Teaching Health Disparities Awareness in Undergraduate Public Health Courses

Anuli Njoku

Ferris State University

(Received 14 August 2017; Accepted 24 May 2018)

Disparities in health outcomes between U.S. population subgroups, related to factors like race/ethnicity, income, and geographic location, are alarming. By integrating health disparities awareness content into the curriculum, academic institutions can play an important role in developing conscious health practitioners to help close gaps in health outcomes. This paper presents the implementation, results and feedback of efforts to incorporate health disparities awareness content into two undergraduate public health courses at a rural Midwestern U.S. university. Throughout this process, the author's work was supported by a faculty development program. Students completed pre- and post-surveys to report health disparities knowledge and attitudes and online course evaluations to rate instructor and curriculum elements. A statistically significant increase in mean scores occurred for survey items pre- to post-survey. Online course evaluation ratings revealed student progress on related outcomes and positive student experience. Findings suggest promise for teaching health disparities content in public health courses.

INTRODUCTION

Health Disparities

Health disparities have been defined as differences in health outcomes among segments of the population that are linked to socioeconomic disadvantage and related to factors such as race/ethnicity, socioeconomic status, gender, geographic location, or other factors related to discrimination or exclusion (U.S. Department of Health and Human Services [USDHHS], 2008). Certain population groups have been disproportionately affected by illness, disability, and premature death, which is attributable to such factors as race, ethnicity, socioeconomic status, gender, and geographic location (Meyer, Yoon, & Kaufmann, 2013). For instance, life expectancy in the United States (U.S.) differs greatly by race, socioeconomic status, gender, and geographic location (CDC, 2013a). Of note, there have been continuing disparities in mortality between African-Americans and whites, illustrated by estimated life expectancy rates of 75.5 and 79.1 years, respectively (Arias, Heron, & Xu, 2016). Life expectancy rates also differ regionally, with lower life expectancy rates among whites and African-Americans who live in the Southeast U.S. (CDC, 2013b). Moreover, residents in primarily minority communities continue to have greater illness risk and burden compared to the general population residing in the same county or state (CDC, 2011). Fair or poor self-rated health is reported by higher proportions of members of racial/ethnic minority groups (except Asian/Pacific Islanders), those with lower levels of education, persons with lower annual income, and individuals who are unemployed, when compared to non-Hispanic whites, those with higher levels of education, individuals with higher income, and those who are employed (CDC, 2000). In comparison to urban area residents, rural inhabitants have higher rates of avoidable health problems such as obesity, diabetes, cancer and injury (Barnridge *et al*., 2013; Befort, Nazir, & Perri, 2012). Rural residents also have higher rates of risky health behaviors such as poor diet, physical inactivity, smoking and limited seat belt use, when compared to their urban area counterparts (Eberhardt & Pamuk, 2005; Hartley, 2004). Societal efforts to eliminate health disparities can enhance the health and well-being of all groups and achieve health equity, defined by Healthy People 2020 as an "attainment of the highest level of health for all people" (USDHHS, 2016). This requires a commitment to value everyone equally and challenge avoidable inequalities (USDHHS, 2016).

Health Disparities Awareness in the Curriculum

Addressing health disparities will require a multifaceted approach from diverse stakeholders, including academic institutions. The future scientific and medical workforce is one target area, as incorporating health disparities awareness courses in the curriculum can help develop conscious health practitioners in efforts to close gaps in health outcomes (Benabentos, Ray, & Kumar, 2014). Low levels of health disparities awareness have been reported among the general public and racial minority groups (Benz, Espinosa, Welsh & Fontes, 2011). It is important to develop courses that improve and measure changes in health disparities-related knowledge, aptitudes and skills (Tang, Fantone, & Bozynski, & Adams, 2002; Mavis, Keefe, & Reznich, 2004). While efforts have been made to incorporate health disparities courses into medical school curriculum (Ross *et al*., 2010; Vela, Kim, Tang & Chin, 2010), there are benefits to introducing health disparities courses earlier in the educational pipeline to promote engagement, preparation, and motivation of a future healthcare workforce (Benabentos *et al*., 2014). While there is a growing number of Public Health programs (Arnold & Schneider, 2010), a review of sample courses in 2013-2014 revealed that less than 30% of public health courses contained substantial health disparities content (Benabentos *et al*., 2014), suggesting an opportunity to incorporate such content into public health curriculum. Thus, the purpose of this article is to describe how health disparities awareness content was incorporated into two undergraduate public health courses and to assess the effect of integrated course content on students' knowledge and attitudes about health disparities.

