Impact Evaluation of Patient-Centered, Community-Engaged Health Modules for Homeless Pregnant Women

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ABSTRACT

Purpose: Pregnant women who experience homelessness are at a greater risk for poor birth outcomes than the general population. This pilot study describes results of a service-learning program informed by previously identified unmet perinatal health needs. In this patient-centered service-learning program, medical students partnered with homeless women currently residing in a shelter in Milwaukee, Wisconsin.

Methods: Medical students in the Health Advocacy in Pregnancy and Infancy (HAPI) project at the Medical College of Wisconsin developed and taught 6 service-learning modules to shelter residents: healthy cooking, mental health, perinatal nutrition, infant care/safety, breastfeeding, and contraception. Implemented between 2018 and 2021, modules were hosted in person and via electronic videoconferences. We gathered qualitative data on participants' perceived impact of the modules and used grounded theory analysis to examine written comments and verbal feedback.

Results: A total of 141 participants attended 42 learning sessions. Participants included pregnant and postpartum mothers and women interested in learning about pregnancy-related health. Qualitative analysis revealed 3 universal themes regarding the impact of the sessions on participants: "Knowledge," "Intention to Change," and "Empowerment."

Conclusions: Our community-engaged health education partnership program between homeless pregnant women and medical students focused on perinatal health. This well-received, effective strategy cultivated new knowledge, empowering participants to not only change their own behaviors, but to teach and support others. This study demonstrates the ability of using community-based teaching sessions to enhance participants' understanding of pregnancy and postpartum health and empower others to implement changes.

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INTRODUCTION

The infant mortality rate (IMR) is defined as the number of infant deaths during the first year of life per 1,000 births in 1 year. This metric is often used as a benchmark to assess not only maternal and child health, but the overall health of a society. Although infant mortality may seem like a problem mainly affecting developing countries, the IMR in the United States is among the highest in the world.[1,2] According to the Centers for Disease Control and Prevention, the United States IMR is 5.7,[3] but it is especially high in certain areas of the country, including Milwaukee, Wisconsin. In 2020, Milwaukee's overall IMR was 11.6, while the 3-year rolling average IMR for 2012-2015 in Milwaukee was 9.8.[4,5]

Homeless women and their babies are particularly vulnerable. There is no published data on the IMR of homeless women in Milwaukee. The most recent data on the IMR in homeless women is from a 1990s New York study, which showed that homeless mothers experienced an IMR of 24.9.[6] Furthermore, homeless women were found to have inadequate prenatal care more often, and infants of mothers who had no prenatal care had an IMR nearly 8 times greater than those who had prenatal care.[7] More recent data have shown that infants of homeless mothers face higher rates of complications, including premature delivery and increased odds of neonatal intensive care unit admissions for infants born at term.[8]

The leading causes of infant mortality in Wisconsin are con-

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genital anomalies, premature birth, and maternal complications of pregnancy.[5] Premature birth is of greater concern in Black women, as this contributes to approximately two-thirds of all infant deaths, compared to about one-third of the infant deaths in the White population.[4] Additionally, the preterm birth rate in Wisconsin is 63% higher for Black women when compared to other women.[9] The substantial morbidity associated with premature birth, including motor delay, intellectual disability, behavioral problems, and respiratory illnesses, additionally contributes to health disparities in the non-Hispanic Black population.[10]

While Milwaukee's IMR of 11.6 is already high compared to state and national levels, the disparity is even more pronounced when separated by race and ethnicity.[5] The IMR is 15.8 for the non-Hispanic Black population, compared to 5.1 for the non-Hispanic White population.[5] This means that in Milwaukee, Black infants are 3 times more likely to die within the first year of life than White infants. In 2016, 53.3% of homeless individuals were White, while 35.9% were Black.[11] Although the IMR has declined for all subgroups over the past several years, the decline has not been as pronounced for the Black population, leading to an ever-widening gap in racial health disparity in Milwaukee.[4] The disparity is evident across all metrics. For example, even when controlled for maternal education, the IMR is still higher in the Black population than the White population.[4] In fact, Black mothers with a college degree have a higher IMR than White mothers with less than a high school education.[4]

