

The Health Education Models in Reducing Child Mortality Rate of Vulnerable Communities

Model Pendidikan Kesehatan dalam Menurunkan Angka Kematian Anak pada Masyarakat Rentan

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ABSTRACT

Culturally adapted health education plays a crucial role in reducing child mortality in vulnerable communities with diverse cultural backgrounds. This article conducts a systematic review of existing literature to evaluate the effectiveness of health education models adapted to local cultural contexts. Through a systematic literature review approach, this research identifies and synthesizes scientific evidence regarding the impact of cultural adaptation models on child health outcomes. Key findings show that interventions that take into account community-specific cultural values and practices have a significant positive impact on reducing child mortality. However, the effectiveness of this model is highly dependent on the extent to which cultural elements are integrated in health education strategies and implementation contexts. This article provides practical implications for policy makers, health practitioners, and researchers, and identifies research gaps that need further exploration. Recommendations for future research include longitudinal studies, broader context-based research, and integration of qualitative methods to increase understanding of cultural adaptation in health education.

Keywords: Health Education, Cultural Adaptation, Child Mortality Rates, Vulnerable Communities, Systematic Literature Review, Health Interventions.

ABSTRAK

Pendidikan kesehatan yang diadaptasi secara budaya memainkan peran krusial dalam mengurangi angka kematian anak di komunitas rentan dengan latar belakang budaya yang beragam. Artikel ini melakukan tinjauan sistematis terhadap literatur yang ada untuk mengevaluasi efektivitas model pendidikan kesehatan yang disesuaikan dengan konteks budaya lokal. Melalui pendekatan *systematic literature review*, penelitian ini mengidentifikasi dan mensintesis bukti ilmiah terkait dampak model-model adaptasi budaya terhadap hasil kesehatan anak. Temuan utama menunjukkan bahwa intervensi yang memperhitungkan nilai-nilai dan praktik budaya spesifik komunitas memiliki dampak positif yang signifikan terhadap penurunan angka kematian anak. Namun, efektivitas model ini sangat bergantung pada sejauh mana elemen budaya diintegrasikan dalam strategi pendidikan kesehatan dan konteks implementasi. Artikel ini memberikan implikasi praktis bagi pengambil kebijakan, praktisi kesehatan, dan peneliti, serta mengidentifikasi celah penelitian yang perlu dijelajahi lebih lanjut. Rekomendasi untuk penelitian masa depan mencakup studi longitudinal, penelitian berbasis konteks yang lebih luas, dan integrasi metode kualitatif untuk meningkatkan pemahaman tentang adaptasi budaya dalam pendidikan kesehatan.

Kata Kunci: Pendidikan Kesehatan, Adaptasi Budaya, Angka Kematian Anak, Komunitas Rentan, Systematic Literature Review, Intervensi Kesehatan.

1. Introduction

Health education is increasingly recognized as a crucial intervention in reducing child mortality, especially in vulnerable communities facing geographic, social and economic isolation. These communities often face challenges in the form of limited access to health services and a lack of knowledge about safe health practices, which worsen child mortality

rates. Research shows that culturally adapted health education programs can significantly improve health outcomes by addressing these barriers. For example, emphasizing that adapting evidence-based interventions to fit the cultural context of underserved populations can improve health equity and effectiveness, as culturally relevant programs are more likely to be accepted and used by community members (Schoenberg et al., 2022). Additionally, studies have shown that maternal education is an important determinant of child health, with higher levels of education correlating with lower child mortality rates (Bedada, 2017; Kanmiki et al., 2014). This relationship highlights the importance of integrating educational components in health interventions aimed at mothers in these communities.

Implementing health education in a multicultural environment faces unique challenges. Every community has cultural values and beliefs that influence their perceptions of health and medical care. Without a theoretical basis for cultural adaptation, health promotion programs may fail to resonate with the target population, leading to ineffective outcomes (Wang-Schweig et al., 2014). Additionally, cultural adjustments in interventions not only increase engagement and compliance but also improve overall health outcomes by making health messages more relevant to the daily lives of the community (Sidani et al., 2017). The need for culturally sensitive approaches is further supported by research showing that interventions that respect and integrate local cultural dimensions are more successful in achieving their health goals (McCrary & Royer, 2011). Cultural adaptation of health interventions is critical to foster community acceptance and ensure the relevance of health messages. For example, research shows that maternal education significantly influences child mortality rates, suggesting that educational interventions tailored to cultural contexts can improve health outcomes (Kanmiki et al., 2014). In addition, the integration of local cultural values in health education programs can bridge the gap between modern medical knowledge and traditional practices, thereby increasing the effectiveness of such programs (Balci et al., 2020). As noted by Balci et al. (2020), systematic modification of evidence-based practices to align with cultural patterns and values is critical to improving the appropriateness of health interventions for specific populations. This cultural adaptation not only increases the reach and effectiveness of health programs but also fosters a collaborative environment between health care providers and communities (Ward et al., 2022). In conclusion, the development and implementation of culturally adaptive health education models is critical to reducing child mortality in vulnerable communities. By systematically reviewing the existing literature on cultural adaptation, this study aims to identify best practices and inform future policies that increase the effectiveness and inclusiveness of health interventions. Evidence suggests that culturally sensitive health education strategies can significantly contribute to achieving broader global health goals, including substantial reductions in child mortality.

The research questions in this study are: How do culturally adapted health education models influence child mortality rates in vulnerable communities with diverse cultural backgrounds? This research question aims to explore how health education models adapted to local cultural contexts can influence child mortality rates in vulnerable communities. This research focuses on identifying and evaluating health education models that have been adapted to take into account cultural diversity and how these adaptations impact the effectiveness of interventions in reducing child mortality.

In this context, some aspects to consider include:

1. Cultural Adaptation in Health Education Models: How can health education models be adapted to local cultural norms, values, and beliefs? What cultural elements are integrated in the model to increase its relevance and acceptance by the target community?
2. Methods and Approaches Used: What methods and approaches are used in adapting health education models for different cultures? How do these strategies differ among communities with different cultural backgrounds?

3. **Intervention Effectiveness:** How does cultural adaptation impact child health outcomes? Is there evidence that cultural adaptations in health education models can significantly reduce child mortality compared with unadapted models?
4. **Factors Influencing Success:** What factors influence the success of culturally adapted health education models in vulnerable community contexts? How do social, economic, and environmental contexts play a role in determining the effectiveness of this model?
5. **Gaps and Opportunities:** What are the gaps in the existing literature related to culture-based health education models? What are the opportunities for further research and development in increasing the effectiveness of health interventions to reduce child mortality in vulnerable communities?

By exploring these questions, this study aims to provide a deeper understanding of the relationship between cultural adaptations in health education and child health outcomes, as well as to identify best practices that can be implemented across communities with diverse cultural backgrounds.

This research aims to identify and synthesize scientific evidence regarding the effectiveness of culturally adapted health education models in reducing child mortality rates in vulnerable communities. Facing the challenge of reducing child mortality rates in vulnerable communities, it is critical to understand how culturally adapted health education models can play a role in achieving significant results. The primary aim of this research is to explore and gather scientific evidence supporting the effectiveness of these models in culturally diverse contexts. This includes a thorough analysis of studies that examine how adapting health education to local cultural values and practices can influence child health outcomes.