METHODS

Setting

The study took place at a mid-sized, public, rural university in the Midwestern United States. The university has eight colleges, including a College of Health Professions, and a student body of almost 14,000 undergraduate and graduate students. The study setting was one section of an undergraduate health promotion and education course and one section of a rural public health

https://doi.org/10.20429/ijsotl.2018.120215

course taught in Spring 2016 and Fall 2016 respectively. The health promotion course met for a 75-minute lecture twice a week and had 18 students. The rural public health course met for a three-hour lecture once a week and had 20 students. Both courses are required for all Public Health majors in the university.

Faculty Training and Development

A timeline of activities is illustrated in Figure 1. During 2014-15, faculty were assigned to develop courses for a new Public Health program at the university. Concurrently, a cohort of faculty were selected to participate in a Junior Faculty Fellows Program (JFFP). The JFFP opportunity was available to faculty in their second or third year of teaching and designed to help faculty hone their goals for teaching, scholarship or service; receive support in reaching their goals; develop relationships with faculty at similar stages in their careers; and share their work and expertise with the university community. Over four sessions, faculty advanced their work, and shared their successes, challenges, and progress with colleagues. Faculty fellows also shared their preliminary project results during an orientation for new faculty in August 2016. Upon completion of work associated with the learning community and delivery of a final product, faculty were eligible to receive a Professional Development Incentive (PDI) to purchase resources or pursue conference travel that would enhance their teaching and their students' learning. The JFFP opportunity positively influenced the author's ability and motivation to implement certain learning strategies and to collect data on student learning regarding health disparities. Moreover, with support from the JFFP initiative, the author incorporated health disparities awareness content into two undergraduate Public Health courses at the university.

Figure 1. *Timeline of Activities*

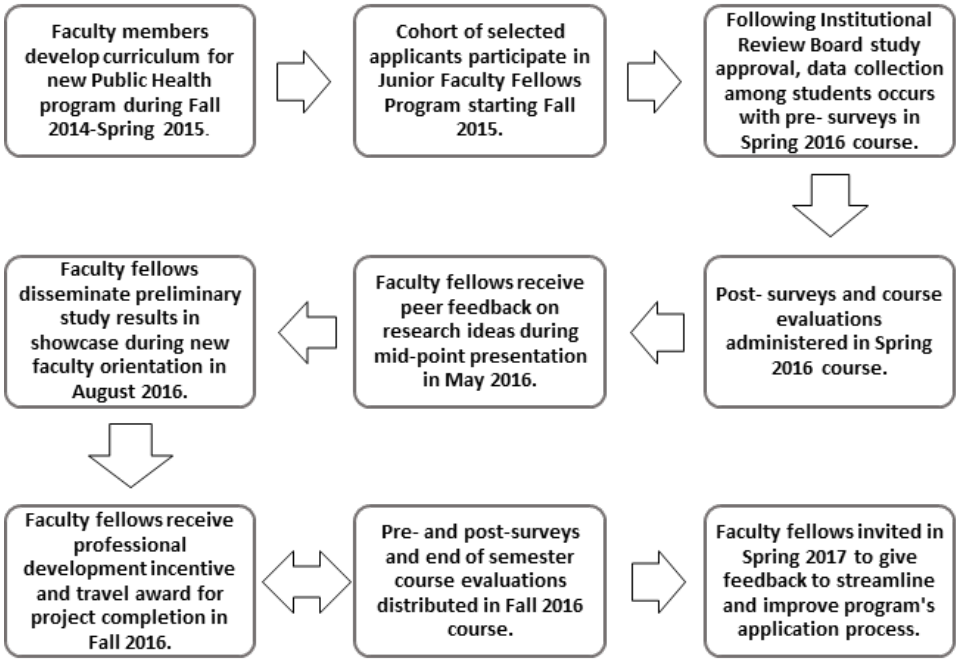


Table 1. *Select Course Learning Outcomes, Assessment Methods, Lecture Topics and Objectives.*

	Course Learning Outcome	Assessment Method	Lecture Topic	Sample Lecture Objective
Health Promotion Course	1. Analyze the models of cultural diversity and their contribution to the understanding of health status and health care utilization.	Reaction Paper	Social Determinants of Health	Explain how the various determinants of health contribute to the overall health and well-being of individuals.
	2. Discuss the role of theory in understanding health behavior and disparities in health status.	Quiz	Health Behavior Change Theories and Models	Discuss the role of models and theories in changing health behavior.
	3. Integrate multilevel points of intervention in addressing public health issues, particularly those related to health disparities.	Social Environmental Assessment Paper	Physical Activity Behaviors	Identify social influences that contribute to ethnic health disparities in physical activity behavior.
Rural Health Course	1. Describe rural and non-rural populations.	Reaction Paper	Depth of Rural Health Disparities	Describe the behavioral, cultural and environmental influences on health disparities in rural communities.
	2. Identify the health needs/concerns of rural populations.	Group Presentation	Mental Health in Rural Areas	Understand the key determinants of mental health issues in rural areas.
	3. Discuss the socio-behavioral determinants of health and healthcare disparities in rural populations.	Discussion Board Posting	Farm Safety	Identify the sociocultural, cognitive and behavioral influences on farm-related injuries.