Project Aim

In an earlier study, the Health Advocacy in Pregnancy and Infancy (HAPI) group sought to identify unmet needs and challenges in the pregnancy experience of homeless women in Milwaukee.[12] This prior needs assessment led the HAPI group to develop 6 student-led service-learning modules seeking to address identified needs and deliver these modules at the Milwaukee Women's Center—a local homeless and emergency shelter for women and children—for the past 2 years. By improving access to relevant education regarding pregnancy and childcare, HAPI seeks to decrease infant mortality in this high-risk population. The current study aims to qualitatively identify the impact of these modules on the Milwaukee Women's Center community of women.

METHODS

This study was approved by the Medical College of Wisconsin Institutional Review Board (PRO00029920).

Program Description

The Health Advocacy in Pregnancy and Infancy (HAPI) program was conceived as a service-learning outreach program to benefit homeless pregnant women and their babies, while meeting the educational needs of medical students participating in the Urban and Community Health Pathway curriculum.[13] Under faculty supervision and based on a needs assessment published in 2018,[12] the HAPI team used reputable sources to develop the following modules to meet some of the identified needs: healthy cooking, mental health, healthy nutrition for mom and baby, infant care and safety, breastfeeding, and contraception. First-, second-, and third-year medical students were trained to lead selected sessions at the Milwaukee Women's Center. This site was chosen because of the longstanding relationship with the shelter, which had participated in the needs assessment.[12] Training consisted of an introductory module to the HAPI program, reviewing PowerPoints presentations specific to each teaching module, and shadowing experienced medical students for 2 to 3 sessions before leading a session independently.

Medical students led 60-minute sessions of their respective topics, with time for participants to complete comment cards and debriefing forms. Modules were staggered and held every 4 to 6 weeks, with 1 or 2 medical students leading each module. Sessions held between January 2018 and March 2020 were held in person at the Women's Center. The COVID-19 pandemic necessitated pausing these sessions, which resumed via Zoom from September 2020 to present. During in-person sessions, medical students shared PowerPoint presentations on their personal laptops. The Zoom sessions were set up by the shelter staff, with a tablet and speaker in a communal room for shelter residents to participate. No personal smartphones were used.

Participant Recruitment

Regardless of pregnancy status or ethnicity, all adult women living at the women's homeless shelter were invited to participate. Participants were informed that any forms completed would remain anonymous and the data was being used to assess the impact of the teaching sessions; participants provided verbal consent. Session dates and times were posted in the common living areas, and overhead announcements were provided at the time of the sessions. When the sessions transitioned to a virtual format, in addition to the fliers posted in the common living areas, the shelter staff personally recruited participants. To encourage attendance, all in-person modules were held after the shelter's curfew, and the medical students provided healthy snacks. Virtual sessions were held in early afternoon. Participants continued to receive health- and maternal-related incentives, which were delivered ahead of time. Participants were not tracked longitudinally, as participation was anonymous and women were usually limited to 4-week stays at the shelter; some did not have access to phones or internet outside of the shelter. However, the consistent times of the sessions allowed women to participate weekly if they chose.

Modules

Descriptions of modules, including content, format, and incentives, are listed in Table 1.

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Table 1. Description of Modules' Content, Format, and Incentives

