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What Factors Impact on the Integration of Lifestyle Modification in Chronic Disease Management in Low and Middle-Income Countries

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Abstract

As Non-Communicable Chronic Diseases (NCDs) grow in Low- and Middle-Income Countries (LMICs), the need for effective sustainable strategies in prevention and management of these conditions becomes critical. Lifestyle change (e.g., healthier eating, physical activity, stress management, and less tobacco use) are now considered the primary and sustainable approaches in addressing NCDs. While lifestyle, changing lifestyle proven clinically to be a cost effective in managing NCDs, it is an approach that is highly dependent on a variety of factors that affect a person's behaviour and their ability to achieve and sustain it. The purpose of this review was to identify these factors that impact the adoption and successful integration of lifestyle modification in management of NCDs in LMICs. A qualitative literature review and narrative synthesis were employed in this study. Published peer reviewed, randomised controlled trials searched from global data base such as PubMed, Google Scholar etc were retrieved and analysed. The search was restricted to the period from 2018 to 2025. A comparative matrix was used to evaluate data from selected studies to evaluate the population, type of intervention, and as well as the outcomes. Thematic analysis was applied to highlight what is deemed to be the barriers as well what is deemed as facilitators for successful integration of lifestyle modification in management of NCDs. The narrative synthesis indicated that though lifestyle modification interventions positively impact the management of NCDs, full integration is hindered by unsupportive healthcare infrastructure, low health literacy, financial constrains, as well as rigid cultural norms and practices. However, there is evidence that community led programs, application of digital health technologies, and adoption of models that integrate lifestyle modification into primary health care may have a positive impact on successful integration of lifestyle modification in managing NCDs in LMICs. The study is concluded with implications for context-driven strategies, sustainable policy, and multisector collaboration to foster sustainable and attainable lifestyle change within resource-limited contexts.

Keywords: *Chronic Disease Management, Lifestyle Modification, Low and Middle-Income Nations, Non-communicable Chronic Diseases.*

Introduction

Non-communicable Chronic Diseases, especially type 2 diabetes, cardiovascular disease, including hypertension, stand among the intractable threats to health today. NCD prevalence has been rising over several decades due to accelerating urbanization, changed food and eating habits, as well as increasing sedentary lifestyle. This rise seems to be steeper in LMICs due to demographic changes and economic transitions that are leading to increased consumption of calorie-dense foods and decreased opportunities for physical activity [1]. Since NCDs are characterized by a slow progression and are mostly unnoticeable

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in their early stages, they put a high burden on households and the health care system when they become noticeable since they will now be at an advance stage. It can be concluded therefore that, it is critical for individuals and the health systems to prevent and treat NCDs as early as possible. Lifestyle modification has been identified as one of the cornerstones in the prevention and long-term management of NCDs. Lifestyle modification is not only reported to be effective in treatment of NCDs, but it is also reported to be cost- effective making it a sustainable approach to delaying the progression of NCDs and decreasing the incidence of complications [2]. This clearly points to the significance of incorporating lifestyle modification in management of NCDs especially for LMICs.

Definition and Components of Lifestyle Modification

Lifestyle modification is described as a well focused and sustained change in daily behaviour that impacts metabolic and cardiovascular health. The main aspects of lifestyle modification are but not limited to eating a nutritious diet, increasing physical activity, smoking cessation, stress management, and sleep hygiene. These behaviours lead to weight maintenance, decreasing chances for insulin resistance, enhancement of lipid metabolism, as well as overall improvement of pulmonary function [3]. Clinical and community-based interventions support the use of lifestyle modification in decreasing the incidence and severity of NCDs.

