Electronic Journal of General Medicine
2026, 23(1), em707
e-ISSN: 2516-3507
https://www.ejgm.co.uk/

MODESTUM

Original Article

OPEN ACCESS

Using artificial intelligence to create case studies addressing social determinants in graduate nursing education

Karen Elaine Alexander [1]*, Nisha Mathews [1], Steven Sutherland [1], Jolly Joseph [2], Katecia Holmes [1], Madison Sims [3]

[1] University of Houston-Clear Lake, Houston, TX, USA
[2] The University of Texas MD Anderson Cancer Center, Houston, TX, USA
[3] Georgia State University, Atlanta, GA, USA
***Corresponding Author:** alexanderk@uhcl.edu

Citation: Alexander KE, Mathews N, Sutherland S, Joseph J, Holmes K, Sims M. Using artificial intelligence to create case studies addressing social determinants in graduate nursing education. Electron J Gen Med. 2026;23(1):em707. https://doi.org/10.29333/ejgm/17634

ARTICLE INFO

Received: 21 Jul. 2025

Accepted: 15 Nov. 2025

ABSTRACT

This paper reports on an ongoing pilot study exploring the use of artificial intelligence (AI)-generated case studies to teach graduate nursing students about social determinants of health (SDoH) in rural and urban Texas settings. Five master of science in nursing students co-developed unfolding patient scenarios using ChatGPT and StudyCrafter, embedding clinical reasoning, empathy, and equity-focused decision-making. These simulations are currently being piloted with undergraduate students to assess feasibility, usability, and educational value. A mixed-methods design guides the evaluation. Quantitative data are collected via pre- and post-surveys to assess perceived changes in SDoH competency, while qualitative data come from student reflections and reflexive journals. Thematic analysis, conducted using Dedoose, will inform iterative refinement through faculty-student collaboration. As the study is ongoing, this paper outlines the design, methods, and theoretical framework and development of AI-enhanced, equity-focused simulations. This project offers a model for integrating SDoH into nursing curricula and preparing educators to address structural inequities.

Keywords: artificial intelligence, nursing education, social determinants of health, health equity, rural health, case-based learning

INTRODUCTION

Social determinants of health (SDoH) are non-medical factors that influence health outcomes, including the conditions in which individuals are born, raised, live, work, and age [1]. While the National Academies of Medicine advocates interprofessional education and collaborative practice, many nursing students continue to struggle with effectively contextualizing SDoH within both urban and rural clinical and community frameworks. This challenge is particularly evident in rural and underserved areas, where structural inequities are more pronounced. In Texas, urban and rural areas face different SDoH that impact health outcomes. Urban regions in Texas tend to have higher population densities, often resulting in increased competition for resources and a potential strain on infrastructure.

In contrast, residents in rural areas of Texas face various structural, social, and economic disparities, which often result in poorer health outcomes [2]. In response to national health priorities, the federal office of rural health policy commissioned Texas A&M University, then the nation's only school of rural public health, to develop a specialized toolkit aligned with healthy people in 2010. The primary purpose of this initiative is to continue emphasizing the promotion of health in rural, underserved, and minority populations through initiatives such as rural healthy people 2020 [3]. Despite these efforts, educators and providers in rural areas continue to encounter persistent barriers in addressing SDoH, including limited access to healthy food options, widespread food deserts, and inadequate infrastructure for safe and affordable physical activity [4-6].

To address this persistent educational gap, we propose leveraging generative artificial intelligence (AI) to create dynamic, personalized case studies that enable experiential learning to be tailored to diverse social and geographic contexts.