Instructional Delivery

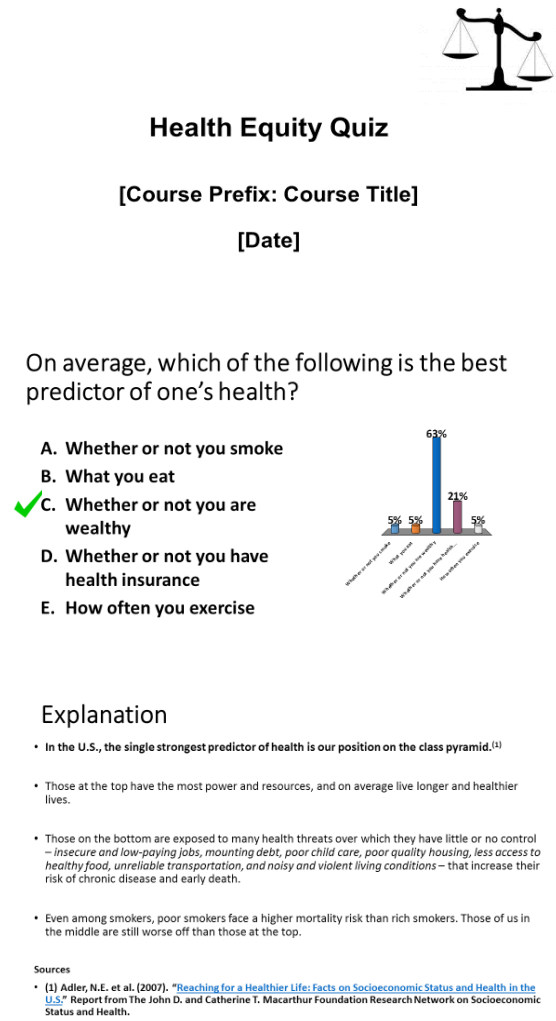
Incorporating a variety of teaching methods, the instructor made concerted attempts to infuse health disparities awareness content into the health promotion and rural public health courses (Table 1). Learning outcomes, lecture objectives, and topics were designed to promote understanding of the existence, contributors to, and consequences of health disparities within American society.

For example, after completing a training at the university, the instructor used clickers technology to administer a 10-question multiple choice "Health Equity Quiz" to students during a session of the health promotion course. The goal of the Health Equity Quiz activity was to assess student understanding of concepts discussed in the previous class, including health disparities due to factors such as socioeconomic status and geographic location. Clickers refer to inquiry-based teaching approaches combined with interactive computer technology (i.e., hand-held devices) that allow instructors to ask verbal questions and receive immediate, anonymous feedback from students (Bruff, 2009). Clickers have gained in popularity in recent years, primarily due to their value in engaging students during lectures (Cain & Robinson, 2008; Collins, 2008) and have also been shown to improve clinical reasoning, problem-solving, and critical thinking skills among nursing students (De-Bourgh, 2008; Russell, McWilliams, Chasen & Farley, 2011).

Prior to the class in which clickers were used, students were instructed to view a documentary that discussed how distribution of power, resources and wealth affect health outcomes (Adelman, Fortier, Smith, Stange, & Strain, 2008) and then write a reflective paper. Administration of the Health Equity Quiz followed the general clicker process for conceptual understanding, as per the guidelines described by Crouch, Watkins, Fagen and Mazur (2007). During the class, the instructor presented a brief excerpt from the documentary and reviewed key concepts. After explaining how to use the clickers, the instructor asked a conceptual question related to health equity. The instructor allowed students one to two minutes to think, then asked students to vote on responses. Students reflected on the question, and submitted an answer. Next, the instructor presented the results of the votes, and reviewed student responses with the class. Students then discussed their reasoning and responses with the class. Before moving to the next question, the instructor also presented a summary slide to explain the correct answer (Figure 2).

