E-ISSN 3048-1562 Vol. 3, Issue 3 (2026)
Doi: https://doi.org/10.37899/mjdh.v3i3.388

Magenta Journal De Healthymedi

Health Promotion Strategies and Behavioral Interventions for Non-Communicable Disease Prevention: A Comprehensive Review

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Article Info

Article History:
Received: 12 June 2026
Revised: 3 August 2026
Accepted: 18 September 2026

Keywords:
Health Promotion,
Behavioral Intervention,
Non-Communicable Disease,
Public Health,
Prevention

Abstract

Non-communicable diseases (NCDs) represent the leading global cause of morbidity and premature mortality, accounting for approximately 74% of all deaths worldwide. Health promotion and behavioral interventions constitute the most scalable and cost-effective strategies for NCD prevention, yet their translation into practice remains inconsistent. This comprehensive review synthesizes evidence across six interconnected health promotion domains: cardiovascular health and metabolic disease prevention; cancer screening and early detection; vaccination programs and infectious disease control; environmental and occupational health promotion; maternal, child, and reproductive health; and mental health promotion and psychosocial support. A narrative review methodology was employed to integrate evidence from over 55 peer-reviewed publications spanning epidemiological analyses, systematic reviews, randomized controlled trials, and national surveillance studies. Findings indicate that multisectoral health promotion frameworks, incorporating community engagement, digital health tools, and cultural competency, yield the strongest preventive outcomes. Critical implementation gaps remain in vaccine hesitancy, antimicrobial stewardship, climate-related health promotion, and mental health integration into primary care. Evidence-based recommendations are presented for health policymakers, nurses, public health practitioners, and hospital administrators.

INTRODUCTION

Non-communicable diseases (NCDs) have emerged as the dominant global health burden of the 21st century. The Global Burden of Disease Study 2019, conducted across 204 countries and territories, documented that NCDs account for an overwhelming proportion of disability-adjusted life years (DALYs) globally, with cardiovascular diseases, cancers, chronic respiratory conditions, and diabetes at the forefront (GBD 2019 Diseases and Injuries Collaborators, 2020). Cardiovascular diseases alone represent the leading cause of premature mortality worldwide, with the 1990-2019 trend analysis revealing minimal improvement in age-standardized

cardiovascular mortality rates in low- and middle-income countries despite decades of clinical advances (Roth et al., 2020). The International Diabetes Federation projects that the number of adults living with diabetes will reach 700 million by 2045, driven by sedentary lifestyles, obesogenic food environments, and aging populations (Saeedi et al., 2019).

Health promotion defined by the Ottawa Charter as the process of enabling people to increase control over and improve their health encompasses a broad spectrum of interventions ranging from individual behavioral change support to structural policy modifications. Behavioral interventions, including lifestyle counseling, physical activity promotion, dietary modification support, smoking cessation programs, and stress management, address the modifiable risk factors underlying NCDs. Population-level health promotion strategies, including taxation of unhealthy products, urban design modifications, food labeling legislation, and mass media health communication campaigns, create the environmental and social conditions that enable healthier behavioral choices.

Vaccination programs represent a specialized domain of health promotion with particular relevance to infectious disease prevention and indirect NCD risk reduction. Vaccine hesitancy identified by the WHO as one of the top ten global health threats is compromising herd immunity for multiple vaccine-preventable diseases including measles (Almohammadi, 2026a), HPV-associated cervical cancer (Almohammadi, 2025a), and meningococcal disease (Almohammadi, 2026b). Evidence from cross-sectional studies in Saudi Arabia demonstrates that information gaps, religious misconceptions, and social media misinformation are the dominant drivers of childhood vaccination hesitancy (Almohammadi, 2026c; Almohammadi, 2026d), with implications for vaccination program design globally.

Digital health technologies have expanded the toolkit for health promotion delivery, enabling personalized behavior change support at unprecedented scale. Systematic reviews of digital health interventions for chronic disease prevention and management have documented improvements in self-management, medication adherence, and health literacy across diverse populations (Almohammadi, 2026e; Almohammadi, 2026f). However, digital equity gaps and implementation science limitations continue to constrain the translation of digital health innovations into equitable population health gains. Mental health promotion represents an emerging priority: secondary analyses of national survey data and global disease burden estimates reveal substantial mental health burden that existing primary care systems are ill-equipped to address (Almohammadi, 2026g; Almohammadi, 2026h).

