AUCTORES
Globalize your Research

Journal of Cancer Research and Cellular Therapeutics
Hamidreza Zendehtalab *

Open Access

Research Article

The Impact of a Community-Based Participatory Intervention on Colorectal Cancer Health Literacy Among Middle-Aged Adults: A Field Trial Study

Hesam Dolatabadi [1], Hamidreza Zendehtalab [2]*, Fatemeh Heshmati Nabavi [3]

[1]Master of Community Health Nursing, Department of Community Health Nursing, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran.

[2]Assistant Professor, Department of Community Health Nursing, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran.

[3]Professor, Department of Nursing Management, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran.

***Corresponding Author:** Hamidreza Zendehtalab, Assistant Professor, Department of Community Health Nursing, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran.

Received Date: May 12, 2025; **Accepted Date:** May 19, 2025; **Published Date:** May 26, 2025

Citation: Hesam Dolatabadi, Hamidreza Zendehtalab, Fatemeh H. Nabavi, (2025), The Impact of a Community-Based Participatory Intervention on Colorectal Cancer Health Literacy Among Middle-Aged Adults: A Field Trial Study, *J. Cancer Research and Cellular Therapeutics*. 9(3); **DOI:10.31579/2640-1053/239**

Abstract

Background and Aim: Health literacy is critical for preventing chronic diseases like colorectal cancer. This study evaluated the impact of a community-based participatory research (CBPR) intervention on colorectal cancer health literacy among middle-aged adults.

Methods: This interventional pre-test/post-test study was conducted in 2023 in a Comprehensive Health Services Center in Mashhad, Iran. A total of 64 adults aged 40–59 years were randomized into intervention (n=31) and control (n=33) groups. The 5-week intervention included educational workshops, counseling, materials distribution, and follow-up. Data were collected using the European Health Literacy Survey (HLS-EU) and analyzed with t-tests and two-way ANOVA.

Results: Post-intervention, the intervention group's mean health literacy score (103.13±13.43) was significantly higher than the control group's (89.12±14.74) ($P<0.05$). Significant improvements occurred in healthcare ($P<0.05$) and health promotion ($P<0.03$) domains, but not in disease prevention ($P=0.23$).

Conclusion: The CBPR intervention enhanced health literacy in healthcare and health promotion, offering a scalable model for resource-constrained settings. Longer interventions are needed to impact disease prevention.

Keywords: health literacy; colorectal cancer; community-based participatory research; middle-aged adults; prevention

Introduction

Health literacy, defined as the ability to access, understand, appraise, and apply health information and services to make informed decisions, is a cornerstone of public health promotion and chronic disease prevention [1]. This concept is particularly critical in addressing colorectal cancer, the third most common cancer globally and a growing public health challenge in Iran [2]. According to the World Health Organization (WHO), colorectal cancer accounted for over 1.8 million new cases and approximately 880,000 deaths in 2018, with projections indicating a substantial increase by 2030 due to aging populations and lifestyle changes [3]. In Iran, the annual incidence ranges from 98 to 110 cases per 100,000, with a notable upward trend over recent decades, underscoring the urgency of effective prevention strategies [4].

Low health literacy is associated with numerous adverse outcomes, including higher healthcare costs, reduced adherence to screening programs, delayed diagnosis, and exacerbated health disparities [5]. A systematic review by Navarro et al. (2017) found that individuals with low health literacy are 30–50% less likely to participate in colorectal cancer screening programs, such as colonoscopy or fecal occult blood testing (FOBT), increasing the risk of late-stage diagnosis and mortality [6]. This issue is particularly pronounced among middle-aged adults (40–59 years), a group at elevated risk for colorectal cancer where timely lifestyle modifications and screening can significantly reduce disease

progression. Interventional studies, such as Ladabaum et al. (2020), have demonstrated that early adoption of preventive behaviors, including high-fiber diets and regular physical activity, combined with routine screening, can reduce colorectal cancer incidence by up to 40% [7]. However, limited knowledge and skills to navigate health services, especially in populations with restricted access to resources, hinder the uptake of these preventive measures [8].

Colorectal cancer imposes a substantial economic and social burden on healthcare systems and communities. A narrative review by Khan & Lengyel (2023) estimated that the direct and indirect costs of colorectal cancer in middle-income countries like Iran amount to billions of dollars annually, largely due to late-stage diagnoses requiring advanced treatments [9]. In Iran, structural barriers, such as limited screening facilities in rural and underserved areas, and cultural barriers, including stigma surrounding colorectal cancer screening, exacerbate prevention challenges [10]. These issues are particularly critical for middle-aged adults, who face increasing exposure to risk factors such as obesity, unhealthy diets, and sedentary lifestyles [4]. Enhancing health literacy in this population can empower individuals to adopt preventive behaviors and access screening services, thereby reducing the disease burden and improving health equity.

