

Systemic Review of Community-Based Interventions for Preventing Chronic Diseases in Preventive Medicine Practice: Review Article

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ABSTRACT

Background: Community-based interventions are methodical endeavors carried out at the community level to elevate health status and mitigate risk factors. These interventions entail the collaboration of community members, local organizations, and medical professionals to foster awareness of health, facilitate modifications in behavior, and create conducive conditions. They frequently encompass a wide array of tactics, including educational programs, modifications in lifestyle, and alterations in the environment. Community-based interventions have a vital role in preventing chronic diseases in the realm of preventive medicine.

Objective: This review article aimed to through the light on the importance of the community-based interventions for prevention of chronic diseases.

Methods: The search was performed on scientific databases including the Cochrane Central Register of Controlled Trials (CENTRAL) of the Cochrane Library, Elsevier, National Library of Medicine (Pubmed), Frontiers, Research Gate, Scopus, Pubmed Central (PMC), and Google Scholar. The search for this article utilised many medical subject headings such as "prevention," "community-based intervention," "chronic diseases and mortality," "prevention of morbidity," "education intervention and diabetes," and "education in young adults," among others. The main strategies encompass health education and awareness campaigns, initiatives to promote physical activity, programs focused on nutrition, efforts to help individuals quit smoking, programs for screening and early detection, collaborations between communities, advocacy for policy changes and environmental modifications, social support programs, telehealth services and technology-based interventions, and customization based on cultural factors. English-language peer-reviewed research ensures the maintenance of academic rigor and comprehensive incorporation of intellectual contributions. The analysis incorporated research conducted between 2010 and 2023. Research conducted in languages other than English, for which translations are not available, was excluded.

Conclusion: Evidence has shown that community-based therapies are successful in improving metabolic control, reducing diabetic secondary complications, and optimizing glycemic control in persons with Type 2 diabetes mellitus. Research has shown that peer support was successful in improving diabetes management and dietary behaviors, especially in geographically isolated regions. Research demonstrated that interventions implemented within communities proved to be efficacious in diminishing the prevalence of cardiovascular illnesses and managing hypertension. Nevertheless, these interventions encountered obstacles such as logistical, socio-cultural, sustainability and measurement and evaluation of difficulties that must be resolved to ensure their long-term viability and effectiveness.

Keywords: Community-based interventions, Prevention of chronic diseases, Prevention, Community intervention, Risk reduction.

INTRODUCTION

Community-based interventions for avoiding chronic diseases are systematic initiatives implemented at the community level to enhance health and reduce risk factors. These interventions entail the cooperation of community people, local organizations, and medical personnel to promote health consciousness, enable changes in behavior, and establish settings that provide support⁽¹⁾.

Their method frequently involves the utilization of a diverse range of strategies, such as educational initiatives, adjustments to one's lifestyle, and alterations to the surrounding environment. These treatments primarily aim to enhance knowledge and understanding of beneficial habits, advocate for a healthy lifestyle, and enact modifications to the existing systems⁽²⁾. Community engagement is essential for implementing culturally

appropriate, pertinent, and customized interventions, which promote a sense of collective responsibility and empowerment amongst members of the community⁽³⁾.

Community-based interventions are a crucial component in the prevention of chronic diseases within the field of preventive medicine. These treatments prioritize the mitigation of risk factors, the encouragement of health-promoting behaviors, and the establishment of supportive environments in communities. Primary approaches encompass health education and awareness campaigns, physical activity initiatives, nutrition programs, smoking cessation efforts, screening and early detection programs, collaborations between communities, policy advocacy and environmental modifications, social support programs,

telehealth services and technology-based interventions, and cultural customization ⁽⁴⁾.

Health awareness and education initiatives:

They encompass the organization of workshops, seminars, and health fairs with the aim of enlightening community members about the perils associated with chronic diseases and the significance of adopting healthy lives. Physical activity programs facilitate engagement in physical exercise through structured seminars, walking groups, and athletic leagues. Nutrition programs contribute to the availability of nutritious food by means of community gardening or farmers' markets. Smoking cessation efforts provide assistance groups and counseling services for persons attempting to quit smoking and enforce tobacco-free regulations in public areas ⁽⁵⁾. Screening and early detection of programs offer low or no-cost screenings at community centers or local clinics that can help in early identification and treatment of chronic diseases. Community partnerships can also entail cooperative efforts with nearby educational institutions, commercial enterprises, and religious establishments to advance the cause of physical and mental well-being ⁽⁶⁾.

