited school or program to qualify for certification.

CONCLUSION

Each of these considerations contributes to the educational enterprise as well as definition of the health administration and public health professions. Health administration and public health education share a variety of issues as they are atypically disciplines where graduate education preceded undergraduate education. This narrative is an opportunity to demonstrate that the recent growth of undergraduate public health education is not unique. While health administration may not offer all of the answers to integration of the public health baccalaureate education into a discipline with established graduate degree entry level profession, we may not only learn from other disciplines but also contribute to their evolution.

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Progress in the articulation of undergraduate and graduate public health?

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Historically, in the absence of baccalaureate education in the public health, entry level education was offered at the graduate level in the Master of Public Health (MPH) degree. As MPH education was not preceded by baccalaureate education in the discipline, there are not typically prerequisite requirements for MPH admission, and introductory coursework in public health has always been offered at the graduate level. Other disciplines including business and nursing offer joint and dual degree programs; however, these programs are typically designed to accelerate completion of baccalaureate and graduate degrees (1–4) rather than supplement graduate with undergraduate education. While the developers of new undergraduate public health programs may look at the experience in other disciplines, public health presents the atypical characteristic that well-established graduate education preceded undergraduate education. In addition, review of a variety of accelerated programs at different universities demonstrates that they tend to be unique to individual universities rather than of a standard design.

The recent establishment of undergraduate public health degree programs presents an interesting situation for students seeking an MPH degree following completion of their baccalaureate degree. The typical curricula at both the undergraduate and graduate levels will require similar, but not identical introductory courses that likely vary in depth and breadth as detailed elsewhere by the authors (5, 6). Consequently, these students will potentially experience unintended duplication of content with additional costs of time and money.

As undergraduate public health education began to experience interest and rapid growth, one of the authors of this commentary published a paper *Articulation of Undergraduate and Graduate Education in Public Health* (7). The paper addressed the benefits of designing strategies to better coalesce or articulate undergraduate and graduate education, identifying barriers to articulation and strategies to achieve alignment between undergraduate and graduate education. The paper additionally presented a set of issues that were unanswered and require careful consideration. It is now 6 years later, and the authors wish to assess progress in articulating undergraduate and graduate public health education to achieve greater harmony between the two degrees. In doing so, we presume that improving the articulation of undergraduate and graduate programs to better align public health in a manner similar to many other disciplines is beneficial and have not heard arguments to the contrary.

While there has not been a systematic national effort to catalog implementation of these strategies, the authors have sought to identify examples of progress where they exist. Each of the proposed strategies and observations offering examples of current status follow.

- Plans for formally articulated programs might be established at a single university where both undergraduate and graduate public health education are offered, as a memorandum of agreement among two or more programs, SPHs, or universities; and/or a national policy supported by the Association of Schools and Programs in Public Health (ASPPH, formerly ASPH) and/or Council on Education in Public

Health (CEPH): as an example of unified degrees in a single unit, Tulane University School of Public Health and Tropical Medicine offers a continuous study BSPH/MPH combined degree program where students may complete up to 12 graduate credits in public health core courses that may be applied to both the BSPH and the MPH. A cross-university option is offered by the Johns Hopkins University Bachelor of Arts/Master of Sciences in Public Health (BA/MSPH) programs as a coordinated academic collaboration between the Krieger School of Arts and Sciences and the Johns Hopkins Bloomberg School of Public Health. The option enables students to complete the two degrees in 5–6 years. Inter-institutional agreements are far more complicated than a single school of public health offering both degrees, or even two colleges at the same university. An example of a 5-year inter-institutional program is offered as a baccalaureate degree from Mount Mary College and an MPH degree from the Medical College of Wisconsin. In this model, students have the opportunity to complete up to 15 credits of graduate coursework that apply to both undergraduate and graduate degrees. Interestingly, the undergraduate degree may be in any discipline, and the College does not offer a free standing undergraduate degree in public health. Presently, a national model has not yet been proposed to address this type of initiative at a broader level.

- Graduate programs could base course waivers on detailed content analysis of undergraduate-course syllabi or by competency examinations using the

ASPH MPH core competencies: while it is likely that course waivers are being accomplished on a case-by-case basis in various programs, there is little evidence of waivers being promoted as policy in graduate programs. Further, CEPH accreditation presently calls for a minimum requirement of 42 semester hours for the MPH degree and this does not offer the flexibility to reduce credit requirements based upon prior course competencies. Consequently, at best a waiver would enable a student to avoid duplication by completing advanced coursework, but not an accelerated degree.

- Early matriculation to graduate school might be offered prior to the awarding of a baccalaureate degree, where the baccalaureate degree requirement is either waived or awarded upon completion of the first year of graduate education. This model is most common with early admission to medical or dentistry schools: in contrast to professional degrees, most graduate programs require a baccalaureate degree for matriculation, and the innovation appears limited to professional degrees in the awarding of baccalaureate degrees. It does not appear that any accredited MPH programs currently offer this option.
- Graduate programs, with the approval of the graduate schools that govern their degrees, could permit current undergraduates to enroll in graduate courses applicable to graduate degrees: while there may be restriction associated with eligibility based upon total hours earned, grade point average to be eligible, and/or a maximum number of graduate courses that may be completed, the opportunity for undergraduates to enroll in graduate courses appears to be in place in many universities. However, in the absence of a formal process to apply this coursework to an MPH degree, it is less clear how completion of graduate work prior to entering a graduate program would benefit a student, and it could potentially complicate the pursuit of an MPH degree.
- Graduate programs could create undergraduate prerequisite courses for all entering students in areas such as overview of public health, introductory epidemiology, introductory biostatistics,

public health biology, and/or ethics: the absence of specific prerequisites for matriculation into an MPH program does require offering introductory coursework for incoming students and limits the number of advanced courses that may be completed in a 2-year-curriculum. Requiring prerequisite courses for graduate education would better align with graduate education in other disciplines, but based upon the limited number of baccalaureate public health programs would currently reduce the eligible applicant pool for MPH admissions, as well as affecting non-traditional students returning to school. Further, while a prerequisite in an area such as biology or statistics might be more easily defined, the current absence of standardized undergraduate courses in public health may result in diversity in the preparation of students. The recent establishment of CEPH accreditation of freestanding baccalaureate programs may aid in standardizing these courses in the future. Presently, it does not appear that any accredited MPH currently specifies public health-related course prerequisites for admission.