Traditional health literacy interventions, often employing top-down approaches, have shown limited effectiveness due to their failure to address community-specific needs and cultural contexts. In contrast, community-based participatory research (CBPR) engages community members in the design and implementation of interventions, fostering trust, increasing acceptance, and ensuring sustainability [11]. Interventional studies, such as Lin et al. (2019), have demonstrated that CBPR can improve health literacy by up to 25% in areas like diabetes and cardiovascular disease management [12]. A systematic review by Ramanadhan et al. (2018) further highlighted that CBPR interventions in cancer prevention, particularly in low- and middle-income countries (LMICs), can increase screening participation rates by up to 20% [13]. However, the application of CBPR to colorectal cancer health literacy remains underexplored, especially in resource-constrained settings like Iran.

Despite the growing evidence on the role of health literacy in colorectal cancer prevention, few interventional studies in Iran have utilized CBPR to address this issue. Most existing interventions have focused on hospital-based education or mass media campaigns, with limited emphasis on community empowerment through active participation [15]. Furthermore, there is a paucity of studies examining the impact of CBPR on specific health literacy domains (healthcare, disease prevention, and health promotion) among middle-aged adults, a group with high potential for behavior change but significant risk exposure. Additionally, the lack of research addressing Iran-specific barriers, such as cultural stigma or limited screening access, represents a critical knowledge gap.

This study seeks to answer the question: “To what extent can a community-based participatory intervention improve colorectal cancer health literacy among middle-aged adults attending in a Comprehensive Health Services Center in Mashhad, Iran?” By addressing this question, the study aims to evaluate the effectiveness of a CBPR intervention in enhancing health literacy and to provide a scalable model for Iran’s healthcare system, while considering context-specific barriers.

Objectives

Primary Objective: To evaluate the impact of a CBPR intervention on colorectal cancer health literacy among middle-aged adults at the Shahid Comprehensive Health Services Center in Mashhad.

Specific Objectives:

1. Assess the intervention’s effect on the healthcare domain of health literacy.
2. Evaluate its effect on the disease prevention domain.
3. Determine its effect on the health promotion domain.
4. Analyze the influence of demographic variables (age, gender, education) on outcomes.

Methods

Study Design

This filed trial study with a pre-test/post-test design was conducted from April to September 2023 in a Comprehensive Health Services Center in Mashhad, Iran, serving approximately 50,000 residents in the Qasemabad district.

Population and Sample

The target population included adults aged 40–59 years with active health records. Inclusion criteria were literacy in Persian, no history of colorectal cancer or severe chronic diseases, and consent to participate. Exclusion criteria included missing more than one educational session or incomplete post-test questionnaires.

Using a formula for interventional studies (95% confidence, 80% power, effect size 0.5), a minimum sample of 61 was calculated, increased to 70 (35 participants per group) to account for 10% dropout. Four participants in the intervention group and two participants in the control group withdrew from the study for reasons such as not attending more than one educational session and failing to complete the questionnaires. Ultimately, the final analysis was conducted on 64 participants. Random allocation used a random number table.

Data Collection Tools

The European Health Literacy Survey (HLS-EU), validated in Persian (Tavousi et al., 2016), was the primary tool, with 36 items across three domains:

- ✓ Healthcare (12 items): Accessing and using health services.
- ✓ Disease Prevention (12 items): Understanding preventive measures.
- ✓ Health Promotion (12 items): Empowering health improvement.

Items were scored on a 4-point Likert scale (1=very difficult, 4=very easy), with total scores from 36 to 144. Cronbach’s alpha was 0.89. A demographic questionnaire collected age, gender, education, and marital status. The validity and reliability of the European Health Literacy Survey Questionnaire (HLS-EU) have been confirmed in Iran through a study by Ghanai et al in 2023 [16]. In the present study, the Cronbach's alpha coefficient for each of the three dimensions of health literacy was calculated to be 0.91, indicating high internal consistency.

