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EVALUATION OF THE IMPORTANCE OF HEALTH EDUCATION IN PREVENTIVE MEDICINE: HOW COMMUNITY-BASED PROGRAMS CAN EMPOWER INDIVIDUALS TO TAKE CONTROL OF THEIR HEALTH

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ABSTRACT

Background: Preventive medicine plays a pivotal role in reducing disease burden and promoting overall well-being. Community-based health education programs can serve as a key strategy to empower individuals with the knowledge and practices necessary for preventive care.

Objective: To determine how well a structured community health education program enhances both preventive health knowledge and self-reported safety practices within urban adult populations.

Methodology: This quantitative pre-post interventional study was conducted from 1 October 2023 to 31 March 2024. A total of 180 adult participants were enrolled through convenience sampling. The intervention comprised two interactive educational sessions covering hygiene, nutrition, physical activity, immunization, and disease screening. Data were collected using a structured questionnaire adapted from the WHO STEPS instrument and administered before and four weeks after the intervention. SPSS version 26 was used for analysis; paired t-tests and chi-square tests evaluated differences in pre- and post-intervention knowledge and practices.

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Results: Out of 180 participants, 53.4% were female, and the majority were aged between 31–45 years. Most had education up to matriculation, and 61.1% were unemployed or housewives. Post-intervention, the mean knowledge score significantly increased from 9.9 ± 2.9 to 14.8 ± 2.4 ($p < 0.0001$). Preventive practices also improved markedly: handwashing (62% to 88%), daily physical activity (32% to 59%), fruit and vegetable intake (41% to 73%), routine health monitoring (25% to 47%), and awareness of adult vaccinations (16% to 45%), all with $p < 0.0001$. Knowledge gain was positively associated with education level.

Conclusion: Community-based health education programs significantly enhance preventive health knowledge and behaviors. Such interventions can be vital in promoting public health at the grassroots level.

KEYWORDS: Preventive medicine, health education, community-based intervention, health promotion, knowledge improvement, urban population.

INTRODUCTION

Health is defined as a complete state of physical, mental, and social well-being and is much more than the absence of disease.[1] A movement from a reactive to a preventive approach has evolved and accelerated in modern medicine as global health needs have evolved.[2] Preventive medicine seeks to protect patients from the process leading to disease development by educating patients to change behaviors for an individual patient and changing the behavior of communities.[3] Preventive medicine can best protect health by improving population health through both classic health education and preventative healthcare is sustainable and highly cost-effective.[4] This approach shifts the emphasis from disease treatment to health promotion, empowering individuals with the tools and knowledge necessary to make informed decisions about their health. By fostering awareness about risk factors and healthy lifestyle choices, preventive medicine serves as a proactive strategy to reduce the burden of disease and associated healthcare costs. Community engagement and educational outreach are thus pivotal in achieving long-term public health goals.[5]

However, health service providers in many community settings, and low- and middle-income countries specifically, focus on curing illness and neglect preventative care.[6] Many health conditions persist until late stages due to poor health-seeking behavior, limited knowledge or access to information, societal beliefs around conditions, and a general lack of understanding. Many health conditions, such as hypertension, diabetes, and malnutrition, in addition to

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infectious diseases and care around maternal and child health, are avoidable and treatable through public education and awareness, follow-up screening, and simple behavior or lifestyle change. [7, 8]

A significant barrier to the adoption of preventive health practices in low- and middle-income countries is the disconnect between available healthcare services and the health literacy levels of the population.[9] Health literacy, the ability to access, comprehend, and utilize health information, is often critically low, especially among individuals with limited formal education.[10] This makes it difficult for people to recognize early warning signs of disease or to navigate the healthcare system effectively. Furthermore, the lack of preventative care is often compounded by a mistrust of the healthcare system, the reliance on home remedies, and pre-existing cultural traditions that may not promote proactive health behavior. This challenge is made worse when healthcare providers are stretched too thin and are not able to provide individualized education, limiting options for intervention and health promotion.[11]