This review aims to synthesize the current evidence base for health promotion strategies and behavioral interventions across the spectrum of NCD prevention, from cardiovascular health and cancer screening to vaccination, environmental health, and mental health promotion. The review targets a multidisciplinary audience of public health practitioners, nurses, hospital administrators, health policy professionals, and primary care clinicians, reflecting the journal's breadth of scope. The objective is to provide an integrated, evidence-informed framework that practitioners can use to design, implement, and evaluate health promotion programs in diverse healthcare and community settings.

METHODS

Study Design

This study employed a narrative literature review to synthesize evidence concerning health promotion strategies and behavioral interventions for the prevention of non-communicable diseases (NCDs). A narrative review design was considered appropriate because the scope of the study encompasses multiple interconnected

public health domains, including cardiovascular and metabolic health, cancer prevention and screening, vaccination and infectious disease control, environmental and occupational health, maternal and child health, and mental health promotion. The review was designed to integrate empirical findings, epidemiological evidence, intervention studies, and established conceptual perspectives rather than to estimate a pooled intervention effect. The methodological approach therefore emphasized thematic integration and interpretation of evidence across heterogeneous study designs.

Literature Search Strategy

A structured literature search was conducted using PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and the Cochrane Library. The search strategy combined general health-promotion terms with disease- and intervention-specific terminology. The principal search terms included *"health promotion," "behavioral intervention," "non-communicable disease prevention," "cardiovascular health promotion," "cancer screening," "vaccine hesitancy," "antimicrobial resistance," "digital health," "occupational health," "mental health promotion," "climate change and health,"* and *"maternal and child health."* Additional disease-specific keywords were applied within individual health-promotion domains to identify relevant evidence that might not be retrieved through the broader search terms.

The search strategy was intentionally broad because the review addressed health promotion from both individual and population-level perspectives. Publications from 2015 onwards were prioritized to capture contemporary evidence, while earlier publications were retained when they represented seminal theoretical frameworks, epidemiological benchmarks, or foundational health-promotion concepts. The search was not restricted according to study design because the objective was to integrate evidence from different methodological approaches.

Eligibility Criteria

Studies were considered eligible when they addressed at least one of the health-promotion or behavioral-intervention domains examined in this review and provided evidence relevant to NCD prevention, health behavior modification, disease prevention, screening, vaccination, environmental health, maternal and child health, or mental health promotion. Eligible evidence included systematic reviews, randomized controlled trials, cohort studies, cross-sectional studies, narrative reviews, epidemiological analyses, and secondary analyses of health-related datasets. Publications were excluded when they were unrelated to health promotion or preventive health, did not provide substantive evidence relevant to the review objectives, focused exclusively on treatment without a preventive or behavioral component, or lacked sufficient information for interpretation. Duplicate publications identified across databases were considered only once. Earlier seminal publications were retained selectively when their theoretical or epidemiological contribution was directly relevant to the framework of the review.

Study Selection and Data Extraction

The literature selection process involved sequential examination of the identified publications according to their relevance to the review objectives. Titles and abstracts were initially assessed to identify potentially relevant studies, followed by examination of the full text when sufficient information could not be established from the initial screening stage. Publications meeting the predefined eligibility criteria were retained for thematic synthesis.

For each relevant publication, information was extracted concerning the health-promotion domain, study population or target group, intervention or preventive strategy, principal behavioral or health outcome, methodological approach, and

major findings. Particular attention was given to evidence concerning behavioral change, health literacy, community engagement, accessibility of preventive services, digital health applications, cultural competency, and institutional or policy support. These variables were selected because they represent recurring mechanisms across the six domains addressed in the review.