Chronic illnesses, such as cardiovascular diseases, diabetes mellitus, and obesity, have a substantial impact on worldwide sickness and death rates. Cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM) are widespread globally, contributing to more than 30% of annual mortality. A considerable segment of the population possesses risk factors that contribute to the development of cardiovascular disease (CVD), such as high levels of blood cholesterol and sugar, being overweight or obese, having hypertension, smoking, and engaging in physical inactivity. Individuals who have several risk factors, such as metabolic syndrome and type 2 diabetes mellitus (T2DM), have a higher likelihood of developing cardiovascular disease (CVD). Diabetes and cardiovascular disease (CVD) have several common risk factors. Participating in diabetes risk reduction programs has been linked to a lower occurrence of CVD and overall mortality, as well as a decreased likelihood of developing diabetes ⁽⁷⁾.

Rural populations are known to have elevated levels of pre-existing risk factors for cardiovascular disease (CVD), a trend observed worldwide. Rural people are located further away from specialized healthcare facilities, have a lower ratio of primary care services per person, lack pedestrian and cycling infrastructure, and may face higher costs for fresh produce and meat. They typically come from disadvantaged socio-economic origins, exhibit less than ideal food and lifestyle habits, and possess less positive attitudes towards health. These

factors contribute to the regional differences in cardio-metabolic health outcomes ⁽⁸⁾.

Community-based treatments are essential for tackling the health concerns of chronic cardiometabolic diseases. The interventions encompass lifestyle modification programs, initiatives for assessing blood pressure and cholesterol levels, programs for diabetes education, support groups, interventions implemented in schools, and the establishment of community gardens and improved access to nutritional foods ⁽⁹⁾.

Preventing cardiovascular disease encompasses to produce lifestyle modifications, including engaging in regular physical activity, adopting good eating habits, and quitting smoking. These initiatives also include the educational campaigns, physical fitness workshops, and clinics to help individuals quit smoking and adopt healthy living habits. Screening programs for blood pressure and cholesterol might aid in the identification of individuals who are susceptible to cardiovascular diseases and complexities, whereas diabetes education programs equip communities with information regarding nutritious diet, consistent physical activity, and health examinations. Checking of blood glucose level at these programs acts as a foundation of diabetes diagnosis in many instances ⁽¹⁰⁾.

School-based interventions:

Address childhood obesity by encouraging the initiation of healthy eating habits and promoting higher levels of physical exercise. Community gardens and activities that promote local farmers' markets augment the availability of fresh produce, so fostering better dietary practices and enhancing the general health of the students and increase the interests of adolescents towards their food choices and consumption ⁽¹¹⁾.

Importance

The prevalence of chronic diseases, such as cardiovascular diseases, diabetes mellitus, obesity and many chronic diseases, have reached epidemic proportions worldwide, requiring the development of creative and scalable prevention techniques ⁽¹²⁾. Community-based treatments have become essential elements of public health campaigns, promoting long-lasting changes in behavior and enhancing health results among general population.

These initiatives promote individual empowerment by implementing focused educational and awareness campaigns, enabling individuals to make well-informed decisions regarding their health and be accountable for their lifestyle choices. Community participation and social support networks promote a cohesive community, motivating individuals to collaboratively address the issues related to preventing of diseases and live a healthy

life ⁽¹³⁾. It further effectively addresses healthcare accessibility disparities, specifically among marginalized populations, by putting healthcare services in close proximity to vulnerable or displaced communities ⁽¹⁴⁾.

The long-term effectiveness of these interventions is emphasized by their ability to generate enduring modifications in health behaviors, leading to a reduction in the occurrence of chronic diseases. Furthermore, it initiates the development of social norms that promote health and prevent sickness, hence generating long-term improvements in population health ⁽¹⁵⁾.

Methods

Establishing inclusion and exclusion criteria is crucial for ensuring methodological rigor and determining the scope of this literature evaluation. The analysis encompasses investigations on community-based interventions of all types, guaranteeing a thorough examination of therapies in various environments. English-language peer-reviewed research ensures the maintenance of academic rigor and comprehensive incorporation of intellectual contributions.