In addition to the Health Equity Quiz, the instructor made concerted attempts to infuse health disparities awareness activities into both courses through group discussion, reflective writing assignments, case studies, and use of multimedia to teach about current events related to health disparities and social justice. For instance, there was group discussion in the health promotion course about the Flint Water Crisis, an incident in which over 100,000 residents were potentially exposed to high levels of lead in the drinking water (Kennedy, 2016). Discussion processes included the instructor providing questions of the day, a recap of the previous class, brief videos that discussed implications of the water crisis, a brainstorming activity that encouraged students to propose suggested next steps, an opportunity to reflect on lessons learned and a summary to conclude the class. Such procedures reflect a learner-centered experience, which encourages students to become familiarized with collaboration during their educational experiences and take an active and reflective part in their own education (Weimer, 2013).

Figure 2. *Sample Clickers 'Health Equity Quiz' Materials*



In the rural public health course, guest speakers were invited to class to reflect the cultural diversity of Public Health practice and to present on topics related to rural health disparities. Guest speakers discussed topics including maternal and child health and mental health in rural areas, health disparities for individuals with disabilities living in rurally located areas, and leadership challenges in the delivery of rural healthcare services. Brief video clips were presented in class on contemporary issues in rural areas, including the use of telehealth to treat mental health in rural areas (Miller, 2016) and the effect of superstore closures on rural food insecurity (The Walmart Effect, 2016). Students then completed reflective exercises to ponder content from the videos. Students also summarized and taught course material to their peers. For instance, students were assigned chapter readings on topics such as the role of community-based participatory research and the linkages between community health advisors and healthcare systems on influencing cancer screening in medically underserved rural areas (Foud *et al*., 2006). Students were then divided into groups, where they would report the summary of their assigned readings to the class. Other activities to engage students in both the health promotion and rural public health courses included small and large group discussions based on videos shown in class;

interactive class exercises, including icebreakers; individual student presentations on current event topics of their choosing; and discussion board assignments on health-disparities related articles and videos. These class activities were designed to teach and reinforce concepts about the presence and impact of rural health disparities within American society.

Survey Data Collection

With Institutional Review Board approval from the university, pre- and post-surveys were administered to assess the effect of course content on students' health disparities knowledge, attitudes and beliefs. For the health promotion course, the surveys were administered three months apart (in January and April) during the Spring 2016 semester. The surveys for the rural public health course were administered in August and December of the Fall 2016 semester. In the health promotion class, the pre-survey included seven questions to assess level of agreement via a 5-point Likert scale (1=strongly agree, 5=strongly disagree). The post-survey consisted of the seven initial questions, plus an additional question related to intention to explore health disparities in education, research or practice. All eight questions were used for both the pre- and post-survey for the rural public health course. The survey questions were based on course learning outcomes. Additionally, the survey collected the following sociodemographic information: gender, age, year in school, area of residence, employment status, and academic major.

Course Evaluation

To assess instructor performance for both courses, students were asked to complete anonymous online IDEA evaluations, which are student ratings of various components of the instructor's teaching and of the course (IDEA, 2017). Overall, faculty at the university collect and review IDEA evaluations at the end of each semester and are advised by administrators to actively encourage students to complete evaluations in efforts to achieve higher response rates. In this sample, students were encouraged to complete IDEA course evaluations online to rate the instructor and both courses. A Department Head and a tenure committee member were also present during two class sessions and completed a customized observation instrument to rate the instructor in areas such as teaching style, student engagement, organization and preparation.

Data Analysis

Study data were coded and entered into the Statistical Package for the Social Sciences (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.). Summary statistics, including frequencies and means, were computed to compare pre- and post-survey scores and analyze demographic characteristics. Paired t-tests were conducted to compare health disparities-related knowledge, attitudes, and beliefs among students at baseline and follow-up. Level of significance was set at $p<0.05$.

RESULTS

Summary statistics of students' sociodemographic characteristics are displayed (Table 2). Students in this sample were primarily between the ages of 18 to 24 with almost half of the students residing in rural areas. Participants were mostly female, Public Health academic majors, seniors in school, and employed part-time.