Understanding Artificial Intelligence

AI refers to computer systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, and decision-making [7]. Standard AI-powered tools such as Copilot, ChatGPT, Duolingo, Google Assistant, Alexa, Gemini, and Grammarly demonstrate AI's growing presence in daily life. Its broader impact is profound: AI is poised to become one of the most transformative forces in human history, rapidly reshaping healthcare, health education, and workforce development [7, 8]. While AI has

A preliminary version of this work was presented at the 2025 Association of Black Nursing Faculty Scientific Conference.

been deeply rooted in fields such as engineering, computer science, and mathematics, its integration into nursing and health education remains underutilized [8, 9]. As healthcare systems evolve toward increasingly technology-driven models of care, incorporating AI into nursing education is not merely an innovation; it is an urgent necessity. Generative AI offers the potential to bridge long-standing educational and practice gaps by embedding real-time, community-based data into case-based learning, empowering future nurses to recognize and respond to the structural determinants that shape patient outcomes [9]. This plays a crucial role in shaping the future of nursing education.

Significance and Rationale

Artificial intelligence and the integration of social determinants of health in nursing education

Despite widespread recognition of their impact on health outcomes, SDoH remain underrepresented in nursing education, thereby limiting nurses' ability to address health disparities in clinical practice [10] entirely. This educational gap limits the nursing profession's ability to effectively respond to the complex and multifaceted needs of diverse populations. The integration of AI into nursing curricula presents a novel and promising strategy to address this limitation. AI can facilitate tailored, experiential learning that enhances students' understanding of SDoH by providing dynamic case-based simulations, predictive analytics, and data-driven scenarios rooted in real-world contexts [11, 12]. This approach aligns with Domain eight of the American Association of Colleges of Nursing (AACN) essentials, which emphasizes the importance of informatics and healthcare technologies in preparing practice-ready nurses [13, 14]. As public health and nursing practice undergo rapid digital transformation, AI offers the potential to make structural and social inequities more visible in education, thus equipping nurses with the competencies required to promote equity-informed care and drive policy change [15].

Objectives

This initiative aims to strengthen the integration of SDoH within nursing education by leveraging innovative technologies and evidence-based teaching strategies. The specific objectives are as follows:

1. Enhance the learning and application of SDoH concepts within the master of science in nursing (MSN) curriculum by embedding content that highlights how SDoH influences healthcare delivery and patient outcomes. This includes targeted integration within research and curriculum development courses, particularly through critical literature reviews, which examine the role of SDoH in health disparities. Designing nursing curricula involves developing and implementing ongoing, contextually relevant simulations.
2. Integrate AI into nursing education to enrich didactic instruction and experiential learning, enabling students to explore complex social and clinical scenarios with adaptive, real-time feedback.
3. Promote a holistic and person-centered approach to healthcare delivery by developing and utilizing authentic, virtual case studies that reflect the lived experiences of diverse populations, particularly those in rural and underserved communities.

These objectives collectively support the advancement of equitable, technology-informed nursing education that prepares future nurses to deliver socially responsive care in an increasingly digital healthcare environment. The guiding question is: "How do MSN students perceive and experience the use of AI-generated case studies to explore SDoH in urban and/or rural Texas communities as part of an educational innovation in nursing education and leadership courses?"

Theoretical Foundation

This project integrates adult learning theory, user-centered design (UCD), and constructivist learning principles to guide the development of an AI-enhanced nursing curriculum addressing SDoH. These frameworks were chosen to align pedagogy with the needs of adult learners, ensure the usability and adoption of AI-enabled tools, and cultivate the collaborative, deep learning required to navigate the complexity of SDoH in real-world practice. Adult learning theory (knowles) emphasizes self-directed, problem-centered learning that builds on prior experience, fostering motivation and practical application in healthcare contexts [16]. UCD ensures educational technologies and simulations are designed around learner needs through empathy-driven research, iterative prototyping, and continuous feedback, enhancing usability, accessibility, and engagement [17]. Constructivist principles promote active participation, collaboration, and the construction of contextual knowledge through AI-driven case studies that reflect the social and environmental influences on health [18]. Collectively, these frameworks provide a robust foundation for innovative, student-centered learning experiences. These experiences prepare nurses to address SDoH in both academic and clinical environments critically. They support the intentional alignment of learning activities, AI-enabled tools, and assessment strategies to enhance critical thinking, real-world problem solving, and equitable care delivery. This integrated approach advances the development of practice-ready nurses capable of addressing SDoH across diverse clinical contexts.