The analysis incorporates research conducted between 2010 and 2023 to guarantee its pertinence and accurately represent contemporary viewpoints. In order to prevent the presence of partial or absent data, exclusion criteria are meticulously employed to narrow down the scope by excluding research that lack comprehensive literature. Research conducted in languages other than English, for which translations are not available, is excluded to maintain linguistic consistency and assure accessibility. Excluding non-chronic disease research is done to ensure the focus remains on relevant topics. Excluding papers published before 2010, the focus is on recent breakthroughs. These criteria enhance the precision and accuracy, which are crucial for maintaining the methodological integrity of literature reviews.

Study selection

The study is undertaken for highlighting the importance of selecting relevant primary research papers to address the topic of community interventions aimed at preventing chronic diseases. To ensure effective research, this study adhered to the widely used Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines ⁽¹⁶⁾.

Keywords were created to guarantee accurate recognition of pertinent data by search engines. The search tools utilise the Boolean Logic "And" operator to ensure that all variables are included in the search and to confirm their presence in several databases. The data management system was used to visually portray important information during the article selection process, which was managed by the author. Additionally, screening research was employed to assess the pros and cons of each inquiry. The researchers meticulously analyzed every search result to enhance the reliability of the findings and to minimize the potential for selection bias. Reviewers examined the reports based on their ability to fulfil the goals and objectives of the study, while writers employed criteria to select studies, to evaluate titles and abstracts, and to determine whether to approve or to reject research.

The researcher evaluated the titles and abstracts to determine if the studies met the criteria for inclusion, with a preference for studies conducted in English. The eligible publications underwent a comprehensive analysis, and 10 articles were assessed using the PRISMA principles. The Newcastle Ottawa scale was utilized to examine the quality of studies, and the results are presented in table (1). The meticulous curation of suitable clinical research guarantees the precision and reliability of the findings and conclusions. The research involved conducting critical appraisal using the Newcastle Ottawa Scale, and only the studies that met the eligibility criteria were included ⁽¹⁷⁾.