Intervention Design

The 5-week CBPR intervention was designed based on a needs assessment and implemented as follows:

1. Needs Assessment: Semi-structured interviews with 20 participants and 5 healthcare workers identified knowledge gaps (e.g., screening awareness).
2. Educational Workshops: Five sessions of 45 to 60 minutes covered colorectal cancer symptoms, screening methods (colonoscopy, FOBT), diet, and exercise. Delivered by trained health educators, sessions used slides, videos, and discussions.
3. Counseling: Each participant received one 30-minute in-person session and two 15-minute telephone follow-ups for personalized guidance.
4. Educational Materials: Illustrated pamphlets were developed with input from community members to ensure cultural relevance.
5. Follow-Up and Referral: Community health workers conducted home visits to monitor adherence and referred eligible participants to screening centers.

Healthcare workers received a 2-day training on colorectal cancer and CBPR principles. The 5-week duration was chosen based on logistical constraints and prior short-term CBPR studies [12]. A summary of the

educational sessions and the content delivered in them is presented in Table 1.

Session	Topic	Content	Duration
1	Introduction to Colorectal Cancer	Risk factors, symptoms	45-60 min
2	Screening Methods	Colonoscopy, FOBT	45-60 min
3	Diet and Nutrition	Fiber-rich diets, red meat reduction	45-60 min
4	Physical Activity	Exercise guidelines	45-60 min
5	Community Action	Advocacy, resource access	45-60 min

Table 1: Overview of Educational Workshop Content

Data Analysis

Data were analyzed using SPSS version 25. Normality was confirmed (Kolmogorov-Smirnov, P>0.05). Independent and Paired t-tests compared group scores, and two-way ANOVA assessed demographic influences. Significance was set at 0.05.

Ethical Considerations

Approved by Mashhad University of Medical Sciences (IR.MUMS.REC.1402.015), the study obtained written consent and ensured data confidentiality. Additionally, the present study received a trial registration code (IRCT20230310057666N1) from the Iranian Registry of Clinical Trials (IRCT).

Results

Demographic Characteristics

Table 2 shows the groups were comparable in age, gender, education, occupation, Socioeconomic status and marital status (P>0.05). The data in Table 2 indicate that there were no significant differences between the participants in any of the demographic variables. Therefore, the two study groups were homogeneous.

Variable	Category	Intervention (n=31)	Control (n=33)	P-value
Age (years)		48.4±7.3	47.8±6.9	0.73
Gender	Male	10 (32.3%)	12 (36.4)	0.85
	Female	20 (67.7)	21 (61.6)	
Educational level	Less than high school	8 (25.8%)	9 (27.3%)	0.92
	High school diploma	16 (51.6%)	15 (45.4%)	
	University degree	7 (22.6%)	9 (27.3%)	
Marital Status	Single	7 (23.6%)	7 (22.3%)	0.73
	Married	24 (77.4%)	26 (78.7%)	
Occupation	Unemployed	4 (12.9%)	6 (18.2%)	0.73
	Homemaker	14 (45.16%)	16 (48.2%)	
	Employed	11 (35.48%)	9 (27.3%)	
	Retired	2 (6.46%)	2 (6.3%)	
Socioeconomic status	Low	19 (61.29%)	21(63.63%)	0.96
	Middle	10 (32.26%)	9 (27.3%)	
	High	2 (6.45%)	3 (9.07%)	

Table 2: Demographic Characteristics of Participants

Total Health Literacy

Prior to the intervention, total health literacy scores were comparable between the two groups (intervention: 87.45 ± 12.31; control: 86.78 ± 13.56; $P = 0.14$), indicating baseline homogeneity. However, following the intervention, the intervention group achieved a significantly higher mean score (103.13 ± 13.43) compared to the control group (89.12 ± 14.74; $P < 0.05$). The results of the independent t-test confirmed that the difference in total health literacy scores between the two groups became statistically significant after the intervention (Table 3).

Time Point	Intervention (Mean ± SD)	Control (Mean ± SD)	P-value
Pre-Intervention	87.45 ± 12.31	86.78 ± 13.56	0.14
Post-Intervention	103.13 ± 13.43	89.12 ± 14.74	<0.05

Table 3: Total Health Literacy Scores

Health Literacy Domains

For the purpose of between-group comparison, the results of the independent t-test revealed no statistically significant difference in the mean score of the healthcare dimension of health literacy between the two groups of middle-aged participants prior to the intervention, indicating baseline homogeneity. Following the intervention, the mean score of this dimension was significantly higher in the intervention group compared to the control group. The independent t-test further confirmed a statistically significant difference between the groups in the post-intervention phase ($P = 0.001$). The results related to the other dimensions of health literacy are presented in Table 4.