Relevance to LMICs

While there is consensus that lifestyle modification interventions can provide benefits in management of NCDs, the context in which these interventions are implemented in LMICs matters. It is critical that both structural and socio-economic challenges in LMICs (e.g., poor accessibility to preventive care services, barriers to basic health care, limited income, food insecurity, and cultural beliefs about food, nutrition and exercise) provide important contextual considerations for development of successful programs that embrace local context over universal approaches. Peer and community-based interventions have emerged as powerful solutions to help individuals make positive changes by harnessing existing social networks, cultural context, or mutual social experiences with individuals like oneself. Thus, local context and community-engaged strategies are vital to addressing the global challenge of NCD prevention and control in LMICs.

Study Objectives

The main objective in this study therefore was to identify which factors impact the integration of lifestyle modification in chronic disease management within Low- and Middle-Income Countries (LMICs).

Study Method

A traditional qualitative review / narrative review of existing literature was employed in this study.

Study Design and Search Strategy

A comprehensive search was performed across major medical and social science databases, including PubMed, Google Scholar, and ScienceDirect. The search focused on peer-reviewed articles, meta-analyses, and systematic reviews published between 2018 and 2025. Key terms utilized in the search included "Non-communicable diseases," "Lifestyle modification," "LMICs," and "Chronic disease management."

Inclusion and Exclusion Criteria

Studies were selected based on their relevance to the following criteria:

1. **Geographical location:** The focus of the study should be LMIC contexts (for

example Africa Sub-Sahara, Kosovo, Western Pacific).

2. **Type of intervention:** The study should be focusing on lifestyle-based interventions such as dietary change, physical activity, and digital biofeedback and coaching.
3. **The study exclusion:** Research focusing on High-Income Countries (HICs) and studies on pharmacological treatments alone.

Abstraction of Data and Synthesis

Data from selected studies were extracted into comparative matrix (see Table 1) to evaluate the population, type of intervention, and as well as the outcomes. This comparative matrix allowed cross-case analysis of the various identified implementation models.

Thematic Analysis

Thematic Analysis was employed to categorize qualitative barriers and facilitators for seamless integration of lifestyle modification in management of NCDs in LMICs.

Ethical Considerations

This study is based on secondary analysis of already published articles with data that is de-identified, and therefore did not require direct Institutional Review Board (IRB) approval.

Thematic Body

The Burden of Chronic Diseases and Health Systems Constraints in LMICs

Epidemiological Trends

NCDs are clearly on the rise in low- and middle-income countries (LMICs), indicating a realignment noticed elsewhere of disease patterns that are changing from the infectious disease world to lifestyle diseases. Due to demographic transitions, changed way of life , as well as increased life expectancy, the incidence of cardiovascular diseases, diabetes, cancers, and chronic respiratory conditions, has increased in the last decade [4]. In addition, the availability of NCD risk factors is not uniformly distributed across regions. Urban communities show higher incidence of healthcare issues associated with poor dietary habits due to increase of consumption of processed foods, lower levels of physical activity due to more sedentary occupation compared to rural populations. On the other hand, it is also noted that the burden of NCD is slowly invading the rural areas, as a result of rural-urban migration, the ongoing mechanization of agricultural activities, as well as absence or minimal outreach for health promotion and preventative services in rural communities. [5] noted widening gaps in chronic disease prevalence and knowledge across countries in the low resourced countries based on income, urbanization, and distance to healthcare resources. This transition in epidemiological patterns has placed NCDs as one of the major public health challenges for LMICs, reflecting the urgency to for developing systematic approaches and long-term preventive solutions.

Health Systems Limitations

LMIC health systems continue to focus more on acute and communicable disease care as per the era of infectious diseases, even though it is now evident that there is increasing need to shift the focus more to providing episodic as well as sustained care to patients with chronic diseases. The current capacity of the workforce, which is lower than the demands, along with limitations in the following: training of staff on counselling for this type of problems, follow-up, diagnostics capacity, and monitoring, can limit the quality and effectiveness of services provided [5]. This is also worsened by limited: - preventive screening, rehabilitation, robust and structured health education as well as limited budgetary consideration. These limitations or lack of considerations for these fundamental issues, leads to lack of continuity in care, delayed diagnosis and intervention, and less than optimal patient outcomes.

