


Improving Food Insecurity Education in Medical School Through Integrative Service Learning

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ABSTRACT

INTRODUCTION: The COVID-19 pandemic has left more than 38% of households food insecure in the United States. Improved education of food security topics in medical school can improve screening for food insecurity and improve health outcomes. The first aim of this study was to address if participation in an experiential integrative service learning program improved medical students' understanding of food insecurity. The second aim was to compare knowledge of food insecurity between the general body of medical students and those who participated in the service learning program.

METHODS: This was a cohort study at a large medical school in southeast Michigan in 2019–2020. We administered the Food Insecurity for Health Professionals (FISHP) survey to medical student participants; higher scores on the FISHP survey suggest higher knowledge and comfort with food security topics. We administered online Qualtrics surveys to the volunteer group before and after volunteering 12 hours at an urban farm. We also administered a one-time survey to a control group of medical students. We performed univariable and bivariable statistical analyses with StataSE 16. The study was exempted by the institutional IRB.

RESULTS: Medical students in the volunteer group ($n = 18$) and the control group ($n = 66$) completed online surveys. Participants in the volunteer group had increased knowledge of food security after volunteering in the service learning program ($p = .03$). There was a statistically significant difference between the mean FISHP scores for the control group and the volunteer group ($p = .001$).

CONCLUSION: Medical student participation in an experiential integrative service learning program improved knowledge of food security topics and increased comfort discussing food insecurity with patients, compared to students who did not participate. Experiential integrative service learning may improve holistic patient care through physician recognition of food insecurity and other social determinants of health.

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Introduction

Food insecurity is defined by the United States Department of Agriculture (USDA) as “household-level economic and social condition of limited or uncertain access to adequate food”.¹ Over the past five years, food insecurity rates have remained relatively stable, affecting 11–12% of households in the United States (US).² However, the COVID-19 pandemic has exacerbated alarming health disparities related to socio-economic status, including food insecurity. As of April 2020, approximately 38% of households were affected by food insecurity in the US, more than tripling previous estimates.³ The Association of American Medical Colleges (AAMC) released a statement in response to these widening disparities in vulnerable populations created by the COVID-19 pandemic.⁴ The AAMC called for the development of a national data collection system to capture social determinants of health, including food insecurity data, which could contribute to more equitable patient outcomes.⁴

Food insecurity is associated with adverse health outcomes, negative effects on pediatric behavior and development, increased health care utilization, and increased health care

spending.^{5–7} Furthermore, food insecurity contributes to increased frequency of childhood illness, slower recoveries, and increased hospitalization.⁸ Children experiencing food insecurity can also present with obesity, inappropriate feeding, and poor growth, emphasizing the importance of health care provider knowledge about food insecurity.⁹

Service learning is beneficial for medical student education, and could provide opportunities for food security education beyond traditional classroom learning.^{10,11} Integrative service learning programs at US medical schools have demonstrated success in teaching medical students professionalism, social justice, advocacy skills, and patient communication strategies.^{12,13} It is also recommended that medical education integrates experiential service learning to improve understanding of social determinants of health, including food insecurity, to improve clinical skills and improve population health.¹⁴ The Liaison Committee on Medical Education (LCME) standards require that medical education provides opportunities for service learning activities, yet many schools do not provide structured activities or enforce participation.¹⁵ Strengthening our understanding of existing experiential integrative service



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learning will allow improved curriculum design and increased opportunities to serve the community.

Aesculapians Honor Society (AHS) is a service organization of more than 60 medical students at the Wayne State University School of Medicine (WSUSOM), devoted to

Table 1. Changes in FISHP pre- and post-survey scores (N = 84).

