

Research Article

Barriers to the Adoption of Healthy Behaviours Among Patients with Non-communicable Diseases at One Selected Referral Hospital in Rwanda

Liliane Nirere^{1, *}, Mukarugwiza Marguerite², Rudashirikaka Jean de Dieu³

¹Nursing and Midwifery Directorate, Kibungo Level Two Teaching Hospital, Ngoma, Rwanda

²Department of Nursing and Midwifery, Adventist University of Central Africa (AUCA), Kigali, Rwanda

³Department of Nursing and Midwifery, Mount Kigali University, Kigali, Rwanda

Abstract

Background: Sub-Saharan Africa faces a growing epidemic of non-communicable diseases (NCDs) alongside persistent infectious diseases, creating a dual burden that strains limited healthcare resources. Although awareness and interventions promoting healthy behaviors have been introduced, many patients with NCDs continue to exhibit poor self-care practices. This study aimed to identify the barriers hindering the adoption of healthy behaviors among patients with NCDs at a referral hospital in Rwanda. **Methodology:** This study used a descriptive cross-sectional design with a quantitative approach. The target population included 300 patients enrolled in the NCD department of the selected referral hospital at the time of the study. A sample size of 171 participants was determined using Taro Yamane's formula. Data were collected through a developed and validated self-administered questionnaire. The data were analyzed using SPSS version 22.0. Descriptive and inferential statistics were applied to examine associations between sociodemographic characteristics and barriers to adopting healthy behaviors. Cross-tabulations and statistical tests were used to assess the significance of these associations. **Results:** The most common barriers identified were financial constraints, such as the high cost of healthy food (38.6%), lack of structured exercise programs at workplaces (37.4%), and unfavorable working conditions (46.2%). Gender and education levels were significantly associated with challenges in physical activity ($P=0.002$) and smoking cessation ($P=0.002$), while age, education, and marital status were linked to different NCD categories ($P=0.003$, $P=0.001$, $P=0.002$, respectively). **Conclusion:** This study identified various personal, social, cultural, and economic barriers that hinder patients with NCD from adopting healthy behaviors. These barriers significantly impact patients' ability to choose healthier lifestyles. The findings underscore the urgent need for targeted, context-specific interventions that address these challenges. Stakeholders are encouraged to consider these factors when designing and implementing strategies to prevent and manage NCD and promote sustainable and accessible health improvements for individuals living with NCD in Rwanda.

Keywords

Non-communicable Diseases, Healthy Behaviors, Behavior Change, Barriers, Rwanda

*Correspondence: Liliane Nirere (nililly08@gmail.com)

Received: 10 May 2026; **Accepted:** 8 June 2026; **Published:** 26 June 2026



1. Introduction

Globally, NCDs, particularly cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and cancers, represent the main causes of morbidity and mortality, contributing to more than 70% of annual deaths worldwide. [1] The burden of NCDs is rapidly increasing in low- and middle-income countries (LMICs), including Rwanda, due to demographic transitions, urbanization, and lifestyle changes. [2] In Rwanda, NCDs contribute to nearly 40% of all deaths, with cardiovascular diseases and diabetes reported among the most common conditions. [3] The adoption of healthy behaviors such as maintaining a balanced diet, engaging in regular physical activity, avoiding tobacco use, and limiting alcohol consumption is essential for the prevention and effective management of NCDs. These lifestyle modifications significantly reduce the risk factors associated with NCDs, including cardiovascular diseases, diabetes, chronic respiratory diseases, and certain cancers [4].

National and international health authorities strongly advocate for lifestyle modifications such as a healthy diet, regular physical activity, tobacco cessation, and alcohol moderation as cost-effective strategies to reduce the risk of complications related to NCDs and to enhance overall quality of life. [5] However, despite widespread dissemination of these recommendations, many individuals living with NCDs encounter substantial barriers to adopting and maintaining healthy behaviors, including socioeconomic constraints, limited access to health education, cultural norms, and inadequate support systems [6].

Multiple studies have demonstrated that the gap between knowledge and the actual practice of healthy behaviors is shaped by a complex interplay of individual, social, economic, and environmental factors. In Rwanda, the government has prioritized preventing and controlling NCDs through national health promotion campaigns, community-based screening programs, and NCD clinics within referral hospitals. [7] Despite these efforts, the uptake of healthy behaviors among patients remains suboptimal. Commonly reported barriers include financial constraints, limited access to nutritious foods, lack of safe and accessible spaces for physical activity, and competing demands such as family and work responsibilities [7].

Despite increased awareness and the availability of NCD-related services, the uptake and sustainability of healthy behaviors among patients remain suboptimal. Multiple studies indicate that individual, socioeconomic, cultural, and environmental factors shape knowledge and action gaps. [8] The burden of NCDs is increasing rapidly in Sub-Saharan Africa (SSA), adding to the region's ongoing challenges with infectious diseases. [9, 10] studies conducted in Kenya and Tanzania have shown that community-based support groups and culturally tailored educational interventions can significantly enhance adherence to healthy behaviors among individuals at risk for or living with NCDs.

In the Rwandan context, common barriers include financial constraints, poor access to healthy foods, limited infrastructure for physical activity, and competing life priorities such as family obligations and work. [11] Moreover, cultural norms, limited health literacy, and weak social support networks often hinder patients from maintaining lifestyle changes that could improve their health outcomes. Despite these efforts, empirical data on the barriers faced by Rwandan patients with NCDs, particularly those receiving care at referral hospitals, remain limited. Understanding these barriers is essential for designing effective interventions and informing policy decisions. By identifying the main obstacles to healthy behavior adoption, this study aims to explore the barriers to adopting healthy behaviors among NCD patients at a selected referral hospital in Rwanda.