To achieve this goal, this research will take several key steps:

1. **Identify Culturally Adapted Health Education Models:** Compile a list and explore various health education models that have been implemented with cultural adaptations in vulnerable communities. This includes evaluation of specific components adapted to meet local cultural needs.
2. **Synthesis of Scientific Evidence:** Collect and analyze evidence from relevant studies to understand the impact of culture-based health education models on child mortality rates. This process involves critically assessing the quality and relevance of existing studies, as well as identifying patterns and consistent findings among studies.
3. **Effectiveness Evaluation:** Assess the extent to which culturally adapted health education models are successful in reducing child mortality compared with unadapted models. This includes an analysis of the results reported in the studies reviewed, as well as the factors that contributed to the success or failure of the models.
4. **Introduction to Contextual Factors:** Examines how contextual factors such as cultural background, socio-economic conditions, and community structure influence the effectiveness of adapted health education models. Understanding the interactions between educational models and local contexts will provide additional insight into ways to improve implementation and outcomes of culturally based health programs.

By achieving this goal, it is hoped that this research can make a significant contribution to the development of health education strategies that are more effective and appropriate to the needs of vulnerable communities. In addition, the results of this research are expected to provide useful recommendations for policy makers, health practitioners and researchers to design more inclusive and adaptive health interventions, which in turn can help in reducing child mortality rates globally.

2. Method

2.1 Research Design

This research uses a systematic literature review approach to examine existing literature regarding the effectiveness of culturally adapted health education models in reducing

child mortality rates in vulnerable communities. This approach was chosen for its ability to systematically collate, assess, and synthesize evidence from a wide range of relevant studies, enabling the identification of patterns and consistent findings across studies. This systematization involves structured steps starting from literature search, study selection, quality evaluation, to analysis and synthesis of results.

2.1 Inclusion and Exclusion Criteria

To ensure that only relevant and high-quality studies were included in this literature review, the following inclusion and exclusion criteria were applied:

2.1.1 Inclusion Criteria:

1. Study Focus: Studies examining health education interventions in vulnerable communities with an emphasis on cultural adaptation. This includes research evaluating how cultural adjustments in health education models influence child health outcomes.
2. Publication Type: Articles published in peer-reviewed journals. These journals must meet high academic standards and involve a rigorous peer review process.
3. Publication Language: Articles published in English to ensure accessibility and broad understanding.
4. Time Limitation: Studies published within the last 10-15 years, to ensure that the data reviewed is up-to-date and relevant to the current context.

2.1.2 Exclusion Criteria:

1. Study Type: Studies that did not focus on health education or did not address cultural adaptations in health interventions. This includes articles that only discuss other aspects of children's health without cultural adjustments.
2. Publication Quality: Articles that have not gone through a peer-review process or that are published in publications that are not indexed in leading academic databases.
3. Publication Language: Articles published in languages other than English, due to limitations in assessing and understanding literature in other languages.
4. Publication Date: Studies published before the established deadline (more than 15 years ago) to maintain the relevance and completeness of the information.

2.1.3 Literature Search and Selection Procedures

The literature search process will be carried out through major academic databases such as PubMed, Scopus, and Google Scholar. The search will use a combination of relevant keywords and phrases, such as "culturally adapted health education", "child mortality reduction", "vulnerable communities", and "systematic review".

Identified articles will be examined based on title and abstract to determine initial relevance. Furthermore, articles that meet the inclusion criteria will be further evaluated through full reading to ensure compliance with the research criteria. Each article will be assessed based on methodological quality and relevance of findings to the research question.

2.2 Data Analysis and Synthesis

Data from selected studies will be analyzed to identify patterns, themes, and key findings regarding the effectiveness of culturally adapted health education models. The analysis will include an evaluation of the types of cultural adaptations implemented, methods of evaluating results, and their impact on child mortality rates. Data synthesis will be carried out using meta-analysis techniques where possible, or a narrative approach to organize existing findings comprehensively. The results of this analysis will provide a clear picture of the success

of culturally based health education models in reducing child mortality and will offer recommendations for future practice and research.

2.2.1 Data Sources and Search Strategy

Database Used:

1. PubMed: This database will be used because of its broad coverage in the health and medical fields. PubMed provides access to peer-reviewed articles from a variety of high-quality medical and health journals.
2. Scopus: This database was chosen because of its ability to provide information about international and interdisciplinary scientific journals. Scopus also offers analysis tools to evaluate research trends.
3. Web of Science: This database is used to access journals that are widely indexed and cover various research fields. Web of Science helps in finding articles that have had a significant impact in the field.

2.2.2 Keywords Used in Searches

A literature search will be conducted using a combination of relevant keywords and phrases to ensure comprehensive results. Keywords used include:

1. "Culturally adapted health education"
2. "Child mortality reduction"
3. "Vulnerable communities"
4. "Cultural adaptation in health interventions"
5. "Health education models"
6. "Effectiveness of health education"
7. "Cross-cultural health education"
8. "Community-based health interventions"

These keyword combinations will be used in various variations and Boolean combinations (AND, OR, NOT) to expand or narrow search results as needed.

2.3 Article Selection Process

1. Selection Based on Title and Abstract:
 - a. Initial Screening: Articles identified through the initial search will be screened against the title and abstract to determine relevance to the research question. Articles that clearly do not fit the research focus, such as those that do not discuss cultural adaptation in health education or do not relate to vulnerable communities, will be filtered out.
 - b. Acceptance Criteria: Articles that meet the initial criteria will be forwarded for further evaluation. Inclusion criteria such as a focus on culturally adapted health education and relevance to vulnerable communities will be considered.
2. Selection Based on Full Text:
 - a. Quality Evaluation: Articles that pass the initial screening will be read in full to assess methodological quality and relevance to the research objectives. Articles will be assessed based on research design, methods used, and findings.
 - b. Compliance with Criteria: Only articles that meet full inclusion criteria, including those published in peer-reviewed and English-language journals within the last 10-15 years, will be included in the literature review.
 - c. Assessment of Bias and Validity: Articles will be evaluated for potential bias and the internal and external validity of the study. This is important to ensure that the synthesized results are representative and reliable.

This selection process is designed to ensure that only the most relevant and high-quality studies are included in the literature review. With this approach, this study aims to

provide an accurate and in-depth synthesis of the effectiveness of culturally adapted health education models in reducing child mortality in vulnerable communities.

2.4 Data Collection and Analysis Process

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines will be implemented to ensure the data selection and extraction process is carried out with transparency and consistency. Implementing the PRISMA guidelines involves several key steps:

1. Study Identification:
 - a. Reference Recording and Management: All relevant articles identified through database searches will be recorded and managed using reference management software, such as EndNote or Zotero. This ensures that all references are well organized and makes literature management easier.
2. Study Selection:
 - a. Layered Screening: Identified articles will go through a multi-layered screening process. First, the title and abstract were checked to assess initial relevance, followed by a full evaluation of the article text to ensure compliance with inclusion criteria.
 - b. Screening and Criteria: The selection process will be carried out independently by two researchers to reduce bias. Disagreements in selection decisions will be resolved through discussion or involving a third researcher as a mediator.
3. Data Extraction:
 - a. Information Collection: Relevant data from each selected article will be extracted using the data extraction form that has been developed. Information collected includes: health education methods used, elements of cultural adaptation, community context, outcomes measured, and effects on child mortality rates.
 - b. Verification and Validation: Data extraction will be carried out by two researchers independently to ensure accuracy and consistency. The extracted data will be verified through cross-checking and confirmation with the source article if necessary.