METHODS

Research Design

This AI project employs an interprofessional, experiential learning approach through a collaborative partnership between students in the MSN education and leadership program and those in the human factors psychology (HFP) program. The collaboration was designed to enhance educational outcomes for both groups by integrating clinical knowledge with UCD principles in the development of AI-assisted simulations.

Ethical Considerations

Permission for the study was obtained from the Institutional Review Board–#2025-157. Confidentiality was maintained by using pseudonyms to prevent the attribution of specific experiences to individual participants and to protect the integrity of the shared narratives. This approach also helped preserve the authenticity and impact of the participants' contributions. Additionally, the faculty involved

in the study were already certified in the protection of human subjects.

This study includes two distinct participant groups. The first group consists of five MSN students enrolled in the education and leadership program, who participated in the initial phase of case study and simulation development. The second group includes twelve undergraduate nursing students who will participate in the pilot phase to evaluate feasibility and usability. This dual-sample structure supports the mixed-methods design and iterative refinement of the simulation tools, facilitating the development of robust and effective simulation tools.

Sampling

Five MSN students enrolled in the MSN–education and leadership program participated in the initial phase of the project. These students were enrolled in the advanced nursing research and curriculum development courses. All participants are registered nurses in Texas, actively working in clinical settings, and their ages range from 30 to 45 years.

In the next phase of the study, twelve undergraduate nursing students enrolled at Institution will participate in a pilot implementation of the AI-generated simulations. Their engagement will support the evaluation of feasibility, usability, and educational value. This forthcoming data collection aligns with the mixed-methods design and will inform iterative improvements to the simulation tools and curriculum.

Data Collection

As part of the MSN research course assignment, the 5 enrolled MSN students first selected a relevant healthcare topic that SDoH influences. After which, they completed a literature review on the chosen topic to ground their work in current evidence. These reviews informed the MSN students as they applied their clinical expertise and theoretical knowledge to design case scenarios enriched with SDoH, ensuring both clinical accuracy and scholarly rigor. These case studies were then built into the virtual simulation scenarios, using StudyCrafter [19], an AI-assisted simulation development platform that supports interactive storytelling and experiential learning. Through this process, nursing students demonstrated their ability to translate course concepts such as health equity, population health, and patient-centered care into realistic and engaging virtual simulation cases.

Concurrently, two HFP master of science program students, serving as user experience (UX) researchers and designers, worked with the MSN students and focused on testing simulations and refining the user interface. They employed usability testing, iterative prototyping, and design feedback sessions to enhance the overall accessibility, functionality, and engagement of the simulation tools. This allowed HFP students to apply their coursework in real-world contexts while also deepening their understanding of healthcare-specific challenges.

The collaboration fostered reciprocal learning, with each discipline contributing essential knowledge in its respective domain. MSN students ensured the clinical relevance and integrity of the simulation content. In contrast, HFP students brought technical expertise to ensure that the final product met high standards for usability and learner experience.

The implementation and evaluation plan for the simulations will involve a series of pilot studies prior to the MSN student capstone teaching practicum experience, focusing on evaluating learning outcomes and user perceptions. This will occur in the next phase of this study.

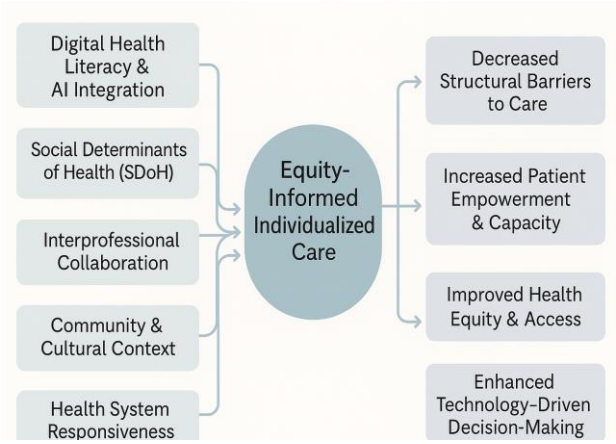

Figure 1. EIICM (adapted from [6])