2. Material and Methods

2.1. Study Design

This study used a descriptive cross-sectional design with a quantitative approach. The design was appropriate because it enabled the researcher to assess the barriers experienced by patients with NCDs in practicing healthy behaviors at a single point in time. It also supported efficient data collection and analysis, while providing useful information on the extent and type of barriers affecting the study population.

2.2. Study Setting

The research was conducted in a referral hospital's NCDs department in Rwanda's Eastern Province. The hospital, established in 1989 by Chinese missionaries, has a capacity of 293 beds and provides care to an average of 5,902 patients each month. This includes approximately 1,051 new inpatient admissions and 4,851 outpatient consultations. The healthcare team at the facility comprises 25 physicians, 113 nurses, 48 paramedics, 11 specialists, and 39 administrative staff. The hospital collaborates with national and international partners to improve healthcare quality by adopting advanced technologies and modern service delivery models.

2.3. Study Population and Sample Size

The target population was 300 patients registered in the hospital's NCD department during the study period. The sample size was determined using Yamane's formula (1967) to ensure adequate representation while accounting for a 5% margin of error. The formula is expressed as:

$$n = \frac{N}{1+N(e)^2}$$

Whereby:

n : simple size

N : the population size

e : the acceptable sampling error (0.05)

$$n = \frac{N}{1+N(e)^2} = \frac{300}{1+300(0.05)^2} = 171$$

Based on this calculation, 171 patients were selected for the study.

2.4. Inclusion and Exclusion Criteria

Participants were included in the study if they were aged 18 years and above, had a confirmed diagnosis of at least one non-communicable disease, such as hypertension, diabetes mellitus, cardiovascular disease, or chronic respiratory disease, and were registered in the hospital's NCD department during the study period. In addition, participants were required to be mentally and physically able to provide informed consent and to take part in the study, whether they were receiving outpatient or inpatient care at the time of data collection.

Participants were excluded if they were critically ill, had cognitive impairment, or had severe mental health conditions that could limit their ability to understand the study or provide meaningful responses. Patients who refused to participate or were unable to provide informed consent were also excluded. In addition, temporary visitors and patients who were not routinely followed up in the NCD department were not included in the study.

2.5. Data Collection Instrument

Data were collected using a structured questionnaire developed after reviewing relevant literature, the conceptual framework, and recent empirical studies. The questionnaire had four major sections covering sociodemographic characteristics, individual-level barriers, social barriers, and economic barriers influencing the adoption of healthy behaviors among patients with non-communicable diseases. To enhance validity, the instrument was reviewed by subject matter experts for face and content validity. Its reliability was assessed using the test-retest approach, which showed good consistency of the responses over time.

2.6. Data Analysis

The collected data were entered, cleaned, and analyzed using Stata version 17. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' sociodemographic characteristics and the barriers reported. Inferential analyses, including chi-square tests and logistic regression, were conducted to examine the relationship between demographic characteristics and barriers to adopting healthy behaviors. Statistical significance was determined at a p -value of less than 0.05.

2.7. Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board of the University of Rwanda, College of Medicine and Health Sciences, under approval number CMHS/IRB/586/2022. After receiving ethical clearance, authorization to conduct the study was granted by the management of the referral hospital. Throughout the study, key ethical principles, including respect for participants' autonomy, voluntary participation, informed consent, and confidentiality, were observed.

Before participation, respondents were informed about the aim of the study, as well as any possible benefits and risks associated with taking part. Participation was entirely voluntary, and completion and return of the questionnaire indicated informed consent. To protect participants' privacy, questionnaires were assigned numerical codes instead of personal identifiers. The researcher's contact information was also provided to allow participants to ask questions or seek clarification when needed. No financial incentives were given to participants. However, the findings of the study may contribute to improved patient care and greater awareness among healthcare professionals regarding the management of non-communicable diseases.

3. Result

3.1. Demographic Characteristics of Respondents

Table 1 presents the socio-demographic profile of the 171 respondents surveyed. Most participants were female (110, 64.33%), while males accounted for 61 individuals (35.67%). Regarding marital status, 76 participants (43.44%) were married, while 68 (39.77%) were widowed. The remaining respondents included 14 divorced individuals (8.19%) and 13 single individuals (7.60%). Looking at age distribution, the most significant proportion of respondents (60, 35.09%) were aged between 51 and 70 years. This was followed by 44 individuals (25.73%) aged 31–50 years, 43 (25.15%) aged over 71, and 24 respondents (14.04%) aged below 30. Regarding educational attainment, most participants (104, 60.82%) had completed primary school education. A notable portion (48, 28.07%) had no formal education, while 17 (9.94%) had reached secondary school level, and only two individuals (1.17%) held university-level qualifications.

For occupational status, 61 participants (35.67%) were self-employed, followed by 60 (35.09%) who were unemployed. A further 27 (15.79%) worked in private services, and 23 (13.45%) were employed in government services. Concerning NCDs, the most prevalent condition reported was hypertension, affecting 104 respondents (60.82%). This was followed by diabetes mellitus (41, 23.89%), asthma (20, 11.70%), and cancer (6, 3.51%).

Table 1. Socio-demographic characteristics of Respondents.