2.5 Techniques for Synthesis of Findings from Multiple Studies

Once the data is collected, appropriate synthesis techniques will be applied to analyze and present the findings of the various studies. Synthesis techniques include:

1. Qualitative Synthesis:
 - a. Grouping of Findings: Data from different studies will be grouped based on key themes and categories relevant to the research questions. This includes analysis of elements of cultural adaptation and their impact on child health outcomes.
 - b. Thematic Analysis: Thematic analysis will be used to identify consistent patterns and themes among existing studies. Emphasis will be placed on findings about the ways in which cultural adaptation influences the effectiveness of health education models.
2. Quantitative Synthesis (If Available):
 - a. Meta-Analysis: If quantitative data from selected studies is possible, a meta-analysis will be conducted to measure the combined effect of culturally adapted health education models on child mortality rates. This involves calculation of effect sizes and heterogeneity analysis.

- b. Descriptive Statistics: For studies that cannot be integrated in a meta-analysis, descriptive statistics will be used to present a summary of the data, including the frequency and proportion of outcomes reported.
3. Narrative Analysis:
 - a. Narrative Synthesis: For studies where results cannot be combined quantitatively, narrative analysis will be used to describe and discuss findings in detail. This includes interpreting study results in the context of a culture-based health education model.
4. Quality Assessment and Bias:
 - a. Study Quality Evaluation: Each included study will be evaluated for methodological quality using appropriate quality assessment tools. This assessment will help in assessing the reliability and validity of the findings presented.
 - b. Publication Bias Considerations: Potential publication bias will be considered by evaluating the distribution of positive and negative results among existing studies.

By applying PRISMA guidelines and systematic synthesis techniques, this study aims to present a comprehensive and objective analysis of the effectiveness of culturally adapted health education models in reducing child mortality in vulnerable communities.

3. Results

In this systematic literature review, a number of selected studies have been analyzed to evaluate the effectiveness of culturally adapted health education models in reducing child mortality rates in vulnerable communities. Based on a strict selection process, a total of 57 articles have been included in this review.

3.1 Main Characteristics of the Study:

1. Study Design: The included studies varied in research design, including experimental studies, cohort studies, case-control studies, and program evaluations.
2. Location and Population: The studies cover various geographical locations and communities with different cultural backgrounds, such as indigenous communities, rural communities, and ethnic minority groups in various countries.
3. Health Education Methods: The health education models evaluated include a variety of methods, from community-based training and health education, to technology-based educational materials adapted to local cultural needs.
4. Measured Results: The studies measured a variety of outcomes, including reduced child mortality, increased health literacy, behavioral changes, and adherence to health interventions.

3.2 Categories of Culturally Adapted Health Education Models

Culturally adapted health education models are an important element in addressing the diverse needs of communities. These models can be categorized into several main types: community-based models, technology-based models, formal and informal education models, and cultural adaptation models. Each category implements unique strategies to improve health education while respecting the local cultural context.

3.3 Community Based Model

Plays a crucial role in delivering appropriate health education to local populations. One effective approach is Local Training and Counseling, where community leaders and local health workers are trained to provide culturally relevant health information. This method has been shown to improve community engagement and health outcomes by aligning health messages

with local cultural norms (Alves, 2023). Besides that, Use of Local Media, such as community radio and culturally adapted posters, have proven effective in increasing awareness and understanding of health issues. These media initiatives can significantly increase community participation and knowledge dissemination (Didarloo et al., 2016).

Technology Based Model leveraging digital innovation to reach a wider audience. Use Digital Applications and Platforms adapted to the local language and cultural context allows for the delivery of interactive and easily accessible health information. Studies show that mobile health applications can significantly improve health literacy and self-management among users, especially in chronic disease management (Martin et al., 2020; Setyowati, 2023). Even farther, Telemedicine and Remote Consultation has emerged as an important tool in providing health services in remote areas, ensuring that cultural adaptation is integrated in the delivery of care. This approach not only improves access to health services but also increases patient satisfaction and adherence to treatment (Heffner & Mull, 2017).

In the realm of Formal and Informal Education Models, development Curriculum and Education Modules that integrate local cultural values is very important. Adapted health education curricula in schools can encourage a deeper understanding of health issues among students, promoting healthy behavior from an early age (Decker et al., 2022). Approach Family Based is another effective strategy, which emphasizes family involvement in health education. This model recognizes the influence of family norms and customs on health behavior, thereby facilitating more effective behavior change interventions (Lee et al., 2022). Model Cultural Adaptation focuses on ensuring that health education content is relevant and acceptable to the community. Content Adaptation involves modifying health messages to reflect traditional practices and beliefs, which can increase the effectiveness of health interventions (Widman et al., 2018). Besides that, Cultural Participation emphasizes the active involvement of community members in designing and implementing health education programs. This participatory approach not only ensures that interventions are culturally relevant but also fosters a sense of ownership and commitment among community members (Carroll et al., 2017). In conclusion, culturally adapted health education models encompass a variety of strategies that are critical for addressing the health needs of diverse populations. By integrating community engagement, technology, educational frameworks, and cultural relevance, these models can significantly improve health outcomes and promote sustainable health practices.

3.4 Key Findings

The findings of this review indicate that cultural adaptation in health education models is critical to increasing community acceptance and participation in health programs, which can have a significant impact on reducing child mortality rates. Evidence suggests that when health education models are adapted to local cultural contexts, they tend to be more effective. For example, the Health Extension Program (HEP) in Ethiopia has been proven to reduce the mortality rate of children under five years old by increasing awareness of preventive and curative health services among mothers who participate as model families in the program (Zelege, 2022; Tadesse, 2021). This emphasizes the importance of culturally sensitive health interventions that align with community values and practices.

Additionally, maternal education plays an important role in child health outcomes. Research shows that mothers with higher levels of education are more likely to engage in health-promoting behaviors, such as ensuring regular health check-ups and vaccinations for their children (Panda & Sarangi, 2023; Iddrisu et al., 2020; Patel & Olickal, 2021). The relationship between maternal education and child mortality has been well documented, with findings suggesting that educated mothers are better able to make informed health decisions, which directly contributes to reduced child mortality (Hossain et al., 2015; Aheto, 2019; Woldeamanuel, 2019). This relationship highlights the need to integrate educational components into health programs to empower mothers and improve child survival.

Furthermore, the effectiveness of health interventions can vary greatly based on how well they are adapted to local needs and cultural context. For example, a systematic review highlighted that culturally tailored health education initiatives were more likely to be successful in reducing child mortality in vulnerable communities (Mensch et al., 2019). This suggests that future research should focus on developing and evaluating health education models that are not only evidence-based but also culturally relevant, ensuring that they meet the specific needs and preferences of the target population. In conclusion, adaptation of health education models to local cultural contexts, combined with an emphasis on maternal education, can result in improved child health outcomes. These findings provide a strong basis for further research aimed at refining health education strategies to maximize their effectiveness in reducing child mortality in various communities.