Module	Content	Format	Incentive, Handouts and Materials
Breastfeeding	Participants' experiences with breastfeeding, benefits and challenges of nursing, and ways to overcome them	Discussion-based, complemented by PowerPoint presentation and a video of proper breastfeeding technique	All participants received a nursing cover and 1-page handout
Infant Care Safety	Multiple subtopics, including bathing and hot water, feeding (what should your baby eat?), do-it-yourself baby wipes, baby crying, infant development, baby rashes, sick baby, and what to expect at well-child visits. Infant safety included safe sleep, baby-proofig, choking, vaccines, and first aid	Presenters chose 3 subtopics but covered all topics on a rotating basis. Sessions were discussion-based, spending about 15 minutes/topic, and each subtopic was accompanied by PowerPoint visuals	All participants received a first-aid kit and 1-page handout
Mental Health	Postpartum depression and stress management	Discussion-based with PowerPoint presentation. First half of session reviewed postpartum depression and finding resources and support. Second half focused on individual signs of stress and stress management techniques	Participants received a 1-page handout and were led through a stress management activity of creating their own "stress sock," incorporating aromatherapy for use as a heating pad
Cooking	Healthy, affordable recipes for children and adults	Two medical students led 2-hour cooking sessions that involved making simple, affordable meals. Participants assembled ingredients, and while meal was cooking, students led discussion on how to incorporate healthy foods into everyday life	All participants received a steam basket and 1-page handout
Healthy Eating for Mom and Baby	Healthy, affordable baby food choices and healthy nutrition during pregnancy	Discussion-based with PowerPoint presentation. Medical students and participants discussed prior knowledge and concepts of healthy nutrition, and how to prepare healthy, cheap baby food from scratch.	All participants received a cook-book (Good and Cheap; eat well on $4/day), a vegetable peeler, and a 1-page handout
Contraception	Various contraception methods, including ease/frequency of use and effectiveness	Discussion-based with a PowerPoint presentation. Participants encouraged to ask questions and share experiences with different forms of birth control; also given opportunity to explore model IUDs, hormonal arm implant models, and condoms	All participants received condoms as an incentive to practice safe sex, a 1-page handout, and a Planned Parenthood brochure

Data Collection

Medical students distributed blank comment cards to all participants at the end of each in-person session. Participants were invited to share their impressions about the session; comment cards were left face down without identifiers. Due to varying literacy levels, the medical students also completed a voluntary verbal group debriefing at every session, asking all participants what they liked, disliked, how the sessions could be improved and, most importantly, what participants would do differently after attending a session. The medical students recorded the results of the debriefing conversations on a debriefing form document (Appendix). The debriefing forms and comments cards served as the source documents for this study.

Qualitative Data Analysis

We used descriptive content analysis and applied open coding strategies to analyze the comment cards and debriefing forms. Content analysis is a qualitative method used to identify the presence of themes within a data set. Our open-coding approach provided a systematic framework for our team to define concepts within our data and to lay the foundation to imply possible relationships to other codes. Four independent coders divided analysis among the 6 topics to generate a preliminary code list, which was determined to be knowledge, intention to change, and empowerment.[14,15] To achieve high interrater reliability, 3 additional coders reviewed the list and made suggested edits. The full research team then met to agree on the final code list and address any discrepancies, which was then reapplied to comment cards and debriefing forms. We also reviewed secondary findings by using the comment cards to assess participants' satisfaction with the program, including content and structure.

RESULTS

While the HAPI program is ongoing, this study encompasses 42 sessions attended by 141 participants. Participants included adult pregnant and postpartum mothers and all adult women interested in learning about pregnancy- and infant-related health. We identified 3 central and cross-cutting themes across all modulus: "Knowledge," "Intention to Change," and "Empowerment." "Knowledge" represents increased knowledge, understanding, or new skills gained by participants during a session. "Intention to Change" reflects behavioral changes the women were interested in implementing directly. "Empowerment" includes any indication

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Table 2. Description of Modules' Attendance and Representative Direct Comments for 3 Themes