Table 2. *Characteristics of Study Participants (n=38) from Pre- and Post-test Surveys*

Variable	N (%)
Age	
18-24 years	35 (92.1)
25-44 years	3 (7.9)
Gender	
Male	12 (31.6)
Female	23 (60.5)
Missing Data	3 (7.9)
Year in School	
Freshman Student	1 (2.6)
Sophomore Student	4 (10.5)
Junior Student	10 (26.3)
Senior Student	23 (60.5)
Area of Residence	
Urban Area	13 (34.2)
Rural Area	18 (47.4)
Suburban Area	7 (18.4)
Employment Status	
Employed Full-Time	2 (5.3)
Employed Part-Time	25 (65.8)
Unemployed	7 (18.4)
Seasonal or Temporary Worker	4 (10.5)
Academic Major	
Allied Health Science	3 (7.9)
Dental Hygiene	1 (2.6)
Healthcare Systems Administration	1 (2.6)
Nursing	8 (21.1)
Public Health	25 (65.8)

Students reported higher mean scores for seven survey questions from pre-to post-survey (Table 3). Paired t-tests of the pre- and post-survey scores revealed significant positive changes in scores for the survey questions, including for: understanding what the term 'health disparities' means (3.92 vs. 4.7; $p<.001$), ability to discuss strategies health promotion programs can use to reduce health disparities (3.42 vs. 4.53; $p <.001$), and ability to discuss the role of theory in understanding health behavior and disparities in health status (3.08 vs. 4.32; $p <.001$) (Table 3).

The instructor observed that the interactive exercises, such as incorporation of clickers technology, allowed for immediate assessment of student comprehension. The various teaching modes encouraged student learning and increased student participation and engagement. Completion rate for the online IDEA evaluations was 80% for the health promotion course and 87% for the rural public heath course, and showed student progress on relevant outcomes and positive student experience. On the evaluations, students' summary assessment of teaching effectiveness resulted in an overall course rating of 4.1 for the health promotion course and 4.3 for the rural public health course (out of a 5.0 scale). Students gave ratings (out of a 5.0 scale) on various

items for instructor assessment for the health promotion course and rural public health course, respectively, including: 'found ways to help students answer their own questions' (4.71, 4.29), 'encouraged students to use multiple resources to improve understanding' (4.75, 4.29), 'related course material to real life situations' (4.76, 4.65), and 'formed teams or discussion groups to facilitate learning' (4.76, 4.71). Students provided quantitative and qualitative responses to the IDEA evaluations for both courses. Some comments on the evaluations referred to the various teaching modes used as well as course content on health disparities. One qualitative student response to the course evaluation was:

> *I really enjoyed this course and the variety of ways we were able to learn. I love all the small group discussions, videos and different types of assignments throughout the course.*

Another student commented:

> *[Instructor] was an excellent professor and I feel that I gained a lot by taking [instructor's] course. I would gladly take another course offered by [instructor], because [instructor] has a way of making you want to participate in class, and it helps you apply what you're learning to real life situations.*

One student stated:

> *The use of questions to facilitate discussion among students in class makes the course much more appealing and effective.*

Additionally, another student stated:

> *Learning about theories and models is not always very exciting however, [instructor] does a great job in helping us understand the material. [Instructor's] use of Youtube videos, projects, assignments, etc. make the class more interesting. I especially enjoyed discussing the Flint water crisis and would like to have more discussions about current events in public health.*

A qualitative response from the rural public health course included:

> *I really enjoyed this class and thought that it really made me more aware of the disparities in rural areas. I thought [instructor] did a great job teaching it, I love that [instructor] incorporate(d) so many different things and not just lectures, it really makes the class a lot better.*

Feedback from teaching observations were positive and provided an opportunity to discuss feedback with the Department Head and members of tenure committees. Strong attributes identified during these observations included that the instructor opened with a warm, collective greeting to class, reached out to the university's Faculty Center for Teaching and Learning for guidance on the use of Clickers to effectively teach and engage students, and presented objectives to set the stage well for class sessions. Feedback also noted that the instructor reached various learning styles, used small groups for discussion and problem-solving, employed the Socratic Method well, and utilized clear and concise PowerPoint slides. Opportunities for improvement identified during the teaching observations included suggestions for the instructor to move around the classroom a bit more, and to consider having fewer PowerPoint slides. Additionally, faculty were able to apply PDIs earned from participation in the JFFP learning community to further their research and attend academic conferences. These conferences provided an opportunity to expand teaching knowledge in efforts to improve student learning. Additionally, peer-reviewed conference proceedings were submitted to chronical efforts to teach health disparities subject matter in undergraduate public health courses.