- Graduate programs, with the approval of graduate schools, could grant academic credit for selected, previously completed undergraduate courses, reducing hours required for the articulated degrees: while the previously mentioned formally articulated programs fit this model, it does not appear that this option is being formally offered. However, it may be available on an *ad hoc* basis for individual students. (This would also require CEPH's concurrence to revise the MPH 42 semester-hour accreditation requirement to accommodate undergraduate work.)
- Duplication of coursework could be avoided by waiving specific graduate-course requirements based upon undergraduate work, and substituting advanced graduate courses to achieve greater depth in curriculum content: in contrast to the articulated programs that use graduate-course work to meet undergraduate degree requirements, this strategy would call for application of baccalaureate coursework to graduate requirements. In addition to assessing adequacy of content in these courses, in

universities where the MPH is located in the graduate school approval would be challenging. This would also require CEPH's concurrence to revise the MPH 42-semester-hour accreditation requirement to accommodate undergraduate work, and consequently the strategy is not presently viable.

- Programs could waive required field experience requirements for students with baccalaureate practicum experiences admitted directly to graduate education: in addressing "practical skills" CEPH accreditation criteria call for a planned, supervised and evaluated practice experience for all graduate professional degree students. However, individual waivers may be granted based on well-defined criteria, the possession of a prior professional degree in another field, or prior work experience. It is possible that an MPH student with an undergraduate degree in public health may be eligible for a waiver; however, the value added in an additional practical experience would need to be carefully considered.
- A small number of advanced or specialty MPH or MSPH degree programs designed exclusively for graduates of baccalaureate public health curricula could be established: this remains an interesting strategy and would be reflective of education in a discipline such as nursing. At this stage of baccalaureate development it is unlikely that such an MPH program could generate the critical mass of applicants to be successful, while concurrently denying access to other applicants.
- Students with a baccalaureate degree in public health could be offered the opportunity to bypass a master's degree and proceed directly to doctoral education: this option exists in some universities for disciplines in the arts and sciences. More recently, early entry or "fast-track" options in doctoral education in nursing have grown for baccalaureate graduates. While atypical, admission criteria for the Doctor of Public Health degree in Public Health Policy and Management at the University of Arizona Mel and Enid Zuckerman College of Public Health provide that applicants with a bachelor's degree and 5 years of public health work-related experience may be admitted into the program. However, these students are required to complete

the five core MPH courses in addition to the minimum DrPH credit hours of course work in the major. It is unlikely that this model will see rapid growth.

The examples presented are anecdotal as there presently is not a formal national mechanism to collect and disseminate information about undergraduate program innovations. Presently, there is not even agreement in regard to the definition or number of undergraduate programs (Tarasenko and Lee, submitted). While the concept of articulation of the MPH with other graduate and professional degrees including the MSW, MA, MS, MHA, MBA, MD, PharmD, DMD, MSN, and JD is well accepted, articulation with undergraduate degrees is a relatively new framework. Issues related to course academic content and rigor, degree requirements, graduate school policies, and accreditation must be considered in planning for the articulation of undergraduate and graduate public health degrees. Efforts by ASPPH, CEPH, and the Association of American Colleges and Universities have contributed to the advancement in the development of undergraduate education; however, issues related to national policies promoting degree articulation have not yet been addressed.

As both interest in undergraduate education and the number of programs and students grow, issues related to the career paths of baccalaureate graduates and their opportunities to pursue graduate degrees in an efficient manner will continue to

receive attention. While examples of articulation better aligning undergraduate and graduate public health education are available, these examples tend to be exceptions to convention associated with a not yet mature undergraduate degree. Articulation has the potential to facilitate the admission of students into MPH programs and additionally, provide opportunities for MPH programs to adjust their curriculum to accommodate students with relevant educational preparation. Given the ever increasing direct and indirect costs of graduate education, schools and programs in public health might wish to consider creating opportunities for students to complete their degrees in a shorter period of time using articulation with undergraduate public health education as one way to accomplish this goal. Actions to address these policies will facilitate public health education and the students we serve.

AUTHOR NOTE

The authors who presently serve in administrative leadership positions in graduate education have both previously served as directors of undergraduate programs in health administration as well as on committees and the Board of the Association of University Programs in Health Administration and as site visitors for Council on Accreditation in Health Management Education.

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The evolution toward accreditation

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The Council on Education for Public Health (CEPH) was established in 1974 to accredit schools and programs of public health, primarily those at the graduate level. For the field, it provides assurance for students, employers, and the public that educational programs meet national standards. For nearly 40 years, the MPH degree has been the recognized entry-level professional degree in the field of public health. However, other public health specialized degrees, particularly those in community health education, environmental health, and health administration have existed at the baccalaureate level for many years. These degrees continue to prepare graduates for certain specialized positions in public health. Accreditation in public health allows educational programs to participate in certain federal funding opportunities, provides them with a marketing advantage to potential students, and provides graduates with opportunities for certain governmental fellowships and jobs.

Over the last decade, undergraduate majors in public health have become increasingly popular. This popularity is seen both at universities with accredited graduate schools or programs in public health, as well as in liberal arts and other types of higher education institutions. A 2008 survey conducted by the Association of American Colleges and Universities, founded in 1915 to represent liberal arts colleges, indicated that 137 of its 837 members, or 16%, offer majors or minors in public health (1). While these numbers represent the most recent official survey data, anecdotal evidence suggests that the number of existing programs today may number as many as 500. These programs

have become wildly popular majors for students and attractive to many universities as revenue generators in difficult economic times. Johns Hopkins University has offered an undergraduate major in public health studies since 1976. There were 159 majors in 1998 and 311 majors in 2008. It remains one of the university's most popular undergraduate majors, currently producing between 110 and 150 graduates per year. At William and Mary, a freshmen seminar on emerging diseases is so popular that it has to be offered in two sections each semester and fills up instantly (1). In 2009, The Chronicle of Higher Education identified public health as one of the five most "up-and-coming majors" likely to be developed at colleges and universities in the coming years (2).

With the growing popularity of and interest in undergraduate public health came an expanded view of what was considered "public health" at colleges and universities around the country. Public health has long been a profession that has benefited from knowledge and expertise contributed by a variety of professions (e.g., medicine, law, business, and social work) and numerous disciplines (e.g., psychology, sociology, and anthropology). Many faculty from these disciplines and professions have applied their expertise to health and health-related questions throughout their careers. On the other hand, few faculty trained in public health find academic homes outside graduate-level public health programs and are unlikely to be found on undergraduate campuses. As such, emerging undergraduate public health majors were of varying foci and tended to reflect existing faculty expertise

within the university. Faculty were looking to national organizations, including CEPH, the Association of Schools and Programs in Public Health (ASPPH), and the American Public Health Association (APHA) for guidance on what should be included in the majors they had been asked to develop and seeking a mechanism for quality assurance.