3.5 Key Findings

3.5.1 Effectiveness of Various Culturally Adapted Health Education Models in Reducing Child Mortality Rates

Culturally adapted health education models have demonstrated significant effectiveness in reducing child mortality, especially in vulnerable communities. This model utilizes community-based strategies, technology, and formal and informal educational approaches to increase health literacy and encourage behavioral changes that are critical to improving children's health.

1. **Community Based Model:** is one of the most effective strategies involving local training and education initiatives. Programs that train local health workers and engage community members in health education have shown positive results in increasing health literacy and promoting important health practices. For example, research shows that community-based education significantly increases understanding of health issues and encourages behavior change, which is critical for reducing child mortality (Lin & Lou, 2020). Additionally, the use of local media, such as radio broadcasts and culturally relevant posters, has proven effective in disseminating health information. This approach not only reaches a wider audience but also amplifies health messages in a relevant cultural context, thereby increasing their impact (AlAli et al., 2023).
2. **Technology-Based Model:** has also emerged as a powerful tool in the integration of digital technology into health education. Health apps adapted to local languages and cultural contexts facilitate easier access to health information, especially in remote areas. Research shows that such digital platforms can significantly improve health monitoring and education, contributing to reduced child mortality (Wies et al., 2021). Telemedicine programs tailored to local cultures further increase access to quality healthcare, strengthening trust and engagement in the community. This program allows consultation with health professionals who understand local cultural nuances, thereby increasing the effectiveness of health service delivery (Scott et al., 2015).
3. **Culturally adapted Formal and Informal Education Models:** in school curricula have been shown to positively influence health literacy among students and their families. Educational materials that align with local cultural norms and values facilitate better understanding and adherence to health practices (Areemit et al., 2020). Additionally, family-based approaches involving the entire family in health education have shown success in increasing adherence to health practices. When educational materials are tailored to families' cultural beliefs, they are more likely to engage in health-promoting behaviors, which is critical for reducing child mortality (Hollis et al., 2016).

Overall, the effectiveness of culturally adapted health education models in reducing child mortality is seen through a variety of community-based, technological, and educational

strategies. These models not only increase health literacy but also encourage behavioral changes that are important for improving child health outcomes in vulnerable populations.

3.5.2 Factors that Support or Inhibit Intervention Success

The success of health education interventions is influenced by various factors that can support or hinder their implementation. Understanding these factors is critical to designing effective programs that meet the specific needs of each community.

1. **Community Engagement:** Active participation of community members in the design and implementation of health education programs has been proven to increase the success of interventions. Involvement of the local population ensures that the intervention conforms to local cultural norms and values, thereby increasing its relevance and acceptability. Bender et al. (2014) emphasize that community involvement increases the effectiveness of interventions and ensures their conformity to evidence-based guidelines adapted to the local context. Tomas (2022) also highlights that experiential learning in community service has a positive impact on students and encourages a sense of responsibility, which in turn can translate into more effective health interventions.
2. **Culturally Appropriate Adaptation:** Adaptation of educational materials to reflect local cultural practices is critical to increasing program acceptability and effectiveness. Schoenberg et al. (2022) stated that culturally and contextually adapted interventions are more likely to be successful because they align with the beliefs and practices of the target population. Kwon et al. (2022) also support this idea, pointing out that cultural adaptation involves modifying interventions to fit community-specific values and practices, which is important for encouraging engagement and achieving desired health outcomes.

3.5.3 Factors Inhibiting Intervention Success

1. **Resource Limitations:** A shortage of trained health personnel and inadequate infrastructure are significant obstacles to the implementation of health education programs. Douthit et al. (2015) discussed how rural areas often experience a shortage of healthcare providers, which limits access to necessary health services and educational programs. This lack of resources can lead to ineffective program implementation and reduced health outcomes. Hamidzadeh et al. (2019) also highlight that challenges at the local level, including inadequate health education efforts, exacerbate these resource limitations, making it difficult to implement effective interventions in rural areas.
2. **Cultural Resistance:** Cultural resistance can also hinder the success of health interventions, especially when those interventions conflict with traditional practices or beliefs. Chowdhary et al. (2014) note that interventions deemed incompatible with local customs may face significant resistance, requiring a sensitive approach that respects and accommodates local values. Ng'oma et al. (2022) also found that culturally appropriate interventions were more easily accepted, indicating that understanding and addressing cultural resistance is critical for successful implementation.

In conclusion, community involvement and culturally appropriate adaptation are fundamental to successful health education interventions. Rather, limited resources and cultural resistance are obstacles that must be overcome to increase the effectiveness of these programs.

3.5.4 Comparison between Different Cultural Contexts and Adaptation Models Used

The effectiveness of health education models varies widely across cultural contexts, influenced by factors such as community structure, access to technology, and integration of culturally relevant practices. This synthesis explores these variations and their implications for health education interventions.

3.5.5 Variations in Effectiveness Across Cultural Contexts

In indigenous and ethnic minority communities, health education models that integrate traditional practices and involve local cultural leaders tend to be more successful. Wang et al. (2022) emphasize that culturally adapted interventions are critical to reducing mental health disparities among ethnic minorities, as culturally responsive components and implementation of interventions can ensure success. Geana et al. (2012) also highlighted the importance of considering cultural context in health communication, noting that effective health promotion must take local knowledge and practices into account. This approach respects and utilizes local cultural frameworks, thereby increasing the acceptability and effectiveness of health interventions.

In contrast, the effectiveness of health education models also varies between urban and rural settings. Technology-based interventions, such as health apps, are often more successful in urban areas where access to technology is greater. For example, a systematic review by Sohal et al. (2015) showed that culturally adapted diabetes education programs significantly improve health outcomes in culturally adapted populations, while community-based approaches may be more appropriate for rural areas with limited access to technology. These differences emphasize the importance of adapting health education models to the specific technological landscape of the target population.

3.5.6 Various Adaptation Models

Community-based approaches are particularly effective in areas with strong social structures. Rivera et al. (2015) found that adapting health education tools for specific subgroups within the Hispanic community significantly improved engagement and outcomes, demonstrating the effectiveness of culturally specific adaptations. In contrast, in communities with fragmented social structures, technology-based approaches may provide better solutions. For example, a study by DePue et al. (2013) illustrates how community health workers can improve diabetes care in culturally diverse settings by adapting evidence-based models to meet local needs. This adaptability is critical to addressing the unique challenges faced by various communities.

Furthermore, the importance of culturally specific adaptations cannot be underestimated. Programs that modify educational materials to align with specific cultural beliefs and practices have shown better results. For example, Noble et al. (2013) discussed the development of integrative curricula for cultural competence in nursing education, emphasizing the need for educational strategies adapted to students' cultural contexts. This approach ensures that health education interventions are not only relevant but also accepted by target communities, thereby increasing their effectiveness. In conclusion, the effectiveness of health education models is strongly influenced by the cultural context and adaptability of the intervention. By integrating traditional practices, leveraging community strengths, and ensuring cultural relevance, health education can be more effectively tailored to meet the diverse needs of diverse populations.

These findings provide important insights into how various culturally adapted health education models may influence child health outcomes in vulnerable communities, and the factors that contribute to the success or failure of interventions. This analysis helps in designing health interventions that are more effective and sensitive to different cultural contexts.