Table 3. *Paired Sample T-Test Mean Scores for Students' Pre- and Post-Test Surveys*

Survey Question	Mean Baseline Survey Score (1=low, 5=high)	Mean Follow-Up Survey Score (1=low, 5=high)	Significance (2-tailed)	95% Confidence Interval	
				Lower	Upper
1. I have an interest in health promotion and education.	4.47	4.55	.538	-.333	.175
2. I have discussions with others about topics related to health promotion and education.	3.79	4.53	.000*	-1.027	-.447
3. I understand what the term 'health disparities' means.	3.92	4.7	.000*	-1.133	-.430
4. I am able to explain the relevance of health disparities to planning, implementing and evaluating a health promotion program.	3.54	4.47	.000*	-1.285	-.581
5. I am able to discuss strategies health promotion programs can use to reduce health disparities.	3.42	4.53	.000*	-1.453	-.758
6. I am able to discuss the role of theory in understanding health behavior and disparities in health status.	3.08	4.32	.000*	-1.631	-.843
7. I am able to examine the role of collaboration and advocacy in developing effective public health interventions.	3.47	4.66	.000*	-1.567	-.801
8. I would like to explore issues related to health disparities in my education, research, or practice.	4.35	4.66	.049*	-.614	-.002

*Statistically significant ($p<0.05$)

DISCUSSION

To keep students engaged and feeling part of a learning community, the author employed inquiry, group discussions, case studies, interactive lectures, human relations group techniques, multimedia materials, and cooperative learning in the two classes. Assessment activities were also geared to align with course learning outcomes.

Faculty development opportunities, including the JFFP initiative and clickers training, gave instructors an opportunity to develop skills to enhance their teaching and their students' learning. Successful development of faculty is seen as a continuing, intentional and systematic process (Guskey, 2000) and can prepare faculty to apply a learner-centered approach to teaching. Such an approach prioritizes focus on what students learn and promotes critical thinking, problem-solving, collaboration and active learning among students (Weimer, 2013). With insight gained and support provided from faculty development programs, various teaching modes and activities were used to promote awareness of health disparities and promote engagement and enhanced learning among students in this sample. Moreover, course goals were tied to the ultimate aim of increasing greater motivation for learning and promoting greater satisfaction with school among students. This is important because the courses are within a newly launched Public Health program at the university. Furthermore, the university is in a rurally located area. Efforts to enhance curriculum design and delivery can help meet program goals of equipping students to address the needs of underserved populations.

The increase in mean scores for each survey item from pre- to post-survey was notable and suggested course content promoted health disparities-related awareness, interest and intention among students. Further, IDEA score averages in the course were positive and illustrated effectiveness at achieving course objectives and learning outcomes as well as promoting a learner-centered environment. Higher ratings indicate more considerable student progress and more positive student experience (IDEA, 20017). Qualitative student responses to the IDEA evaluation suggest students were receptive to the opportunity to learn about, discuss and reflect on the subject of health disparities and how the information would align with their learning capabilities. The IDEA evaluation scores and comments also suggest faculty successfully implemented instructional approaches such as clickers and peer instructions, and enabled students to learn public health constructs. It is important to promote student satisfaction with learning and school since graduates of an undergraduate Public Health program are preparing for entry-level employment or are on the trajectory to advanced levels of training (Lee & Friedman, 2002).

There are various advantages of offering health disparities courses in an undergraduate curriculum. Public health is interdisciplinary in nature due to its examination of the biological, social, psychological, and other factors that affect health. A health disparities course could encourage collaboration among departments to develop interdisciplinary courses. Further, disparities in healthcare outcomes is one of the pressing current public health concerns (Benabentos *et al*, 2014). Promoting awareness of factors contributing to healthcare disparities can also allow students to contextualize current societal issues that affect health. Awareness of such disparities may encourage students to consider addressing these issues in their educational, research or practice endeavors (Vela *et al*, 2010).

Strengths and Limitations

This study had some limitations. First, we had a small sample size as enrollment in each course was capped at 20 students. Assessments of health disparities courses may be limited by a small number of student participants (Mavis *et al*, 2004). The student cohorts in the study sample consisted of mostly females who were enrolled in a required course. Thus, results may not be generalizable to larger populations. Conversely, this study is strengthened by the opportunity to assess effect of course content across two different courses. Future studies can also consider stratifying results by demographic characteristics. Furthermore, data collection is ongoing, with plans to assess effect of integrating health disparities content in different course delivery formats (e.g., online vs. face-to-face). Second, selection bias may be an issue in this study because the courses discussed are required for undergraduate Public Health majors at the university. Students may have been more motivated to take them as a result. However, non-majors can take these courses with instructor approval and over one-third of students in this sample were non-majors. Third, the two courses were taken sequentially, with the health promotion course preceding the rural public health course. Since both courses are required for the Public Health major, some students in the rural public health course may have had previous exposure to the survey questions, introducing a possible bias. Overall, the statistically significant changes in students' health disparities-related knowledge and attitudes are encouraging. The change in survey scores suggest a positive effect on student knowledge and attitudes, and signify a need for more research in this area.