Each of these barriers can be grouped under the umbrella of social interaction and/or knowledge, which has resulted in the rise of community-based health education around the globe, which is based on theoretical models, such as the Health Belief Model and Social Cognitive Theory, and practical applications of research fields like social marketing.[12] The goal of community-based health education is not only to impart information but to help change attitudes, self-efficacy, and environments.[13] In a systematic review of community-level structured interventions in Bangladesh, Kenya, and Brazil, significant outcomes have been documented showing positive changes in behaviors around antenatal care attendance, uptake of vaccinations, and management of chronic diseases such as diabetes and hypertension.[14-16] These studies also expressed the importance of locally designed and participatory education programs that are directed towards specific contexts, linguistically and culturally appropriate materials, and placed with a community-based participatory focus.

Health education programs implemented at the community level have proven to be an effective solution for creating better health knowledge access within local populations. Health education initiatives follow specific formats to serve target community requirements through suitable local teaching practices, including group sessions along with visual materials, and theatrical performance methods along with community dialogue programs.[17] Such interventions take place within schools and community centers as well as through direct household visits, thereby teaching people the significance of hygiene practices and nutrition, and vaccines, along with

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medical checkups and exercise. The distribution of health education plays a pivotal role since it provides people with knowledge about making better healthcare decisions, while it lessens the strain on healthcare systems.[18]

Multiple research projects worldwide have demonstrated that these health interventions produce positive results by enhancing literacy skills, combined with lower risky actions and reduced disease occurrences.[19-21] Many regions around South Asia, along with certain parts, use community-based health education insufficiently and monitor its impact. Municipal health officials must create proof of community intervention outcomes that healthcare providers and political leaders can use to add this form of health promotion to fundamental wellness care systems.[22] Strengthening the evidence base through well-structured studies can help justify the integration of these programs into national health policies and funding streams. Furthermore, ongoing monitoring and evaluation of such interventions are essential to adapt strategies according to local needs, measure effectiveness, and ensure sustainability over time. When supported by strong community involvement and institutional backing, these initiatives have the potential to transform health outcomes at a population level.

Due to rapid urbanization and lifestyles that were changing for an urban or semi-urban outcome in Pakistan, along with a lack of access to established health messages, health behaviors are a high risk.[23] Poor eating habits, physical inactivity, smoking, and hygiene practices are heavily prevalent due to a lack of awareness and community supportive systems. In addition to this, myths, taboos, and social stigma in health behavior, where illness is recognized with a cultural context, promote a delay in diagnosis and treatment, particularly for those most vulnerable in a society.[24] This is compounded in terms of service access to preventive healthcare provision, and low literacy levels. This begs for more structured health education initiatives that are culturally sensitive and have an established model of practice. There is potential for the community system to foster a health education program that engages the public through meaningful activities, as part of the program, like many health education initiatives. Community action through health education offers opportunities for attention to health equity differences at the community level, and the communities can build a healthier context through engagement and empowerment.

Community-based health education interventions can be designed not just to share knowledge, but to transform attitudes and behaviors that affect health outcomes. Unlike awareness campaigns that engage users once at a time of need, community-based health education

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interventions engage users multiple times and in contextually relevant situations. Research indicates that participatory learning options such as indigenous storytelling, peer education, and visuals in indigenous language significantly improve retention and application of knowledge.[25, 26] When health education is delivered by local community members, such as health workers or volunteers, it fosters trust and is accepted as a credible form of behavioral change. Community-based health education initiatives create an environment of health agency, whereby individuals feel empowered to take ownership of their health and that of their families and communities. Preventive health measures are paramount, especially in low- and middle-income countries, where the incidence of preventable diseases remains high. Preventive health practices, such as proper hygiene, regular physical activity, eating well, and receiving vaccinations, are primary interventions contributing to public health, decreasing morbidity and mortality. Evidence demonstrates the impact of preventative practices; yet, many people are still uninformed about critical information, and others with knowledge do not practice prevention. One reason for this can be attributed to factors such as limited health literacy, socio-cultural beliefs, and access. Communities with low levels of education, especially in urban and semi-urban settings, did not value prevention as a means to manage their health. Even when communities have access to education about prevention-focused behaviors, these barriers limit personal and effective decision-making to practice safe behaviors. This study aims to determine the degree to which a structured community health education program increases both preventive health knowledge and self-reported safety practices among at-risk urban adult populations.