FISHP Survey Item	Control Group Survey Mean (n = 66)	Volunteer Group Pre-Survey Mean (n = 18)	Volunteer Group Post-Survey Mean (n = 18)	Paired t-test P-Value
FISHP Survey Total Score	29.70	34.28	36.72	.035
I am knowledgeable about food insecurity and how it can adversely affect health.	3.55	4.17	4.67	.015
I am knowledgeable about referring patients to resources that address food insecurity (local food banks, food-stamp equivalent programs.)	2.53	2.94	4.00	.005
It is important to assess low-income patients for food insecurity.	4.35	4.83	4.72	.430
It is important to refer low-income patients to food resources.	4.50	4.83	4.72	.430
Food insecurity is relevant to my patient population.	4.55	4.94	4.83	.430
I am willing to ask my patients about food insecurity.	4.07	4.50	4.56	.749
I have asked my patients about food insecurity.	2.52	3.61	3.72	.756
I have referred my patients to a local food bank.	1.85	2.44	3.22	.074
I have referred my patients to food stamps.	1.79	2.00	2.28	.500
Estimate the percentage of my patients who have food insecurity.	44.79	46.88	42.71	.546

community service in the city of Detroit. Each academic year, AHS selects a 501c3 organization operating within the city limits of Detroit as their community partner of the year, to assist the organization with volunteering and fundraising. In the 2019–2020 academic year, AHS worked closely with the Michigan Urban Farming Initiative (MUFI). MUFI is a non-profit organization that uses agriculture to promote food security and community building within the city of Detroit. Student volunteering activities at MUFI included gardening, landscaping, and distributing produce to community members. AHS members volunteering at MUFI throughout the year was hypothesized to benefit students' understanding of food insecurity, knowledge of community resources, and comfort discussing food security with patients.

To our knowledge, there are few known studies that examine food security education through experiential integrative service learning in undergraduate medical education. The first aim of this study was to address if participation in an experiential integrative service learning program improved medical students' understanding of food security. The second aim was to compare knowledge of food security topics between the general body of medical students and those who volunteered in the experiential integrative service learning program.

Methods

This was a cohort study conducted at WSUSOM from August 2019-May 2020. Institutional review board exemption status was obtained. The volunteer group participants were second, third, and fourth year medical students at WSUSOM who were active members of AHS. All AHS members were initially required to volunteer a minimum of 12 hours with MUFI, but this requirement was eliminated in March 2020 with stay at home orders in Michigan due to COVID-19.

We administered a pre-survey to medical student volunteers who participated in the experiential integrative service learning program in August 2019, and we then administered a post-survey to volunteers in May 2020 after participation in the experiential integrative service learning program. We also recruited a separate convenience sample of third-year medical students who were not in AHS by email to serve as a control group. The control group completed a one-time survey in September 2019. We collected data and written informed consent electronically with Qualtrics surveys, using unique identifiers to ensure participant confidentiality and to match participants. Incomplete surveys were excluded from analysis. As part of a larger preclinical curriculum on social determinants of health, all students at WSUSOM receive didactic training on food insecurity during the Patient, Physician, Population, and Professionalism course.

The Food Insecurity for Health Professionals (FISHP) survey utilizes a 5-point Likert scale and was adapted into a 14-question survey to be administered prior to and following the completion of the required 12 hours of volunteering, or

one-time for the control group ($\alpha = .81$).¹⁶ We summed scores for the first 9 items of the FISHP survey, ranging from 9–45, with higher scores on the FISHP survey suggesting higher knowledge of food security and comfort discussing food security with patients. The remainder of the survey items were analyzed with descriptive statistics. For descriptive items, responses of “somewhat agree” or “strongly agree” were combined to better understand existing clinical learning from resident and physician attendings on food security topics.

Results from the FISHP survey were summed and analyzed as a continuous variable. Paired t-tests were used to compare pre- and post-survey means for the volunteer group. Mean FISHP scores and descriptive frequencies were compared between the control group and the volunteer group using independent t-tests. We performed univariable and bivariable statistical analyses with StataSE 16. Significance was determined at a p-value of .05.

Results

Volunteer pre-surveys were completed by 41 participants, and post-surveys were completed by 26 participants. Only participants who completed both pre- and post-surveys were analyzed statistically (n = 18); 66 medical students completed the control survey.