CONCLUSION

In summary, the increase in health disparities knowledge among students is critical because addressing gaps in health outcomes is a pertinent public health issue. Undergraduate institutions can play a crucial role in developing a conscious public health work-force and helping to bridge the gap in health outcomes (Benabentos *et al*, 2014). Infusing health disparities awareness content into the curriculum can inspire students to commit to working with underserved populations to address these disparities (Vela *et al*, 2010). Efforts to promote student engagement in the classroom can help improve teaching and accelerate student learning.

All of these items are critical because efforts towards quality improvement in course development and delivery will help achieve program goals of enabling future health professionals to address needs of underserved populations. Ultimately, this will help enhance public health practice. As the main goal of public health is to improve the health and well-being of populations, promoting health disparities awareness among students can encourage them to tackle such issues and help contribute to the advancement of public health practice.

ACKNOWLEDGEMENTS

The author would like to thank Todd Stanislav and Julie Rowan from the Faculty Center for Teaching and Learning, Julie Rowan for valuable feedback on earlier drafts of this manuscript, Justice Odiase for assistance with data analyses, Dean Matthew Adeyanju and Gregory Zimmerman for their support in accommodating these courses into the curriculum, and all the students who participated in this study.

REFERENCES

Adelman, L. (Executive Producer), & Fortier, J. M., Smith, L. M., Stange, E., & Strain, T. H. (Directors). (2008). Unnatural causes: Is inequality making us sick? [DVD]. Available from http://www.unnaturalcauses.org/

Arias, E., Heron, M., & Xu, J. Q. (2016). United States life tables, 2012. *National Vital Statistics Reports, 65*(8), 1-68. Retrieved June 06, 2017, from https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_08.pdf.

Arnold, L.D. & Schneider, D. (2010). Advising the newest faces of public health: A perspective on the undergraduate student. *American Journal of Public Health*, *100*, 1374–1380. doi: 10.2105/AJPH.2009.180695

Barnridge, E., Radvanyi, C., Duggan, K., Motton, F., Wiggs, I., Baker, E., & Brownson, R. (2013). Understanding and addressing barriers to implementation of environmental and policy interventions to support physical activity and health eating in rural communities. *The Journal of Rural Health, 29*(1), 97-105. doi: 10.1111/j.1748-0361.2012.00431.x

Befort, C., Nazir, N., & Perri, M. (2012). Prevalence of obesity among adults from rural and urban areas of the United States: Findings from NHANES (2005-2008). *The Journal of Rural Health, 28*(4), 392-397. doi: 10.1111/j.1748-0361.2012.00411.x

Benabentos, R., Ray, P., & Kumar, D. (2014). Addressing health disparities in the undergraduate curriculum: An approach to develop a knowledgeable biomedical workforce. *CBE – Life Sciences Education*, 13, 636-640. doi: 10.1187/cbe.14-06-0101

Benz., J.K., Espinosa, O., Welsh, V., & Fontes, A. (2011). Awareness of racial and ethnic health disparities has improve only modestly over a decade. *Health Affairs,* 30(10), 1860-1867. doi: 10.1377/hlthaff.2010.0702

Bruff, D. (2009). Teaching with classroom response systems: Creating active learning environments. San Francisco, CA: Jossey-Bass.

Centers for Disease Control and Prevention. (2013a). *CDC Health Disparities & Inequalities Report – United States, 2013. Morbidity & Mortality Weekly Report (MMWR) Supplement*, 62 (3), 1-187.

Centers for Disease Control and Prevention. (2011). *Surveillance of health status in minority communities–Racial and Ethnic Approaches to Community Health Across the U.S. (REACH U.S) Risk Factor Survey, United States, 2009. Morbidity & Mortality Weekly Report (MMWR) Supplement*, 60 (6), 1-44.

Cain J, & Robinson E. (2008). A primer on audience response systems: current applications and future considerations. *American Journal of Pharmaceutical Education*, 72(4):77.

Centers for Disease Control and Prevention. (2013b). State-specific healthy life expectancy at age 65 years—United States, 2007–2009. *Morbidity & Mortality Weekly Report (MMWR) Supplement*, 62, 561–566.

Centers for Disease Control and Prevention. (2000). Measuring healthy days: population assessment of health-related quality of life. Atlanta, GA: US Department of Health and Human Services. Retrieved from http://www.cdc.gov/hrqol/pdfs/mhd.pdf

Collins J. *(2008).* Audience response systems: technology to engage learners. *Journal of the American College of Radiology,* 5(9), 993-1000.