Ongoing conversations among public health academicians revealed a growing unease about the purpose of the undergraduate major in public health. Should students prepared in public health at the undergraduate level be entry-level public health practitioners? Should they be preparing for further professional education in public health or a related profession? In some states, demand is high for entry-level public health professionals trained at the undergraduate level. In certain public health specialty areas, such as community health education, sanitation, and health administration, entry-level practitioners have traditionally been trained at the baccalaureate level. In other areas of the country, and in some employment settings, employers prefer master-level training. Further concern was expressed that the development of undergraduate training in public health would lower the professional bar – that individuals trained at the baccalaureate level would squeeze out MPH graduates in difficult economic times. All these issues converged around the question of whether an accreditation mechanism should be developed for baccalaureate programs in public health.

To determine whether to develop an accreditation system for baccalaureate-level public health programs, the Council, CEPH's decision-making body, considered

two key questions. First, was providing quality assurance for undergraduate public health programs an appropriate “fit” for the organization given that CEPH has accredited only graduate-level programs for almost 40 years? And second, would quality assurance for undergraduate programs in public health be a positive development for the workforce and, ultimately, for the health of the public? The Council determined that the answer to both questions was “yes.”

While the Council had not accredited programs in universities without graduate public health degrees, it had been accrediting schools of public health containing undergraduate degrees for decades and graduate programs that are administratively located with undergraduate degrees since 2007. Graduates from existing programs market themselves as trained in “public health,” but without profession-wide standards or quality assurance mechanisms, the programs vary widely in content, philosophy, and orientation. The Council determined that developing a mechanism to accredit undergraduate public health programs would have a positive impact on the organization’s comprehensive services to the public health profession. The Council also believed that developing a quality assurance program that addresses all levels would have a positive impact on the field of public health by providing a coordinating role between degree levels and public and employer expectations of those levels. In short, the Council believed that expansion of its services to undergraduate public health education was appropriate and mission driven.

The Council understood that since there was not yet profession-wide agreement on many aspects of the undergraduate public health major, that development of quality assurance standards around it would need to be a deliberative process. In early 2010, CEPH developed a white paper that outlined the plan for transition to a system of accreditation for undergraduate programs. The paper asked for comments from related organizations about process, content, questions, and potential unintended consequences. Written input was solicited from approximately 30 organizations, representing both public health academia and public health practice, and 11 responded. Comments were strongly

supportive for moving forward with exploration of accreditation of public health baccalaureate degrees, but respondents wanted to participate in the design, development, and implementation of any new system.

To ensure a collaborative process, on February 6, 2011, CEPH brought together a group of senior-level public health and educational leaders representing 11 public health and higher education organizations. Members of the group were selected not only for their individual expertise but also to ensure that varying perspectives from government and private public health organizations, potential employers, and academic institutions were represented. The group was asked to provide recommendations to the Council about whether and how to proceed with quality assurance in baccalaureate public health degree programs, particularly those developing without an affiliation with an accredited school or graduate program in public health.

The group arrived at the following consensus statements:

- Given the rapid growth in undergraduate public health in all types of higher education institutions, accreditation might be necessary to assure quality in baccalaureate-level public health majors.
- Accreditation is an iterative, collaborative process that takes time and must involve key stakeholder groups.
- Principles of quality should apply to all baccalaureate-level public health majors, whether in schools of public health, affiliated with graduate public health programs, or in colleges or universities without graduate-level public health training.

The group participated in a brainstorming and prioritization exercise in which they identified core public health content, service learning, and personal and social responsibility among the most important areas of curricular concern. In addition, the group identified important program elements that they believed should be addressed in any potential quality assurance system. These included practitioners as teachers; advising and mentoring students; authentic evaluation of student learning; and recruitment and retention of students, particularly those from underrepresented groups. Further, they agreed that

development of criteria for baccalaureate degrees should be informed by ongoing initiatives, such as the Framing the Future Initiative, convened by the ASPPH, to identify curricular components for baccalaureate degree majors.

In 2012, ASPPH convened an expert panel to provide recommendations around undergraduate public health majors as part of its Framing the Future Initiative. The expert panel comprised faculty who worked with undergraduate public health students, practitioners who hired their graduates, and experts on higher education and public health accreditation. Together, this group recommended four critical component elements of an undergraduate public health education that included background domains, public health domains, cumulative experience and field exposure, and cross-cutting areas (3). While the report of the expert panel expanded on each of these areas, it also identified nine public health content domains for undergraduate public health majors. These content areas included an overview of public health; the role and importance of data in public health; identifying and addressing population health challenges; underlying science of human health and disease; determinants of health; project implementation; overview of the health system; health policy, law, ethics, and economics; and health communication. This expert panel report was essential to moving undergraduate public health education from something defined at the university level alone, to something defined by a profession.

From the expert panel report, CEPH was able to draft the curricular criteria for what it called Standalone Baccalaureate Programs (SBP). These undergraduate programs are those not affiliated with a graduate school or program in public health. In early 2013, CEPH convened two focus groups composed of designated leaders of public health majors at a diverse array of universities. The focus group participants gave feedback on the draft criteria and multiple changes were made. Following a period of open public comment on the criteria, the Council adopted them in October 2013 (the full criteria for accreditation are available on the CEPH website at <http://ceph.org/assets/SBP-Criteria.pdf>). In February

2014, CEPH accepted its first baccalaureate applicants for accreditation.

The accreditation process for SBP is nearly identical to that of schools and graduate programs in public health. The process includes the preparation of a detailed self-study document by the program followed by an on-site visit by a team of peer reviewers who interview faculty and administrators, students, alumni, and community members. Following the visit, the site visit team provides a detailed written report outlining compliance with each accreditation criterion. The Council reviews all the available information and makes a decision about accreditation. The process takes approximately 2.5–3 years from initial application to final accreditation decision. Following initial accreditation, programs are monitored annually and the full process is repeated in 5 years – subsequent re-accreditation processes occur every 7 years. Preparing a program to undertake the accreditation process can take time; thus, the number of applicant and accredited baccalaureate programs expected over the next few years is modest, but will expand over time. Working together with the early applicant programs and the field, CEPH expects to refine its processes and criteria as lessons are learned and promising practices are shared. New information and resources will be updated regularly on the CEPH

website at <http://ceph.org/constituents/programs-baccalaureate-level/>.