Volunteer Group

Medical students in the volunteer group reported previously working an average of 20.8 hours with organizations that address food insecurity before their participation in MUFI. Survey respondents in the volunteer group completed an

average of 11.8 hours at MUFI when the post-survey was administered. The mean FISHP score on the pre-survey was 34.3, compared to 36.7 on the post-survey (p = .035) (Table 1). Although statistically non-significant by paired t-tests, the mean FISHP scores for many items increased from pre- to post-survey, including understanding the importance of assessing low-income patients for food insecurity, understanding the relevance of food insecurity to the patient population, willingness to ask patients about food insecurity, and referring patients to food banks and food stamps (Table 1).

Survey responses of items related to working clinically with resident physicians and attending physicians who asked patients about access to food and interest to learn more about food insecurity in the curriculum are included in Table 2. None of these comparisons were statistically significant between pre- and post-volunteering (p > .05).

Control Group

Participants in the control group reported working less often with resident or attending physicians who asked their patients about food insecurity (Table 2). Baseline comparisons of the mean pre-volunteer group and control group responses to working with resident physicians or attending physicians who asked patients about food insecurity were non-significant (p > .05). Mean responses for control participants who had worked with a resident physician who asked patients about food insecurity differed significantly from the post-volunteer group (p = .006). This was also statistically significant for working with attending physicians (p = .01).

Participants in the control group expressed a higher interest in learning more about food insecurity in the medical curriculum compared to the volunteer group at baseline (81% in the control group vs. 78% in the volunteer group). However, after the volunteering intervention, the volunteer group expressed a higher interest in learning more about food insecurity (81% in the control group vs. 89% in the volunteer group). Neither of these comparisons were statistically significant (p > .05).

An independent t-test demonstrated a statistically significant difference between mean FISHP scores for the control group (29.7) and the volunteer group pre-survey (34.3) (p = .001). There was also a statistically significant difference between the control group (29.7) and the volunteer group post-survey (36.7) (p < .001).

Discussion

Medical students were more likely to report knowledge regarding food security and how to refer patients to resources after participating in an experiential integrative service learning program. Students were more willing to ask patients about food security, asked their patients about food security more frequently, and referred patients more frequently to a local food bank or food stamps. Pre- and post-survey results for the

Table 2. Responses to FISHP survey about clinical experiences and curriculum (N = 84).

Survey Item	Control Group (n = 66)	Volunteer Group Pre-Survey (n = 18)	Volunteer Group Post-Survey (n = 18)	Paired t-test P-Value
“I have worked with resident physicians who asked patients about access to food.” (%)*	26.6%	44.4%	55.6%	.312
“I have worked with attending physicians who asked patients about access to food.” (%)*	29.7%	50.0%	66.7%	.189
“Learning more about food insecurity would be helpful in the curriculum.” (%)*	81.3%	77.8%	88.9%	.409

*Strongly agree or somewhat agree.

volunteer group, compared to a control group of medical students, also demonstrated statistically significant higher FISHP scores, suggesting higher knowledge and comfort with food security topics than students who did not participate with MUFI. This may potentially indicate that experiential learning through involvement in an integrative service learning program increases education about food security and improves abilities to refer patients to existing community resources.

Food insecurity disproportionately affects people of color, individuals experiencing poverty, and households with children.^{2,17} The American Academy of Pediatrics (AAP) has determined food insecurity to be an important health issue and recommends screening all patients at least annually.⁶ However, a recent survey of over 2000 physician practices found that fewer than 40% of providers screened for food insecurity, and even fewer screened for additional social determinants of health.¹⁸ Although food insecurity is associated with numerous healthcare disparities and poor health outcomes, it is not routinely clinically addressed due to barriers including lack of time, resources, and finances.¹⁸ Improved education and experiential learning for physicians in training could contribute to compassionate screening and timely referrals to available community and federal resources.