Crouch, C.H., Watkins, J., Fagen, A.P., & Mazur, E. (2007). Peer instructions: engaging students one-on-one, all at once. In: Reviews in Physics Education Research, ed. EF Redish and P Cooney, College Park, MD: *American Association of Physics Teachers*, 1-55.

DeBourgh, G.A. (2008). Use of classroom "clickers" to promote acquisition of advanced reasoning skills. *Nurse Education in Practice*,8(2), 76-87. doi: 10.1016/j.nepr.2007.02.002.

Eberhardt, M., & Pamuk, E. (2005). The importance of place of residence: examining health in rural and nonrural areas. *American Journal of Public Health, 94*(10), 1682-1686.

Fouad, M., Partridge, E., Dignan, M., Holt, C., Johnson, R., Nagy, C.,…Wynn, T. (2006). A community-driven action plan to eliminate breast and cervical cancer disparity: Successes and limitations. *Journal of Cancer Education*, 21 (Suppl.), S91-S100.

Guskey, T. (2000). *Evaluating professional development*. Thousand Oaks, CA: Corwin Press.

Hartley, D. (2004). Rural health disparities, population health, and rural culture. *American Journal of Public Health, 94*(10), 1675-1678. *doi:* 10.2105/AJPH.94.10.1675.

Kennedy, M. (2016, April 20). *Lead-laced water in Flint: A step-by-step look at the makings of a crisis*. Retrieved from http://www.npr.org/sections/thetwo-way/2016/04/20/465545378/lead-laced-water-in-flint-a-step-by-step-look-at-the-makings-of-a-crisis

IBM SPSS Software. (2016, March 17). Retrieved June 07, 2017, from https://www.ibm.com/analytics/us/en/technology/spss/

IDEA. (2017). Retrieved from http://www.ideaedu.org/

Lee, J.M. & Friedman, L.H. (2015). Progress in the articulation of undergraduate and graduate public health? *Public Health Education and Promotion,* 3:22. doi:10.3389/fpubh.2015.00022.

Mavis, B. Keefe, C.W., & Reznich, C. (2004). Summer research training programme in health care disparities. *Medical Education*, 38(11), 1192-3. doi: 10.1111/j.1365-2929.2004.02003.x

Meyer, P.A., Yoon, P.W., & Kaufmann, R.B. (2013). Introduction: CDC Health Disparities and Inequalities Report — United States, 2013. *Morbidity & Mortality Weekly Report (MMWR) Supplement*, 62, 3, 3-5.

Miller, W. (2016, September 22). Texas A&M uses Telehealth to treat mental health in rural communities. Retrieved from http://www.kbtx.com/content/news/Texas-AM-uses-Telehealth-to-treat-mental-health-in-rural-communities--394504771.html

Ross, P.T., Wiley, C.C., Bussey-Jones, J., Brown, A.F., Blackman, D., Fernández, A., …Lypson, M.L. (2010). A strategy for improving health disparities education in medicine. *Journal of General Internal Medicine*, *25*, 160–163. doi: 10.1007/s11606-010-1283-3.

Russell, J.S., McWilliams, M., Chasen, L., & Farley, J. (2011). Using clickers for clinical reasoning and problem solving. *Nurse Educator*, 36(1):13-15. doi: 10.1097/NNE.0b013e3182001e18.

Tang, T.S., Fantone, J.C., Bozynski, M.E., & Adams, B.S. (2002). Implementation and evaluation of an undergraduate Sociocultural Medicine Program. *Academic Medicine,* 77(6), 578-85.

The Walmart Effect. (2016, February 5). Retrieved from http://america.aljazeera.com/watch/shows/live-news/2016/2/the-walmart-effect.html

U.S. Department of Health and Human Services. (2016). Office of Minority Health. National Partnership for Action to End Health Disparities. Retrieved from https://minorityhealth.hhs.gov/npa/templates/browse.aspx?lvl=1&lvlid=34

U.S. Department of Health and Human Services. (2008). The Secretary's Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020. Phase I report: Recommendations for the framework and format of Healthy People 2020 [Internet]. Section IV: Advisory Committee findings and recommendations. Retrieved from http://www.healthypeople.gov/sites/default/files/PhaseI_0.pdf.

Vela, M.B., Kim, K.E., Tang, H., & Chin, M.H. (2010). Improving underrepresented minority medical student recruitment with health disparities curriculum. *Journal of General Internal Medicine*, *25*, S82–S85. *doi: 10.1007/s11606-010-1270-8*.

Weimer, M. (2013). *Learner-centered teaching: Five key changes to practice (2nd ed.)*. San Francisco: Jossey-Bass.