

A Systematic Review On Behaviour Change Communication Strategies For The Prevention And Control Of Non-Communicable Diseases In Nigeria

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Abstract

Objectives: To synthesize existing evidence on behavioural risk factors for non-communicable diseases (NCDs) and examine behaviour change communication strategies for NCD prevention and control in Nigeria.

Methods: Following PRISMA systematic review guidelines, this review analysed studies on NCD behavioural risk factors and prevention strategies in Nigeria. Documentary evidence from peer-reviewed studies published between 2017 and 2025 was systematically reviewed, focusing on tobacco use, alcohol consumption, unhealthy diet, and physical inactivity among various Nigerian populations across the life course.

Results: Five studies were included in the final synthesis, involving 3,327 participants across educational and occupational settings, including in-school adolescents, university students, and employees. Major findings revealed critically high prevalence of behavioural risk factors across all age groups: physical inactivity (17.1-91.0%), unhealthy diet (20.6-94.6%), alcohol consumption (24.0-66.5%), and tobacco use (1.0-7.9%). Alarming, 37.5-43.8% of adolescent smokers-initiated tobacco use before age 13. Rural-urban disparities were evident, with urban adolescents showing higher sedentary behaviour (25.0% vs. 13.4%) and obesity (4.5% vs. 1.7%), while rural adolescents had higher low physical activity rates (31.1% vs. 17.1%). Overall, 95-99% of participants had at least one behavioural risk factor, yet only 23.9-31.5% had attended NCD prevention programmes. Significant gaps were identified in behaviour change communication interventions, with no comprehensive, theory-based programmes documented across any age group or setting.

Conclusion: Despite critically high prevalence of NCD risk factors beginning in adolescence and persisting through adulthood, behaviour change communication strategies in Nigeria remain grossly inadequate. There is urgent need for comprehensive, life-course-oriented, culturally appropriate, multi-sectoral behaviour change interventions that address the specific behavioural risk factors identified across Nigerian populations, with particular emphasis on early prevention before age 13.

Keywords: behaviour change communication, non-communicable diseases, NCDs prevention, behavioural risk factors, health education, life-course approach, Nigeria

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I. Introduction

Non-communicable diseases (NCDs) remain a leading cause of morbidity and mortality worldwide, posing significant public health challenges, particularly in low- and middle-income countries (LMICs). According to the World Health Organization (2020), these countries bear a disproportionate share of the global NCD burden. Similarly, Allen, Nicholson, Yeung, and Goiana-da-Silva (2020) emphasized that the implementation of effective NCD prevention policies remains uneven across regions, with Africa lagging in adopting sustainable health interventions. In Nigeria, as in many other African nations, NCDs are largely driven by common behavioural risk factors such as poor diet, sedentary lifestyles, excessive alcohol intake, and tobacco use (Sakaria & Indongo, 2025; Kassa & Grace, 2022; Nyaaba, Stronks, de-Graft Aikins, Kengne, & Agyemang, 2017). These risk factors are modifiable and, therefore, preventable through the application of well-designed behaviour change communication (BCC) strategies. The World Health Organization (2018a) describes BCC as a cost-effective means of reducing the prevalence and impact of NCDs by promoting healthier behavioural choices among populations.

To strengthen prevention efforts, the World Health Organisation (2018b) has identified several “best buy” interventions that emphasise population-based approaches, including public awareness campaigns, health education, and other forms of behaviour change communication. Tuangratananon *et al.* (2018) also highlight the success of such approaches in several Asian countries, demonstrating that national action plans integrating communication and education can significantly improve health outcomes. However, within Africa, and Nigeria in particular, most health policies and disease prevention initiatives continue to prioritise communicable diseases, with limited focus on NCD prevention and the systematic implementation of BCC strategies (Mukanu, Zulu,

Mweemba, & Mutale, 2017; Witter *et al.*, 2020). Behaviour change communication offers a structured and evidence-based framework for promoting positive health behaviours through strategic communication aimed at influencing knowledge, attitudes, and practices. According to UNICEF (n.d.), BCC combines social and behavioural science theories with communication tools to achieve measurable changes in health behaviour. Similarly, Glanz, Rimer, and Viswanath (2015) assert that effective BCC strategies should target multiple levels of influence, individual, interpersonal, organisational, community, and policy, to create sustainable behaviour change that reduces the risks of NCDs.

Despite its proven potential, there is limited empirical evidence on the extent to which BCC strategies have been applied to NCD prevention in Nigeria. Studies from other African countries, such as Ethiopia, have identified significant policy and strategy gaps in addressing modifiable behavioural risk factors (Shiferaw *et al.*, 2019), suggesting that similar challenges may exist in the Nigerian context. Adults represent a critical target group for NCDs, as behavioural habits developed early in life tend to persist throughout adulthood. Evidence from intervention studies among university and college students indicates that targeted communication and health education can significantly improve lifestyle behaviours related to physical activity, nutrition, and weight control (Plotnikoff *et al.*, 2015; Qiu, Huang, Xiao, Nie, Ma, Zhou & Liu, 2025). Given the increasing burden of NCDs in Nigeria and the crucial role of communication in promoting preventive behaviours, this structured literature review aims to synthesize existing evidence on the prevalence and patterns of behavioural risk factors for NCDs, identify current BCC and health education strategies, assess gaps in implementation and policy development, and propose actionable recommendations for strengthening behaviour change communication approaches to effectively reduce NCDs in Nigeria.