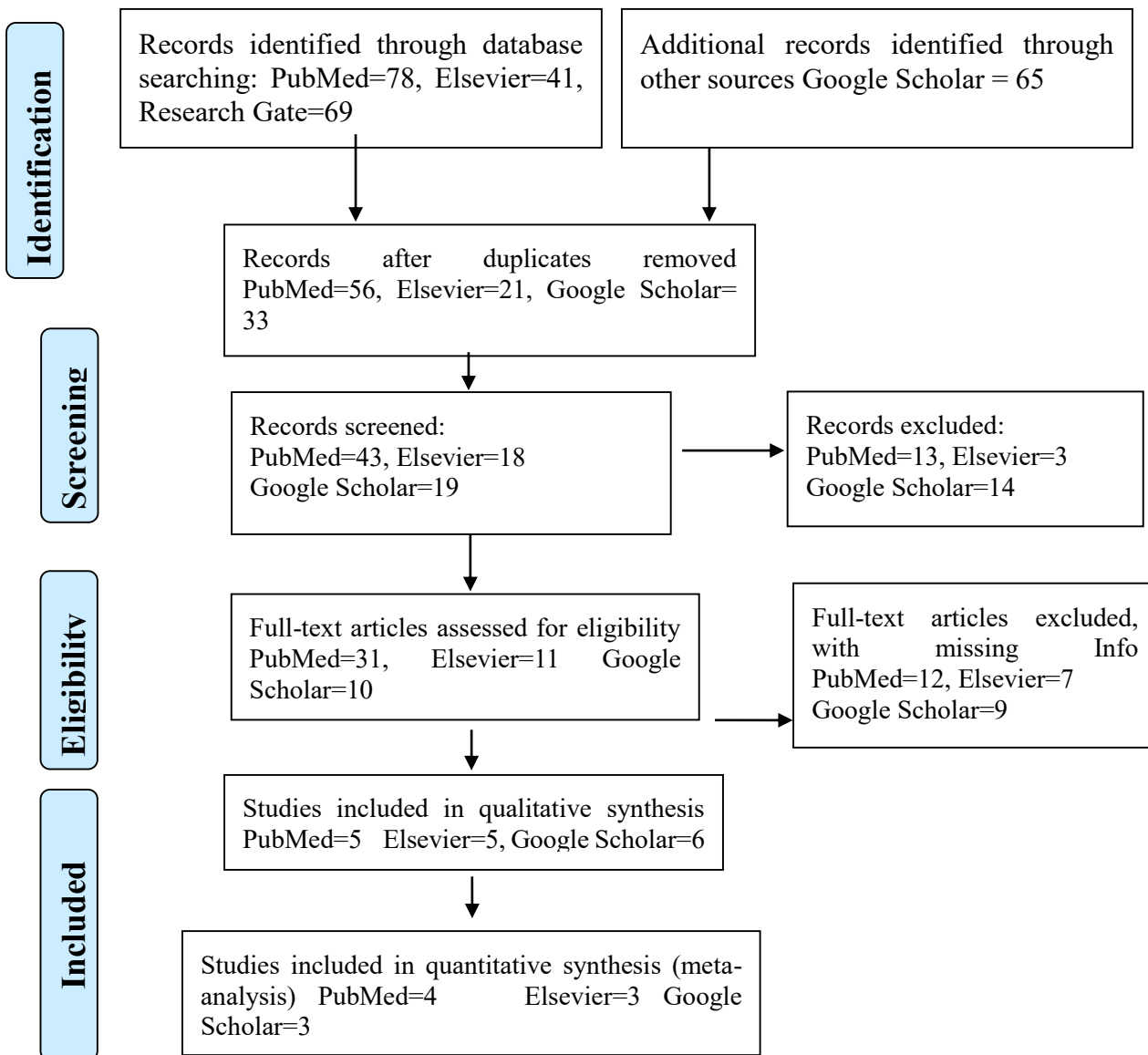


Figure (1): PRISMA diagram

Table (1): Quality of articles

	Davis et al., 2010 ⁽¹⁸⁾	Balagopal et al., 2012 ⁽⁸⁾	Harati et al., 2010 ⁽¹⁹⁾	Mash et al., 2014 ⁽²⁰⁾	Assah et al., 2015 ⁽²¹⁾	Baumann et al., 2015 ⁽²²⁾	Adeomi et al., 2014 ⁽²³⁾	Nguyen et al., 2012 ⁽²⁴⁾	Valdheim et al., 2010 ⁽²⁵⁾	Jiang et al., 2013 ⁽²⁶⁾
Did the review address a focused question?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Did the authors look for the correct type of papers?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Do you think all the essential, relevant studies were included?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Did the review’s authors do enough to assess the quality of the included studies?	✓	✓	✓	✓	✓	✓	✓	✓	✓	
If the review results have been combined, was it reasonable to do so?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
What are the overall results of the review?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
How precise are the results?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Can the results be applied to the local population?	✓	✓	✓		✓	✓	✓	✓	✓	✓
Were all important outcomes considered?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Are the benefits worth the harms and costs?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Results	Fair	Good	Good	Fair	Good	Good	Good	Good	Good	Fair

RESULTS

There were total of ten publications that were taken into consideration, and each of them was a community-based research study. Most of these studies compared the participants' conditions before and after the intervention in order to evaluate the influence that community-based treatments had on the individuals who participated in the study. During the intervention, the parameters of cardiovascular disease were the primary emphasis of four investigations, whereas the primary focus of four other research was on cardiometabolic illnesses, notably diabetes mellitus. Specifically, the influence of peer-based education on sexual education was investigated in a study.

A number of health professionals, including nurses, peer supports, community health workers, and health volunteers, worked together to deliver community-based therapies that resulted in positive outcomes.

In the case of diabetes mellitus, **Mash et al.**⁽²⁰⁾ observed a significant differential of 25%, but **Assah et al.**⁽²¹⁾ reported a difference of 22.3% after the intervention. According to the findings of the study carried out by **Davis et al.**⁽¹⁸⁾, the forest plot analysis demonstrated that the utilization of TeleCare, a remote education intervention, for the purpose of diabetes self-management led to a 33.5% improvement in cardiovascular health, as evaluated by systolic blood pressure.

Participants in the diabetes education seminars were supervised by healthcare professionals who provided them with instructional materials, conducted counseling sessions, and employed video conferencing in order to educate those who were diagnosed with diabetes.