At the time of this writing, just a few months after accepting the first applications, CEPH has 12 SBP applicants for accreditation. The list of applicants can be located on the CEPH website at <http://ceph.org/accredited/applicants/>. The applicants are diverse in many ways, including, program size, geographic location, and delivery model. One-third of them are located in a university with a separately administered graduate program or school of public health. While most note that they are preparing graduates for entry-level public health jobs in a variety of sectors, the aim of others is to provide pre-professional education for graduates to enter health professional schools like medicine, nursing, or pharmacy or non-health professional schools, such as law or urban planning. Nobody is certain whether graduates from a public health major will provide a pipeline to graduate public health education, to another health professional school, or to any number of other paths they may take. One thing that is certain, no matter what these graduates do over the next 5 years or over the next 30 years of a long career, they will have an intellectual foundation that will allow them to understand how their chosen field impacts and is impacted by health. They will understand health determinants and disparities. This

popular undergraduate major will bring us one step closer to health in all policies and health in all professions.

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U.S. undergraduate education in public health: hot or not?

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Objectives: Undergraduate public health education has received growing attention in recent years. This includes a *Washington Post* article referring to undergraduate public health education as a “hot field” for a global generation, the Critical Component Elements of an Undergraduate Major in Public Health developed by the Association of School and Programs in Public Health (ASPPH), and a recent report from the de Beaumont Foundation and ASPPH. To evaluate the demand for the degree and assess the current state of undergraduate public health education, the researchers examined the number and characteristics of publicly reported U.S. baccalaureate public health programs.

Methods: The researchers reviewed three 2013 college directories and the ASPPH website and identified 112 institutions that used the term “public health” in their baccalaureate degree listings that guide prospective students in selecting an academic program. The researchers defined the undergraduate degree in public health as a major leading to a B.S., B.A., or other baccalaureate degree in public health or public health studies that provides students with a strong general background in areas of knowledge basic to public health, or a specialized training in at least one of the five core disciplines of public health. The researchers then compared the degree contents as listed in the directories to the institutions’ websites to verify offering a public health curriculum. Carnegie Commission on Higher Education’s classifications of colleges and universities were applied to assess the characteristics of institutions offering baccalaureate degrees in public health.

Results: Only 54 of the 2,968 U.S. institutions of higher education provided online information meeting the definition of an active undergraduate public health degree program.

Conclusion: While public health may be a “hot” field in terms of the interest that it generates, the actual number of verified undergraduate programs presently available is relatively modest.

Keywords: undergraduate public health education, baccalaureate degree in public health, baccalaureate program in public health, undergraduate students, college directories, websites

A 2008 *Washington Post* article received a great deal of national attention when it referred to public health as a “hot field” for a global generation (1). The article noted that courses in epidemiology, public health, and global health had been “drawing undergraduates to lecture halls in record

numbers, prompting a scramble by colleges to hire faculty and import ready-made courses,” and “schools that have taught the subjects for years have expanded their offerings in response to surging demand” (1).

A recent report documents an increase in the number of public health degree conferrals from 759 in 1992 to 1,469 in 2004 and 6,464 by 2012 (2). In an effort to “assure conditions in which people can be healthy” (3), the Institute of Medicine (IOM) recommended that all undergraduates should have access to public health education. The intent was to prepare an “educated citizenry” as well as a well-educated public health workforce (4). The recommendation sparked the Educated Citizen and Public Health Movement (5–7). The movement encourages undergraduate public health core curricula as part of general education at 4-year and 2-year colleges, as well as integration of public health throughout undergraduate education (5–8).

Estimates of the number of institutions awarding undergraduate public health degrees vary widely. A 2008 survey by Association of American Colleges and Universities (AAC&U) found 137 (16%) of its 837 members reported offering majors, minors, or concentrations in public health (9). In his review of five college directories, Lee found overlapping but not identical listings for 154 U.S. baccalaureate degrees in public health, public health education, and public health nursing (10). A 2008 Internet search revealed more than 40 U.S. undergraduate programs in public health, community health, or health promotion (11). This variation in estimates called attention to how undergraduate programs are defined and counted.

The purpose of this study was to assess the number and characteristics of public health baccalaureate programs in the U.S. in 2013, and in turn, their growing popularity by comparing reported and demonstrated educational activity. The methodology mirrored the path taken by potential undergraduate students of selecting their programs of interest by referring to college directories and websites of universities.

Methods

The nature and content of an undergraduate degree are typically captured by Bachelor of Arts (B.A.) or Bachelor of Science (B.S.) designations, as well as majors and minors. For the purposes of this analysis, an undergraduate degree in public health was defined as a major leading to a B.S., B.A., or other baccalaureate degree in public health or public health studies, which provides students with a strong general background in public health, or specialized training in at least one of the five core disciplines of public health: health policy and management, health behavior, biostatistics, epidemiology, and environmental health (12, 13).

The researchers reviewed three 2013 college directories widely used by high school students in selecting a university, and the Association of School and Programs in Public Health (ASPPH) listing of institutions offering undergraduate education in public health (14–17). The three directories and ASPPH offered overlapping but not identical listings. The initial review identified a combined inventory of 112 U.S. colleges and universities that used the phrase “public health” in their listings of baccalaureate degrees offered.

Fifty-eight institutions were subsequently excluded because they reported exclusively offering freestanding courses rather than awarding a public health degree (18) and offered a related major listed in another discipline. For example, health promotion as listed in kinesiology or environmental health is listed in engineering.

The degree title of each of the remaining 112 programs was then compared to its description on the institution's website. Information on the website was used to assess curricula of programs, mission statements, required and elective coursework, field experience, and other characteristics to provide a foundation for baccalaureate programs. The Carnegie Commission on Higher Education classifications describing institutional diversity in U.S. higher education were applied to assess the characteristics of institutions offering baccalaureate degrees in public health (e.g., public vs. private; doctoral/research university, master's college and university, or baccalaureate or associate college) (19, 20).

Results

Upon examination, 54 of the original 112 institutions reporting a baccalaureate degree in public health matched the aforementioned definition of the undergraduate public health degree. Review of the institutions' websites revealed notable variation in program characteristics and contents. The researchers created a template to summarize and interpret the findings.

Each of the 54 identified institutions offered a 4-year major. Upon successful completion of a 4-year program, most of the institutions award a B.S. degree in public health. Fewer award a B.A. or a B.S. in Public Health Studies. Less than one-fourth of schools offer a 5-year dual degree program, concurrently awarding a B.A. or B.S. degree and either a Master of Public Health (MPH) or Master of Health Sciences degree.

