



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 (# further education + # employed/# 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 BSPH 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

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,

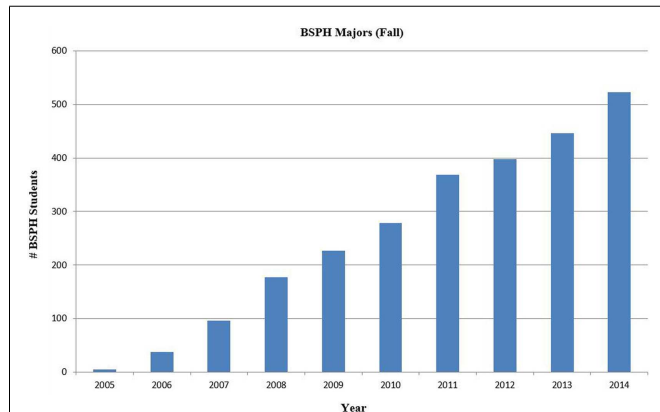


FIGURE 1 | Increase in the number of student enrolled in the BSPH program from 2005 to 2014. The BSPH program has had a steady increase in enrollment since it began in 2005.

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

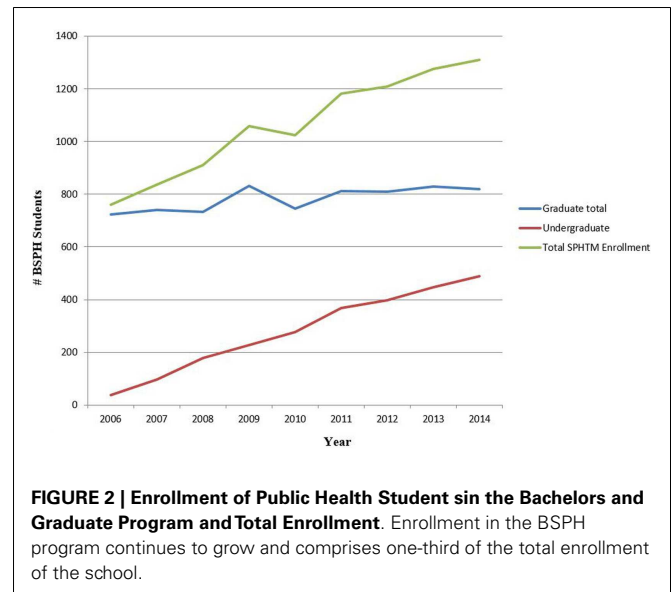
Tulane SPHTM offers a BSPH/MPH combined degree that provides a seamless pathway to MPH programs at SPHTM. The combined degree results in a savings of approximately 25% time (one semester) and tuition in completing the MPH. Of the 118 students who graduated in May, 2014, 45 (38%) proceeded onto one of 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 enters 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 professional 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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