This study had several limitations. The response rate and sample size were small, which was likely affected by changing schedules of medical students and the COVID-19 pandemic. We did not collect demographic information such as previous experience or knowledge related to community resources, which might have allowed for controlling confounding variables in statistical analyses. Additionally, only students who were AHS members and already active in community volunteering participated in the volunteer group, introducing selection bias that may disproportionately represent students already knowledgeable about food security topics at baseline. Despite these limitations, there are many strengths to this study, including the use of validated surveys, the intervention serving a local community organization, and the generalizability of this study to other medical schools and residency programs. This study can meaningfully contribute to improved medical education related to food insecurity and other social determinants of health.

The results of our study build upon a 2017 study of medical students and resident physicians.¹⁶ A didactic food security educational training demonstrated increased knowledge of food security one year after the didactic training, resulting in over 1600 additional patient screenings for food insecurity.¹⁶ This highlights the potential of additional food security education in medical curricula, especially when combined with experiential integrative service learning. Although our study did not examine maintenance of knowledge, future research could examine differences in knowledge maintenance after didactic sessions, compared to a combination of didactic session with experiential integrative service learning. Experiential integrative service learning provides students

with opportunities to make meaningful personal connections in the community, which may create empathy and longer lasting awareness of the importance of food insecurity screening and referral.

Future research should also include community perceptions of our involvement at urban farms. Additional research could also be conducted to evaluate food insecurity knowledge of pre-clinical facilitators teaching food insecurity curricula. Given the numerous benefits to integrative service learning cited in previous literature, we hope to expand experiential integrative service learning opportunities for medical students at other local organizations related to food security, such as additional urban farms or food banks.⁹⁻¹³ After scaling up a pilot program that includes more participants than the current study, our hope is that all medical students at our institution will have opportunities and strong encouragement to participate in service learning related to food insecurity.

Our study found that participation in an experiential integrative volunteering program promotes active learning of food security topics and enriches the education of medical students. Education on food security is relevant to all future physicians to ensure comprehensive patient care. Patients would benefit from increased physician awareness of food insecurity, knowledge about screening and resources, and the intersection of food insecurity with other social determinants of health. Improved food security education and experiential service learning in medical school may lead to early identification of patients experiencing food insecurity and timely referral to community resources. As the importance of addressing food insecurity has been emphasized, it is of the utmost importance to identify the most optimal methods to teach health care professionals in order to address these issues in clinical practice.

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Author Contributions

- Samantha Rea assisted in designing the project, collecting and analyzing data, interpreting findings, and drafting the manuscript. She provided final approval for publication and agrees to be held accountable for all aspects of the work.
- Jay Jarodiya assisted in correspondence with the IRB, designing the project, collecting data, interpreting findings, and drafting the manuscript. He provided final approval for publication and agrees to be held accountable for all aspects of the work.

- Madeline Berschback assisted in designing the project, collecting data, interpreting findings, and drafting the manuscript. She provided final approval for publication and agrees to be held accountable for all aspects of the work.
- Diane Levine substantially contributed to conception of the project and revising the manuscript for intellectual content. She provided final approval for publication and agrees to be held accountable for all aspects of the work.


Informed Consent

Not applicable, because this article does not contain any studies with human or animal subjects.

Trial Registration

Not applicable, because this article does not contain any clinical trials.