Variables	Frequency (N=171)	Percentage (%)
Gender		
Male	61	35.67
Female	110	64.33
Marital Status		
Married	76	43.44
Single	13	7.60
Widow/Widower	68	39.77
Divorced	14	8.19
Age		
<30 years old	24	14.04
31 to 50 years old	44	25.73
51 to 70 years old	60	35.09
>71 years old	43	25.15
Education Level		
University level	2	1.17
Secondary school level	17	9.94
Primary school level	104	60.82
No formal education	48	28.07
Occupation		
Private services	27	15.79
Government services	23	13.45
Self-employed	61	35.67
Unemployed	60	35.09

Variables	Frequency (N=171)	Percentage (%)
Types of NCDs		
Hypertension (HTN)	104	60.82
Diabetes Mellitus (DM)	41	23.89
Asthma	20	11.70
Cancer	6	3.51

3.2. Barriers to the Adoption of Healthy Behaviors

3.2.1. Personal, Social, and Economic Barriers to Regular Physical Activity

Table 2 presents the barriers to regular physical activity as reported by the 171 respondents. Personal barriers emerged as the most significant category. Notably, 77 participants (45.03%) stated that they "always feel tired," while 48 (28.07%) felt there was no importance in exercising because they were already sick. Other personal challenges included demotivation due to continued weight gain despite exercising (17, 9.94%) and physical disability (9, 5.26%). Among social barriers, the lack of support from family and friends was reported by 36 individuals (21.05%), while 31 respondents (18.13%) felt ridiculed when seen exercising. Frequent work or leisure travel (30, 17.54%), lack of time for mass sports (18, 10.53%), and limited social interaction (11, 6.43%) were also cited. Economically, the most prominent obstacle was the lack of worksite exercise programs, affecting 67 participants (39.18%). Additionally, 48 respondents (28.07%) reported working late as a barrier, while 44 (25.73%) cited a lack of money to purchase exercise equipment.

Table 2. Personal, Social, and Economic barriers to regular Physical Activity.

Barriers	Frequency (N=171)	Percentage (%)
Personal Barriers		
I often feel too tired to exercise.	77	45.03
I do not feel that exercise is useful because I am already living with an illness.	48	28.07
I lose motivation when I continue to gain weight despite exercising	17	9.94
Physical disability	9	5.26
Lack of knowledge	5	2.92
Lack of time for exercising	4	2.34
Lack of self-motivation	4	2.34
Non-enjoyment of exercises	2	1.17

Barriers	Frequency (N=171)	Percentage (%)
I have an injury	2	1.17
I feel too lazy	1	0.58
Lack of energy	2	1.17
Social Barriers		
No support from my family and friends	36	21.05
Frequent work and leisure travel	30	17.54
People laugh at me when they see me exercising	31	18.13
Lack of time for mass sports	18	10.53
Exercising is difficult with others	13	7.60
Lack of social interaction	11	6.43
Social discrimination	10	5.85
Lack of motivation from peers	13	7.60
My religion does not allow me to exercise	5	2.92
Family caregiving obligations	2	1.17
Other social barriers	2	1.17
Economic Barriers		
Lack of exercise in a worksite program	67	39.18
I have no money to buy equipment for exercising	44	25.73
I do not have time to exercise as I work until late	48	28.07
Lack of financial support	11	6.43
Other economic barriers	1	0.58

3.2.2. Personal, Social, and Economic Barriers to Adopting a Healthy Diet

Table 3 presents the personal, social, and economic barriers to adopting a healthy diet among patients with non-communicable diseases. The most frequently cited personal barriers included a lack of knowledge about a healthy diet (31.6%) and how to prepare one (29.2%). Personal taste preferences (19.9%) and mood-related eating behaviors, such as eating when feeling unhappy (11.7%) or happy (2.3%), were also reported, along with a smaller proportion indicating challenges related to hunger control and self-discipline. Social barriers were also significant, with lack of support from friends and family being the most common (32.3%), followed by religious

dietary restrictions (26.3%) and lack of reminders to maintain healthy eating habits (25.1%). Cultural beliefs, lack of dietary advice, and difficulty preparing separate meals were less frequently mentioned. Economically, the high cost of maintaining a healthy diet was the predominant barrier (39.2%), alongside challenges such as insecure working conditions (18.1%), poor living environments (16.4%), and limited access to cooking equipment or financial support. These findings highlight that broader social and economic factors influence dietary behaviors beyond personal motivation. Addressing these barriers will require targeted interventions, including health education, community and family support, and financial assistance, to support sustainable, healthy eating practices among individuals with NCDs.

Table 3. Personal, Social, and Economic Barriers to Adopting a Healthy Diet.

		Frequency (N=171)	(%)
Personal Barriers	Lack of Knowledge of healthy diets to eat	54	31.6
	Lack of Knowledge regarding preparing healthy diets	50	29.2
	Personal taste preference	34	19.9
	When I am unhappy, I like eating anything at hand (mood)	20	11.7
	When I am happy, I like eating anything at hand (mood)	4	2.34
	Most times, I cannot control my hunger level	7	4.09
	I cannot resist food (lack of self-control before the food)	2	1.17
	Lack of a reminder	43	25.15
Social Barriers	My friends/Family do not support my efforts to change my diet	55	32.26
	My religion is against some food	45	26.32
	My culture and beliefs do not allow me to eat some food	14	8.19
	Lack of advice about diet from others	6	3.51
	Preparing a regimen separately from what others are eating is very difficult	6	3.51
	Eating fruits and vegetables in my community is for children	2	1.17
	The regime is costly	67	39.18
	Poor living conditions	28	16.37
Economic Barriers	Insecure working conditions	31	18.13
	Lack of equipment/materials to prepare a healthy diet	17	9.94
	Lack of financial support	15	8.77
	High cost of health food options	9	5.26
	Low income	3	1.75
	Financial constraints	1	0.58