Initially, the student-created simulations were reviewed by the faculty in collaborative group meetings and in student-faculty collaborative meetings. Once the student simulations are finalized, pilots using the MSN student-created simulations will be administered to approximately 12 undergraduate nursing program students at Institution by the MSN students under the guidance of the researchers. This interprofessional model represents a scalable and sustainable approach to simulation design rooted in co-creation, applied learning, and mutual respect across disciplines.

Case Study and Simulation Development

We utilized the equity-informed individualized care model (EIICM) (**Figure 1**), developed by a nursing faculty member, as a conceptual framework to guide the design of the case study and simulation. This model emphasizes how five key factors–digital health literacy and AI integration, SDoH, interprofessional collaboration, community and cultural context, and health system responsiveness–shape the delivery of equitable, individualized care. These elements were embedded into the case study and the simulation interface using StudyCrafter, where students created interactive case studies reflecting both urban and rural health disparities. The case study simulations enabled learners to explore how various decisions affect patient outcomes, particularly for underserved populations. By aligning each case with the EIICM, students were able to visualize how addressing SDoH can reduce structural barriers, increase patient empowerment, and improve health equity. This approach not only supported clinical reasoning and empathy but also reinforced the educational goal of preparing nurses to deliver socially responsive, technology-informed care.

The simulation development process integrated AI with evidence-based instructional design to create personalized, dynamic case studies that reflect the complexity of SDoH. AI was utilized to generate diverse and responsive case study scenarios, enabling rich narrative variations and decision-making pathways that enhance learner engagement and authenticity.

The platform StudyCrafter served as the primary development environment, enabling students to transform AI-created case studies into authentic interactive simulations. Simulation development occurred through a one-on-one,

iterative process between MSN and HFP students and course faculty, utilizing AI tools to personalize each case study to the learner's healthcare topic of interest. Through multiple rounds of feedback and refinement, students adjusted the narrative, embedded decision points, and aligned content with key course concepts, including cultural competence, ethical decision-making, and population health. Before gamification, students critically examined how different decisions within the simulation produced varying outcomes, especially regarding vulnerable populations and health disparities. Further, students embedded NCLEX-style questions at strategic points within the simulation. This allowed learners to visualize the 'ripple effects' of clinical and policy-level decisions, thereby reinforcing a deeper understanding of SDoH and the broader implications of nursing practice. This AI-augmented, student-centered approach to simulation development not only supports academic learning but also promotes reflection, creativity, and system-level thinking in nursing education.

Rigor and Trustworthiness

Rigor and trustworthiness in this study were upheld through continuous reflexivity, narrative transparency, and dialogic validation. Faculty members maintained reflexive memos throughout the research process to document their evolving insights. The MSN students also captured their changing insights and emotions through reflective journaling. Interpretations were grounded in the narrative data and collaboratively refined through iterative dialogues in regular bi-weekly team meetings. This methodology adheres to the relational and interpretive standards of collaborative autoethnography, emphasizing ethical self-awareness and collective meaning-making over traditional positivist criteria [22].

Data Analysis

Because this study is ongoing, the following analysis reflects planned and in-progress procedures rather than finalized results. Five MSN students enrolled in the MSN–education and leadership program participated in the initial phase, creating their AI-assisted case studies. After this, the UX researcher students collaborated to assign the conversion to simulations using StudyCrafter. Additionally, the 5 MSN students and the 2 UX researcher students engaged in structured self-reflection, using guided prompts to generate narrative data that captured their experiences of the project.