Most institutions provide their undergraduates with an opportunity to obtain general knowledge of public health combined with a specialization in a core area of public health. The most frequently offered specializations are health management and policy, environmental health, and health promotion and behavior. Health education (which includes both public health and community health education) is also identified as a public health specialization on the websites. Health informatics and epidemiology specializations are offered less frequently. While some institutions offer more than one specialization in the public health major, no institution offer specialization in all five of the core areas of public health.

As a general pattern in the 54 programs, undergraduate students are required to meet prerequisites in biological science, mathematics, psychology, and chemistry, as well as completing public health requirements (e.g., introductory courses in biostatistics, epidemiology, environmental health, health policy and management, and community health). Near the completion of their academic coursework, undergraduate students in most of the universities participate in a field practice experience.

The expectations for the baccalaureate graduates, as articulated by the programs' information on their websites, are three-fold. First, students may pursue graduate or professional education. Programs with an emphasis in natural sciences prepare students

for developing their post-graduate professional careers in areas including medicine and dentistry. Second, undergraduate students are expected to be prepared for entry-level public health practice positions in a variety of settings, including health departments, community agencies and organizations, schools, and clinical settings. Third, consistent with the Educated Citizen and Public Health model (vs. the existing professional model) (6), the undergraduate public health programs provide students with basic understanding of health concepts as they relate to behavioral, environmental, economic, housing, occupational, and social welfare issues.

Using the Carnegie Commission on Higher Education's classification, the vast majority (over 60%) of the programs are located in the public institutions classified as "research institutions at the master's and doctoral levels." Unlike "baccalaureate colleges" that award undergraduate degrees exclusively, doctoral and master's colleges and universities also offer graduate degrees across different disciplines.

Discussion

Of the original 112 programs identified in the three college directories and the ASPPH database, the websites of only 54 of the 2,968 4-year institutions of higher education in the U.S. (21) provided information describing active undergraduate public health programs awarding baccalaureate degree in public health as defined for this study. This finding was surprising. Given the national attention to undergraduate public health education including ASPPH, AAC&U, and media such as *the Washington Post*, the researchers anticipated a larger number of programs, particularly in liberal arts colleges known to primarily offer baccalaureate degree programs.

The underlying reasons for the discrepancies between the number of public health programs reported in the directories and the actual number might be associated with the methods of the college directory publishers or the reporting by colleges and universities. The false positive reporting is also reflected in the discrepancies between the three directories. One might expect very similar, if not identical, reporting by all directories, but this was not the case. For example, 11 schools were listed in the *College Blue Book* (14), 54 schools were listed in the *Barron's Profile* (15), and 70 schools were listed in *U.S. News College Compass* (16).

In addition to potential variation in their definitions of a public health degree, some schools might furnish information on proposed undergraduate programs. Public health degree programs that are not reported in the directories may also exist.

The study findings differ from those of the AAC&U and of the de Beaumont Foundation and ASPPH based upon both source and program definition. AAC&U's 2008 Catalog Scan of Undergraduate Public Health Programs identified 93 institutions that offered a major in public health (9). The AAC&U data were gathered from online published materials of a specific subset of AAC&U's 1,181 member institutions. Majors, minors, and concentrations in community health and other related fields were considered public health if they included the primary components of public health education for undergraduates (including courses in epidemiology, health systems, and others) (9); whereas this

study applied a more traditional definition of an undergraduate degree in public health rather than a specialization.

Difference in operationalization of a public health degree used by the National Center for Education Statistics (NCES) may also explain why these study findings differed from other recently published reports. The de Beaumont Foundation and ASPPH relied on secondary analysis of data, specifically the Classification of Instruction Program (CIP) codes obtained from the Integrated Postsecondary Education Data System (IPEDS). Based on the analysis of the CIP codes, by 2012, 176 institutions awarded undergraduate public health degree. The CIP codes rely on self-reporting by university registrars of the number of awarded degrees, and more importantly, on the definition of IPEDS category of the degree. Although degrees in related fields (e.g., exercise and nutrition science) have their own CIP code in the NCES system, the degree may be misclassified as "public health." The misclassification may be attributed to potential institutional differences in the interpretation of what constitutes a public health degree and as a result, in programs' contents. In fact, a sensitivity analyses done by excluding institutions with fewer than 10 graduates per year found the number of institutions decreased by one-third. As noted by the researchers themselves, the decrease suggests that the number of institutions actually awarding public health degrees is smaller than alluded in the NCES data (2).

The study here used schools' websites to validate the information provided by the directories. A direct follow-up with individual institutions might have changed the findings. This was beyond the scope of the current investigation, as the researchers were interested in availability of and ease of access to the information from the perspective of potential students.

In November 2006, the Consensus Conference on Undergraduate Public Health Education presented recommendations on curriculum frameworks and learning outcomes and methods for integrating those recommendations into the nation's long-term strategy for public health education. It was noted that websites should be developed "to provide information on undergraduate public health and to share curriculum materials (22)." This recommendation remains vital. Colleges and universities should put extra emphasis on posting accurate and detailed information on availability and contents of undergraduate public health programs for prospective students.

In search of a program, potential students may inquire about its accreditation associated with a well-rounded education based upon the five core public health areas and with assurance that the education program in a school of their choice has met an agreed upon standard of quality (23, 24). Specialty accreditation of schools and programs is also available through the Council on Education for Public Health (CEPH). While CEPH accreditation was provided for undergraduate programs located in accredited schools of public health, undergraduate degrees associated with accredited programs in public health only became eligible for inclusion in the accreditation process in 2005 (25). Out of 49 schools and 99 programs accredited by CEPH in the U.S. (26), only 17 schools and 10 programs are included in our final listing of undergraduate programs. In September 2013, CEPH approved procedures to include "Standalone Baccalaureate Programs (SBPs)" as a unit of accreditation (27). Presently, there

are no accredited SBPs in public health, and only 13 programs are presently applicants for review¹ (28).

The finding that the majority of the programs were located in the public institutions classified by the Carnegie Commission as research institutions at the master's and doctoral levels was unexpected. The majority of the programs were expected to be in institutions classified as baccalaureate, as these are the institutions that would be more likely to invest first in new undergraduate programs to attract students. Perhaps, the academic and financial burden associated with establishment of a new undergraduate program is easier for the institutions with preexisting public health programs at master's and doctoral levels due to the availability of public health faculty and graduate teaching assistants.