Domain	Group	Pre- Int	Post- Int	P-value
Healthcare	Intervention	31.94±7.31	41.37 ± 7.62	0.001
	Control	32.34±7.68	33.76 ± 6.31	0.48
Disease Prevention	Intervention	24.21±5.28	26.19±5.32	0.14
	Control	23.96 ± 5.31	24.78 ± 6.11	0.38
Health Promotion	Intervention	27.97±7.73	35.87 ± 6.63	0.001
	Control	28.41±8.07	30.78 ± 7.74	0.19

Table 4: Health Literacy Domains

Demographic Influences

Two-way ANOVA showed no confounding effects from age (P=0.54), gender (P=0.67), or education (P=0.39), occupation (P=041), marital status (P=0.37) and socioeconomic status (P=0.51).

Discussion

This study demonstrates that a CBPR intervention significantly improved colorectal cancer health literacy among middle-aged adults in Mashhad, particularly in the healthcare and health promotion domains. The improvement in healthcare literacy aligns with Lin et al. (2019), who found CBPR effective in enhancing access to health services [12]. The use of tailored workshops and counseling likely empowered participants to navigate screening and treatment options, supported by culturally relevant materials developed with community input [17]. The engagement of trained community health workers fostered trust, a key factor in CBPR success [11].

The lack of improvement in the disease prevention domain, unlike Li et al.'s (2020) 6-month study, may stem from multiple factors [18]. The 5-week duration may have been too brief to change behaviors like screening adherence or dietary habits, which require sustained effort [19]. Additionally, the HLS-EU questionnaire may not fully capture nuanced preventive behaviors, as some items focus on general health rather than cancer-specific actions [1]. Cultural barriers, such as stigma around colorectal cancer screening in Iran, or logistical issues, like limited screening access, may have further hindered progress [4]. Future studies could use cancer-specific tools or extend intervention periods to address these challenges.

The health promotion domain's improvement, consistent with Avery et al, reflects CBPR's strength in enhancing self-efficacy [20]. Community-driven sessions likely motivated participants to adopt healthier lifestyles and advocate for health, creating potential community-wide benefits [13]. This aligns with CBPR interventions in other LMICs, such as India, where community engagement improved cancer screening uptake [21].

In Iran, contextual factors like healthcare infrastructure and cultural attitudes toward cancer screening significantly influence health literacy interventions. Stigma and low awareness often deter screening, particularly among men, while urban-rural disparities limit access to services [22]. This study's urban setting may have facilitated access to resources, but rural populations may face greater barriers, necessitating tailored CBPR approaches. Addressing these factors requires integrating community leaders and leveraging digital platforms to overcome logistical constraints.

Globally, this study contributes to the growing evidence on CBPR in LMICs, where resource constraints demand innovative approaches [23]. Unlike high-income countries with established screening programs, Iran's healthcare system benefits from CBPR's low-cost, community-driven model. Future research should compare CBPR with other interventions and assess long-term outcomes like screening rates.

Limitations

The study has several limitations. The 5-week duration may have limited behavioral changes, particularly in disease prevention. The urban setting and voluntary participation may introduce selection bias, potentially overestimating effects among motivated participants. Socioeconomic factors, not fully explored, could influence outcomes, as lower-income individuals may face greater barriers to screening access. The HLS-EU's general focus may have reduced sensitivity to colorectal cancer-specific literacy. Generalizability to rural or less educated populations is uncertain due to Mashhad's urban context. Long-term follow-up was not conducted, limiting insights into sustained impacts. Future studies should extend durations, use targeted tools, and include diverse populations to address these issues.

Conclusion

The CBPR intervention significantly improved colorectal cancer health literacy in healthcare and health promotion domains, offering a scalable, low-cost model for Iran's healthcare system. The lack of impact on disease prevention highlights the need for longer interventions and cancer-specific tools. Future research should address cultural and logistical barriers and assess long-term outcomes to enhance CBPR's effectiveness in LMICs.

Acknowledgement

The authors express their gratitude to all clients and healthcare workers at the Comprehensive Health Service Center. This article is derived from a Master's thesis in Community Health Nursing, conducted with the support of the Research Deputy of Mashhad University of Medical Sciences.

Conflict of Interest

The authors declare no conflicts of interest and have contributed equally to the writing of the manuscript.