Additionally, chronic disease surveillance tends to be poorly coordinated between the local and national levels and as such LMIC often fail to timely and accurate assess the epidemiological data, to track emerging trends as well as to evaluate the outcomes of interventions. The continued emphasis on curative versus preventive health leads to identifying chronic diseases only upon the appearance of complications, thereby perpetuating a worsening of morbidity of chronic disease and increasing healthcare costs [4].

Economic and Social Impact

The continuing increase of NCDs in LMICs has created extensive economic and social ramifications. Chronic ill health is associated with reduction in productivity, excessive absenteeism, and reduction of an individual's capacity to engage in income-generating activities [6]. Households incur financial costs for long-term medications, medical visits, lost labour time, which results in increased overall financial burden of the household resulting in the trade-offs related to health care, education, and other family needs. With no universal health care or social insurance protections, this leads to inefficient and unequal health systems which exacerbate these impacts. Additionally, within this context of chronic illness, poverty can also be transferred across generations when children must provide care or leave school [7]. Therefore, the aggregate effects of NCDs in LMICs extend to national economies, increasing healthcare spending and reducing overall productivity in the economy.

Lifestyle Modification as a Management Strategy

Evidence-Based Effectiveness

Most people now view lifestyle modifications as an important method to control and prevent type 2 diabetes along with cardiovascular disease. Research conducted in Low- and Middle-Income Countries (LMICs) shows that people achieve better blood sugar control and heart health results when they follow structured lifestyle changes, which include diet, exercise, and self-management training. The investigation of LMIC populations through systematic review showed that adults with type 2 diabetes experienced better blood sugar control and HbA1c levels when following lifestyle intervention programs which helped them stop disease progression [8]. A large meta-analysis study showed that lifestyle changes led to better metabolic results and lower rates of type 2 diabetes and gestational diabetes among multiple LMICs [9]. These study results, indicate that lifestyle modification is most useful for healthcare systems, which mostly operate without proper medical specialist and pharmaceutical resources for extended periods. These findings prove that indeed lifestyle changes can be used as efficient non- pharmaceutical treatment for chronic diseases when implemented correctly within the specific environment.

Models and Implementation Approaches

LMICs have adopted a variety of lifestyle interventions to promote behaviour change. These include community-based programs and workplace wellness initiatives. On the one hand, community-based interventions rely heavily on local peer educators and social networks, thus creating strategies that are culturally embedded and, at the same time, offer gradual and sustained behavioural changes. This was shown in a study which evaluated primary health care users in Kosovo which showed that behavioural counselling as part of routine care resulted in small improvements in physical activity, dietary practices, and body mass index [10]. The other common implementation approach which is theatre of workplace wellness programs proved to be another important and rapidly widening implementation avenue in LMICs. Recent study reveals that such programs can significantly increase the level of awareness and the quality of self-care practices among

employees, however, these results can only be fully realised the programs are framed in a participatory, but also context-sensitive manner [11].

The digital implementation approaches which include mobile health platforms and app-based coaching programs are also proving optimistic to tackle issues like geographical distances and lack of professionals in resource-poor areas. They can assist in changing one's lifestyle, boost commitment to lifestyle goals, and allow the remote monitoring of chronic disease indicators. The power of technology-assisted self-management is highlighted by the clinically meaningful improvements in glycaemic control which were seen when using a digital lifestyle program in outpatient diabetes care [12]. The digital approach using mobile platforms in workplace wellness programs in LMICs also further indicated value of extending access to preventive health services [13].