3.2.3. Personal, Social, and Economic Barriers to Adopting Tobacco Cessation

Table 4 presents the personal, social, and economic barriers to adopting tobacco cessation among patients with non-communicable diseases. Among personal obstacles, the most reported were a lack of interest in quitting smoking (11.1%) and fear of experiencing depression after quitting (11.1%). This was closely followed by feeling ill when attempting to quit (10.5%), fear of increased irritability (9.4%), and lack of information about the health impacts of smoking (8.2%). Some respondents also expressed concerns about coping with stress (8.2%) and long-term smoking habits that discouraged cessation (5.9%). Social barriers were also prominent, with the most frequently cited being the difficulty of quitting while living with family members who smoke (34.5%), having friends

who smoke (24.6%), and lack of family support (23.4%). Additional social concerns included fear of losing social connections (9.4%) and limited peer encouragement (2.9%). Economic barriers played a significant role, with 36.8% of respondents fearing job loss or illness if they stopped smoking. Concerns over healthcare costs, such as medications and clinic visits (22.8%), and fear of spending money on treatment if they became unwell after quitting (29.8%) were also reported. These findings illustrate that despite awareness of the health risks associated with smoking, individuals with NCDs continue to face multifaceted personal, social, and economic obstacles that hinder smoking cessation. Addressing these challenges through tailored interventions, such as psychological support, peer and family engagement, and financial assistance, can enhance cessation outcomes in this vulnerable group.

Table 4. Personal, Social, and Economic Barriers to Adopting Tobacco Cessation.

		Frequency (N=171)	(%)
Personal Barriers	Lack of interest in quitting smoking	19	11.11
	I tried to quit, but felt sick	18	10.53
	Fear of inability to cope with stress	14	8.19
	I have been smoking for a long time; I don't see a reason to stop now	10	5.85
	Lack of information about the impact of smoking	14	8.19
	Fear that irritability will increase	16	9.36
	Fear that depression will come	19	11.11
Social Barriers	All my friends smoke	42	24.56
	My family smokes, and it is difficult for me to stop while I live with those who smoke	59	34.50
	Lack of family support	40	23.39
	Fear of loss of compassion for those who smoke	16	9.36
	Lack of motivation from my friend	5	2.92
Economic Barrier	Other Social Barriers	9	5.26
	I feel like I will be sick and lose my job if I stop smoking.	63	36.84
	Fear of spending much money getting help /care if I stop smoking and get sick	51	29.82
	Cost of medications and clinic visits	39	22.81
	Other economic barriers	18	10.53

3.2.4. Personal, Social, and Economic Barriers to the Adoption of Alcohol Reduction

Table 5 highlights a complex interplay of personal, social, and economic barriers that hinder the adoption of alcohol reduction. Individual barriers were prominently reported, with a significant proportion of participants (39.2%) indicating that drinking less leads to reduced self-esteem, and 32.2% expressing fear of being unable to cope with stress, anxiety, or sadness in the absence of alcohol. Additionally, 20.5% feared that reducing alcohol consumption would exacerbate stress levels, while smaller percentages reported concerns about diminished motivation (4.1%), potential health issues (2.9%), or mental health deterioration (1.2%) upon quitting. Social barriers also emerged as influential, with 33.9% citing social isolation and 26.9% reporting fear of losing social companions as deterrents

to reducing alcohol intake. Furthermore, 24.0% reported a lack of encouragement from family and peers, and others noted a lack of health-related guidance (3.5%), stigma in social settings (2.9%), and limited alternatives to alcohol (0.6%). Economic barriers were equally prominent, particularly the uncertainty regarding financial management after quitting alcohol (46.2%) and the perceived affordability of alcoholic beverages (25.2%). Additionally, 24.0% attributed their continued alcohol use to poor working conditions. These findings suggest that interventions aiming to reduce alcohol consumption among patients with NCDs must address not only individual psychological factors but also broader social dynamics and economic constraints. Comprehensive strategies that integrate behavioral counseling, peer and family support, health education, and socioeconomic interventions are essential to mitigate these barriers and promote sustainable behavior change effectively.

Table 5. Personal, Social, and Economic barriers to the adoption of alcohol reduction.

	Frequency (N=171)	(%)
Fear of inability to cope with stress, anxiety, sadness, if I stop drinking	55	32.16

		Frequency (N=171)	(%)
Personal Barriers	Drinking less results in low self-esteem	67	39.18
	Fear that alcohol reduction increases stress	35	20.47
	Fear of the disease if I stop drinking	5	2.92
	Stop drinking results in low self-motivation	7	4.09
	I fear getting mental diseases if I stop drinking or reduce alcohol consumption	2	1.17
	Social isolation	58	33.92
	Lack of motivation from others (family, friends)	41	23.98
Social Barriers	Fear of loss of companions	46	26.90
	Feeling I cannot do things correctly	14	8.19
	Lack of information from health support	6	3.51
	Stigma around reducing drinking in social situations	5	2.92
	Lack of alternative drinking	1	0.58
Economic Barriers	My poor working conditions make me drink to continue resisting	41	23.98
	I do not know what to do with my money if I stop drinking	79	46.20
	Beer is low-cost (affordable)	43	25.15
	Other economic barriers	8	4.68

3.2.5. Association Between Socio-Demographic Characteristics and NCDs Among Respondents

A bivariate analysis was conducted using chi-square tests to examine the association between socio-demographic characteristics, namely gender, marital status, age, and education level, and the prevalence of major NCDs, including hypertension (HTN), diabetes mellitus (DM), asthma, and cancer, among 171 respondents. The findings revealed significant associations for gender ($\chi^2 = 8.242, p = 0.041$), marital status ($\chi^2 = 25.277, p = 0.003$), and education level ($\chi^2 = 26.650, p = 0.002$). Females reported a higher prevalence of hypertension (62.7%) and asthma (15.5%) compared to males, while males

had a higher prevalence of diabetes (34.4%). Widowed individuals had the highest rates of hypertension (70.6%), while singles showed elevated levels of diabetes (61.5%) and asthma (30.8%). Educational attainment showed a transparent gradient, with those lacking formal education exhibiting the highest prevalence of hypertension (79.2%) and diabetes (18.8%), in contrast to those with university education, where NCD prevalence was markedly lower. Although age did not show a statistically significant association with disease prevalence ($\chi^2 = 8.531, p = 0.482$), older adults (particularly those aged 51 and above) still demonstrated higher proportions of chronic conditions, underscoring age as a potential risk factor. The results highlight the socio-demographic determinants' critical role in shaping NCD risk and call for targeted, equity-focused public health strategies.