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REFERENCES

1. Definitions of Food Security. USDA Economic Research Service. United States Department of Agriculture Website. <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>. Updated Sep 9, 2020. Accessed November 1, 2020.
2. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. Household food security in the United States in 2018. Report No.: 270. Economic Research Service Website. <https://www.ers.usda.gov/publications/pub-details/?pubid=94848>. Updated September 4, 2019. Accessed April 25, 2021.
3. Wolfson JA, Leung CW. Food insecurity during COVID-19: an acute crisis with long-term health implications. *Am J Public Health*. 2020;110(12):1763-1765. doi:10.2105/AJPH.2020.305953.
4. Association of American Medical Colleges. AAMC Calls for Enhanced COVID-19 Data Collection on Health Disparities. <https://www.aamc.org/news-insights/press-releases/aamc-calls-enhanced-covid-19-data-collection-health-disparities>. Updated April 10, 2020. Accessed April 25, 2021.
5. Carlson S, Keith-Jennings B. SNAP Is Linked with Improved Nutritional Outcomes and Lower Health Care Costs. Center on Budget and Policy Priorities Website. <https://www.cbpp.org/research/food-assistance/snap-is-linked-with-improved-nutritional-outcomes-and-lower-health-care>. Updated January 17, 2018. Accessed November 1, 2020.
6. O'Keefe L. Experts Advise Sensitive Approaches to Food Screening. AAP News Website. www.aapublications.org/news/aapnewsmag/2016/02/11/FoodInsecurity021116.full.pdf. Updated 2016. Accessed November 1, 2020.
7. Cook JT, Frank DA, Levenson SM, et al. Child food insecurity increases risks posed by household food insecurity to young children's health. *J Nutr*. 2006;136(4):1073-1076. doi:10.1093/jn/136.4.1073.
8. COUNCIL ON COMMUNITY PEDIATRICS; COMMITTEE ON NUTRITION. Promoting food security for all children. *Pediatrics*. 2015;136(5):e1431-e1438. doi:10.1542/peds.2015-3301.
9. The Impact of Poverty, Food Insecurity, and Poor Nutrition on Health and Well-Being. Food Research & Action Center Website. <https://frac.org/wp-content/uploads/hunger-health-impact-poverty-food-insecurity-health-well-being.pdf>. Updated December 2017. Accessed March 27, 2021.
10. Stewart T, Wubbena ZC. A systematic review of service-learning in medical education: 1998-2012. *Teach Learn Med*. 2015;27(2):115-122. doi:10.1080/10401334.2015.1011647.
11. Freeman S, Eddy SL, McDonough M, et al. Active learning increases student performance in science, engineering, and mathematics. *Proc Natl Acad Sci U S A*. 2014;111(23):8410-8415. doi:10.1073/pnas.1319030111.
12. Borah BF. Longitudinal service learning in medical education: an ethical analysis of the five-year alternative curriculum at stritch school of medicine. *J Med Humanit*. 2018;39(4):407-416. doi:10.1007/s10912-018-9529-x.
13. Gimpel N, Kindratt T, Dawson A, Pagels P. Community action research track: community-based participatory research and service-learning experiences for medical students. *Perspect Med Educ*. 2018;7(2):139-143. doi:10.1007/s40037-017-0397-2.
14. Siegel J, Coleman DL, James T. Integrating social determinants of health into graduate medical education: a call for action. *Acad Med*. 2018;93(2):159-162. doi:10.1097/ACM.0000000000002054.
15. Liaison Committee on Medical Education. 2020. Functions and Structure of a Medical School Standards for Accreditation of Medical Education Programs Leading to the MD Degree. <https://lcme.org/publications/>. Updated 3/2021. Accessed April 25, 2021.
16. Smith S, Malinak D, Chang J, Schultz A, Brownell K. Addressing food insecurity in family medicine and medical education. *Fam Med*. 2017;49(10):765-771.
17. Fitzpatrick KM, Harris C, Drawve G, Willis DE. Assessing food insecurity among US adults during the COVID-19 pandemic. *J Hunger Environ Nutr*. 2021;16(1):1-18. doi:10.1080/19320248.2020.1830221.
18. Frazee TK, Brewster AL, Lewis VA, Beidler LB, Murray GF, Colla CH. Prevalence of screening for food insecurity, housing instability, utility needs, transportation needs, and interpersonal violence by US physician practices and hospitals. *JAMA Netw Open*. 2019;2(9):e1911514. Published 2019 Sep 4. doi:10.1001/jamanetworkopen.2019.11514.