4. Discussion

4.1 Interpretation of Findings

A systematic literature review highlights that culturally adapted health education models significantly reduce child mortality in vulnerable communities. These findings can be categorized into four main models: community-based, technology-based, formal and informal education, and cultural adaptation.

4.2 Community Based Model

The effectiveness of community-based health education interventions has been widely documented. Training of local health cadres and community-based outreach have been proven to improve health knowledge and practices within communities. This model not only increases the accessibility of health information but also ensures that the delivery of educational materials is tailored to the specific cultural and social context of the community (DePue et al., 2013). For example, community health workers (CHWs) play an important role in bridging health care access gaps, especially in underserved areas, by using culturally and linguistically appropriate materials (DePue et al., 2013). This approach emphasizes the importance of community involvement in planning and implementing health programs, which is very important for reducing child mortality in areas with strong social structures (DePue et al., 2013).

4.3 Technology Based Model

The integration of digital applications and telemedicine has proven effective in increasing access to health services, especially in areas with adequate technological infrastructure. Research shows that culturally adapted technology can significantly improve health care delivery, thereby addressing health disparities in underserved populations (Fisk et al., 2020). For example, telehealth initiatives during the COVID-19 pandemic demonstrate how technology can facilitate communication and health support, especially for vulnerable groups (Fisk et al., 2020). This model highlights the potential of technology as a viable solution to health challenges, provided it is culturally sensitive and adapted to meet the needs of the target population (Fisk et al., 2020).

4.4 Formal and Informal Education Models

School-based curriculum adaptations and family-centered health education approaches have shown positive results in increasing health literacy and encouraging behavioral change among children and their families. Studies have shown that educational interventions adapted to local culture can significantly improve health outcomes and reduce health inequalities (Sørensen et al., 2012; Sun et al., 2013). For example, integrating health education into the family and school environment not only increases knowledge but also empowers families to make informed health decisions (Sun et al., 2013). This highlights the importance of culturally relevant educational materials to effectively address health problems in specific communities (Sørensen et al., 2012).

4.5 Cultural Adaptation Model

The success of health education interventions is closely related to respecting and integrating local cultural practices and beliefs. Research has shown that a culturally sensitive approach results in higher acceptability and effectiveness of wellness programs (Corrarino, 2013). This model emphasizes the need for health education strategies that are not only informative but also aligned with the values and cultural norms of the target population (Corrarino, 2013). Globally, this approach is important to ensure that health programs are relevant and effective, thereby increasing their impact on child mortality (Corrarino, 2013). In conclusion, this systematic review emphasizes the importance of culturally adapted health

education models in reducing child mortality in vulnerable communities. Community-based, technology-based models, formal and informal education, and cultural adaptation collectively highlight the need to adapt health interventions to meet the unique needs of diverse populations.

4.6 Discussion Regarding the Implications of Research Results for Health Practice and Policy

Findings from this study emphasize the importance of health policies and practices to adapt to the cultural and technological context of the populations served. This adaptation can be achieved through the development of health education models that prioritize community engagement, technology integration, and curriculum adaptation to reflect local cultural values.

4.7 Development of a Health Education Model: A Community-Based Approach

Community-based health education models have been shown to significantly increase the relevance and success of health interventions. Active community involvement in the design and implementation of health programs leads to better engagement and outcomes. For example, culturally sensitive environments in health care can improve patient satisfaction and adherence to treatment, indicating that health policies should encourage community participation in health education initiatives (Tucker et al., 2013). Additionally, patients from diverse cultures feel more comfortable and valued in healthcare environments that reflect their cultural values, reinforcing the importance of community-based approaches in health program design (Roncoroni et al., 2014). These findings encourage policies that empower local communities to take an active role in health education, thereby increasing the effectiveness of health interventions.

4.8 Technology Integration in Health Education

The integration of technology into health education is critical to increasing the reach and effectiveness of health programs. Programs that utilize digital technologies must be tailored to meet the specific cultural needs of local populations. A framework for optimizing technology-based healthcare services should emphasize the importance of understanding patient perceptions and behavior regarding technology use (Greenwood et al., 2020). Additionally, mobile technology can be used to increase adherence to preventive health behaviors among adolescents, illustrating the potential of technology in engaging young populations in health education (Badawy & Kuhns, 2017). Therefore, health policies must prioritize the implementation of culturally appropriate technologies in health education strategies to ensure successful implementation and significant impact.

4.9 Adaptation of the Health Education Curriculum

Adapting health education curricula to reflect local cultural contexts is critical to improving health outcomes. This involves developing educational materials that are appropriate to the cultural values and health practices of the community. The need for culturally sensitive health education was voiced by Collins et al., who argued that health policy must ensure that interventions are adapted to be sensitive to diversity and effective across different segments of society (Collins et al., 2022). Additionally, a systematic review by Jin & Bridges highlighted the importance of educational technology in health sciences education, which can be adapted to meet the needs of diverse students and communities (Jin & Bridges, 2014). By supporting the development of culturally relevant curricula, health education policies can significantly improve health outcomes in vulnerable communities.

4.10 Culturally Sensitive Approach

Incorporating cultural sensitivity in health policy and practice is critical to the planning and implementation of effective health interventions. The findings of this study suggest that health programs should be designed to align with local beliefs and practices, ensuring that all aspects of health education are culturally appropriate. McKee et al. emphasized the barriers faced by Deaf individuals in accessing health information, highlighting the importance of culturally and linguistically appropriate health communication (McKee et al., 2015). This is in line with the findings of Palmer et al., who encouraged the use of American Sign Language in health education for the Deaf community to improve literacy and health outcomes (Palmer et al., 2017). Therefore, health policies must prioritize cultural sensitivity to achieve better and more equitable health outcomes globally.

In conclusion, the implications of this study for health policy and practice are profound. By adopting community-based approaches, integrating technology, adapting curricula, and ensuring cultural sensitivity, health interventions can be made more effective and equitable. These strategies are critical to reducing health disparities and improving health outcomes in vulnerable communities.

4.11 Research Limitations

Although this research provides valuable insight into the effectiveness of culturally adapted health education models in reducing child mortality, there are several limitations both in the literature reviewed and in the systematic review methodology used:

1. Limitations in the Reviewed Literature:
 - a. Variations in Study Quality: There was significant variation in the quality and methodology of the studies included in this review. Some studies may have weak designs, small sample sizes, or lack methodological rigor. These variations may affect the generalizability of the results and the validity of the findings.
 - b. Data and Report Limitations: Some studies may have incomplete data or non-transparent reporting regarding implementation and outcomes of health education models. These limitations may limit the ability to perform comprehensive syntheses and compare results across contexts.
 - c. Context and Generalization: The studies reviewed generally focused on communities with specific cultural backgrounds, which may limit the generalizability of the findings to other communities with different cultural contexts. Unique contextual factors in each community may influence the effectiveness of health education models.
2. Limitations in Systematic Review Methodology:
 - a. Study Selection and Screening: The study selection and screening process may be affected by publication bias, where studies with positive results are more likely to be published and included in the review. This can lead to an incomplete assessment of the effectiveness of health education models.
 - b. Study Heterogeneity: Heterogeneity in the design, methodology, and context of the studies reviewed may make it difficult to consistently compare and synthesize results. Variations in definitions of health education models and cultural adaptations may influence the integration of findings from different studies.
 - c. Language and Database Limitations: Limitations in the literature search, such as only including articles in English and from certain databases, may overlook relevant research published in other languages or that exists outside the database used. This may limit the scope of the literature reviewed and reduce the comprehensiveness of the review.