Table 6. The socio-demographic factors associated with NCDs (N= 171).

Social demographic variables	Types of NCD				$\chi^2 = 0.05$	p-value
	HTN (%)	DM (%)	Asthma (%)	Cancer (%)		
Gender						
Male	35 (57.4%)	21 (34.4%)	3 (4.9%)	2 (3.3%)	8.242	0.041
Female	69 (62.7%)	20 (18.2%)	17 (15.5%)	4 (3.6%)		
Marital status						

Social demographic variables	Types of NCD				$\chi^2 = 0.05$	p-value
	HTN (%)	DM (%)	Asthma (%)	Cancer (%)		
Married	48 (63.2%)	18 (23.7%)	9 (11.8%)	1 (1.3%)	25.277	0.003
Single	1 (7.7%)	8 (61.5%)	4 (30.8%)	0 (0%)		
Widow/widower	48 (70.6%)	11 (16.2%)	5 (7.4%)	4 (5.9%)		
Divorced	7 (50%)	4 (28.6%)	2 (14.3%)	1 (7.1%)		
Age (years)					8.531	0.482
< 30	19 (11.1%)	2 (1.2%)	3 (1.8%)	0 (0.0%)		
31 to 50	28 (16.4%)	11 (6.4%)	4 (2.3%)	1 (0.6%)		
51 to 70	32 (18.7%)	17 (9.9%)	9 (5.3%)	2 (1.2%)		
>71	25 (14.6%)	11 (6.4%)	4 (2.3%)	3 (1.8%)		
Education Level					26.650	0.002
University	1 (50%)	0 (0%)	0 (0%)	1 (50%)		
Secondary	7 (41.2%)	5 (29.4%)	4 (23.5%)	1 (5.9%)		
Primary	58 (55.8%)	27 (26%)	15 (14.4%)	4 (3.8%)		
No formal education	38 (79.2)	9 (18.8%)	1 (2.1%)	0 (0%)		

3.2.6. Multivariable Analysis of Barriers to Healthy Behavior Adoption

This analysis examined the association between socio-demographic characteristics and perceived personal, social, and economic barriers to adopting healthy behaviors, including regular physical activity, nutritious diet, tobacco cessation, and alcohol reduction, among patients with NCDs at a referral hospital in Rwanda. The independent variables considered were gender, marital status, age, educational level, and occupation.

For regular physical activity, occupation was significantly associated with personal barriers ($\beta = -0.525$, $p = 0.004$), indicating that employed individuals were less likely to report personal challenges such as lack of time or motivation. Additionally, occupation was positively associated with social barriers ($\beta = 0.619$, $p = 0.002$), suggesting that employed individuals may face more social obstacles, such as a lack of social support or workplace constraints. No socio-demographic variables significantly predicted economic barriers to physical activity.

Regarding a healthy diet, gender was a significant predictor of personal barriers ($\beta = -0.792$, $p = 0.001$), with males less likely to report such barriers than females. This suggests gender-specific differences in perceptions or experiences related to dietary change. No significant socio-demographic predictors were found for social or economic barriers to healthy diet

adoption, although occupation showed a borderline association with social barriers ($p = 0.079$).

Regarding tobacco cessation, marital status showed a marginal association with personal barriers ($p = 0.082$), possibly reflecting the influence of family dynamics on smoking behavior. However, none of the socio-demographic variables were statistically significant predictors of social or economic barriers to quitting tobacco.

For alcohol reduction, occupation was significantly associated with personal barriers ($\beta = -0.177$, $p = 0.026$), indicating that employed participants were less likely to report personal hindrances. Gender also showed a marginally significant relationship ($p = 0.061$), with males reporting fewer personal barriers. No significant predictors emerged for social or economic obstacles to reducing alcohol consumption.

Overall, occupation and gender emerged as the most consistent predictors across multiple types of barriers. Occupation was particularly influential in shaping both personal and social barriers to physical activity and alcohol reduction, while gender was a strong predictor of the individual obstacles to healthy eating. These findings suggest that interventions aimed at improving the adoption of healthy behaviors among patients with NCDs should be tailored to address the specific challenges individuals face based on their employment status and gender. Understanding these demographic influences can help design more effective, context-sensitive public health strategies.

Table 7. Multivariable Logistic Regression Analysis of Socio-Demographic.

