Using Community Outreach Interventions to Reduce Maternal Motality in the United States: A Systematic Literature Review

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Abstract: The United States has battled maternal mortality unsuccessfully for decades. With maternal mortality rates continuing to rise, especially in rural or low-income communities, new strategies are needed to increase education, awareness, access, and equity. This systematic literature review aimed to determine if the use of community outreach interventions, targeting education and awareness, could lower maternal mortality in rural or low-income communities in the United States. A search was conducted using PubMed (including MEDLINE), CINAHL, and Web of Science academic databases following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. 18 articles were analyzed and categorized using established screening criteria. Five common themes emerged, which included (1) improvements in maternal health or maternal mortality rates; (2) increased education and/or awareness; (3) increased use/acceptance of preventative care; (4) positive impact on health equity; and (5) applicability in rural or low-income settings in the United States. The findings and results indicate that the use of community outreach interventions can reduce maternal mortality in rural or low-income areas. A multimodal health promotion tactic, community outreach can simultaneously address MMR reduction and improve maternal health through in-person, group, and virtual delivery settings, as supported by the systematic literature review results. Further research should be conducted on the topic of community outreach interventions as a method for maternal mortality reduction to build upon the evidence gathered in this review.

Keywords— Community outreach, maternal mortality, low-income, rural, maternal health, maternal education

1. INTRODUCTION

Maternal mortality represents a global health crisis [1]. On average, in 2017, 808 women died every day due to pregnancy or childbirth-related causes; most of these deaths were preventable and in developing countries [2]. However, maternal deaths are not isolated to only developing countries. The United States (US) maternal mortality rate (MMR) is at least double (17.4 deaths per 100,000 live births versus 8.7 or fewer deaths per 100,000 live births) the rate of comparable industrialized countries including France, Canada, the United Kingdom, Germany, and Poland [3]. Globally, maternal mortality data from 2017 is the most recent and will be used for the comparison between the US and other developed countries. However, in April of 2021, the Centers for Disease Control and Prevention (CDC) released the US MMR for 2019 [2]. The data showed that the US MMR jumped 2.7 points from 17.4 deaths per 100,000 live births to 20.1 deaths per 100,000 live births in two years, emphasizing the ongoing importance and relevance of finding sustainable and effective maternal mortality reduction programs within the US [4].

Prior to 2017, the US MMR saw a consistent decline from 1929 to 2002 due to advancements in medical practices and safety. After which, the MMR began to rise from a low of 7.1 deaths per 100,000 live births to a high of 20.1 deaths per 100,000 live births in 2019 [4, 5]. The change could result from the evolving reporting practices and standards for documenting maternal deaths, but it still represents an area of concern and weakness in the US healthcare system. Furthermore, racial and socioeconomic disparities in maternal deaths continue to highlight the growing need for further research and interventions, especially in underserved populations. According to the CDC, African American, American Indian, and Alaska Native women were two to three times more likely to die from pregnancy related causes [6]. Often the disparities stem from lack of access and equity in underserved populations. While causes of maternal mortality can vary based on both individual and environmental factors, on average, in the US, the most common causes in 2017 included: cardiovascular event/condition/complication (33.6%), embolism (15.1%), sepsis or infection (12.7%), hemorrhage (10.7%), cerebrovascular accidents (8.2%), anesthesia complications (0.4%), or other non-cardiovascular event/condition/complication (12.5%) [5].

One method to achieve a lower MMR might be to utilize community outreach interventions. Recent findings show positive support and outcomes for the use of community-based interventions to improve maternal health in low- and middle- income countries [7, 8, 9]. However, less is known regarding the effectiveness and benefits of community-based interventions, specifically targeting education and awareness, as a way to reduce maternal mortality rates in the US. Therefore, the purpose of this study is to conduct a systematic literature review to determine if community-based outreach interventions focused on maternal education and awareness can effectively reduce MMRs in rural or low-income communities in the US.
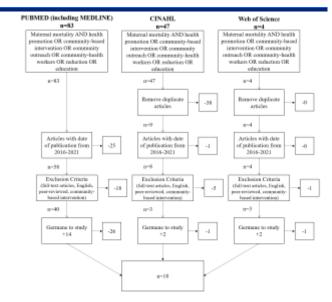
2. METHODS