Materials and Methods

To assess the effectiveness of a community-based health education program to improve levels of preventive health knowledge and practices among adults, a quantitative pre-post interventional study design was used. The research study was conducted in urban communities in Rawalpindi, Pakistan, utilizing accessible, low-cost public sites (e.g., health centers or community halls) to increase participation and decrease potential burden for the target participants. The study ran for six months from 1st October 2023 to 31st March 2024 to allow adequate time for intervention to take place and follow-up to occur.

The target population was adults (18 years+) living in selected urban communities. Participants were enrolled based on the following predetermined inclusion criteria: age 18 years+, willingness to participate and provide informed written consent, and residency in the

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community for a minimum of 6 months to ensure sufficient understanding of the local health norms and exposure to the intervention. Participants were excluded if they were known to have a cognitive impairment or psychiatric disorder that may not necessarily impede understanding or meaningful participation, or if they were currently participating in any organized health education program during the study, to prevent a confounding effect on gaining knowledge.

A non-probability convenience sampling method was deployed to recruit 180 participants. The sample size was calculated using Open Epi software and was based on previous research findings with moderate effect sizes for knowledge gain, 80% power, and a 95% level of confidence to detect significant improvements.[27, 28] This sampling method was suitable considering the challenges of using random sampling approaches in community contexts.

The health educational intervention developed for the sample was structured and incorporated a culturally contextualized program developed for a specific population. The intervention was conceived in consultation with public health professionals and adapted to the community's language, cultural dispositions, and health issues. The intervention involved two interactive health education sessions of 60 to 90 minutes each, comprised of trained public health educators delivering the sessions at one-week intervals. The emphasis on health education was on personal hygiene practices, balanced nutrition, being physically active, vaccination schedules, regular health screening of non-communicable conditions such as diabetes, and discouraging other risky behaviors, such as tobacco use.

The sessions incorporated interactive and engaging learning methods, including the use of large visual aids (e.g., posters and flipcharts), short educational video clips, and printed Urdu-language pamphlets for take-home reinforcement. Additionally, small-group discussions and question-and-answer segments were integrated to foster participant engagement, clarify misunderstandings, and strengthen knowledge retention through peer interaction.

To evaluate the effectiveness of the intervention, data were collected at two time points: before the intervention (pre-test) and four weeks after the final session (post-test). A structured questionnaire was utilized as the data collection instrument. This questionnaire was based primarily on the WHO Stepwise approach to risk factor surveillance for non-communicable diseases (WHO STEPS Instrument) and was supplemented with context-specific questions derived from previous literature on preventive health behavior.[29, 30] The questionnaire was divided into three parts: Demographic Section – capturing participant characteristics such as age, gender, education, and employment status, Knowledge Section – consisting of 20 multiple-

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choice questions addressing topics covered in the health sessions and Practice Section – including 10 items that assessed the frequency of preventive health behaviors such as handwashing, physical activity, dietary habits, and routine medical checkups.

The questionnaire was adapted from validated tools used in similar community-based studies and underwent pilot testing with a subgroup of 20 participants to evaluate its clarity, reliability, and cultural appropriateness. Feedback from the pilot phase led to minor refinements in wording and layout to enhance understanding across diverse literacy levels.