Quality Assessment and Evidence Synthesis

The methodological strength of the retrieved evidence was assessed qualitatively according to study design and the robustness of the evidence presented. Systematic reviews and randomized controlled trials were given greater interpretive weight than observational, descriptive, or narrative evidence, particularly when findings concerning intervention effectiveness were discussed. This qualitative weighting was used to avoid treating heterogeneous evidence as methodologically equivalent.

The extracted evidence was subsequently synthesized thematically across six predefined domains: (1) cardiovascular and metabolic health, (2) cancer prevention and screening, (3) vaccination and infectious disease control, (4) environmental and occupational health, (5) maternal, child, and reproductive health, and (6) mental health and psychosocial wellbeing. Within each domain, findings were compared according to intervention characteristics, target populations, behavioral mechanisms, implementation considerations, and reported health outcomes. Cross-domain patterns were then identified to determine common mechanisms underlying effective health promotion, particularly health literacy, behavioral capability, community engagement, accessibility, cultural competency, digital support, and institutional capacity.

Evidence Base

The final narrative synthesis incorporated more than 55 peer-reviewed publications, including epidemiological studies, systematic reviews, randomized controlled trials, observational studies, and secondary data analyses. Global epidemiological benchmarks were additionally informed by the Global Burden of Disease Study 2019 and the International Diabetes Federation Diabetes Atlas, which were used to contextualize the global burden of NCDs and metabolic disease. The resulting synthesis was used to develop an integrated health-promotion framework linking individual behavioral interventions with community, healthcare-system, digital, and policy-level strategies.

RESULTS AND DISCUSSION

This section presents the findings obtained from the narrative synthesis of literature on health promotion strategies and behavioral interventions for disease prevention. The results are organized according to the six thematic domains established in the methodology, namely cardiovascular and metabolic health, cancer prevention and screening, vaccination and infectious disease control, environmental and occupational health, maternal and child health, and mental health and psychosocial wellbeing. The section begins with a description of the reviewed evidence and subsequently presents the principal findings within each domain. A cross-domain synthesis is then provided to identify recurring intervention components and target populations. The presentation focuses on patterns and findings identified in the reviewed literature, while interpretation and comparison with previous studies are addressed separately in the Discussion.

Characteristics of the Reviewed Evidence

Table 1. Literature Databases and Search Scope

No.	Database	Search Scope	Main Evidence Retrieved
1	PubMed/MEDLINE	Health promotion, behavioral interventions, NCD prevention, clinical and public health evidence	Clinical, epidemiological, and public health studies
2	Scopus	Multidisciplinary health promotion and behavioral intervention literature	Multidisciplinary and public health evidence
3	Web of Science	Health promotion, disease prevention, and interdisciplinary research	Peer-reviewed interdisciplinary studies
4	Google Scholar	Broad supplementary search for relevant health-promotion literature	Additional relevant academic publications
5	Cochrane Library	Preventive interventions and evidence from controlled studies and systematic reviews	Systematic reviews and intervention evidence

Source: Authors' literature search strategy based on the databases specified in the study methodology

The reviewed evidence comprised more than 55 peer-reviewed publications covering a heterogeneous range of methodological designs. The evidence included systematic reviews, randomized controlled trials, cohort studies, cross-sectional studies, narrative reviews, epidemiological analyses, and secondary analyses of health-related datasets. Publications from 2015 onward were prioritized, while selected earlier studies were retained when they provided foundational epidemiological evidence or established conceptual frameworks relevant to health promotion. The literature search covered PubMed/MEDLINE, Scopus, Google Scholar, Web of Science, and the Cochrane Library.

The synthesis demonstrated that health promotion was addressed through multiple intervention levels. Individual-level strategies included lifestyle modification, dietary improvement, physical activity, smoking cessation, health counseling, screening participation, vaccination, self-management, and stress management. Community- and institution-level strategies included school-based programs, community cardiovascular prevention, primary-care integration, occupational safety, antimicrobial stewardship, and psychosocial support. Digital health interventions, health literacy, cultural competency, and community engagement appeared across several thematic domains. The evidence was therefore organized not only according to specific diseases but also according to behavioral, social, technological, environmental, and institutional dimensions of prevention.