Conclusion

Based on the review of the three 2013 college directories and the ASPPH listing of institutions offering undergraduate education in public health (14–17), followed by the review of the programs' websites, wide variation appeared in both the characteristics and assessment of the number of the undergraduate

programs in public health. Variations in definition of what constitutes a baccalaureate degree in public health have implications for both the students seeking an undergraduate degree in public health, and the potential employers or graduate schools admitting these students. Discrepancies between college directories and information posted on programs' websites may pose challenges to potential students and their families seeking to pursue undergraduate training toward a baccalaureate degree in public health.

The study could confirm that only 54 baccalaureate public health degrees are currently offered among the 2,968 institutions of higher learning in the U.S. (21). Due to surging demand for public health education, it is now on the agenda for many national organizations, schools and programs in public health, and their universities that will not wait for a national model to be finalized. As the *Washington Post* has reported, indeed, public health is a "hot field" when it comes to the interest that it generates. Despite the different findings of the various studies, there does appear to be noteworthy and rapid growth in undergraduate public health education, the question is one of magnitude and content.

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¹As of November 6, 2014, CEPH published 13 SBP applicants for accreditation. Six are included in the list of 54. Five programs offering either a Bachelor of Health Science, Applied Science, Science in Applied Health, or Science in Public Health were not listed in the directories. The remaining two programs did not meet the definition as their websites focused either on a specialization rather than a generalist public health focus or offered a degree in health promotion. No CEPH applicants were included in the ASPPH listing, and AAC&U listing included only four applicants. This variation reiterates the immaturity of undergraduate education.

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Career planning in public health

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A book review on

101 Careers in Public Health

by Beth Seltzer, Springer Publishing Company, New York, 2010. ISBN: 978-0-8261-1769-4

In contrast to many other professions, prospective public health students and particularly undergraduate students are frequently uninformed about the career opportunities available to them. *101 Careers in Public Health* seeks to address this deficiency.

101 Careers in Public Health is one of the series of Springer Publishing's 101 Careers books that includes guides for Healthcare Management, Gerontology, Psychology, Counseling, and Social Work. The book does provide information on 101 public health career paths, but offers additional information for the novice briefly defining what public health is, educational pathways including baccalaureate, masters, doctoral, and combined degrees, and finding jobs in public health.

Following the introductory chapters, the book is divided into 19 career chapters addressing opportunities in infectious disease, chronic disease and cancer, public safety, maternal and child health, pharmaceutical and drug safety, environmental health and water safety, occupational health and safety, food safety and nutrition, disaster preparedness and response, health communication, education, public mental health, public health law, regulations, and policies, non-profit organizations, public health administration and leadership, global health, and a category called "off the beaten path." Each chapter offers four to eight individual job descriptions. For each job, there is a template of a position description, education and certification requirements, core

competencies, compensation, workplaces, an employment outlook, and citation of sources for further information. Thirty of the careers are followed by a profile of a practitioner based upon an interview that includes responses to a common set of questions about the job: a typical day, education, the path to the current job, advice, future plans, the worst or most challenging part of the job, and advice for those interested in the job.

The book does indeed address 101 careers in public health, including the traditional public health careers such as epidemiologist, health educator, and biostatistician, and appropriate entry positions for baccalaureate graduates (health educator, specialist in poison information, community health worker, and health teacher). Additional opportunities focus on dual degree positions such as public health veterinarians, dentists, nurses, pharmacists, lawyers, environmental engineers, social workers, and occupational medicine physicians. Others focus on careers more appropriate to master's level education in public health for practice (injury prevention specialist, deputy director/family health services, hydrologist, emergency preparedness specialist) or doctoral level education in public health (behavioral scientist, professor, or researchers in disaster preparedness, bioterrorism, mental health, and outcomes).

Other opportunities are more peripheral to public health, in careers such as journalism, marketing, or as a health teacher. Additional group is aspirational positions

in public health including dean of a school of public health, federal agency director, Surgeon General of the United States, NGO founder/director, and professional association director. The "off the beaten path" category includes positions such as dance instructor, urban planner, hospital administrator, and chef. The book concludes with a brief discussion of the public health future and career opportunities related to health reform, climate change, changing populations, and new media.

While the introductory and concluding sessions provide a brief overview of what public health is, education for public health careers, finding jobs, and the future, each of these sections is short and may best serve as an introductory first step rather than a detailed guide. To achieve the target of 101 careers, the range of opportunities may be a bit stretched, and a large number of the jobs require clinical credentials in medicine or another health profession. Opportunities for graduates with a master of public health degree as their entry credential is the most modest group of career choices offered.

Only two other books on public health careers have been published. *Advancing Healthy Populations: The Pfizer Guide to Careers in Public Health* (1) follows a similar approach of profiles of 25 public health professionals in a less structured narrative format without the individual position descriptions. The book also includes five "Thought Pieces" by senior public health practitioners. Originally distributed at no

charge, the book no longer appears to be in print, but is available online at several sites. *Public Health: Career Choices That Make a Difference* (2), uses a similar approach to *101 Careers* offering chapters addressing public health and occupations, the future, and appendices of resources, but organizes its career information around more general chapters addressing categories of career paths in administration, environment and occupational health, and epidemiology and disease control. Consequently, *101 Careers* is the most recent of these books, accessible to students, and offers a blend of these two approaches for the novice.

Each of these guides will offer value and insight to those individuals with a curiosity about public health careers and the educational requirements leading to positions. Despite minor limitations, *101 Careers in Public Health* will serve as an excellent introduction to opportunities for

undergraduates exploring public health, and may assist a high school or undergraduate student develop an appreciation for baccalaureate majors and minors, or graduate education. Student advisors in high schools and colleges will find the book useful as a tool to acquaint students with pathways to a career in public health when used in conjunction with web sites such as <http://www.aspph.org/discover/>, www.cceph.org, and www.cdcfoundation.org/content/what-public-health. Faculty who are shaping undergraduate public health programs will find the range of careers presented useful as a basis to help students understand public health professional competencies and knowledge needed for entry to the field.

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Significance of population health knowledge in the education of the undergraduate workforce for careers in the health care sector

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U.S. hospitals and health care systems are focusing increasing attention on health outcomes and the distribution of such outcomes as a means to improve the health of and to eliminate health inequities in their respective communities and patient populations. Much of this attention can be attributed to the provisions in the Patient Protection and Affordable Care Act (ACA) that explicitly promotes a population health approach by accelerating the transition to value-based payment models and by expanding access to health care services among newly insured Americans. As a result, hospitals and health care systems will need to realign their organizational infrastructures to be congruent with a population health management agenda. Health care leaders recognize that population health will be a key to their success moving forward, but identifying hospital-based leaders and training a workforce versed in population health will be critical to that success.