Table (2): Short information about articles

Study	Aim	Sample Size	Age	Intervention done by	Intervention	Conclusion
Balagopal et al., 2012 ⁽⁸⁾	Assess the effectiveness of community-based prevention approach to prevent and manage diabetes mellitus	1681	41.9	Community health workers	Lifestyle education with model meals and cooking techniques	The study demonstrated enhanced understanding of DM and CVD decreased levels of overall and abdominal obesity, and a drop in undetected hypertension, along with the presence of metabolic comorbidities.
Harati et al., 2010 ⁽¹⁹⁾	Evaluate the impact of a lifestyle intervention implemented within a school setting	10368	43	Community health workers	Nutritional education classes	In a population-based environment, the implementation of lifestyle intervention led to a significant reduction in the occurrence of type 2 diabetes and improved management of non-communicable disease risk factors.
Mash et al., 2014 ⁽²⁰⁾	Assess the efficacy of group education sessions, facilitated by health promoters.	1570	56.1	Community health promoters	Health education session	The study found that diabetes education by trained professionals in well-resourced settings have been effective with clinically significant results.
Assah et al., 2015 ⁽²¹⁾	Assess the efficacy of a community-centered strategy that utilizes peer support at many levels.	200	57.1	Peer supporters	Health education sessions through meetings, telephone calls and personal encounter	The implementation of community-based peer support resulted in a substantial enhancement in metabolic control among individuals with type 2 diabetes and prevention of developing diabetic secondary complications
Baumann et al., 2015 ⁽²²⁾	Evaluate the practicality of implementing a peer intervention aimed at enhancing glycemic control.	46	46	Community nurses and peer supporters	Health education sessions at clinic or by telephone	An intervention consisting of a brief peer support program in a remote area of Uganda led to enhancements in diabetes care and eating habits.
Adeomi et al., 2014 ⁽²³⁾	Assesses the efficacy of peer education in augmenting HIV awareness, attitude, and sexual behaviors among adolescents who attend school.	400	10-19	Peer educators	Peer education about sexual behaviors	The study indicates that peer education effectively enhances knowledge, attitude, and preventive practices about HIV/AIDS among in-school adolescents, suggesting the need for tailored educational programs.
Davis et al., 2010 ⁽¹⁸⁾	1-year study to evaluate diabetes TeleCare, a remote diabetes self-management education intervention administered by a dietitian and nurse in a rural South Carolina FQHC.	165	>35	Health professionals	Diabetes education session by class, handouts, counselling and video conferencing	Telehealth facilitated a remote Diabetes Self-Management Education (DSME) session provided by a nurse Certified Diabetes Educator (CDE) and a nutritionist, which improved metabolic control and decreased cardiovascular risk in a population residing in a rural area with varied ethnic backgrounds.
Nguyen et al., 2012 ⁽²⁴⁾	Evaluation of the influence of healthy lifestyle promotion campaigns on CVD risk factors in the general population, specifically within a community-based hypertension management program.	4650	>25	Disease educators	Educational classes, physical activity classes, and dietary advice	Community-targeted healthy lifestyle promotion can improve the CVD risk factors significantly

Study	Aim	Sample Size	Age	Intervention done by	Intervention	Conclusion
Valdheim et al., 2010 ⁽²⁵⁾	Evaluate the effectiveness of diabetes prevention program lifestyle intervention	84	50.5	Health professionals	Lifestyle intervention program cooking classes, physical activity classes, and face to face interaction	Community level diabetes prevention programs in rural settings yielded positive results.
Jiang et al., 2013 ⁽²⁶⁾	Evaluate the community-based health promoting physical activity	1269	>18	Multi-sectoral working group	Community based physical activity promotion via mass media publicity	The study found that participants spent 145 minutes weekly walking after interventions, demonstrating the effectiveness of walking promotion strategies, media cooperation, and the Healthy Trail, which integrated healthy elements into walking.