Variables	Coefficient	Std. err.	P value	95% CI		
				Lower	Upper	
Regular Physical Exercise personal barriers	Gender	.4951846	.4060075	0.224	-.3064552	1.296824
	Marital status	-.0059761	.1816565	0.974	-.364647	.3526947
	Age	-.1417944	.1915722	0.460	-.5200433	.2364544
	Educational level	.5574827	.3028283	0.067	-.0404354	1.155401
	occupation	-.5254109	.1823762	0.004	-.8855028	-.165319
	_cons	1.838434	1.329717	0.169	-.787019	4.463887
Regular Physical Activity Social Barriers	Gender	.1325675	.4318354	0.759	-.720068	.9852031
	Marital status	-.0559569	.1932124	0.772	-.4374444	.3255305
	Age	-.2083112	.2037589	0.308	-.6106221	.1939997
	Educational level	-.4922796	.3220925	0.128	-1.128234	.1436746
	occupation	.6188442	.1939779	0.002	.2358453	1.001843
	_cons	4.09091	1.414306	0.004	1.29844	6.883379
Regular Physical Economic Activity Barriers	Gender	.0887025	.1638121	0.589	-.2347356	.4121406
	Marital status	.0107836	.0732931	0.883	-.1339296	.1554967
	Age	-.0354275	.0772937	0.647	-.1880398	.1171848
	Educational level	-.1834829	.1221823	0.135	-.4247253	.0577595
	occupation	.0058694	.0735834	0.937	-.1394171	.1511559
	_cons	2.525022	.5365016	0.000	1.465729	3.584316
Healthy Diet Personal Barriers	Gender	-.791791	.2243742	0.001	-1.234806	-.3487764
	Marital status	-.0544211	.1003898	0.588	-.2526353	.1437932
	Age	-.0018523	.1058696	0.986	-.210886	.2071814
	Educational level	.1237464	.1673537	0.461	-.2066843	.4541771
	occupation	.1339216	.1007876	0.186	-.0650779	.4541771
	_cons	3.051491	.7348485	0.000	1.600573	4.502409
Healthy Diet Social Barriers	Gender	.0633333	.2189692	0.773	-.3690096	.4956761
	Marital status	.0747634	.0979715	0.446	-.1186761	.2682028
	Age	.0745118	.1033193	0.472	-.1294866	.2785101
	Educational level	.1771028	.1633223	0.280	-.1453682	.4995738
	occupation	-.173597	.0983597	0.079	-.3678028	.0206089
	_cons	1.959264	.7171468	0.007	.5432964	3.375231
Healthy Diet Economics Barriers	Gender	-.289873	.2820807	0.306	-.846826	.2670799
	Marital status	-.0557056	.1262089	0.660	-.3048983	.1934871
	Age	-.1333745	.133098	0.318	-.3961694	.1294203
	Educational level	-.0338514	.2103951	0.872	-.4492651	.3815624
	occupation	-.0239515	.126709	0.850	-.4492651	.3815624
	_cons	3.71734	.9238432	4.02	-.2741315	.2262284

Variables		Coefficient	Std. err.	P value	95% CI	
					Lower	Upper
Tobacco Cessation Personal Barriers	Gender	-.0465578	.5610787	0.934	-1.154377	1.061262
	Marital status	.5610787	.2510386	0.082	-.0564044	.9349199
	Age	.4126742	.2647415	0.121	-.1100436	.935392
	Educational level	.2647415	.418491	0.898	-.8801734	.7724022
	occupation	-.017151	-.017151	0.946	-.514777	.4804749
	_cons	4.293542	1.837591	0.021	.6653196	7.921765
Tobacco Cessation Social Barriers	Gender	-.0729819	.2174279	0.738	-.5022815	.3563177
	Marital status	.1474888	.0972819	0.131	-.0445891	.3395667
	Age	-.0717247	.102592	0.485	-.2742871	.1308377
	Educational level	-.1077362	.1621727	0.507	-.4279374	.2124649
	occupation	.0541603	.0976673	0.580	-.1386786	.2469991
	_cons	2.65913	.7120989	0.000	1.25313	4.065131
Tobacco Cessation Economics Barriers	Gender	-.2586509	.164319	-0.44	-.5830899	-.5830899
	Marital status	.0244528	.0735199	0.740	-.1207082	.1696137
	Age	-.0338784	.0775329	0.663	-.186963	-.186963
	Educational level	.1934324	.1225604	0.116	-.0485565	.4354214
	occupation	.1142225	.0738112	0.124	-.0315136	.2599586
	_cons	1.593221	.5381618	0.004	.5306493	2.655792
Alcohol Reduction Personal Barriers	Gender	-.3312037	.1754417	0.061	-.6776037	.0151963
	Marital status	-.0488773	.0784964	0.534	-.2038641	.1061096
	Age	-.0277783	.0827811	0.738	-.191225	.1356684
	Educational level	.1193872	.1308565	0.363	-.1389817	.3777562
	occupation	-.1773734	.0788074	0.026	-.3329743	-.0217726
	_cons	2.97169	.5745896	0.000	1.837195	4.106186
Alcohol Reduction Social Barriers	Gender	.0691487	.2228254	0.757	-.3708079	.5091054
	Marital status	-.0589864	.0996969	0.555	-.2558325	.1378596
	Age	.0164564	.1051388	0.876	-.1911345	.2240472
	Educational level	.2087736	.1661985	0.211	-.1193762	-.1193762
	occupation	-.0069066	.1000919	0.945	-.2045326	.1907193
	_cons	1.678213	.7297761	0.023	.2373099	3.119117
Alcohol Reduction Economics Barriers	Gender	-.1182033	.1344514	0.381	-.3836703	.1472638
	Marital status	.0017503	.0601565	0.977	-.1170254	.120526
	Age	-.0699001	.0634401	0.272	-.1951591	.0553589
	Educational level	.1485472	.1002831	0.140	-.0494564	.3465507
	occupation	.0291067	.0603948	0.630	-.0901396	.1483529
	_cons	1.931946	.4403423	0.000	1.062514	2.801378

4. Discussion

Non-communicable are a significant global public health concern, with rising incidence and prevalence in low- and middle-income countries, including Rwanda. The adoption of healthy behaviors, such as regular physical activity, a balanced diet, alcohol reduction, and tobacco cessation, is essential for the prevention and effective management of NCDs. However, individuals living with NCDs often encounter numerous barriers that hinder the adoption of these healthy behaviors, leading to poor health outcomes and increased healthcare costs. Findings from the current study revealed that feeling tired was the most reported personal barrier (45.03%), followed by not perceiving the importance of exercise due to preexisting illness (28.07%) and demotivation resulting from weight gain (9.94%). These results align with previous research conducted in Gaza in 2021, which also identified physical fatigue, lack of motivation, and a perceived lack of benefits as key personal barriers to regular physical activity among individuals with chronic diseases [12].