Cardiovascular and Metabolic Health Promotion

Cardiovascular diseases remain the leading cause of global premature mortality (Roth et al., 2020), and their prevention through health promotion represents the highest-yield behavioral intervention domain. Stroke, a leading NCD complication, demonstrates persistent epidemiological burden from 1990 to 2021 despite improvements in acute care (Almohammadi, 2026i; Almohammadi, 2026j). Behavioral risk factor modification targeting physical inactivity, dietary sodium excess, tobacco use, harmful alcohol consumption, and uncontrolled hypertension constitutes the evidence base for primary cardiovascular prevention. School-based cardiovascular health promotion programs have demonstrated effectiveness in establishing protective health behaviors early in the life course, with evidence

supporting structured physical education, dietary education, and cardiovascular risk screening as high-yield school health components (Almohammadi, 2026k).

Genetic risk scoring for myocardial infarction prevention represents an emerging precision health promotion tool, though critical infrastructure gaps must be addressed before population-level implementation is feasible (Almohammadi, 2026l). GLP-1 receptor agonists, increasingly accessible through health system-level chronic disease management programs, offer cardiovascular risk reduction benefits beyond glycemic control representing a pharmacological complement to behavioral interventions for high-risk individuals (Almohammadi, 2026m). Community-based CVD prevention models in low- and middle-income countries provide scalable frameworks for extending health promotion reach to underserved populations without specialist healthcare infrastructure (Almohammadi, 2026n).

Metabolic disease health promotion requires particular attention to the interplay between diabetes management and cardiovascular risk. Diabetic nephropathy a major NCD complication in populations with high diabetes prevalence underscores the importance of early metabolic health promotion before irreversible organ damage occurs (Almohammadi, 2025b). Metabolic phenotyping for dyslipidemia in type 2 diabetes patients enables individualized dietary and pharmacological interventions that align with precision health promotion principles (Almohammadi, 2026o). Iron deficiency anemia, frequently underestimated as a metabolic health burden, affects women and children disproportionately; multisource surveillance analyses document substantially higher prevalence than clinically recognized (Almohammadi, 2026p; Almohammadi, 2026q), with direct implications for nutrition promotion program design.

Cancer Prevention, Screening, and Health Promotion

Cancer health promotion encompasses three complementary strategies: primary prevention through behavioral risk factor modification, secondary prevention through organized screening programs, and tertiary prevention through survivorship support. Colorectal cancer health promotion must urgently prioritize screening uptake improvement, as the preventable rise in colorectal cancer burden reflects a systematic failure to translate screening evidence into practice (Almohammadi, 2026r). Breast cancer health promotion faces analogous challenges: a 17-year epidemiological analysis documented persistent late-stage diagnosis, indicating insufficient integration of opportunistic and organized screening into routine primary care (Almohammadi, 2026s).

Oral cancer prevention through microbiome modulation represents an innovative behavioral health promotion frontier. Evidence for the role of dietary patterns, oral hygiene behaviors, tobacco cessation, and probiotic supplementation in modifying oral microbiome composition toward a cancer-protective profile is accumulating (Almohammadi, 2026t). HPV vaccination constitutes a primary cancer prevention health promotion strategy, yet implementation is constrained by cultural barriers and communication challenges that require tailored health literacy and counseling approaches (Almohammadi, 2025a). Surgical complication prevention including surgical site infection control (Almohammadi, 2026u) and incisional hernia prevention (Almohammadi, 2026v) represents a health promotion domain relevant to hospital management and nursing practice.

Vaccination Programs, Infectious Disease Control, and Antimicrobial Stewardship

Vaccination remains the most cost-effective health promotion investment in infectious disease prevention. Achieving and sustaining herd immunity requires not only supply-side vaccine availability but demand-side behavioral interventions addressing hesitancy. Multi-level hesitancy drivers including misinformation exposure, distrust in healthcare systems, and religious or cultural concerns must be addressed through culturally competent health communication strategies (Almohammadi, 2026c; Almohammadi, 2026d). The post-pandemic measles resurgence provides a cautionary case study: immunization program disruptions during the COVID-19 pandemic created immunity gaps that have driven outbreak recurrence globally (Almohammadi, 2026a). Mass gathering-associated infection risks, exemplified by meningococcal disease resurgence during Umrah 2025, necessitate proactive pre-travel vaccination counseling and compliance monitoring (Almohammadi, 2026b).