The way in which we train and properly prepare the health care sector workforce rest mainly with our for-profit and non-profit institutions of higher learning, baccalaureate nursing schools, other training programs, and the community college system where much of the important ancillary health care workforce first begin their professional training. Therefore, it begs the question: do our training and academic programs that lead to a career in the health care sector include a core public health component focusing specifically on population health competencies? If not, are we doing a disservice to the

health care sector workforce, particularly the undergraduate trained individuals, by not preparing them for the demands their health care systems are now asking them to undertake in the realm of population health management? The workforce demand for undergraduates educated in public health is potentially in the thousands, and given the types and numbers of healthcare organizations, likely exceeds the demand for the direct public health workforce. For example, today the U.S. has 5,723 hospitals, over 33,000 medical group practices, 1,128 federally qualified health centers, and nearly 1,300 health insurance companies (1–5). Given the emphasis of the ACA on collaborative management of prospective and current patients, all of these organizations are likely to want staff knowledgeable about the parameters and metrics of population health. In the world of healthcare delivery, education for “public health” is synonymous with education for “population health.”

The significance of an undergraduate workforce educated about population health for the health care sector should not be minimized during this health system transformation. Many health care professionals trained at the undergraduate level will not have the opportunity to broaden their knowledge and expertise particularly in population health if they do not seek formal graduate education in public health. Prior to the implementation of the ACA, the reasons for this are many and this commentary will not try to list them all. However, one’s education on population health in their undergraduate training

years may be impeded by: (1) their specific curriculum does not already have a built in public health component; (2) some health care training programs may not see a value in blending these competencies into their curriculum; (3) health care training programs are not listening to the needs of the employer community; and/or (4) health care employers are not demanding potential hires to already be trained in population health competencies.

In an attempt to better understand the best practices for population health as it relates to changing models of health care delivery and financing, the Association for Community Health Improvement (ACHI) and the American Hospital Association conducted an environmental scan among U.S. hospitals and health care systems on organizational structure, leadership, staffing, and community health initiatives. The information gathered and reported out is extremely insightful and further supports the continued need for a workforce educated about population health for the health care sector. All the findings will not be summarized here, but this commentary will highlight a particular segment of the hospital-based workforce to make the point that an undergraduate workforce educated about population health is vital.

ACHI has over 800 members, with representatives of more than 28% of the nation’s non-profit hospitals (1, 6). The 1,198 respondents completing a recent survey likely represent not only other ACHI members but also the many staff in other non-profit hospitals working on issues of community benefit and community

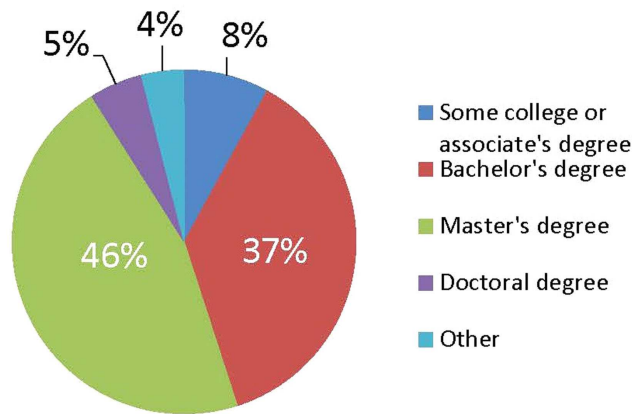


FIGURE 1 | Educational attainment of Person Heading Department with Principal Responsibility for Population Health (n = 1,148) (7).

outreach (7). Of note, almost half of the respondents (46%) whose principal responsibility is leading population health initiatives hold either bachelor's degree, associate's degree, or some other training (Figure 1). Further, the most important professional and educational backgrounds for staffing population health initiatives over the next few years were identified as community health, health education, and community benefit. Also, respondents identified community health needs assessments, healthy communities, collaborative facilitation, leadership, and community benefit as the most in-demand continuing professional education subjects (7). As hospitals adapt to using their community health needs assessments and community benefit requirement to advance their population health initiatives, their workforce needs will continue to evolve. Training institutions will need to prepare future hospital-based population health staff with a multidisciplinary background. More importantly, as an individual is determining their health care career focus during their undergraduate years, population health competencies should be a required interdisciplinary component of any health care undergraduate and associate degree curricula or other

health care training programs. An education grounded in public health will be vital in providing a foundation for an individual interested in becoming an effective population health coordinator, manager, or leader for the health care sector no matter what role they hold inside the proverbial four walls.

Finally, population health knowledge and expertise have not historically been taught within most traditional American medical or health care curricula. Yet, hospital and health care system leaders recognize that advancing population health will enable them to thrive in a value-based landscape. Health care personnel needed now and in the foreseeable future for population health management will specifically need to be capable communicators and collaborative leaders who have the ability to understand and analyze the impacts of complex social systems on individual and community health, integrate public health concepts, use data to plan and evaluate their work, and possess those other skills acquired from the Core Competencies for Public Health Professionals (8). This demand creates a significant opportunity at the undergraduate level to start cultivating a workforce with the ability to integrate population health initiatives

that are aligned with the community's resources and needs well before they go on to advanced training or degrees in the health field.

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Health department accreditation as a catalyst to foster the development of a future public health workforce

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The relatively new Public Health Accreditation Board (PHAB) proffers a new force to bring attention to the need for undergraduate, graduate, and continuing education for those working in public health. The workforce of federal, state, and local health departments in the United States comprises more than 450,000 individuals representing a wide variety of disciplines, from nurses to sanitary engineers to health educators (1). Despite the many professionals with graduate training in clinical and other disciplines, the majority of those working in local public health departments have baccalaureate-level or less education (2) – making undergraduate college a key focus for public health workforce training. A projected shortage in the future raises concerns about the capacity and capabilities of those working to promote public health (2). This Opinion reveals how PHAB standards reinforce the need to ensure the pipeline for trained public health department workers. In addition, early evidence suggests that accredited health departments have the capacity to partner with schools to strengthen the workforce. As more health departments pursue accreditation, it will likely provide opportunities to foster partnerships between public health agencies and undergraduate institutions that are preparing individuals to address the practical needs of twenty-first century public health.