Module	No. of Sessions	No. of Participants	Knowledge	Intention to Change	Empowerment
Breastfeeding	7	30	"Taught [me] what is not taught well in the hospital" "Taught [me] information about how to breastfeed" "Now I know about breastfeeding and how to place my breast in my child's mouth"	"Try to breastfeed in the future" "Feeling more confident about breastfeeding, especially in public" "Try to breastfeed for longer over time"	"Empowers women to breastfeed" "Educate other mothers about breastfeeding" "Tell friends about hard palate for latching" "Tell people it's healthier and cheaper"
Infant Care and Safety	8	20	"Tips on scenarios [were] easy to relate to real life." "Understandable and easy to remember"	"Read labels" "Take toys out of [the] crib" "Will babyproof more" "No smoking in house"	"Knew a lot of it already, but will be more confident that [I am] doing it right." "Feel I am able to ask questions [about infant safety]"
Mental Health	11	25	"Helpful tips" "Felt informed about symptoms" "Good to have [a conversation] about mental health signs and symptoms."	"Be aware next pregnancy" "Voice stress" "Change how I parent" "Deep breathing to try and relax" "[Use] stress socks to manage stress"	"Offer to help women that might be having postpartum depression" "Contacting a doctor for help with depression" "Enjoyed talking to one another about what relaxes me and relating to others about struggles/stress."
Cooking	2	8	"Educational" "Taught me something new" "I really learned a lot"	"Add some more different seasonings" "Will be trying different foods"	"I tried foods I've never heard of" "The session was very uplifting" "Inspiring"
Healthy Eating for Mom and Baby	7	36	"Learned about seasonal veggies and how to prepare them for babies" "Very direct on information containing different food to feed babies" "Learning what the baby can eat"	"Taking prenatal vitamins" "Not eating soft cheeses" "Prep own fruits and vegetables for self and kids "Purchase blender"	"Learning the proteins helped me for things to make to feed my baby" "Learned about proteins you can make yourself vs buying them premade"
Contraception	7	22	"Explained a lot of things about hormones" "I learned which ones [contraception] can be used for breastfeeding" "I learned a little more about the different options for birth control" "Handouts were smart, to the point but with details"	"Was going to get my tubes tied, now getting Nexplanon" "Now will use birth control while breastfeeding" "[Going to] try different birth control" "Going to get on birth control after pregnancy"	"It was well taught and plan to use the resources" "Talk to…daughters and grandkids about various birth controls and encourage them to be on one"

by the participants that they were considering larger life changes, planning to advocate for others in the future, and/or transferring newly acquired knowledge to those around them.

In the following sections, we describe each of these major themes in the context of each module. The quotes listed in Table 2 are representative of each theme.

Session Modules

Breastfeeding

The most frequent comments revolved around knowledge about proper breastfeeding technique (Table 3). Among the secondary findings are that participants enjoyed the sessions' conversational format, the video about breastfeeding, and the module leaders' efforts to answer questions.

Infant Care and Safety

The most frequent theme was intention to change, with participants reporting increased confidence with infant safety and implementing changes (Table 3). Participants also emphasized that the sessions reinforced basic safety principles in infant care and provided reassurance to experienced mothers.

Mental Health

The most frequent comments revolved around empowerment, with participants expressing motivation to talk to physicians and advocate for themselves and others with mental health challenges (Table 3). Secondary findings emphasized that participants enjoyed the sessions' conversation-based structure and talking to peers with similar experiences. Participants also planned to employ stress reduction practices, such as journaling and deep breathing.

Cooking Session

Comments most frequently centered around knowledge, with participants learning new ways to prepare food (Table 3). Secondary findings include the participants' enjoyment of hands-on food preparation.

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Table 3. Summary of comment card and debriefing form content grouped by theme.