Data collection was conducted through face-to-face interviews by a team of trained fieldworkers who were fluent in the local language and well-versed in community engagement. To maintain consistency and minimize interviewer bias, the same fieldworkers conducted both the pre- and post-intervention assessments. All responses were initially recorded on paper-based forms and later digitized for data entry. Confidentiality was rigorously ensured by assigning unique anonymous codes to each participant in place of identifiable information. All digital records were stored securely, accessible only to the principal investigator and authorized personnel. The study was carried out following ethical principles. Ethical approval was obtained from the Institutional Review Board (IRB). Before enrollment, informed written consent was obtained from all participants after a thorough explanation of the study's purpose, benefits, potential risks, and confidentiality measures. Participation was strictly voluntary, and individuals were informed of their right to withdraw at any time without facing any consequences or loss of benefits. Data analysis was performed using SPSS version 26. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to summarize demographic data and response distributions. To assess the impact of the intervention, a paired sample t-test was applied to compare pre- and post-intervention knowledge scores. Chi-square tests were employed to evaluate changes in categorical preventive practices before and after the intervention. Additionally, ANOVA was used to examine the relationship between education level and change in knowledge scores across different groups. A p-value of < 0.05 was considered statistically significant throughout the analysis.

Results

A total of 180 participants were included in the study. The age distribution showed that the majority of respondents were between 31 and 45 years (45.5%), followed by those aged 18 to 30 years (36%), while 17.7% were in the 46 to 60 years age bracket. In terms of gender, females

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comprised a slightly higher proportion (53.4%) compared to males (46.6%), suggesting a relatively balanced gender representation. *(Figure 1)*

Regarding educational status, 25.5% of participants had no formal education, indicating a significant portion of the study population with limited literacy. The majority, 61.1%, had education ranging from primary to matriculation level, while only 13.8% had attained education at the intermediate level or above. This suggests that the intervention needed to be inclusive and understandable across varying literacy levels. Employment status showed that 38.8% of the participants were employed, while a larger proportion, 61.1%, were either unemployed or housewives, indicating that the sample largely represented economically dependent individuals or those not in formal employment. *(Table 1)*

Following the health education intervention, a statistically significant improvement in health knowledge was recorded. The mean pre-intervention score was 9.9 ± 2.9, which rose to 14.8 ± 2.4 post-intervention, reflecting a mean difference of 4.9. The improvement was highly significant, with a p-value of 0.0001, confirming the effectiveness of the intervention in enhancing participants' understanding of preventive health behaviors. *(Table 2, Figure 2)*

Significant improvements were also noted in various preventive health practices post-intervention. The practice of regular handwashing before meals increased substantially from 62% before the intervention to 88% afterward. Similarly, the proportion of participants engaging in at least 30 minutes of physical activity daily rose from 32% to 59%, indicating a positive shift toward a more active lifestyle. Additionally, fruit and vegetable consumption increased from 41% to 73%, suggesting a considerable improvement in dietary habits. Routine health monitoring practices also improved, with the percentage of participants checking their blood pressure or blood sugar every 3 to 6 months increasing from 25% to 47%. Awareness about adult booster vaccinations showed a substantial rise as well, from 16% before the intervention to 45% afterward. All these improvements were found to be statistically significant with p-values < 0.0001, reinforcing the intervention's role in positively influencing health behavior. *(Table 3)* A detailed analysis of knowledge improvement across educational levels revealed a strong correlation between education and knowledge gain. Participants with no formal education showed an increase in mean knowledge scores from 9.7 ± 2.2 to 13.5 ± 2.1, demonstrating that even those with limited literacy benefited from the intervention. Those educated up to matric level exhibited a marked increase from 11.3 ± 3.2 to 16.2 ± 3.5, while the highest gains were observed in participants with intermediate education or higher, who

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improved from 14.2 ± 2.5 to 18.2 ± 2.6. The observed improvements in all educational strata were statistically significant, with p-values < 0.0001, underscoring that while higher education was associated with greater pre- and post-intervention scores, the intervention was effective across all educational backgrounds. *(Table 4)*

Table 1: Socio-Demographic Characteristics of Participants (n = 180)

Variable	**n (%)**
Age Group (years)	
18–30	66 (36.0%)
31–45	82 (45.5%)
46–60	32 (17.7%)
Gender	
Male	84 (46.6%)
Female	96 (53.4%)
Education Level	
No formal education	45 (25.5%)
Primary to matriculation	110 (61.1%)
Intermediate and above	25 (13.8%)
Employment Status	
Employed	70 (38.8%)
Unemployed/Housewife	110 (61.1%)