The virtual simulations are scheduled for pilot testing in the next phase of this study, with approximately twelve undergraduate nursing students at the institution in Houston, Texas. The small number of participants is appropriate for a pilot study, as the goal is to assess feasibility, refine methodology, and identify areas for improvement prior to scaling. Methodological guidance suggests that pilot studies often use small, focused samples to test feasibility. Julious recommends a "rule of 12" per group as a practical guideline for pilot trials, and the role of pilot work in informing larger-scale studies are highlighted [20, 21]. The sample size in this study aligns with these recommendations and is sufficient to meet the objectives of testing and refining simulation tools before broader implementation.

Quantitative data will be collected through structured pre- and post-surveys administered to undergraduate pilot participants. These surveys assess perceived changes in SDoH competency, including the ability to identify, interpret, and respond to structural and social influences on health. Descriptive statistical analyses, using the Microsoft Excel data analysis toolpak, will be conducted to examine changes over time.

Qualitative data are being collected on an ongoing basis from the MSN students' reflexive journals and participant feedback on the use of simulations. The analytic process follows a systematic, thematic approach:

(1) initial open coding of journal and feedback entries,

(2) axial coding to group related concepts, and

(3) theme development through constant comparison.

Dedoose, a secure cloud-based application for qualitative and mixed-methods research, is supporting analysis. All data is password protected. To enhance rigor, faculty researchers meet biweekly to review coding, resolve discrepancies, and collaboratively refine emergent themes. Reflexive journals provide an additional lens for examining potential biases, assumptions, and evolving interpretations across the research team.

A thematic blueprint will be constructed iteratively to organize findings and guide integration of results from both the pilot and capstone practicum phases. This blueprint, along with ongoing survey data, will inform iterative refinements to simulation tools and curriculum design. As the study is ongoing, empirical findings from the pre- and post-surveys, as well as the final qualitative analysis, are not reported here but will be disseminated in a subsequent manuscript once data collection is complete.

The snippets of screenshots (**Figure 2**) are from an initial student-created StudyCrafter virtual nursing simulation scenario, which demonstrates the integration of SDoH in a rural area. The simulation illustrates how nursing students apply theoretical knowledge to realistic clinical decision-making scenarios, fostering critical thinking and a deeper understanding of how social factors influence patient care.

ANTICIPATED RESULTS

This project is expected to yield several educational benefits from the integration of SDoH and AI-assisted case study simulations into nursing education. Based on the design and early development phases, we anticipate the following outcomes:

Enhanced student engagement: Interactive, AI-assisted simulations are expected to increase motivation and deepen engagement with course content by providing personalized and contextually relevant learning experiences.

Improved understanding of SDoH: Students are anticipated to gain a clearer understanding of how social determinants manifest differently in rural and urban Texas communities, such as limited healthcare access in rural regions and transportation or housing challenges in urban areas.

Development of clinical reasoning and decision-making: Exposure to complex, equity-focused simulations is expected to strengthen students' ability to navigate care scenarios involving diverse and underserved populations.

Strengthened policy and systems thinking: Learners are anticipated to make stronger connections between patient outcomes and structural issues, such as rural hospital closures or urban environmental justice challenges.

Figure 2. Screenshots from an initial StudyCrafter virtual nursing simulation scenario (Scenario created by this research team using StudyCrafter; https//studycrafter.com)

Increased competency with technology: Graduate nursing students are expected to develop greater confidence in using AI to design realistic, equity-focused case studies, enhancing their readiness for technology-driven educational and clinical environments.

Qualitative growth in empathy and reflection: Through engagement with reflexive journaling and simulation design, students are anticipated to demonstrate increased empathy, cultural humility, and awareness of systemic inequities.

Current Students' Perspective of the Artificial Intelligence Simulation Project

Student reflections from the MSN and HFP programs thus far highlight the transformative and interdisciplinary value of creating the AI simulation case study project.

Master of science in nursing students' perspective

For the nursing students, this aspect of the project fostered a profound personal and professional connection to SDoH. One student reflected, "creating this case helped me better understand how health disparities disproportionately affect Black people as compared to other populations." Another student described, "it was a meaningful experience to use AI to create characters and tell real-life stories of patients with end-stage kidney disease." The use of AI to develop interactive case studies served as both a technical and emotional journey.