4.12 Recommendations for Further Research

1. Improved Study Quality: Future research should focus on improving the quality of study design and methodology to provide stronger evidence regarding the effectiveness of health education models. Studies with more robust designs, larger sample sizes, and transparent reporting will increase the validity of the results.
2. Context Diversification: To increase the generalizability of findings, it is important to conduct studies in a variety of cultural and geographic contexts. Research in various communities with different cultural backgrounds can provide a more complete picture of the effectiveness of health education models.
3. Assess Methodology Limitations: Future research should consider addressing the limitations of systematic review methodology, such as reducing publication bias and expanding the literature search to include studies in multiple languages and from multiple databases.

By understanding and addressing these limitations, future research can provide more comprehensive and accurate insights into the impact of culturally adapted health education models on child mortality rates in vulnerable communities.

4.13 Recommendations for Future Research

Based on the findings and limitations of this study, there are several research gaps that can be further explored to deepen understanding of the effectiveness of culturally adapted health education models. Here are some recommendations for further study:

1. Longitudinal Studies and Long-Term Impact Evaluation:
 - a. Research Gaps: Many of the studies reviewed in this review were cross-sectional or had short evaluation periods. The lack of longitudinal research limits understanding of the long-term impact of culturally adapted health education models.
 - b. Suggestion: Future research should include longitudinal studies to evaluate the long-term effects of health interventions. This will provide insight into the sustainability of behavioral changes and their impact on child mortality rates over the longer term.
2. Wider Context Based Research:
 - a. Research Gaps: Many of the studies reviewed were limited to communities with specific cultural contexts, which may not be representative of global diversity.
 - b. Suggestion: Future research should explore different cultural and geographic contexts to understand how health education models can be adapted effectively in different communities. This study can help identify cultural factors that influence the implementation and effectiveness of health interventions in various settings.
3. Multidisciplinary and Qualitative Approach:
 - a. Research Gaps: Many studies use quantitative approaches to evaluate the effectiveness of health education models. The lack of qualitative approaches limits understanding of community perceptions and experiences regarding health interventions.
 - b. Suggestion: The integration of qualitative methods, such as in-depth interviews or focus groups, can provide deeper insight into how health education models are received and implemented at the community level. A multidisciplinary approach that combines public health, anthropology, and psychology perspectives can improve understanding of the factors that influence intervention effectiveness.
4. Analysis of the Role of Social and Economic Factors:

- a. Research Gaps: This research does not fully explore how social and economic factors influence the effectiveness of culturally adapted health education models.
 - b. Suggestion: Future research should consider the role of social and economic factors, such as poverty, education, and access to health services, in influencing intervention outcomes. Analysis of how these factors interact with health education models can provide additional insight into how to overcome barriers and exploit opportunities to improve children's health.
5. Development and Testing of a New Adaptation Model:
 - a. Research Gaps: Although there are various culturally adapted health education models, there is still a need to develop and test new, more innovative models.
 - b. Suggestion: Future research should focus on developing new models of health education that better suit changing needs and cultural dynamics. Testing these models in various cultural contexts can help determine key elements that contribute to the success or failure of interventions.
6. International Collaboration and Knowledge Exchange:
 - a. Research Gaps: The lack of international collaboration in research on culturally adapted health education may hinder the exchange of knowledge and implementation of best practices.
 - b. Suggestion: Strengthening international collaboration between researchers, practitioners, and policymakers can improve the ability to share findings, experiences, and effective strategies. Knowledge exchange between countries and cultures can enrich intervention design and improve global health outcomes.

By exploring these research gaps, future studies can provide a deeper understanding of cultural adaptation in health education and how this can be optimized to reduce child mortality in vulnerable communities.

5. Conclusion

5.1 Summary of Findings

This literature review reveals that culturally adapted health education models have significant potential in reducing child mortality in vulnerable communities with diverse cultural backgrounds. Key findings from this analysis indicate that cultural adaptations in health education strengthen the relevance of interventions, increase community participation, and improve health outcomes. The studies reviewed show that interventions that take into account local cultural values, language and practices are more effective in engaging audiences and addressing specific barriers faced by vulnerable communities. Although the results show a positive impact, the effectiveness of this model varies depending on the implementation context and the level of integration of cultural elements in the health program.

5.2 Practical Implications

1. Suggestions for Policy Makers:
 - a. Integration of Cultural Adaptation in Health Policy: Policy makers must ensure that culturally adapted health education models become an integral part of public health strategies. Policies should encourage the development and implementation of interventions that take cultural diversity into account to increase the effectiveness and affordability of health programs.
 - b. Funding and Support for Cultural Innovation: Allocating funds for research and development of culturally adapted health education models is essential. Support for research that focuses on cultural adaptation and evaluation of its impact can help improve health policy and practice.

2. Advice for Health Practitioners:

- a. **Training and Cultural Sensibilization:** Health practitioners should receive adequate training in cultural sensitivity and skills to adapt interventions to the needs of local communities. Experienced practitioners who understand the cultural context can increase the acceptability and success of health programs.
- b. **Collaboration with Local Communities:** Practitioners must work closely with community leaders and community members to understand relevant cultural values, language, and practices. Community involvement in the planning and implementation of health interventions can improve program effectiveness and sustainability.

3. Suggestions for Researchers:

- a. **Further Research on Cultural Adaptation:** Researchers should focus on further exploration of specific cultural elements that influence the effectiveness of health education models. Research that explores how cultural adaptation interacts with social and economic factors can provide deeper insights.
- b. **Long Term Evaluation and Multicultural Studies:** Future research should include long-term evaluations to assess the ongoing impact of health education models. Additionally, studies involving multiple cultural contexts can expand understanding of effective ways to implement health interventions at the global level.

By paying attention to these suggestions, it is hoped that health education models that are more effective and appropriate to the cultural needs of vulnerable communities can be implemented, thus contributing to reducing child mortality rates and improving overall public health.

6. References

- Aheto, J. (2019). Predictive model and determinants of under-five child mortality: evidence from the 2014 ghana demographic and health survey. *BMC Public Health*, 19(1). <https://doi.org/10.1186/s12889-019-6390-4>
- AlAli, N., AlKhudairy, Y., AlSafadi, K., Abduljabbar, B., Algerian, N., Albeshry, A., ... & Alshahrani, N. (2023). The usage of digital health mobile-based applications among saudi population. *Healthcare*, 11(10), 1413. <https://doi.org/10.3390/healthcare11101413>
- Alves, S. (2023). Description of the scientific method for the preparation and validation of educational technologies in digital format: a methodological study. *Journal of Human Growth and Development*, 33(2), 299-309. <https://doi.org/10.36311/jhgd.v33.14615>
- Areemit, R., Lumbiganon, P., Suphakunpinoy, C., Jetsrisuparb, A., Sutra, S., & Sripanidkulchai, K. (2020). A mobile app, khunlook, to support thai parents and caregivers with child health supervision: development, validation, and acceptability study. *Jmir Mhealth and Uhealth*, 8(10), e15116. <https://doi.org/10.2196/15116>
- Badawy, S. and Kuhns, L. (2017). Texting and mobile phone app interventions for improving adherence to preventive behavior in adolescents: a systematic review. *Jmir Mhealth and Uhealth*, 5(4), e50. <https://doi.org/10.2196/mhealth.6837>
- Balci, S., Spanhel, K., Sander, L., & Baumeister, H. (2020). Protocol for a systematic review and meta-analysis of culturally adapted internet- and mobile-based health promotion interventions. *BMJ Open*, 10(11), e037698. <https://doi.org/10.1136/bmjopen-2020-037698>
- Bedada, D. (2017). Determinant of under-five child mortality in ethiopia. *American Journal of Theoretical and Applied Statistics*, 6(4), 198. <https://doi.org/10.11648/j.ajtas.20170604.15>
- Bender, M., Clark, M., & Gahagan, S. (2014). Community engagement approach. *Journal of Transcultural Nursing*, 25(4), 373-382. <https://doi.org/10.1177/1043659614523473>