Antimicrobial resistance (AMR) represents a health promotion challenge of the highest order. The WHO global AMR action plan identifies behavioral change in antibiotic prescribing and consumption as a central stewardship component (World Health Organization, 2023). A decade of AMR stewardship program data reveals that institutional prescribing protocols have improved, but community-level antibiotic use behavior including self-medication, incomplete treatment courses, and veterinary antibiotic use remains a major driver of resistance emergence (Almohammadi, 2026w). Traditional and complementary medicine use, prevalent in many communities, can confound antibiotic use patterns and requires integration into stewardship communication strategies (Almohammadi, 2025c). Neonatal sepsis prevention programs, targeting intrapartum care behaviors and antibiotic stewardship in neonatal units, represent high-impact maternal-child health promotion interventions (Almohammadi, 2026x).

Perioperative infection prevention exemplifies the intersection of health promotion, nursing practice, and hospital management. Vaccination programs that extend into preoperative assessment screening and immunizing patients before elective procedures have been shown to reduce perioperative infectious complications (Almohammadi, 2026y). Prevention of surgical site infection requires systematic application of evidence-based behavioral protocols encompassing patient preparation, hair removal technique, antibiotic prophylaxis timing, and wound management practices (Almohammadi, 2026u). The gut microbiome's emerging role in modulating infection susceptibility and immune function offers novel dietary and probiotic health promotion avenues (Almohammadi, 2026z).

Environmental and Occupational Health Promotion

Environmental health promotion addresses the modification of physical, chemical, and biological environmental conditions to support population health. Heat-related illness prevention is a priority in hot climate regions, with health promotion interventions targeting outdoor workers, athletes, pilgrims, and vulnerable general populations. Evidence-based preventive behavioral strategies include acclimatization protocols, hydration education, workload modification, and recognition of early heat illness symptoms (Almohammadi, 2026aa; Almohammadi, 2026ab; Almohammadi, 2026ac). Climate change is intensifying these challenges, with projections indicating that extreme heat events will become more frequent and severe, demanding proactive occupational health policy responses.

The One Health framework positions climate change and vector-borne disease dynamics as a shared human-animal-environmental health promotion challenge. Expanding geographic ranges of Aedes and Anopheles mosquitoes create novel dengue, malaria, and arboviral disease risks in previously unaffected populations (Almohammadi, 2026ad). Climate-driven changes in air quality and allergen

distribution are generating new pediatric respiratory health burdens, with children facing disproportionate vulnerability to climate-related respiratory disease (Almohammadi, 2026ae). Radiation safety education for both patients and healthcare workers represents an underemphasized occupational health promotion domain as diagnostic imaging utilization grows (Almohammadi, 2026af). Occupational dermatological conditions, such as dyshydrotic eczema from wet work exposure, require structured occupational health surveillance and prevention programs (Almohammadi, 2026ag). Maritime occupational health promotion must address decompression illness risk through behavioral pre-dive safety protocols and post-dive monitoring (Almohammadi, 2026ah). Vitamin D deficiency, prevalent in populations with limited outdoor sun exposure, compounds respiratory disease vulnerability and warrants nutritional health promotion integration into occupational health programs (Alqahtani et al., 2020).

Maternal, Child, and Reproductive Health Promotion

Maternal and child health promotion encompasses interventions across the preconception, antenatal, intrapartum, postnatal, and early childhood periods. Iron deficiency anemia in women of reproductive age represents a modifiable nutritional health promotion target with significant implications for birth outcomes, including low birth weight (Almohammadi, 2026p; Mahumud et al., 2017). Neonatal sepsis prevention programs targeting hand hygiene, antiseptic cord care, and breastfeeding promotion represent behavioral health promotion interventions with major impact on neonatal survival (Almohammadi, 2026x). Early intervention and prevention strategies for congenital conditions such as cleft lip and palateincluding periconceptional folate supplementation, avoidance of teratogenic exposures, and early postnatal surgical referral prevent long-term disability and psychosocial burden (Almohammadi, 2026ai).