Beyond storytelling, the integration of AI enhances students' critical thinking, creativity, and organization. A student shared this: "I hope AI continues to be embraced in nursing education, it enhances critical thinking and understanding and helps organize ideas and thoughts." This reflection suggests that AI-assisted simulation development supports deeper engagement with both content and context, especially in the exploration of healthcare inequities.

Human factors psychology (user experience researcher) students' perspective

From the UX researchers' design perspective, students gained meaningful insights into the intersection of design, education, and health equity. One UX researcher emphasized the importance of empathy-driven development: "We focused on how simulation design can address both cognitive and emotional needs in complex settings like healthcare." "Applying human factors methods to healthcare education has been both eye-opening and rewarding." Applying human-centered design and usability testing to nursing simulations provided a unique lens for HFP students. Additionally, their contributions helped ensure the simulations were grounded in realism and equity. A student expressed this: "The research and iteration process was focused on creating realistic, accurate scenarios that reflect healthcare inequalities while deepening users' understanding of SDoH."

These cross-disciplinary perspectives underscore the value of collaborative, AI-enhanced educational innovation. Students not only applied their disciplinary knowledge but also gained a broader appreciation for the social, emotional, and ethical dimensions of health education.

Strengths and Limitations

This project demonstrates several notable strengths, as well as limitations. First, its innovative, interprofessional design leverages expertise from nursing and HFP to develop adaptable, AI-driven simulations that enhance learning of Social SDoH. The approach promotes the development of technological proficiency and informatics skills in students, as learners actively create projects that integrate and apply course concepts, thereby fostering a deeper understanding and engagement. Additionally, the use of cutting-edge AI tools and platforms reflects a commitment to evolving educational resources in alignment with emerging healthcare technologies. However, as an early-stage innovation, the project faces several limitations. Variations in technological literacy among faculty and students may affect the adoption, usability, and effectiveness of AI-based simulations. Integration into existing curricula remains limited, and validation of learning outcomes is ongoing, which may constrain the broader impact at this stage.

Furthermore, infrastructure and cost considerations pose significant challenges, particularly in resource-limited academic settings where access to necessary hardware, software, and technical support may be insufficient. While promising, the initiative requires continued institutional support, faculty development, and dedicated funding to scale effectively. Grant funding opportunities can provide foundational resources to address some of these barriers. But sustainable implementation will depend on strategic

investment and a collaborative commitment across academic stakeholders.

Implications for Nursing Education and Practice

This project underscores the potential of AI to enhance nursing education by integrating SDoH into clinical learning, thereby advancing core nursing competencies. Embedding AI-driven, SDoH-rich simulations supports development across multiple competency domains. These competency domains include patient-centered care (QSEN): Preparing nurses to deliver culturally competent, individualized care that respects patients' unique social and environmental contexts. Evidence-based practice (AACN essentials domain 3): Encouraging critical appraisal and application of current evidence related to SDoH to improve health outcomes. Informatics and healthcare technologies (AACN essentials domain 8; QSEN informatics): Enhancing proficiency in using emerging technologies like AI to support clinical decision-making and patient education. Systems-based practice and health policy (AACN essentials domain 7): Facilitating understanding of how social and structural factors influence health disparities, and empowering nurses to advocate for health equity at institutional and policy levels. Interprofessional collaboration (AACN essentials domain 6): Fostering teamwork and communication across disciplines, as demonstrated by the collaborative development process with HFP students.

By equipping nurses with these competencies, AI-enhanced education promotes holistic, equitable, and technology-informed nursing practice, addressing the complexities of contemporary healthcare. The EIICM, illustrated in **Figure 2**, can provide a framework for incorporating AI-enhanced, equity-focused learning into nursing education, particularly for underserved and diverse communities.

Future Vision for Simulation Center of Excellence

We vision establishing a dedicated simulation center that will serve as a hub for the ongoing expansion, refinement, and dissemination of AI-enhanced learning tools centered on inclusivity and health equity. This center would facilitate the development of a virtual simulation laboratory designed to integrate authentic immersive case studies that reflect the diverse experiences of underserved populations.