Module	Knowledge	Intention to Change	Empowerment
Breastfeeding	11/21 comment cards focused on learning more information about the benefits and techniques of breastfeeding (ie, "very informative," "now I know about breastfeeding")	Participants in 4/7 sessions said that they would place the nipple further in babies' mouths for a better latch Participants in 2/7 sessions discussed breastfeeding with their next baby and breastfeeding longer	Participants in 7/11 sessions discussed encouraging their friends and family to breastfeed
Infant Care and Safety	4/7 comment cards focused on learning from this session (ie, "very helpful," "learned a lot," "session is educational")	Participants in 4/8 sessions discussed specific changes taught during the module they would implement in their lives (ie,"removing toys from crib," babyproofing")	Participants in 2/8 sessions discussed feeling more confident in their abilities to create a safe environment for their babies and asking others about what is safe for babies
Mental Health	5/9 comment cards focused on learning from this session (ie, "got useful information," "very informative," "clear facts, very helpful")	Participants in 4/11 sessions discussed implementing relaxation techniques in their life	Participants in 6/11 sessions discussed how they would speak up about their mental health with physicians, family, and friends Participants in 3/11 sessions discussed offering to help others who are struggling with mental health
Cooking	4/9 comment cards focused on learning from this session (ie, "educational," "very informative teachers taught me something new," "I learned a lot")	Participants in 2/2 sessions discussed implementing teaching points in their lives (ie, "adding some different seasonings" to vary meals, "trying different foods"	Participants in 2/2 sessions discussed how the cooking sessions were inspiring and uplifting
Healthy Eating for Mom and Baby	12/19 comment cards focused on learning from this session (ie, "learned about seasonal veggies and how to prepare them for babies," "learned a lot," "very informative"	Participants in 6/7 sessions discussed implementing teaching points in their lives (ie, "purchase blender [for baby food]," "boil veggies," "prep own fruits and vegetables for self and kids")	Participants in 2/7 sessions discussed that learning helped inspire them to make proteins for their babies themselves
Contraception	8/14 comment cards focused on learning from this session (ie, "very informative and helpful," "learned a little more about all the different options for birth control")	Participants in 4/7 sessions discussed implementing teaching points in their lives (ie, now will use birth control while breastfeeding," "try different birth control")	Participants in 2/7 sessions discussed teaching others about birth control and using the resources provided (information handouts, Planned Parenthood information)

Healthy Eating for Mom and Baby

The most frequent comments were that the session was "educational," and participants planned to change by including more proteins, fruits, and vegetables for themselves and their children (Table 3). Secondary findings include participants finding it useful that information was provided about every food discussed.

Contraception

The most frequent comments related to the clarity of understanding participants gained regarding contraceptive methods (Table 3), and secondary findings include how much participants enjoyed the module and its succinctness.

DISCUSSION

This study is an evaluation of a series of service-learning modules that were developed based on a community-engaged needs assessment that informed the creation of the Health Advocacy for Pregnancy and Infancy (HAPI) program, a novel shelter-based medical education program. Qualitative analysis of participant feedback revealed themes involving knowledge, intention to change, and empowerment as impact factors that participants experienced through this program. The results showed that these themes applied to all session modules.

Analysis of participant quotes showed not only that these themes were universal across session topics, but that there was a potential interplay between them. For instance, if new knowledge was gained by women, it appeared to influence their intent to change health behaviors. The intent to change, in turn, may empower the women to advocate for others because of their increased awareness and confidence in handling health issues relating to pregnancy and infancy. This interconnected model between themes represents the possibility of a deeper impact on participants.

Consideration of this interplay between knowledge, intention to change, and empowerment reflects and builds on adult learning theory. Merriam outlines that learning is a multidimensional process beyond simple "cognitive processing;" encouraging dialogue in addition to connecting new skills to an individual's unique context can facilitate learning and further "meaning-making."[16] The largely discussion-based nature of these modules provides a safe space for participants to engage in such dialogue. Furthermore, participant comments signaling an intention to change and subsequent empowerment to advocate for others portray a connection between knowledge gained and unique personal circumstances. While not all our participants were pregnant, some women expressed their intention to share gained knowledge with family members or friends who are pregnant. This transfer of

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knowledge reflects a function of empowerment to reach a wider audience.

The qualitative analysis shows that not only are these sessions providing the requested health education, but they are also promoting positive changes for individual women and their community. This level of knowledge transfer demonstrated by participants resonates with Paulo Freire's critical pedagogy work for adult learners. His theory brought attention to notions that adult learners can experience a breakthrough learning moment that leads to a critical consciousness of the topic, which prompts a desire in the learner to share that newfound knowledge with others.[17] Albeit self-report data, our findings consistently demonstrated that participants gained new knowledge with a readiness to identify ways to co-learn and support others in their learning of the same topics.