Myopia prevention in children has emerged as a pediatric health promotion priority in digitally saturated societies. Evidence-based behavioral interventions including increased outdoor time, reduced near-work duration, and adherence to the 20-20-20 screen use rule are insufficiently promoted in primary care and school health programs (Almohammadi, 2026aj; Almohammadi, 2026ak). Digital eye strain prevention must be integrated into school health curricula alongside nutrition, physical activity, and mental health education. HPV vaccination uptake promotion specifically in adolescent females represents a reproductive cancer health promotion priority with population-level cervical cancer prevention implications (Almohammadi, 2025a).

Mental Health Promotion and Psychosocial Wellbeing

Mental health promotion encompassing interventions that strengthen positive mental health, build resilience, and prevent mental disorders has historically been the most neglected domain of health promotion practice. Secondary analyses of national health survey data and global disease burden estimates reveal substantial mental health burden dominated by depressive and anxiety disorders (Almohammadi, 2026g). Primary care remains the default mental health delivery platform in most health systems, yet the workforce is ill-equipped for mental health promotion without specific training, tools, and time allocation. Cultural competency adaptations of primary care mental health interventions are essential for reaching diverse cultural communities where stigma and help-seeking norms differ from biomedical traditions (Almohammadi, 2026h).

The microbiota-gut-brain axis offers an emerging biological framework for understanding how dietary health promotion behaviors may confer neuropsychiatric resilience (Almohammadi, 2026z). Psychosocial support interventions in humanitarian and crisis settings provide evidence-based models for mental health

promotion in communities facing extreme adversity (Almohammadi, 2025d). The clinical pharmacy profession's expanding role in medication management, patient counseling, and chronic disease co-management positions pharmacists as important mental health promotion allies in community settings (Almohammadi, 2026al). Traditional and complementary medicine, when evidence-based and safely integrated, can contribute meaningfully to mental health promotion through relaxation techniques, mindfulness practices, and herbal anxiolytic supplementation (Almohammadi, 2025c). Acute pancreatitis, while primarily a clinical condition, illustrates the intersection of dietary behavioral health promotion and gastroenterological NCD prevention (Almohammadi, 2023).

Table 2. Summary of Health Promotion Domains, Key Interventions, and Priority Target Groups

Domain	Key Health Promotion Interventions	Priority Target Groups
Cardiovascular & Metabolic	Lifestyle counseling, dietary modification, school-based programs, GLP-1 therapy support, genetic risk communication	Adults with metabolic risk, school-age children
Cancer Prevention	Organized screening, HPV vaccination, oral hygiene promotion, microbiome-based interventions	Women, adults ≥50, adolescents
Vaccination & AMR	Hesitancy-targeted communication, mass gathering pre-travel counseling, antibiotic stewardship education	Parents, pilgrims, healthcare workers
Environmental & Occupational	Heat illness prevention, vector-borne disease education, radiation safety training	Outdoor workers, athletes, pediatric populations
Maternal & Child Health	Nutrition promotion, neonatal sepsis prevention, myopia prevention, congenital anomaly screening	Pregnant women, neonates, school children
Mental Health	Destigmatization campaigns, primary care integration, psychosocial support, gut-brain dietary promotion	All age groups, crisis-affected populations

Source: Authors' thematic synthesis of the reviewed literature based on the six health-promotion domains; evidence base comprising more than 55 peer-reviewed publications. The domain structure and intervention categories are derived from the review methodology and synthesized findings in the present study

The results summarized in Table 2 demonstrate that health promotion operates across different population groups and intervention settings, but several common mechanisms recur across domains. Individual behavioral change is repeatedly complemented by health education, community involvement, accessible services, digital tools, and institutional support. This cross-domain pattern forms the empirical basis for the integrated health-promotion framework developed in this review.

Discussion

The findings of this narrative review indicate that effective health promotion and behavioral interventions require an integrated approach that combines individual behavior change with community engagement, health literacy, healthcare services, digital technologies, and supportive policies. Across the six domains examined, the evidence suggests that prevention is more sustainable when interventions address both individual determinants and the social and institutional environments in which health behaviors occur. This finding strengthens the broader health-promotion

perspective by demonstrating that health behavior cannot be separated from accessibility, cultural context, trust, and health-system capacity.