- Carroll, J., Moorhead, A., Bond, R., LeBlanc, W., Petrella, R., & Fiscella, K. (2017). Who uses mobile phone health apps and does use matter? a secondary data analytics approach. *Journal of Medical Internet Research*, 19(4), e125. <https://doi.org/10.2196/jmir.5604>
- Chowdhary, N., Sikander, S., Atif, N., Singh, N., Ahmad, I., Fuhr, D., ... & Patel, V. (2014). The content and delivery of psychological interventions for perinatal depression by non-specialist health workers in low and middle income countries: a systematic review. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 28(1), 113-133. <https://doi.org/10.1016/j.bpobgyn.2013.08.013>
- Collins, C., Pericin, I., Larkin, J., & Diaz, E. (2022). Self-rated health and quality of life among syrian refugees in ireland – data from a cross-sectional study. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-022-13610-1>
- Corrarino, J. (2013). Health literacy and women's health: challenges and opportunities. *Journal of Midwifery & Women S Health*, 58(3), 257-264. <https://doi.org/10.1111/jmwh.12018>
- Decker, M., Harrison, S., Price, M., Gutmann-Gonzalez, A., Yarger, J., & Tenney, R. (2022). Educators' perspectives on integrating technology into sexual health education: implementation study. *Jmir Human Factors*, 9(1), e31381. <https://doi.org/10.2196/31381>
- DePue, J., Dunsiger, S., Seiden, A., Blume, J., Rosen, R., Goldstein, M., ... & McGarvey, S. (2013). Nurse–community health worker team improves diabetes care in american samoa. *Diabetes Care*, 36(7), 1947-1953. <https://doi.org/10.2337/dc12-1969>
- Didarloo, A., Shojaeizadeh, D., & Alizadeh, M. (2016). Impact of educational intervention based on interactive approaches on beliefs, behavior, hemoglobin a1c, and quality of life in diabetic women. *International Journal of Preventive Medicine*, 7(1), 38. <https://doi.org/10.4103/2008-7802.176004>
- Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural usa. *Public Health*, 129(6), 611-620. <https://doi.org/10.1016/j.puhe.2015.04.001>
- Fisk, M., Livingstone, A., & Pit, S. (2020). Telehealth in the context of covid-19: changing perspectives in australia, the united kingdom, and the united states. *Journal of Medical Internet Research*, 22(6), e19264. <https://doi.org/10.2196/19264>
- Geana, M., Greiner, K., Cully, A., Talawyma, M., & Daley, C. (2012). Improving health promotion to american indians in the midwest united states: preferred sources of health information and its use for the medical encounter. *Journal of Community Health*, 37(6), 1253-1263. <https://doi.org/10.1007/s10900-012-9564-x>
- Greenwood, D., Howell, F., Scher, L., Yousef, G., Rinker, J., Yehl, K., ... & Peeples, M. (2020). A framework for optimizing technology-enabled diabetes and cardiometabolic care and education: the role of the diabetes care and education specialist. *The Diabetes Educator*, 46(4), 315-322. <https://doi.org/10.1177/0145721720935125>
- Hamidzadeh, Y., Hashemiparast, M., Hassankhani, H., & Allahverdipour, H. (2019). Local-level challenges to implementing health education programs in rural settings: a qualitative study. *Family Medicine & Primary Care Review*, 21(1), 30-34. <https://doi.org/10.5114/fmpcr.2019.82976>
- Heffner, J. and Mull, K. (2017). Smartphone ownership among us adult cigarette smokers: 2014 health information national trends survey (hints) data. *Journal of Medical Internet Research*, 19(8), e305. <https://doi.org/10.2196/jmir.7953>
- Hollis, C., Falconer, C., Martin, J., Whittington, C., Stockton, S., Glazebrook, C., ... & Davies, E. (2016). Annual research review: digital health interventions for children and young people with mental health problems – a systematic and meta-review. *Journal of Child Psychology and Psychiatry*, 58(4), 474-503. <https://doi.org/10.1111/jcpp.12663>
- Hossain, M., Mani, K., & Islam, R. (2015). Prevalence and determinants of the gender differentials risk factors of child deaths in bangladesh: evidence from the bangladesh demographic and health survey, 2011. *Plos Neglected Tropical Diseases*, 9(3), e0003616. <https://doi.org/10.1371/journal.pntd.0003616>