Table 2: Comparison of Mean Knowledge Scores Before and After the Intervention

Assessment Time Point	**Mean Score ± SD**	**Mean Difference**	**p-value**
Pre-Intervention	9.9 ± 2.9	4.9	0.0001
Post-Intervention	14.8 ± 2.4		
**One-way ANOVA applied* **Significant at p < 0.05*			

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Table 3: Preventive Health Practices Pre and Post-Intervention (n = 180)

Preventive Practice	Practicing n (%)		p-value
	Pre-Intervention	Post-Intervention	
Regular handwashing before meals	112 (62%)	160 (88%)	< 0.0001*
Daily physical activity (≥30 mins/day)	58 (32%)	107 (59%)	< 0.0001*
Consumption of fruits/vegetables daily	75 (41%)	132 (73%)	< 0.0001*
Regular BP/sugar check (every 3–6 months)	45 (25%)	86 (47%)	< 0.0001*
Vaccination awareness (adult boosters)	30 (16%)	82 (45%)	< 0.0001*

**Chi-square test applied*

**Significant at p < 0.05*

Table 4: Association Between Education Level and Knowledge Improvement

Education Level	Mean Score		Mean Difference	p-value
	Pre-Intervention	Post-Intervention		
Uneducated	9.7 ± 2.2	13.5 ± 2.1	3.8	< 0.0001*
Primary to matric	11.3 ± 3.2	16.2 ± 3.5	4.9	< 0.0001*
Intermediate and above	14.2 ± 2.5	18.2 ± 2.6	4.0	< 0.0001*

**One-way ANOVA test applied*

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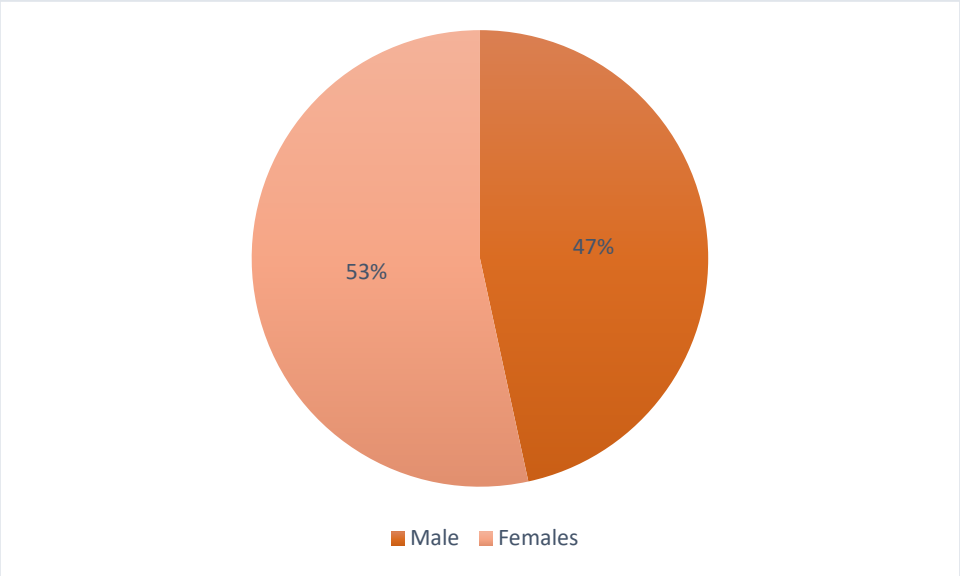