Diabetes Mellitus

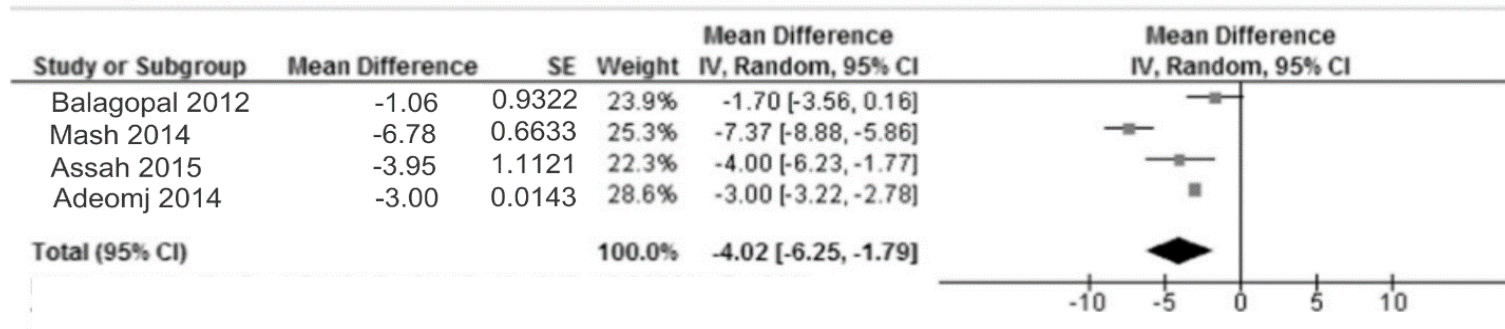


Figure (2): Forest plot indicating difference observed in diabetes mellitus.

SBP (mmHg)