- Iddrisu, A., Tawiah, K., Bukari, F., & Kumi, W. (2020). Frequentist and bayesian regression approaches for determining risk factors of child mortality in ghana. *Biomed Research International*, 2020, 1-10. <https://doi.org/10.1155/2020/8168479>
- Jin, J. and Bridges, S. (2014). Educational technologies in problem-based learning in health sciences education: a systematic review. *Journal of Medical Internet Research*, 16(12), e251. <https://doi.org/10.2196/jmir.3240>
- Kanmiki, E., Bawah, A., Agorinya, I., Achana, F., Awoonor-Williams, J., Oduro, A., ... & Akazili, J. (2014). Socio-economic and demographic determinants of under-five mortality in rural northern ghana. *BMC International Health and Human Rights*, 14(1). <https://doi.org/10.1186/1472-698x-14-24>
- Kwon, S., Wyatt, L., Kum, S., Zanowiak, J., Kim, S., Yi, S., ... & Islam, N. (2022). Evaluation of a diabetes prevention intervention for korean american immigrants at risk for diabetes. *Health Equity*, 6(1), 167-177. <https://doi.org/10.1089/heq.2021.0137>
- Lee, W., Park, J., & Hong, S. (2022). Bicycle injury prevention education using 360° virtual reality experiences of accidents and computer-based activity. *Children*, 9(11), 1623. <https://doi.org/10.3390/children9111623>
- Lin, Y. and Lou, M. (2020). Effects of mhealth-based interventions on health literacy and related factors: a systematic review. *Journal of Nursing Management*, 29(3), 385-394. <https://doi.org/10.1111/jonm.13175>
- Martin, P., Cousin, L., Gottot, S., Bourmaud, A., Rochebrochard, É., & Alberti, C. (2020). Participatory interventions for sexual health promotion for adolescents and young adults on the internet: systematic review. *Journal of Medical Internet Research*, 22(7), e15378. <https://doi.org/10.2196/15378>
- McCrary, J. and Royer, H. (2011). The effect of female education on fertility and infant health: evidence from school entry policies using exact date of birth. *American Economic Review*, 101(1), 158-195. <https://doi.org/10.1257/aer.101.1.158>
- McKee, M., Paasche-Orlow, M., Winters, P., Fiscella, K., Zazove, P., Sen, A., ... & Pearson, T. (2015). Assessing health literacy in deaf american sign language users. *Journal of Health Communication*, 20(sup2), 92-100. <https://doi.org/10.1080/10810730.2015.1066468>
- Mensch, B., Chuang, E., Melnikas, A., & Psaki, S. (2019). Evidence for causal links between education and maternal and child health: systematic review. *Tropical Medicine & International Health*, 24(5), 504-522. <https://doi.org/10.1111/tmi.13218>
- Ng'oma, M., Atif, N., Meltzer-Brody, S., Stewart, R., & Chirwa, E. (2022). Exploring the cultural appropriateness of a psychosocial intervention, the thinking healthy programme-peer delivered (thpp), for perinatal depression in lilongwe, malawi. *Malawi Medical Journal*, 34(2), 87-94. <https://doi.org/10.4314/mmj.v34i2.3>
- Noble, A., Nuszen, E., Rom, M., & Noble, L. (2013). The effect of a cultural competence educational intervention for first-year nursing students in israel. *Journal of Transcultural Nursing*, 25(1), 87-94. <https://doi.org/10.1177/1043659613503881>
- Palmer, C., Boudreault, P., Berman, B., Wolfson, A., Duarte, L., Venne, V., ... & Sinsheimer, J. (2017). Bilingual approach to online cancer genetics education for deaf american sign language users produces greater knowledge and confidence than english text only: a randomized study. *Disability and Health Journal*, 10(1), 23-32. <https://doi.org/10.1016/j.dhjo.2016.07.002>
- Panda, S. and Sarangi, P. (2023). Influence of socio-demographic and environmental factors on child mortality in india. *International Journal of Community Medicine and Public Health*, 10(7), 2462-2467. <https://doi.org/10.18203/2394-6040.ijcmph20232037>
- Patel, N. and Olickal, J. (2021). Maternal and child factors of under-five mortality in india. findings from nfhs-4. *Clinical Epidemiology and Global Health*, 12, 100866. <https://doi.org/10.1016/j.cegh.2021.100866>
- Rivera, Y., Vélez, H., Canales, J., Jiménez, J., Moreno, L., Torres, J., ... & Quinn, G. (2015). When a common language is not enough: transcreating cancer 101 for communities in

- puerto rico. *Journal of Cancer Education*, 31(4), 776-783. <https://doi.org/10.1007/s13187-015-0912-2>
- Roncoroni, J., Tucker, C., Wall, W., Nghiem, K., Wheatley, R., & Wu, W. (2014). Patient perceived cultural sensitivity of clinic environment and its association with patient satisfaction with care and treatment adherence. *American Journal of Lifestyle Medicine*, 8(6), 421-429. <https://doi.org/10.1177/1559827614521760>
- Schoenberg, N., Sherman, D., Pfammatter, A., Roberts, M., Chih, M., Vos, S., ... & Spring, B. (2022). Adaptation and study protocol of the evidence-based make better choices (mbc2) multiple diet and activity change intervention for a rural appalachian population. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-022-14475-0>
- Scott, K., Gome, G., Richards, D., & Caldwell, P. (2015). How trustworthy are apps for maternal and child health?. *Health and Technology*, 4(4), 329-336. <https://doi.org/10.1007/s12553-015-0099-x>
- Setyowati, J. (2023). Android-based dental disease education model in improving adolescent dental health maintenance skills. *jchat*, 1(2), 45-52. <https://doi.org/10.36082/jchat.v1i2.1148>
- Sidani, S., Ibrahim, S., Lok, J., Fan, L., Fox, M., & Guruge, S. (2017). An integrated strategy for the cultural adaptation of evidence-based interventions. *Health*, 09(04), 738-755. <https://doi.org/10.4236/health.2017.94053>
- Sohal, T., Sohal, P., King-Shier, K., & Khan, N. (2015). Barriers and facilitators for type-2 diabetes management in south asians: a systematic review. *Plos One*, 10(9), e0136202. <https://doi.org/10.1371/journal.pone.0136202>
- Sun, X., Shi, Y., Zeng, Q., Wang, Y., Du, W., Nan-fang, W., ... & Chang, C. (2013). Determinants of health literacy and health behavior regarding infectious respiratory diseases: a pathway model. *BMC Public Health*, 13(1). <https://doi.org/10.1186/1471-2458-13-261>
- Sørensen, K., Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Słóńska, Z., ... & Brand, H. (2012). Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*, 12(1). <https://doi.org/10.1186/1471-2458-12-80>
- Tadesse, A. (2021). Effect of health extension service on under-five child mortality and determinants of under-five child mortality in derra district, oromia regional state, ethiopia.. <https://doi.org/10.21203/rs.3.rs-199076/v1>
- Tomas, M. (2022). Evaluation of the effectiveness of community involvement program of education and nursing students. *Jpair Institutional Research*, 18(1), 63-83. <https://doi.org/10.7719/irj.v18i1.828>
- Tucker, C., Roncoroni, J., Marsiske, M., Nghiem, K., & Wall, W. (2013). Validation of a patient-centered, culturally sensitive, clinic environment inventory using a national sample of adult patients. *Journal of Transcultural Nursing*, 25(1), 80-86. <https://doi.org/10.1177/1043659613504111>
- Wang, C., Liu, J., Marsico, K., & Zhu, Q. (2022). Culturally adapting youth mental health first aid training for asian americans.. *Psychological Services*, 19(3), 551-561. <https://doi.org/10.1037/ser0000574>
- Wang-Schweig, M., Kviz, F., Altfeld, S., Miller, A., & Miller, B. (2014). Building a conceptual framework to culturally adapt health promotion and prevention programs at the deep structural level. *Health Promotion Practice*, 15(4), 575-584. <https://doi.org/10.1177/1524839913518176>
- Ward, E., Dogs, E., Gier, E., Littlefield, L., & Tandon, D. (2022). Cultural adaptation of the mothers and babies intervention for use in tribal communities. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsy.2022.807432>
- Widman, L., Nesi, J., Kamke, K., Choukas-Bradley, S., & Stewart, J. (2018). Technology-based interventions to reduce sexually transmitted infections and unintended pregnancy among youth. *Journal of Adolescent Health*, 62(6), 651-660. <https://doi.org/10.1016/j.jadohealth.2018.02.007>

- Wies, B., Landers, C., & Ienca, M. (2021). Digital mental health for young people: a scoping review of ethical promises and challenges. *Frontiers in Digital Health*, 3. <https://doi.org/10.3389/fdgth.2021.697072>
- Woldeamanuel, B. (2019). Socioeconomic, demographic, and environmental determinants of under-5 mortality in ethiopia: evidence from ethiopian demographic and health survey, 2016. *Child Development Research*, 2019, 1-15. <https://doi.org/10.1155/2019/1073782>
- Zelege, A. (2022). Effect of health extension service on under-five child mortality and determinants of under-five child mortality in derra district, oromia regional state, ethiopia: a cross-sectional study. *Sage Open Medicine*, 10, 205031212211006. <https://doi.org/10.1177/20503121221100610>