The current study also identified significant social and economic barriers to the practice of healthy behaviors, particularly regular physical activity, among patients with NCDs. This study also identified several barriers to practicing healthy behaviors among non-communicable disease (NCD) patients. Social barriers were notably prevalent, with the most cited being lack of support from family and friends (21.05%), being laughed at while exercising (18.13%), and frequent work and leisure travel (17.54%). These findings are consistent with those reported by Vilafranca Cartagena et al. (2021), who found that low social support and lack of motivation significantly hinder physical activity among individuals with chronic diseases [13].

Economic barriers also emerged as significant. The leading constraints included the absence of workplace exercise programs (39.18%), lack of time due to late work hours (28.07%), and the inability to afford exercise equipment (25.73%). These results align with the findings of Pedersen et al. (2021), who highlighted that time constraints and financial limitations are key obstacles to engaging in regular physical activity. [14] However, this study's results differ from those reported by Mohamed et al. (2020), where the most common barriers to behavior change included difficulty following a healthy schedule (19.4%) and workplace challenges (14.3%), while the least reported was lack of knowledge.

Mohamed's study also found that doctors' advice, support groups, and mobile reminders were the most effective motivators for adopting healthy behaviors. [15] Demographically, the multivariable logistic regression analysis revealed that women had significantly higher odds of experiencing NCDs compared to men. This aligns with previous studies indicating that biological differences, lifestyle behaviors, and gender-specific social roles contribute to this disparity, highlighting the need for targeted, gender-sensitive interventions. [16] Additionally,

single individuals were more likely to experience NCDs compared to their married counterparts, highlighting the potential protective effect of social support often found in marital relationships. The analysis also indicated that young adults, especially those aged 21 to 50, are increasingly affected by NCDs, suggesting that lifestyle-related risk factors are taking hold earlier in life. However, the scientific implications of these findings are substantial.

The prominence of personal barriers highlights the need for interventions that address chronic disease management's psychological and behavioral aspects. Effective programs should extend beyond clinical treatment to include mental health support, motivational counseling, and strategies to tackle fatigue and emotional eating. Meanwhile, the impact of social barriers underscores the importance of reinforcing family and community support networks and incorporating culturally appropriate messaging into public health initiatives. Economic challenges suggest a pressing need for policy reforms that provide financial relief and increase access to health-enhancing services through subsidies, community-based programs, and affordable healthcare. [17] Gender disparities in NCD prevalence call for targeted efforts to empower women through health education and the creation of flexible, accessible services that accommodate their caregiving and societal roles. Similarly, the greater vulnerability of single individuals to NCDs emphasizes the value of community-building initiatives, such as peer support groups and local wellness programs, to foster social connection and encouragement. Lastly, the link between low education levels and increased NCD risk underscores the critical need to improve health literacy through accessible education campaigns and adult learning opportunities that empower individuals to make informed health choices. This study highlights the complex barriers to healthy living faced by individuals with NCDs in low-resource settings. Effective interventions must take a holistic approach—culturally sensitive and responsive to social, psychological, educational, and economic factors. These findings emphasize the urgent need for systemic change and integrated public health strategies to improve health outcomes and reduce the growing burden of NCDs in low- and middle-income countries.

Study Limitations

This study faced several methodological and contextual limitations. First, time constraints worsened by disruptions from the COVID-19 pandemic affected data collection and analysis, potentially limiting the depth of participant engagement and the richness of the data. Second, the limited availability of prior research on barriers to adopting healthy behaviors among patients with NCDs in Rwanda posed challenges for theoretical grounding and comparative analysis, making it difficult to situate the findings within a broader national context. Third, financial and logistical constraints limited the sample size and geographic coverage, which may affect the generalizability of the results to other populations or regions. Despite these challenges, mitigation strategies such as extend-

ing the data collection period and applying rigorous data management practices were employed to strengthen the study's validity and reliability. Future research with a broader scope and stronger financial and institutional backing is recommended to expand and deepen insights in this critical area.

5. Conclusion

This study reveals the complex and multifaceted barriers to adopting healthy behaviors among patients with NCDs in a low-resource setting. Socio-demographic factors—including gender, marital status, age, and education level were significantly associated with these barriers, with women, single individuals, and those with lower educational attainment facing greater difficulties. Economic constraints and limited access to health-promoting resources hinder healthy lifestyle adoption. These findings highlight the urgent need for targeted, gender-sensitive, and socioeconomically inclusive public health interventions. Efforts should prioritize improving health literacy, strengthening social support systems, and addressing economic barriers through accessible and affordable programs. This study offers valuable evidence to guide policymakers and health practitioners in developing practical, context-specific strategies to reduce the burden of NCDs in Rwanda and other low- and middle-income countries.

6. Recommendations

Based on the findings of this study, healthcare providers should strengthen regular health education and counselling for patients with NCDs, focusing on physical activity, healthy diet, tobacco cessation, and alcohol reduction. These messages should be simple, practical, and adapted to patients' education levels.

NCD clinics should integrate affordable and patient-centered lifestyle support, including dietary counselling, supervised physical activity, smoking cessation support, alcohol reduction counselling, and follow-up reminders. Family members and community health workers should also be involved to improve social support and reduce stigma related to behavior change.

Hospital management, employers, and policymakers should address economic and environmental barriers by promoting workplace wellness programs, access to affordable healthy foods, safe spaces for physical activity, and community-based NCD prevention programs. Special attention should be given to vulnerable groups, including women, patients with low education, unemployed individuals, and those with limited family or social support.