Google Scholar was initially utilized to determine availability of literature related to the research topic, which could help in answering the research question. Does the use of community outreach interventions focused on maternal education and awareness effectively reduce MMRs in rural or low-income communities in the US? The study and literature review search followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [10]. In accordance with the PRISMA framework, after selecting the topic, PubMed (including MEDLINE), CINAHL, and Web of Science databases were utilized to conduct a thorough literature search [10]. MEDLINE was grouped with PubMed as PubMed searches yield results from the MEDLINE data; this was done to prevent repeat articles. A Boolean search was utilized to produce a broad range of articles related to the topic. During the search, various arrangements and combinations of the following keywords were used: maternal mortality, health promotion or community-based intervention or community outreach, community health workers, reduction, and education. The search was further filtered by using the geographic location option to differentiate between global and US-based studies. From the three academic databases, 134 articles were identified.

Exclusion Criteria

After collecting and organizing the 134 articles identified from PubMed (including MEDLINE), CINAHL, and Web of Science, a single-researcher review was conducted. Duplicate articles were identified (n = -38) and eliminated. Filters were then applied to exclude articles outside of the desired publication timeframe of 2016-2021 (n = -26). Any articles that (1) did not have full-text available, (2) had not been peer-reviewed, (3) were not written in English, and/or (4) did not focus on a community-based intervention were excluded (n = -24). After exclusion criteria had been applied, 46 articles remained (see figure 1).

This study is trying to determine the feasibility and potential effectiveness of community outreach interventions to reduce maternal mortality in US communities; only studies in the US or in countries with MMRs similar to the US (MMR greater than or equal to 31 deaths per 100,000 live births) were included. The rate of 31 deaths per 100,000 live births was selected as the exclusion point for this study as it represents the top 75 lowest MMRs in the world as of 2017 and has been determined to be in a comparable range with the US, which ranked 59th in 2017 [3]. With all exclusion criteria applied, 18 studies were determined by the researcher to be germane to the study (see figure 1).

Figure 1: Literature Review Process

3. RESULTS

The driving research question was, does the use of community outreach interventions focused on maternal education and awareness effectively reduce MMRs in rural or low-income communities in the US? A comprehensive literature review was conducted utilizing PubMed (including MEDLINE), CINAHL, and Web of Science. The authors used the PRISMA guidelines for systematic literature reviews during the search, selection, and analysis process to identify reputable and applicable academic articles [10]. Based on the data and information provided from the 134 articles identified, 18 articles were selected for further analysis given the relevancy to the stated research question.

After reviewing the data from the 18 articles, the authors carefully categorized the information presented into five common themes. Each theme directly related to the research question and was reported in an affinity matrix (Table 1) to determine rate of occurrence of the common themes in the established literature. The five common themes include: (a) programs aimed at increasing education or awareness of maternal mortality and/or maternal mortality risk factors, (b) increased usage and/or acceptance of professional medical care as a result of interventions/programs, (c) interventions resulted in a positive impact on improving health equity, (d) interventions led to a positive impact on reducing maternal mortality risk factors or general reduction of MMR in the study population, and (e) feasibility or usage in rural or low-income settings.