Figure 1: A pie chart showing the gender distribution of the study participants

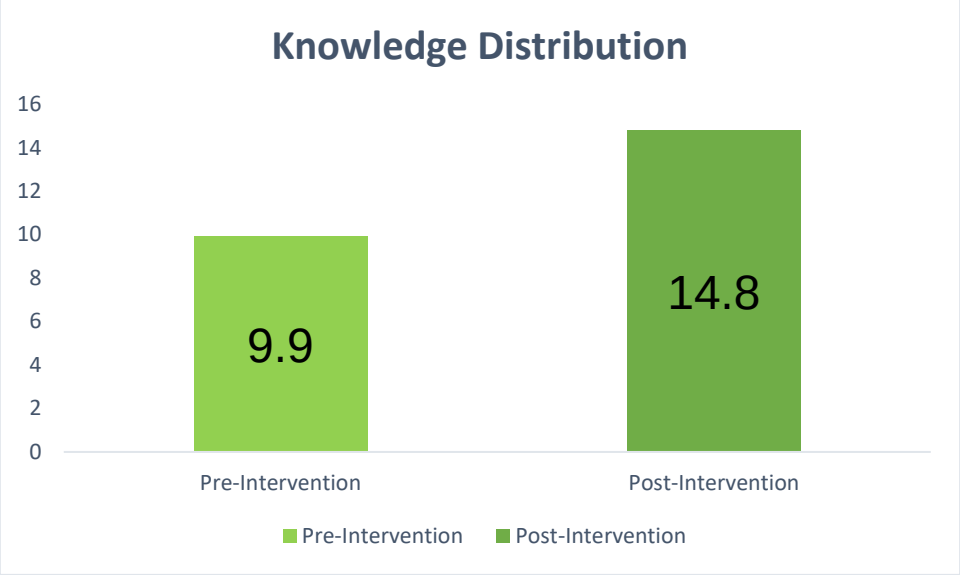

Figure 2: A graph showing the mean knowledge score before and after the intervention

Discussion

This study highlights an increase in preventative health behaviors, signifying a difference in the behavior change outcomes. Regular handwashing before meals increased from 62% to 88% after the intervention. This correlates closely with the findings of Qazi et al. (2021) and Malolo R, et al.2021, who found that handwashing behavior improved after carrying out community-based hygiene workshops.[31, 32] Similarly, daily physical activity behavior increased from 32% to 59% as measured again by a post-survey following the intervention, which corroborates the

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findings of Mahmood A, et al. (2022) who indicated that health counselling was positively associated with improved exercise adherence in low- and middle-income communities.[33] Improved fruit and vegetable consumption from 41% to 73% within our study after the intervention likewise reflects the work of Helland MH et al. (2021), where dietary motivating factors improved dramatically after participation in a nutrition education program.[34]

Another important finding is the increase in awareness and practice regarding routine blood pressure/sugar checks and adult vaccinations. The percentage of participants checking their BP/sugar every 3–6 months increased from 25% to 47%, while the percentage of participants aware of adult booster vaccinations rose from 16% to 45%. The increase in awareness and practice of routine health check-ups and increasing knowledge of vaccinations aligns with Norman et al.'s (2024) study, which showed an increase in the practice and awareness of routine health checks and vaccinations following health promotion interventions in disadvantaged populations.[35]

A significant area of investigation in this research was the relationship between educational level and the increase in knowledge. All groups showed evidence of slightly statistically significant increases, but the participants with an intermediate education and higher had the greatest pre-intervention and post-intervention scores. This pattern reflects similar patterns found in other research by Shahid et al. (2022) found that a higher educational status was associated with higher health literacy level increases. However, the greatest increases were observed in the individuals without a formal education, meaning that the information was interpreted and designed in a way that individuals with every literacy level could understand.[36] Similar findings were reported in a study by Bhattacharjya et al. (2021), who implemented a structured community health education intervention in rural India targeting lifestyle-related non-communicable diseases. Their study demonstrated a significant increase in hand hygiene, dietary modification, and physical activity following a series of interactive community-based sessions.[37] Much like our study, Bhattacharjya et al. reported that group discussions and participatory techniques, including role-plays and demonstrations, played a vital role in fostering behavioral change.[37] These outcomes support the notion that tailored, culturally appropriate health education can lead to measurable improvements in preventive practices among underserved populations.

Additionally, Ataullahjan et al. (2023) conducted a quasi-experimental study in Pakistan to assess the impact of community health sessions on routine screening and vaccination practices.