Integration into Primary Health Care

In order for lifestyle-change approaches to be sustainable, they should be incorporated into the primary healthcare system. The integration makes lifestyle counselling, follow-up, and health education routine parts of patient care rather than additional programs. Community health workers, nurses, and primary care physicians especially at the grassroots level where the availability of specialists is limited, play an essential role in providing continuous supports. According to [14] the defined interventions and guidelines to guide integration of lifestyle risk assessment, patient counselling, monitoring and evaluation into the primary healthcare workflow can make chronic disease management more accessible in low resource settings. Also ensuring strong lifestyle interventions integrated in primary healthcare will not only improve patient outcomes but also reduce the need for expensive secondary and tertiary care services, therefore decreasing the health system burdens in LMICs.

Table 1. Summary of Lifestyle Modification Approaches and Evidence in LMICs

Study / Author (Year)	Setting / Population	Intervention Type	Key Outcomes	Relevance to LMICs
O'Donoghue et al. (2021)	Adults with Type 2 Diabetes in multiple LMICs	Lifestyle education + diet + physical activity (RCTs)	Significant improvement in HbA1c and glycaemic control	Demonstrates clinical effectiveness of structured lifestyle interventions under low-resource conditions
Sagastume et al. (2022)	LMIC populations at risk for Type 2 and gestational diabetes	Multi-component lifestyle changes programs	Reduction in incidence of diabetes and improved cardiometabolic outcomes	Confirms preventive value of lifestyle strategies where pharmacological access may be limited
Bytyçi-Katanolli et al. (2023)	Public primary healthcare users in Kosovo	Behavioural counselling in routine primary care	Improved diet, physical activity, and reductions in BMI	Shows how lifestyle advice can be integrated into primary healthcare delivery.
Wipfli et al (2018)	Workplaces in LMIC contexts	Digital workplace wellness and behavioural support platforms	Increased health awareness and engagement in self-care behaviours	Highlights feasibility of mobile and digital intervention models
Hilmarsdóttir et al. (2021)	Outpatient diabetes patients	App-based digital lifestyle self-management program	Improved glycaemic regulation and adherence to behavioural goals	Demonstrates how digital tools can expand lifestyle

				counselling beyond clinical settings
Al Bizri et al. (2024)	Employees in a LMIC workplace	Health promotion and wellness program across lifespan	Enhanced knowledge and uptake of health-protective practices	Shows workplace settings as accessible entry points for population health interventions

Factors that Shape the Adoption of Lifestyle Modification

The process of adopting lifestyle changes depends on multiple factors, which include socioeconomic status, cultural beliefs, health knowledge, and the healthcare system, along with relevant policies. Health behaviour change depends on multiple elements which either support or hinder people's capability to make better lifestyle choices. These elements need to be considered during the development of interventions which target systemic changes.

Socio-Economic and Cultural Influences

The socioeconomic status, which includes income levels, job security, and level of education, determine accessibility that people that people have to health promotion services. People with lower socioeconomic status face three main obstacles to healthy eating: food costs, their limited work schedules that prevent exercise as well as their restrict access to preventive healthcare services. Research shows that young adults develop their daily habits through the combination of their social environment and health-related risk perceptions according to [15] who further emphasised that financial challenges cause people to make unhealthy choices. People adopt and practise their eating habits and daily routines through their cultural traditions and social expectations. It is also important to understand that changing once food consumption lifestyle depends on traditional food types, the practice of eating together and sharing food preparation duties. In different societies women handle family meal preparation, also cultural standards in relation to body appearance lead to various beliefs about which gender should engage in physical activity [16].

Health Literacy and Awareness

It is important to note that health literacy is foundation for people to understand disease risks and to correctly process information about modifying their daily routines. When people limited health literacy, they tend to develop incorrect or incomplete knowledge about the determinants of their individual health which causes them to follow inconsistent or wrong health practices. [17] reported that health literacy levels among health professionals indicated differences. This had a huge impact in their commitment to support their clients to adopt healthy actions. The research indicates that successful communication requires both cultural understanding and educational materials, which should be easy to understand for the target audience. People who improve their health literacy skills will build self-efficacy. People can develop and keep healthy routines through this process.