The cardiovascular and metabolic findings demonstrate the importance of targeting modifiable risk factors such as physical inactivity, unhealthy dietary patterns, tobacco use, and uncontrolled hypertension. These findings are consistent with Hassen et al. (2021), who reported that community-based cardiovascular interventions can improve physical activity, while Hassen et al. (2022) emphasized the contribution of community interventions to cardiovascular health knowledge. However, the present review extends these findings by emphasizing that knowledge alone is insufficient to produce sustained behavioral change. Health literacy, self-management capacity, social support, and continuous engagement with healthcare providers are necessary to translate knowledge into preventive action. This interpretation is supported by Larsen et al. (2022) and Shao et al. (2023), who demonstrated the importance of structured health-literacy interventions for improving health-related outcomes and self-efficacy.

Cancer prevention and vaccination findings similarly demonstrate that the availability of preventive services does not automatically ensure their utilization. Screening uptake can be strengthened through reminders, patient navigation, and multicomponent interventions (Adhikari et al., 2022; Acharya et al., 2021). Likewise, vaccine hesitancy is influenced by misinformation, trust, communication, and social factors rather than knowledge deficits alone. Whitehead et al. (2023) highlighted the importance of communication strategies in addressing vaccine misinformation. These findings support the present review's interpretation that preventive programs should combine education with behavioral prompts and accessible healthcare systems.

The environmental and occupational findings broaden conventional health-promotion approaches by demonstrating the increasing importance of climate-related risks. Heat exposure, occupational hazards, and vector-borne diseases require both individual preventive behavior and organizational protection. This supports Habibi et al. (2024), who emphasized the need for comprehensive strategies to protect outdoor workers from climate-related heat stress. Similarly, maternal and child health findings support a life-course approach in which nutrition, breastfeeding, neonatal infection prevention, and childhood health behaviors are addressed continuously rather than through isolated programs.

Mental health findings further demonstrate the need to integrate prevention into primary care and community settings. Psychosocial support, stigma reduction, cultural adaptation, and resilience-building interventions are particularly important for vulnerable populations (Schäfer et al., 2023; Nguyen et al., 2023). Digital health also provides opportunities for scalable health promotion through self-monitoring, reminders, feedback, and personalized interventions. Mair et al. (2023) showed that these behavioral techniques are important components of effective digital health interventions, although digital inequality remains a significant implementation challenge.

The principal theoretical contribution of this review is therefore the identification of integrated health promotion as a common framework across cardiovascular, cancer, vaccination, environmental, maternal-child, and mental health domains. Its practical contribution is the recommendation that healthcare institutions, schools, communities, and policymakers coordinate behavioral, educational, digital, and structural interventions. The novelty lies in connecting these traditionally separated prevention domains through shared mechanisms of health literacy, behavioral capability, accessibility, cultural competency, and institutional support.

Several limitations should be acknowledged. The narrative review does not provide pooled effect estimates, and the heterogeneity of study designs, populations, and outcomes limits direct comparison between interventions. Future research should therefore prioritize longitudinal studies, implementation research, cost-effectiveness analyses, and evidence from low- and middle-income settings. Greater attention should also be given to digital equity, culturally adapted interventions, and long-term behavioral sustainability.

CONCLUSION

Health promotion strategies and behavioral interventions provide a scalable and cost-effective approach to NCD prevention. This review synthesized evidence across six domains: cardiovascular and metabolic health, cancer prevention, vaccination and AMR stewardship, environmental and occupational health, maternal and child health, and mental health promotion.

The findings highlight the importance of multisectoral health promotion, cultural competency, health literacy, digital health, and environmental health measures. Integrating health promotion into routine clinical practice through behavioral counseling, vaccination, mental health screening, and dietary advice can strengthen preventive care, while collaboration among healthcare and community professionals can expand its reach. Future research should focus on implementation, long-term behavioral change, and cost-effectiveness, particularly in resource-constrained settings.

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