Future research should be conducted in different health facilities and communities in Rwanda to explore barriers more deeply and test interventions that can improve the adoption of healthy behaviors among patients with NCDs.

Acknowledgments

The authors would like to express their sincere gratitude to the management of Kibagabaga Hospital and the staff of the NCD department for their support and facilitation during data collection. The authors also acknowledge the University of Rwanda, College of Medicine and Health Sciences Institutional Review Board for ethical review and approval of the study under approval number CMHS/IRB/586/2022. Special appreciation is extended to all patients with non-communicable diseases who voluntarily participated in this study and shared their experiences.

Author Contributions

Liliane Nirere: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Project administration, Writing – original draft

Mukarugwiza Marguerite: Conceptualization, Methodology, Supervision, Validation, Resources, Writing – review & editing

Rudashirikaka Jean de Dieu: Methodology, Supervision, Validation, Formal analysis, Writing – review & editing

Conflicts of Interest

All authors declare no conflict of interest.

References

- [1] WHO. Noncommunicable diseases 2024. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases> (accessed June 2, 2025).
- [2] Gouda HN, Charlson F, Sorsdahl K, Ahmadzade S, Ferrari AJ, Erskine H, et al. Burden of non-communicable diseases in sub-Saharan Africa, 1990–2017: results from the Global Burden of Disease Study 2017. *The Lancet Global Health* 2019; 7: e1375–87. [https://doi.org/10.1016/S2214-109X\(19\)30374-2](https://doi.org/10.1016/S2214-109X(19)30374-2)
- [3] Mucumbitsi J, Scholtz W, Nel G, Fourie JM, Scarlatescu O. Rwanda Country Report. *Cardiovasc J Afr* 2020; 31: S27–34. <https://doi.org/10.5830/CVJA-2020-034>
- [4] Murray CJL, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* 2020; 396: 1223–49. [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2)
- [5] Allen LN, Nicholson BD, Yeung BYT, Goiana-da-Silva F. Implementation of non-communicable disease policies: a geopolitical analysis of 151 countries. *The Lancet Global Health* 2020; 8: e50–8. [https://doi.org/10.1016/S2214-109X\(19\)30446-2](https://doi.org/10.1016/S2214-109X(19)30446-2)

- [6] Moucheraud C, Lenz C, Latkovic M, Wirtz VJ. The costs of diabetes treatment in low- and middle-income countries: a systematic review. *BMJ Glob Health* 2019; 4: e001258. <https://doi.org/10.1136/bmjgh-2018-001258>
- [7] Summey E. Diagnosing Noncommunicable Diseases with DHIS2 in Rwanda for Improved Treatment Access. *DHIS2* 2024. <https://dhis2.org/rwanda-ncd-tracker/> (accessed June 2, 2025).
- [8] Budreviciute A, Damiati S, Sabir DK, Onder K, Schuller-Goetzburg P, Plakys G, et al. Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors. *Front Public Health* 2020; 8: 574111. <https://doi.org/10.3389/fpubh.2020.574111>
- [9] Nyirenda MJ. Non-communicable diseases in sub-Saharan Africa: understanding the drivers of the epidemic to inform intervention strategies. *Int Health* 2016; 8: 157-8. <https://doi.org/10.1093/inthealth/ihw021>
- [10] Li Z, Shi J, Li N, Wang M, Jin Y, Zheng Z. Temporal trends in the burden of non-communicable diseases in countries with the highest malaria burden, 1990–2019: Evaluating the double burden of non-communicable and communicable diseases in epidemiological transition. *Global Health* 2022; 18: 90. <https://doi.org/10.1186/s12992-022-00882-w>
- [11] Niyibizi JB, Ntawuyirushintege S, Nganabashaka JP, Umwali G, Tumusiime D, Ntaganda E, et al. Community Health Worker-Led Cardiovascular Disease Risk Screening and Referral for Care and Further Management in Rural and Urban Communities in Rwanda. *IJERPH* 2023; 20: 5641. <https://doi.org/10.3390/ijerph20095641>
- [12] Albelbeisi AH, Albelbeisi A, El Bilbeisi AH, Taleb M, Takian A, Akbari-Sari A. Barriers toward practicing healthy behaviors among patients with non-communicable diseases in Gaza Strip, Palestine. *SAGE Open Medicine* 2021; 9: 20503121211029179. <https://doi.org/10.1177/20503121211029179>
- [13] Vilafranca Cartagena M, Tort-Nasarre G, Rubinat Arnaldo E. Barriers and Facilitators for Physical Activity in Adults with Type 2 Diabetes Mellitus: A Scoping Review. *IJERPH* 2021; 18: 5359. <https://doi.org/10.3390/ijerph18105359>
- [14] Pedersen BK, Saltin B. Exercise as medicine – evidence for prescribing exercise as therapy in 26 chronic diseases. *Scandinavian Med Sci Sports* 2015; 25: 1-72. <https://doi.org/10.1111/sms.12581>
- [15] Mohamdy O. Barriers to Health Behavior Change in People with Type 2 Diabetes: Survey Study 2020. <https://doi.org/10.1101/2020.11.22.20236190>
- [16] Fathnezhad-Kazemi A, Hajian S. Factors influencing the adoption of health-promoting behaviors in overweight pregnant women: a qualitative study. *BMC Pregnancy Childbirth* 2019; 19: 43. <https://doi.org/10.1186/s12884-019-2199-5>
- [17] WHO. Monitoring noncommunicable disease commitments in Europe 2021: are we on track to reach targets 10 years after the Moscow Declaration and First United Nations High-Level Meeting? 2021. <https://www.who.int/europe/publications/i/item/WHO-EURO-2021-4479-44242-62494> (accessed June 7, 2025).