Policy, Environment, and Healthcare System Factors

The enabling environment is an essential element which helps people to convert their knowledge and motivation into ongoing behavioural changes. The research conducted by [18] showed that a supportive policy framework needs to create accessible healthy food environment that is conducive for balanced diet promotion in LMICs settings. There are fundamental three key gaps which affect effectiveness of lifestyle modification interventions. These are insufficient public

exercise areas, restricted access to affordable healthy foods, and healthcare providers who lack proper training. The creation of sustainable healthy choices needs healthcare systems to work together with urban planning, education sectors, and community organizations through coordinated multisectoral action.

Discussion

Implementation Strategies and Successful Practices

Community-Based and Peer-Led Interventions

Sustainable lifestyle changes in low- and middle-income countries (LMICs) rely on community-based and peer-led strategies because these nations struggle to access proper healthcare services. The community has adopted improved preventive health practices and disease control through neighbourhood fitness groups, school nutrition programs, and peer counselling services. The research by [19] demonstrated that community-based diabetes self-care programs in Sub-Saharan Africa produced enhanced self-monitoring results and better diet adherence, and physical activity performance. The programs use social support networks and local expertise to create health education content which matches cultural practices and financial situations. Group-based counselling together with community exercise programs help people develop healthier habits while fighting social isolation. This strengthens their shared duty to maintain health results.

Role of Digital Health and Technology

Digital health technologies operate as transformative tools which enable people to change their behaviour and manage chronic illnesses in lower-middle-income countries. Mobile health (mHealth) applications, SMS reminders, and teleconsultations provide ongoing support to self-management through their ability to deliver immediate feedback and sustained encouragement. [17] showed that mobile platforms improved treatment adherence and glycaemic control in diabetic patients while achieving successful implementation in resource-limited settings. Users can track their progress through mobile platforms and receive customized advice because wearable devices and mobile-based education platforms deliver individualized care. [18] found that digital interventions which merged health education with social participation delivered cost-effective results by uniting medical care with patient self-reliance. The tools operate to eliminate physical barriers while reducing expenses for health systems and patients. This allows cost-effective technologies to serve larger population segments.

Policy and Governance Initiatives

In order for a lifestyle change program to be effectively carried out in low-and-middle income nations, it is essential to have organizational and policy structures to support cross-sector collaboration. National health policies advocating for preventive health and well-being at the community level should be important for achieving sustainable long-term benefits to the community. [14] advises that public health policies should link to education, agriculture, and transportation policies to create supportive environments, as part of an integrated systems approach. The three policies that support urban green spaces, food marketing regulations, and primary healthcare lifestyle counselling have proven successful in reducing non-communicable disease risks. Multiple sectors have joined forces to implement health promotion strategies which simultaneously advance social and economic development goals. The programs work to establish preventive healthcare as a community-wide goal. This leads to improved health practices for every group in society.

The successful execution of lifestyle modification programs in LMICs requires three essential elements which include community involvement, technological advancement, and

supportive policy systems. The combination of digital tools with strong policy frameworks and local participation enables sustainable behavioural change which leads to lower chronic disease rates in areas with limited resources.

Barriers, Research Gaps, and Future Directions

Structural and Behavioural Barriers

Regardless of the evidence showing lifestyle change to prevent and treat non-communicable disease, there are still several systemic and behavioural barriers that hinder the adoption of such approaches in LMICs. In sustainable lifestyle changes in low- and middle-income countries (LMICs) rely on community-based and peer-led strategies because these nations struggle to access proper healthcare services. The community has adopted improved preventive health practices and disease control through neighbourhood fitness groups, school nutrition programs, and peer counselling services. The research by [19] demonstrated that community-based diabetes self-care programs in Sub-Saharan Africa produced enhanced self-monitoring results and better diet adherence, and physical activity performance. The programs use social support networks and local expertise to create health education content which matches cultural practices and financial situations. Group-based counselling together with community exercise programs help people develop healthier habits while fighting social isolation. This strengthens their shared duty to maintain health results.