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They reported a notable improvement in the awareness and practice of routine BP and blood sugar monitoring post-intervention, which parallels our study findings. Their study also highlighted a substantial improvement in adult vaccination awareness, similar to the rise observed in our results.[38] These comparable findings strengthen the argument that accessible health education programs can bridge critical knowledge gaps and promote self-initiated health monitoring practices, particularly in urban and peri-urban populations.

Furthermore, Pardhan et al. (2023), in a study conducted in Nepal, emphasized the role of educational attainment in influencing health literacy outcomes. Their research found that although individuals with secondary and higher education levels had better baseline health knowledge, the most substantial knowledge gains post-intervention were observed among participants with lower or no formal education, echoing the results of our study. Pardhan et al. concluded that health programs incorporating visual aids, simple language, and repeated engagement can significantly empower populations with limited educational backgrounds.[39] This affirms that health interventions designed with inclusivity in mind can overcome literacy barriers and foster equitable learning outcomes across demographic strata.

Despite these promising outcomes, several limitations should be acknowledged. Firstly, the study used a relatively short follow-up period, and long-term retention of knowledge and sustained behavioral change were not assessed. Secondly, the reliance on self-reported practices may introduce social desirability bias where participants over-report positive health behaviors post-intervention. Thirdly, the study was conducted in a single geographic region, which may limit the generalizability of the findings to other settings with different cultural or socio-economic contexts. Additionally, while the intervention demonstrated effectiveness, the exact components contributing most to the observed improvements were not individually assessed, which limits our ability to determine which aspects were most impactful. The present study findings confirmed that community-based educational interventions can lead to significant improvements in health knowledge and preventive practices. The results are in agreement with existing literature and emphasize the importance of health education as a cost-effective and scalable strategy for improving public health outcomes, particularly in resource-constrained settings. Future studies with longer follow-up durations, larger sample sizes, and multi-site designs are recommended to validate these findings and assess long-term behavioral change.

Conclusion

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Educational intervention significantly enhanced participants' knowledge and improved their preventive health practices. The substantial rise in mean knowledge scores after the intervention, coupled with statistically significant gains in many behavioral changes (hand hygiene and other physical activity/healthy eating/routine health check-ups, and awareness of vaccinations), demonstrates the success of structured health education. Additionally, while an individual with higher educational attainment was observed to show greater improvement, there were still positive improvements observable at all education levels, indicating the broad applicability of the intervention. These findings underscore the importance of community-based awareness programs to enhance health literacy and preventive care, particularly in contexts with different socio-demographic characteristics. Furthermore, although individuals with higher educational attainment showed comparatively more substantial color gains, the intervention still had positive effects across all educational strata. This suggests that health education programs that are thoughtfully designed, accessible, and inclusive can successfully reach diverse populations, even if they have low literacy. Community-based awareness programs, therefore, present a significant opportunity to scale a low-cost public health promotion approach, especially in low- and middle-income countries, where preventive care is often poorly utilized.

Future Recommendations

Future research should include longer follow-up periods that evaluate ongoing behavior change over time. While short-term improvements in health knowledge and health-related behaviors are promising, it is important to determine if the positive change our participants demonstrated is sustained over time, or if there is some decay in knowledge retention or practice adherence once the intervention has ended. Longitudinal studies with a follow-up of 6 months to 1 year would be a great way to explore the sustainability of educational intervention on preventive health practices followed by individuals. In addition, studies that investigate behavioral relapse or the need for periodic reinforcement of key messages would help consider strategies for supporting health updates in a community. Finally, when possible, conducting multi-site studies that include a range of geographical, cultural, and socio-economic contexts would enhance the generalizability of the findings.

Expanding the research to different urban and rural contexts, with varying degrees of access to healthcare, educational attainment, and cultural beliefs, would allow the opportunity to discover whether the educational intervention is effective universally across different

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populations, or if interventions require tailoring to meet the contextualized needs of different communities. The benefits of this approach would not only allow for results that are more broadly applicable across various regions, but it would also allow for the recognition of what aspects of health education need further adjustments to be contextually effective in specific cultural or socio-economic circumstances.

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