BACKGROUND

The 2003 Institute of Medicine report entitled “Who Will Keep the Public Healthy?” contained a recommendation that “...all undergraduates should have access to education in public health” (1). In the

intervening years, great progress has been made by the public health academic community in designing creative approaches at the associate, undergraduate, and graduate degree levels in public health, including the addition of more creative modes of the delivery of public health education, such as just-in-time learning; online learning; and flipped classroom. Also reflecting the importance of providing opportunities for students to learn about public health, Healthy People 2020 includes several objectives related to increasing the proportion of schools that offer public health majors, minors, associate degrees, and certificate programs. For example, Objective PH-4.1 seeks to “increase the proportion of 4-year colleges and universities that offer public health or related majors” from a baseline of 7% in 2008 to 10% in 2020 (3). A recent article by Drehobl et al. described the current challenges and solutions facing the public health workforce and summed up the issue in one, salient phrase “Lack of the right number of people with the right skills in the right place at the right time” and described various means by which the public health workforce could be made stronger (4).

A parallel and complementary body of work that occurred in the same decade was the launch of the national voluntary accreditation program that paved the way for public health department accreditation to become a reality. A formal process to explore the feasibility of accreditation (5) was sparked by a recommendation in another 2003 Institute of Medicine report, *The Future of Public Health in the 21st Century*, which noted that accreditation might be a mechanism to strengthen

performance and accountability for governmental public health departments (6). The PHAB launched the national voluntary accreditation program in September 2011, after several years of development and the input from many individuals and organizations (7). As of December 2014, almost 280 of the nation’s approximately 2,400 local health departments, as well as 28 state and 2 tribal health departments are actively pursuing accreditation, including 60 that have already achieved that milestone (8).

The PHAB accreditation standards and measures are based on a public health framework of the three core functions of public health and the 10 Essential Public Health Services (9). Version 1.5 of the PHAB Standards and Measures became effective July 1, 2014, with the intention of clarifying or strengthening the initial version of the accreditation standards and measures. Attention to the public health workforce is a key area within the accreditation standards and received special attention in the July 2014 revisions (10).

Each standard has one or more corresponding measures. (See <http://www.phaboard.org/accreditation-process/public-health-department-standards-and-measures/> for the full text of the standards and measures.) Applicant health departments are reviewed by a team of peers who assesses conformity with each of the measures and includes their findings in a Site Visit Report. The PHAB Accreditation Committee, a majority of whose members have recent or current experience in governmental public health practice, review the report, and make the accreditation determination. The reports of the first 62 health departments to

be reviewed by the Accreditation Committee provide insights on how well the health departments that were among the first to complete the PHAB application process performed on the workforce measures. Some of these insights are shared below.

HEALTH DEPARTMENT ACCREDITATION AND WORKFORCE DEVELOPMENT

The national accreditation standards and measures contain several expectations about workforce development, with two key components. One area of focus is the health department's role in developing the pipeline of future public health workers (Standard 8.1: Encourage the Development of a Sufficient Number of Qualified Public Health Workers). The second is health departments' responsibility for recruiting, hiring, and developing their workforce (Standard 8.2: Ensure a competent workforce through assessment of staff competencies, the provision of individual training and professional development, and the provision of a supportive work environment) (9).

From PHAB's perspective, maintaining a competent public health workforce requires a supply of qualified public health workers in sufficient numbers to meet public health needs. As public health workers retire or seek other employment opportunities, it is essential that newly trained public health workers enter the field. Trained and competent workers are needed in such diverse areas as epidemiology, health education, community health, public health laboratory science, public health nursing, environmental public health, and public health administration and management. Every health department has a responsibility to collaborate with others to encourage the development of a sufficient number of public health students and to encourage qualified individuals to enter the field in order to meet the staffing needs of public health departments and other public health organizations.

Measure 8.1.1 is designed to assess the health department's activities, initiatives, and strategies aimed at encouraging public health as a career choice. PHAB expects that health departments will work with schools, academic programs, or other organizations as a means to promote public health as a viable career choice. Health

departments can document a variety of examples of partnerships in this area, including collaboration with a school or college of public health; working with organizations such as AmeriCorps; coordinating with a high school to make presentations to students about public health careers; working with vocational training schools to promote public health; partnering with a 4H club to provide information about public health to members; guest lecturing at a community college; or providing after school observation experiences for high school or undergraduate students. Examples of more robust academic involvement include: student placements or practicums; academic service learning; internship opportunities; faculty positions or guest lectures by health department staff; participation in high school, university, college, or Tribal college programs; and/or job/career fairs. Collaborations to build the pipeline is an area in which the first set of health departments to be reviewed by the Accreditation Committee excel, with more than 90% fully demonstrating their conformity with Measure 8.1.1. Based on PHAB's experiences to date, fostering the development of future public health workers remains a priority for health departments seeking to obtain and maintain accreditation.

However, there are still opportunities for improvement in the other workforce measures, as only approximately 60% fully demonstrated conformity with Measure 8.2.1 (Maintain, implement, and assess the health department workforce development plan that addresses the training needs of the staff and the development of core competencies). The IOM workforce report called upon schools of public health to "fulfill their responsibility for assuring access to life-long learning opportunities for public health professionals, other members of the public health workforce, and other health professionals who participate in public health activities" (1). Health departments can work with all types of colleges and universities to develop programs to effectively meet health departmental training needs for improving employees' job performance in support of the population's health (2).

Health departments often struggle with recruiting qualified public health workers who reflect the diversity of the population

of the health department's jurisdiction. For this reason, a new requirement has been added to Version 1.5 of the Standard and Measures explicitly requiring the "recruitment of individuals who reflect the population served" (Measure 8.2.2) (9). Multiple creative strategies are needed to assist health departments in their ongoing desire to recruit and hire the most well prepared and diverse workforce possible – and collaborating with local college programs, particularly ones that enroll a diverse student body, can be one such strategy. As an example of this type of partnership, one accredited health department collaborated with a local academic institution on a summer program to help spread awareness about public health among high school students living in the urban core.

CONCLUSION

Preparation for accreditation may motivate health departments to reach out to schools in their communities. Similarly, schools may use the accreditation standards as guidance, as they consider ways to better engage their colleagues in public health practice. As health departments fulfill the expectations for Standard 8.1, they will likely strengthen or build new relationships with undergraduate educational institutions and others. These partnerships, in turn, can help the departments to achieve Standard 8.2 by providing high quality, locally accessible opportunities for continued development of competencies, and life-long learning.

Excellence in public health practice requires a commitment to fostering the development of a strong public health workforce. As public health departments continue to maintain and achieve accreditation, an ongoing partnership with educational programs for public health workforce development will be essential. The collaborations between academic programs in public health and progressive state, local, tribal, and territorial health departments are already paving the way for a stronger collaboration for the future. Accreditation helps shine the spotlight on these critical partnerships.

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