Table 1: Frequency of Occurrence in the Literature

Benefits	Occurrences	Instances of Attributes (n)	Percentage * (%)

Positive impact on reducing MMR or maternal mortality risk factors	12, 13, 15, 16, 17, 18, 19, 22, 24, 25, 26, 27, 28, 29	n = 14	78%
Increased education or awareness	12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29	n = 15	83%
Increased usage/acceptance of professional medical/preventative care	13, 15, 17, 19, 21, 22, 25, 26, 28	n = 9	50%
Positive impact on achieving health equity	12, 13, 14, 15, 16, 17, 20, 24, 25, 26, 28, 29	n = 12	67%
Feasibility or usage or application in rural or low-income settings	13, 14, 15, 16, 17, 19, 20, 21, 22, 24, 25, 26	n = 12	67%

*Percentages rounded to nearest whole number

From the research findings, 78% of articles provided documented evidence of reduced MMRs or maternal mortality risk factors [12, 13, 15, 16, 17, 18, 19, 22, 24, 25, 26, 27, 28, 29]. 83% of the articles addressed increasing education and/or awareness as a method for reducing MMRs [12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29]. 50% of the analyzed articles increased usage and/or acceptance of professional medical care as part of the intervention method [13, 15, 17, 19, 21, 22, 25, 26, 28]. The data also showed that 67% of the articles displayed improved health equity in the sample population [12, 13, 14, 15, 16, 17, 20, 24, 25, 26, 28, 29]. Finally, 67% of articles were concentrated or exhibited feasibility of use in rural or low-income settings [13, 14, 15, 16, 17, 19, 20, 21, 22, 24, 25, 26].

4. DISCUSSION

Maternal mortality continues to be a crisis in the health care industry, with more than 20 maternal deaths per 100,000 live births in the US alone [4]. Racial differences in maternal mortality rates between African American women and Caucasian women has become more pronounced in recent years, bringing attention to the need for solutions to address health inequities in maternal health. The systematic review aimed to determine if community-based outreach interventions focused on maternal education and awareness can effectively reduce MMRs in rural or low-income communities in the US. From the research, five themes emerged, as detailed in Table 2. The five themes support the postulation that community outreach interventions can positively influence maternal mortality rates, especially in low-income or rural areas.

Initial findings show substantial support for the use of community outreach interventions as a method for reducing maternal mortality in the US. A significant percentage (78%) of the articles located reported a reduction in MMRs or maternal mortality risk factors from the use of community outreach interventions [12, 13, 15, 16, 17, 18, 19, 22, 24, 25, 26, 27, 28, 29]. California was able to reduce their MMR by over 50%, and Florida recorded a 3.9% decrease in MMRs in African American mothers. At the same time, programs in Ohio, Wyoming, Pennsylvania, and New Jersey, reported notable improvements in maternal mortality risk factors [12, 16, 13, 22, 24, 27].

Several authors documented the positive impact increasing maternal education or awareness had on improving maternal mortality, maternal health, or maternal risk factors [12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29]. The delivery of education and awareness materials varied, including using recurring group and individual sessions, continuous use of interactive mobile applications, and one-time use mobile trainings. The primary focus of the information was on nutrition, mental health, infant safety, prenatal care, and antenatal care. Programs demonstrating the most prolonged success utilized a recurring method for education delivery, such as Gabbe et al. [13] who concluded that a recurring group education intervention significantly improved psychosocial outcomes. Most participants agreed or strongly agreed that the program contributed to improved maternal health [13]. Participants in the Mackert et al. [23] program reported increased education, but it was viewed as a one-time use process with minimal long-term effects.

Part of increasing education and reducing maternal mortality is increasing prenatal and antenatal care visits and improving general acceptance of medical care. The WHO recommends women receive eight prenatal and antenatal care visits for optimal health outcomes for both the mother and baby [30]. However, lack of trust, access, and health equity continue to present as barriers in achieving the WHO's goal for maternal care visits. Several studies recognized the importance of improving acceptance and use of professional medical care [13, 15, 17, 19, 21, 22, 25, 26, 28], and 67% of the studies worked to improve health equity [13, 14, 15, 16, 17, 19, 20, 21, 22, 24, 25, 26]. Bush, Barlow, Echols, Wilkerson, and Bellevin [22] found mobile applications can increase the frequency of prenatal care visits by nearly 13% compared to non-users of the applications; Dixon-Shambley and Gabbe [15] and Ahn et al. [29] found the use of telehealth programs to be a cost-effective way to address lack of access.