Key features of the simulation center will include the following:

A virtual simulation lab utilizing cutting-edge technology to support dynamic, interactive learning experiences grounded in real-world SDoH.

A focus on underserved and marginalized populations, ensuring that educational content remains relevant and responsive to communities experiencing health disparities.

Interdisciplinary learning opportunities that promote collaboration across nursing, human factors, public health, and other related fields, fostering a holistic approach to health education and practice.

The simulation center aims to be a sustainable resource for nursing education, advancing culturally competent, technology-informed, and equity-focused healthcare training for future generations of health professionals.

CONCLUSIONS

This project highlights the potential of AI to enhance nursing education by embedding SDoH into interactive, equity-focused learning experiences. Through the development of AI-assisted simulations, graduate nursing students gained opportunities to integrate evidence, clinical reasoning, and social context into authentic case-based learning. The interdisciplinary collaboration with HFP students further strengthened the usability and learner-centered design of the simulations.

As this is an ongoing pilot study, findings from pre-/post-surveys and qualitative analyses are not yet available. The present manuscript, therefore, details the study's design, methodological approach, and theoretical foundation, with results to be reported in a subsequent paper. This phased approach is crucial to ensure methodological rigor, transparency, and iterative refinement before implementing on a larger scale.

Future directions include completing data collection with undergraduate pilot participants, analyzing both quantitative and qualitative outcomes, and embedding the finalized simulations into the MSN capstone teaching practicum. These next steps will enable real-world application in instructional nursing settings, provide cross-level benefits for undergraduate and graduate learners, and facilitate iterative improvements to the curriculum. Ultimately, this work aims to prepare practice-ready, equity-focused nurse educators who can integrate technology and SDoH into teaching and leadership roles.

Author contributions: KEA & SS: conceptualization, methodology; **NM:** methodology; **KEA, SS, NM & KH:** data collection, analysis, interpretation; **JJ:** writing - review & editing; **KEA & NM:** data analysis, review; **SS, KH, MS, KEA, & NM:** writing – original draft, writing – review & editing, study design, and overall research progress. All authors have agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Ethical statement: The authors stated that the study was approved by the Institutional Review Board with approval number #2025-157. Written informed consents were obtained from the participants.

AI statement: The authors stated that artificial intelligence tools were used solely for language refinement. Grammarly, an AI-powered application, was employed to ensure grammatical accuracy, clarity, and consistency in the manuscript. No generative AI tools were used for data analysis, interpretation, or content creation

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

1. WHO. Social determinants of health. World Health Organization; 2025. Available at: https://www.who.int/teams/social-determinants-of-health/equity-and-health/world-report-on-social-determinants-of-health-equity (Accessed: 26 September 2025).
2. Ekren G, Maleki S, Curran C, Watkins C, Villagran MM. Health differences between rural and non-rural Texas counties based on 2023 county health rankings. BMC Health Serv Res. 2025;25:2. https://doi.org/10.1186/s12913-024-12109-2 PMid:39748432 PMCid:PMC11696682