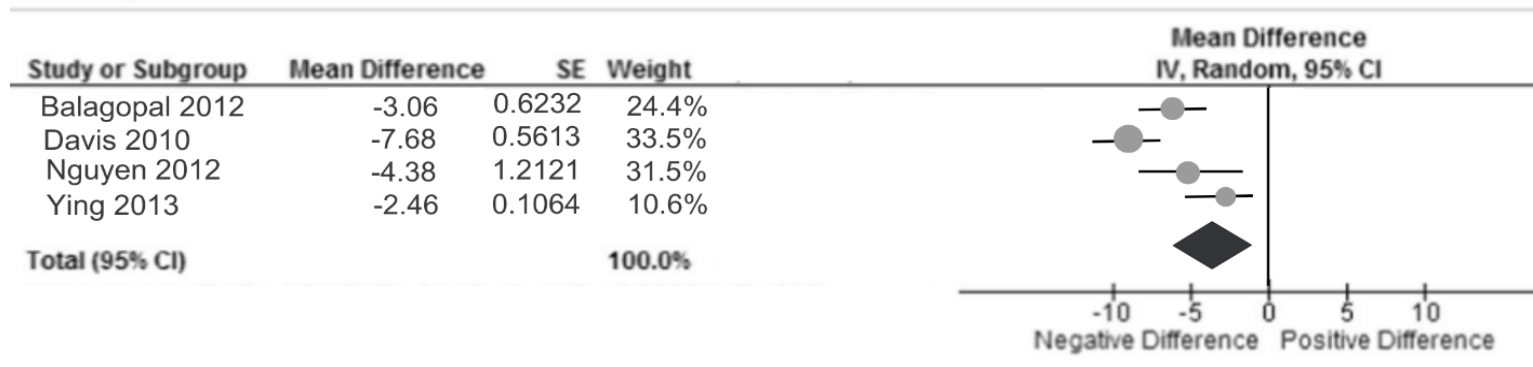


Figure (3): Forest plot indicating the effect size of systolic blood pressure

DISCUSSION

A study was done to examine the effects of community-based lifestyle education, which included teaching about healthy eating habits and demonstrating cooking techniques, on the understanding of diabetes mellitus and the management of blood glucose levels in diabetic patients. The study found that this approach resulted in improved comprehension of the disease and permitted better control of blood sugar levels. Significantly, community health workers implemented this intervention among the selected population⁽⁸⁾. Similarly, community health workers successfully organized nutritional education programs that effectively improved the management of chronic diseases, prevented diabetes complications, and reduced the risk of non-communicable diseases. The use of this strategy led to a significant decrease in the prevalence of long-lasting illnesses⁽¹⁹⁾. Community health promoters play a crucial role in persuading those who are affected by chronic illnesses. A comprehensive investigation was conducted to determine the effectiveness of group education conducted by health promoters found that a total of 1570 patients participated in health education sessions. The results were highly effective, showing clinically meaningful effects, such as a reduced occurrence of hypoglycemia episodes and other problems related to diabetes⁽²⁰⁾. This highlights the significant influence that community health promoters can exert in enhancing health outcomes and overseeing chronic illnesses among populations. Community-based interventions play a crucial role in reducing the occurrence of cardiovascular illnesses and effectively controlling hypertension. In a groundbreaking study, **Nguyen et al.**⁽²⁴⁾ carried out an extensive community intervention by including disease educators into a group of 4650 participants. The intervention consisted of instructional lectures enhanced by practical demonstrations of physical activities and dietary guidance, resulting in a comprehensive lifestyle adjustment targeted at reducing the risk of cardiovascular illnesses. The results of this intervention were highly positive, indicating a substantial decrease in the occurrence of hypertension among the specific group of people. In a similar vein, **Davis et al.**⁽¹⁸⁾ made a significant contribution to the discussion surrounding community-based interventions by launching a telehealth project called the TeleCare program. This intervention specifically aimed to deliver diabetes education to patients through remote means, empowering them with the essential abilities to independently manage their condition. The secondary aim of this intervention was to specifically decrease the cardiovascular risk linked to diabetes. The execution of this campaign was led by health experts, resulting in a significant reduction in cardiometabolic risk across rural people with varied ethnic backgrounds.

These studies collectively emphasized the effectiveness of therapies carried out within the community, not only in dealing with certain chronic conditions like hypertension and diabetes, but also in reducing the related cardiovascular risks. The variety and adaptability of community-based therapies in varied locations and groups are demonstrated through the inclusion of educational components, lifestyle adjustments, and the use of remote healthcare technologies. The study conducted by **Adeomi et al.**⁽²³⁾ implemented a community-based intervention that employed peer education to distribute information regarding sexual activities among peers. The results of this intervention showed that it effectively increased knowledge, influenced attitudes, and played a substantial impact in promoting preventative actions related to HIV and AIDS among young adults aged 10-19 years. In addition, **Jiang et al.**⁽²⁶⁾ executed a community-wide physical activity initiative that encompassed a group of 1269 individuals. Each person committed 145 minutes per week specifically to walking activities. The findings of this intervention demonstrated its efficacy in reducing abdominal obesity, hypertension, and other health conditions linked to a sedentary way of life. The research highlighted the potential influence of community-based physical activity programs in preventing a range of disorders associated with inadequate physical activity.

LIMITATION

Community-based treatments encounter several obstacles, such as logistical, socio-cultural, sustainability, measurement, and evaluation issues. Logistical problems encompass the tasks of planning, allocating resources, and coordinating efforts among stakeholders. On the other hand, socio-cultural sensitivity entails the need to acknowledge and handle cultural nuances and beliefs. The sustainability of a project relies on the enduring dedication and backing from both the organizers and the members of the community. The issues related to measurement and evaluation entail the identification of suitable measures and the establishment of a causal relationship between treatments and results. Limitations in resources, such as financial, human, and infrastructural factors, can undermine the effectiveness and extent of initiatives. Thorough examination is necessary to assess ethical factors, including obtaining informed permission, maintaining confidentiality, and ensuring fair distribution of benefits. It is essential to tackle these problems in order to improve the efficiency and long-term viability of community-based treatments as essential elements of public health programs.

CONCLUSION

Community-based interventions have proven to be efficacious in the prevention of chronic illnesses such as diabetes, cardiovascular diseases, and obesity. These interventions encompass a range of measures, including

health education, physical activity programs, nutrition initiatives, smoking cessation efforts, and screening programs. Studies have demonstrated that they boost comprehension of chronic illnesses, reduce risk factors, and improve overall health outcomes. Nevertheless, community-based treatments encounter obstacles pertaining to logistics, socio-cultural elements, sustainability, and evaluation. Tackling these obstacles is essential for the sustained effectiveness of these treatments in public health programs. Ultimately, community-based interventions play a crucial role in the prevention of chronic diseases, necessitating customized strategies for cardiovascular diseases, diabetes mellitus, and obesity. Subsequent investigations should prioritize the assessment of enduring effects and expandability of these interventions to guarantee a lasting influence on public health.

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