Crucial to this discussion is determining the applicability of community outreach interventions in rural and low-income areas as they continue to be the hardest hit by the maternal mortality crisis. Jacobson, Zackula, Redmond, Duong, and Collins [20] reported that mothers in rural and low-income living situations are subject to higher levels of maternal mortality compared to women in urban or higher-income settings. Therefore, potentially applicable studies to reduce

MMRs in these areas should concentrate on these populations to ensure viability. Out of the 12 articles that have shown the potential to be successful in rural or low-income areas to impact MMRs or maternal risk factors, 10 resulted in a reduction in MMR or maternal mortality risk factors [13, 15, 16, 17, 19, 20, 22, 24, 25, 26]. The review results conclude that community outreach interventions using education or awareness can improve upon MMRs in low-income or rural areas.

While not directly related to the research question, the evidence supporting the use of maternal support groups and public/private collaborations should not go undiscussed. 39% of the identified articles utilized a form of pregnancy or maternal support group to help increase maternal education, provide links to community resources, and address maternal risk factors such as food insecurities, stress, and substance use [13, 15, 16, 20, 21, 24, 29]. Additionally, 67% of articles used collaborative efforts between public entities and private organizations [12, 13, 15, 17, 18, 19, 20, 21, 22]. Using a collaborative approach was often linked to increased use of primary or preventative care, which can help to reduce maternal mortality risk [13, 15, 17, 19, 21, 23]. Both observations represent an area for potential future research to determine their effectiveness at reducing MMRs.

4.1 Limitations

Despite the results above, this review is not without limitations. Potential limitations of the systematic literature review may include (a) time constraints, (b) article search and selection strategies, (c) the exclusion of non-English language articles, (d) limited information on the use of community-based interventions outside of developing countries and, (e) the subjective nature of the reviewers. The search and literature review was limited to a 12-week timeframe. Search and selection strategies included using a Boolean search, guided by specific keywords and language limitations. It is plausible that articles may have been missed that could provide additional insight given the process that the authors followed. The concept of using community outreach interventions to reduce maternal mortality in the US has limited availability of research and recommendations compared to developing countries whose MMR is above the exclusion point for this review (greater than 31 MMR). While the review utilized a two-reviewer process with a Kappa score of 1.00, there is still the potential for reviewer subjectivity regarding interpreting the results.

To reduce the impact of the above limitations, the author followed the PRISMA guidelines and protocols for systematic literature reviews [10]. A saturated search was gathered from PubMed (including MEDLINE), Web of Science, and CINHAL. Articles were carefully read and analyzed for alignment with the research question. To prevent reviewer bias and reduce the effect of the limitations, two independent researchers reviewed the articles to determine the Kappa coefficient, which demonstrated an almost perfect agreement. Aside from the potential limitations, the results showed overwhelming support and positive outcomes associated with the use of community outreach interventions to reduce maternal mortality in rural or low-income communities in the US.

4.2 Future Research

Future researchers can use the results of this study to expand upon the current knowledge regarding MMR reduction interventions in the US. Further experimental research studies are needed to fully understand the impact of community outreach interventions on MMRs in the US. Especially in low-income or rural areas that lack proper access to health care services. The relation between maternal support groups and MMR reduction and public/private collaborations to reduce MMRs, also present areas warranting further investigation to determine if there is a significant relationship between the variables.

5. CONCLUSION

Community outreach interventions targeting education and awareness in rural or low-income communities, present a feasible solution for reducing the US MMR. A multimodal health promotion tactic, community outreach can simultaneously address MMR reduction and improve maternal health through in-person, group, and virtual delivery settings, as supported by the systematic literature review results. The review has shown a clear alignment between community-outreach, maternal mortality reduction, and health promotion practices. The alignment allows for both preventative and reactive approaches to be deployed to a specific population to improve access, equity, and resources in rural or low-income areas, which have the ability to reduce MMRs at community and national levels. The authors suggest further research be conducted on community outreach programs in rural or low-income communities in the US as a method for reducing MMRs to build upon the results gathered from this review.

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