3. Bolin JN, Bellamy GR, Ferdinand AO, et al. Rural healthy people 2020: New decade, same challenges. J Rural Health. 2015;31(3):326-33. https://doi.org/10.1111/jrh.12116 PMid: 25953431
4. Matthews KA, Spears KS, Anderson-Lewis C. Rural health disparities: Contemporary solutions for persistent rural public health challenges. Prev Chronic Dis. 2025;22:E27. https://doi.org/10.5888/pcd22.250202 PMid:40539904 PMCid:PMC12199730
5. Jordanova KE, Suresh A, Canavan CR, et al. Addressing food insecurity in rural primary care: A mixed-methods evaluation of barriers and facilitators. BMC Prim Care. 2024; 25(1):163. https://doi.org/10.1186/s12875-024-02409-1 PMid:38734634 PMCid:PMC11088768
6. Alexander KE, Lihono MA, Penn EB. Examining frequencies of food insecurity and risky behaviors in at-risk adolescents: Community health nurses call to action. J Cult Divers. 2020;27(3).
7. Topol EJ. Deep medicine: How artificial intelligence can make healthcare human again. New York City, NY: Basic Books; 2019.
8. James DCS, Maldonado-Molina MM. Artificial intelligence in the curriculum: Development and implementation of a professional training program to promote literacy among health education college majors. Pedagogy Health Promot. 2025. https://doi.org/10.1177/23733799251335628
9. Glauberman G, Ito-Fujita A, Katz S, Callahan J. Artificial intelligence in nursing education: Opportunities and challenges. Hawai J Health Soc Welf. 2023;82(12):302-5.
10. Newberry DM, Spies LA, Jones JJ, Perez PY. Evaluation of social determinants of health in nursing education through service learning. Creat Nurs. 2023;29(4):383-8. https://doi.org/10.1177/10784535231212410 PMid: 37990479
11. Bompelli A, Wang Y, Wan R, et al. Social and behavioral determinants of health in the era of artificial intelligence with electronic health records: A scoping review. Health Data Sci. 2021;2021:9759016. https://doi.org/10.34133/2021/9759016 PMid:38487504 PMCid:PMC10880156
12. Bharel M, Auerbach J, Nguyen V, DeSalvo KB. Transforming public health practice with generative artificial intelligence. Health Aff (Millwood). 2024;43(6):776-82. https://doi.org/10.1377/hlthaff.2024.00050 PMid:38830160
13. AACN. The essentials: Core competencies for professional nursing education. American Association of Colleges of Nursing; 2021. Available at: https://www.aacnnursing.org/Portals/0/PDFs/Publications/Essentials-2021.pdf (Accessed: 3 July 2025).
14. AACN. The essentials: Advancing nursing education and practice through innovation and technology. American Association of Colleges of Nursing; 2025. Available at: https://www.aacnnursing.org/Portals/0/PDFs/Publications/Essentials-2021.pdf (Accessed: 3 July 2025).
15. Cary jr MP, Bessias S, McCall J, et al. Empowering nurses to champion health equity & BE FAIR: Bias elimination for fair and responsible AI in healthcare. J Nurs Scholarsh. 2025;57(1):130-9. https://doi.org/10.1111/jnu.13007 PMid: 39075715 PMCid:PMC11771545
16. Knowles, MS. The modern practice of adult education: From pedagogy to andragogy. Englewood Cliffs, NJ: Cambridge Adult Education; 1980.
17. Dabbs ADV, Myers BA, Mc Curry KR, et al. User-centered design and interactive health technologies for patients. Comput Inform Nurs. 2009;27(3):175. https://doi.org/10.1097/NCN.0b013e31819f7c7c PMid:19411947 PMCid: PMC2818536
18. Billings DM, Halstead JA. Teaching in nursing: A guide for faculty. St. Louis, MO: Elsevier; 2024.
19. Harteveld C, Manning N, Abu-Arja F, Menasce R, Thurston D, Smith G, Sutherland SC. Design of playful authoring tools for social and behavioral science. In: Companion Proceedings of the 22nd International Conference on Intelligent User Interfaces. New York, NY: ACM; 2017. https://doi.org/10.1145/3030024.3040981
20. Julious SA. Sample size of 12 per group rule of thumb for a pilot study. Pharm Stat. 2005;4(4):287-91. https://doi.org/10.1002/pst.185
21. Hertzog MA. Considerations in determining sample size for pilot studies. Res Nurs Health. 2008;31(2):180-91. https://doi.org/10.1002/nur.20247 PMid:18183564
22. Malorni A, Diaz A, Spencer MS, Jones T. Collaborative autoethnography as a tool for research-practice partnerships: Facilitating self and school transformation. Qual Soc Work. 2022;22(4):643-62. https://doi.org/10.1177/14733250221088211