References

1. Nutbeam, D., & Lloyd, J. E. (2021). Understanding and responding to health literacy as a social determinant of health. *Annual review of public health*, *42*(2021), 159-173.
2. Siegel, R. L., Miller, K. D., Goding Sauer, A., Fedewa, S. A., Butterly, L. F., et al., (2020). Colorectal cancer statistics, 2020. *CA: a cancer journal for clinicians*, *70*(3), 145-164.
3. World Health Organization. (2020). *WHO report on cancer: setting priorities, investing wisely and providing care for all*. World Health Organization.
4. Roshandel, G., Ghanbari-Motlagh, A., Partovipour, E., Salavati, F., Hasanpour-Heidari, S., et al., (2019). Cancer incidence in Iran in 2014: results of the Iranian National Population-based Cancer Registry. *Cancer epidemiology*, *61*, 50-58.
5. Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: an updated systematic review. *Annals of internal medicine*, *155*(2), 97-107.
6. Navarro, M., Nicolas, A., Ferrandez, A., Lanas, A. (2017). Colorectal cancer population screening programs worldwide in 2016: An update. *World journal of gastroenterology*, *23*(20), 3632.6.
7. Ladabaum, U., Dominitz, J. A., Kahi, C., Schoen, R. E. (2020). Strategies for colorectal cancer screening. *Gastroenterology*, *158*(2), 418-432.
8. Fleary, S. A., Paasche-Orlow, M. K., Joseph, P., Freund, K. M. (2019). The relationship between health literacy, cancer prevention beliefs, and cancer prevention behaviors. *Journal of Cancer Education*, *34*(5), 958-965.
9. Khan, S. Z., & Lengyel, C. G. (2023). Challenges in the management of colorectal cancer in low-and middle-income countries. *Cancer Treatment and Research Communications*, *35*, 100705.
10. Hatamian, S., Hadavandsiri, F., Momenimovahed, Z., & Salehiniya, H. (2021). Barriers and facilitators of colorectal cancer screening in Asia. *Ecancermedicalscience*, *15*, 1285.
11. Wallerstein, N., et al. (2020). Engage for equity: A long-term study of CBPR practices. Health Education & Behavior, 47(3), 380-390. [PubMed]
12. Lin SC, Chen IJ, Yu WR, Lee SD, Tsai TI. (2019). Effect of a community-based participatory health literacy program on health behaviors and health empowerment among community-dwelling older adults: A quasi-experimental study. *Geriatr Nurs*. 40(5):494-501.
13. Ramanadhan S, Davis MM, Armstrong R, Baquero B, Ko LK, Leng JC, Salloum RG, Vaughn NA, Brownson RC. (2018). Participatory implementation science to increase the impact of

evidence-based cancer prevention and control. *Cancer Causes Control*. 29(3):363-369.

14. Tavousi, M., et al. (2016). Health literacy in Iran: Findings from a national study. *Payesh*, 15(1), 95-102.
15. Ghanei Gheshlagh. R., Mahmoodi. H., Pelikan. J. M., Afkhamzadeh. A., Ebadi. A. (2023). Psychometric evaluation of the Persian version of the European Health Literacy Instrument (P-HLS-EU-Q47), *Health Promotion International*, Volume 38, Issue 5.
16. Baccolini, V., Isonne, C., Salerno, C., Giffi, M., Migliara, G., et.al., (2022). The association between adherence to cancer screening programs and health literacy: A systematic review and meta-analysis. *Preventive Medicine*, *155*, 106927.
17. Li, M., Yeh, Y. L., Sun, H., Chang, B., Chen, L. S. (2020). Community-based participatory research: a family health history-based colorectal cancer prevention program among Chinese Americans. *Journal of Cancer Education*, *35*(3), 485-492.
18. Shah, S. K., Nakagawa, M., Lieblong, B. J. (2020). Examining aspects of successful community-based programs promoting cancer screening uptake to reduce cancer health disparity: A systematic review. *Preventive medicine*, *141*, 106242.
19. Avery, H., Sjögren Forss, K., Rämgård, M. (2022). Empowering communities with health promotion labs: result from a CBPR programme in Malmö, Sweden. *Health promotion international*, *37*(1), daab069.
20. Sharma, P., Khanna, D., Pradhan, S., & Birur, P. (2023). Community cancer screening at primary care level in Northern India: determinants and policy implications for cancer prevention. *Family medicine and community health*, *11*(Suppl 1), e002397.
21. Khashij, S., Jalilian, F., Vaezi, M., Jalilian, M., Gharibnavaz, H., et.al., (2018). 'Measuring Beliefs Related to Colorectal Cancer Screening Behavior among Iranian Middle-Aged and Elderly: a Psychometric Study', *Asian Pacific Journal of Cancer Prevention*, 19(8), pp. 2211-2216.
22. Mthembu, Z., Mogaka, J. J., & Chimbari, M. J. (2023). Community engagement processes in low-and middle-income countries health research settings: A systematic review of the literature. *BMC Health Services Research*, *23*(1), 457.

.

DOI:10.31579/2640-1053/239