Beyond their connection to adult learning theory, our findings also can be considered in the context of social determinants of health. There are myriad factors that contribute to a higher IMR in the non-Hispanic Black population. Psychosocial factors, including ethnicity, socioeconomic status, cultural background, access to prenatal care, level of education, work status, and quality of relationships with partners and family, have been identified as determinants of stress during pregnancy.[18] Research has demonstrated that elevated levels of cortisol and adrenaline—the major stress hormones of the body—impact placental blood flow and blood pressure. These both contribute to premature and low-birthweight babies.[4] Another risk factor for infant mortality is limited access to prenatal care. African American mothers were twice as likely to delay prenatal care, mainly due to a lack of early insurance.[19] All of these factors contribute to health disparities in birth outcomes amongst different ethnic groups. By improving access to health education for homeless women who are particularly vulnerable to poor pregnancy outcomes, our team sought to leverage participants' newfound knowledge, behavior changes, and sense of empowerment to help address social determinants of health. This approach holds promise to positively affect infant mortality through implementation of similar health education modules in Milwaukee.

While this research does not investigate the impact of our program on IMR, the approach is in alignment with recommended strategies in the city of Milwaukee's Fetal Infant Mortality Review (FIMR).[4] For example, the FIMR report highlights recommendations for interventions to address the disparities in IMR, one of which is social support programs.[4] The HAPI program seeks to improve social support by providing health education to homeless women in Milwaukee, a group particularly vulnerable to poor pregnancy outcomes. Another important recommendation from the FIMR report is to promote reproductive life planning and contraception.[4] Feedback from our contraception module consistently demonstrated intention to change by more carefully reconsidering birth control options, as well as empowerment to teach family members. Finally, the FIMR report recommends promotion and integration of in-house health education and health promotion across community and service provider settings.[4] HAPI also aligns with other national health promotion programs. For example, HAPI promotes breastfeeding in a community setting, which is a scientifically supported intervention to increase breastfeeding rates and improve health outcomes.[20] As a health education program focused on maternal and infant well-being, HAPI aims to increase education at different perinatal stages, while also being community-engaged through our partnership with the Milwaukee Women's Center.

Limitations

Limitations of this study include a small sample size from a single site, which may limit the generalizability of this health education model. Although the modules were aimed at educating pregnant women and women with young children, they were open to all women at the shelter. As a result, the sample included women who were not pregnant or beyond childbearing age, making it difficult to discern if our target group of women experienced the same increase in knowledge, intention to change, and empowerment. We did not include a metric for assessing baseline knowledge of session topics prior to participation, which limits our understanding of knowledge gained from the session. Although our informational content was designed to be very easy to understand, low health literacy remains a limitation. Lastly, a part of our study occurred during the COVID-19 pandemic, which necessitated sessions being switched from in person to virtual. While we were able to complete verbal debriefings virtually, we were unable to collect comment cards.

Future Applications

This study demonstrates the importance of community-based health education as a strategy for empowering women to learn and use their newfound knowledge. Future directions include additional qualitative investigation to further explore the relationship between the identified themes and promotion of healthier choices during pregnancy. It would be interesting to quantify the impact of HAPI's partnership program on birth outcomes and IMR by longer-term follow-up. More community-based health education programs emphasizing similar themes and their interplay may experience comparable results and potentially have a positive impact on IMR.

CONCLUSIONS

A pregnancy and infant care education program for homeless women in Milwaukee has demonstrated success through participant-reported outcomes. Common themes were a reported knowledge gain, an intention to use that knowledge to change, and a feeling of empowerment. In alignment with adult learning theory, participants articulated a more profound understanding of

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pregnancy and postpartum health and a plan to share their new knowledge among their social networks, suggesting that similar education strategies may improve health outcomes on a broader scale. Additional investigation of the impact of community-based health education programs on infant mortality and health outcomes is warranted.

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Appendix: Available online at wmjonline.org.

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