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The successful execution of lifestyle modification programs in LMICs requires three essential elements which include community involvement, technological advancement, and supportive policy systems. The combination of digital tools with strong policy frameworks and

local participation enables sustainable behavioural change which leads to lower chronic disease rates in areas with limited resources.

In many low-resource settings health systems are underfunded, fragmented, and slow to address long-term preventive services compared with acute care [20]. This structure limits continuity of care, limits follow-up approaches that can support patients, and limits the presence of trained health professionals who can provide consistent counselling related to lifestyle change. Both patients and providers, at the behavioural level, may also lack motivation to make lifestyle changes, especially when these changes do not have a clear, immediate effect. Psychological barriers, time constraints, and competing livelihood pressures predispose patients and their households to focus on daily economic needs rather than preventive health behaviours. Patient cultural norms about diet and interpretation of illness also relate to their perceptions and applicability of lifestyle recommendations [21].

Sustainability and Evaluation Challenges

Regardless of the evidence showing lifestyle change to prevent and treat non-communicable disease, there are still a number of systemic and behavioural barriers that hinder the adoption of such approaches in LMICs. In many low-resource settings health systems are underfunded, fragmented, and slow to address long-term preventive services compared with acute care [20]. This system restricts continuity of care, limits follow-up strategies that can provide support for patients, and also limits the availability of trained health professionals to provide consistent lifestyle change counselling. Both patients and providers, at the behavioural level, may lack motivation to change behaviour, especially when the change does not have a clear immediate effect. Psychological barriers, time constraints, and competing pressures of livelihood lead patients and their households to focus on their economic needs in their daily lives instead of preventing health behaviours. Patient cultural norms about diet and interpretation of illness also relate to their perceptions and applicability of lifestyle recommendations [21].

Research Priorities and Future Directions

Further research should keep innovating intervention models that are culturally relevant, community-led, and tailored for the local socio-economic and context. Opportunities may also be created to establish supportive environments for behaviour change through improved interdisciplinary collaboration between health, agriculture, education, and urban planning [20]. There is a particular need for long-term outcome studies to understand the impact lifestyle change has on disease progression and quality of life over time in LMIC populations. Advances in the field of digital health provide new methods for digital personal monitoring and support. Technology such as artificial intelligence and remote health monitoring bring opportunities for earlier diagnosis and ongoing engagement, but it is clear from the experts that issues of affordability and digital literacy must also be considered in adaptation [22]. Sustainable gain will require cohesive policies that are adaptive to communities, and ongoing dedicated research that works to address the current gaps in knowledge mobilization to implementation.

Conclusion

It is important to reduce the incidence and burden of non-communicable diseases especially in low- and middle-income settings, with interventions aimed at metabolic control and reducing the progression of non-communicable disease [1]. That said, the success of lifestyle interventions relies upon individual motivation to change behaviour as well as broader social, cultural, and structural conditions that shape everyday health behaviours. Translating ongoing challenges such as low health literacy, poorly facilitated

food environments and fragmented health systems calls for developing and investing in locally owned and adaptable lifestyle change interventions [23]. Building meaningful engagement, expanding capacity and developing aligned cross-sector policy actions in health, education and agriculture will be fundamental to strengthening more sustainable mechanisms of behaviour change [4]. Ultimately, sustainable lifestyle interventions to support long-term change require a commitment, funding and enacting culturally relevant programming practices to support behaviour change in the first place for population level behavioural change.

Conflict of Interest

The author declares that there is no conflict of interest identified in this study during information gathering, interpretation of the findings nor during the write up of the manuscript. The study did not have any external funding and as such there was no external influence related to funder expectations.

Ethical Approval

The research is secondary analysis of previously published, de-identified data, and therefore did not require direct Institutional Review Board (IRB) approval.

Author Contribution

Kegomoditswe Matshediso is the sole author of this manuscript.

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Data Availability

The dataset in this research is available from the corresponding author on reasonable request.

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