II. Methods

Study Design

This structured literature review followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to identify, analyse, and synthesize evidence on behavioural risk factors for NCDs and behaviour change communication strategies in Nigeria (Moher, Liberati, Tetzlaff, & Altman, 2009). The review focused on studies published between 2017 and 2024 to capture recent trends and developments in NCD prevention efforts.

Search Strategy

A comprehensive literature search was conducted across multiple electronic databases, including PubMed, Google Scholar, and African Journals Online, using the following search terms: "non-communicable diseases" OR "NCDs" AND "behavioural risk factors" OR "behaviour change" OR "health education" OR "prevention" AND "Nigeria." The search strategy was designed to maximize sensitivity while maintaining specificity for identifying relevant studies on NCD risk factors and prevention strategies among Nigerian populations (Kassa & Grace, 2022).

Eligibility Criteria

Studies were included if they: (1) were conducted in Nigeria with Nigerian populations; (2) examined at least one of the four major behavioural risk factors for NCDs, tobacco use, alcohol consumption, unhealthy diet, or physical inactivity, as defined by WHO guidelines (World Health Organization, 2018); (3) reported quantitative prevalence data on behavioural risk factors; (4) were published in peer-reviewed journals in English between 2017 and 2024; and (5) included population groups relevant to NCD prevention such as adolescents, students, university populations, or working adults.

Data Extraction and Analysis

Two reviewers independently extracted relevant information, including study population, sample size, study design, prevalence of behavioural risk factors, socio-demographic correlates, and any behaviour change interventions or health education programmes from included studies. Data were synthesized thematically following established systematic review methods (Popay *et al.*, 2006). A PRISMA flow diagram documented the study selection process. Extracted data were analysed to identify patterns, gaps, and opportunities for behaviour change communication strategies in Nigerian contexts.

III. Results

Study Characteristics

Four studies met the inclusion criteria, involving a total of 3,327 participants across different Nigerian populations and settings (Table 1). The included studies comprised two comparative cross-sectional studies examining university students, one cross-sectional study of university employees, one study comparing medical and law students, and one comparative study of rural and urban adolescents. Study populations included

undergraduate students from public and private universities, university employees, professional students in medicine and law, and in-school adolescents from rural and urban areas.

Table 1: Characteristics of Included Studies

Authors	Setting	Study Population	Sample Size	Study Aims
Jenewari and Tolulope (2025)	Adamawa State	In-school adolescents from rural and urban areas	624 (308 rural, 316 urban)	To assess prevalence and determinants of NCD risk factors among in-school adolescents in rural and urban settings
Onwasigwe and Anyaehie (2024)	University of Nigeria	Medical and law undergraduate students	620 (310 medical, 310 law)	To evaluate and compare prevalence and correlates of behavioural risk factors of NCDs among medical and non-medical students
Owopetu <i>et al.</i> (2020)	Southwest Nigeria	Undergraduate students from public and private universities	1,200 (600 public, 600 private)	To assess knowledge, prevalence, and correlates of behavioural risk factors for NCDs among undergraduates
Agaba <i>et al.</i> (2017)	University of Jos	University employees (academic and non-academic staff)	883 (521 males, 362 females)	To survey non-communicable diseases and their risk factors among university employees

Prevalence of Behavioural Risk Factors

Physical Inactivity

Physical inactivity emerged as the most prevalent behavioural risk factor across all studied populations, though patterns varied significantly by age group and setting. Among medical and law students at the University of Nigeria, 91.0% of medical students and 87.4% of law students were classified as physically inactive, with no statistically significant difference between the groups ($p = 0.155$) (Onwasigwe and Anyaehie, 2024). Similarly, in the comparative study of public and private universities in Southwest Nigeria, 68.8% of public university students and 72.5% of private university students reported inadequate physical activity ($p = 0.008$) (Owopetu *et al.*, 2020). Among university employees, 77.8% (95% CI: 74.9-80.5%) were physically inactive (Agaba *et al.*, 2017). Among in-school adolescents in Adamawa State, physical inactivity patterns differed significantly between rural and urban settings. Rural adolescents showed higher rates of low physical activity (31.1%) compared to urban adolescents (17.1%, $p < 0.001$) (Jenewari and Tolulope, 2025). However, sedentary behaviour was more prevalent among urban adolescents (25.0%) compared to rural adolescents (13.4%, $p < 0.001$) (Jenewari and Tolulope, 2025). This suggests that while urban adolescents may engage in more structured physical activity, they also spend more time in sedentary behaviours, possibly related to increased screen time, motorized transportation, and urbanized lifestyles. Age-specific analysis revealed that among medical students, younger students (≤ 24 years) had significantly higher rates of physical inactivity (93.6%) compared to older students (83.1%, $p = 0.006$) (Onwasigwe and Anyaehie, 2024). However, no such age-related difference was observed among law students.

Unhealthy Diet

The prevalence of unhealthy diets varied considerably across populations but remained consistently high across all age groups. Overall, 68.3% of university students in Southwest Nigeria had unhealthy diets, with a significantly higher proportion among private university students (70.6%) compared to public university students (66.0%, $p < 0.001$) (Owopetu *et al.*, 2020). Among medical and law students, 20.6% of medical students and 28.4% of law students reported unhealthy dietary practices, with the difference being statistically significant ($p = 0.025$) (Onwasigwe and Anyaehie, 2024). The most striking finding was among university employees, where 94.6% (95% CI: 92.8-95.9%) had inadequate intake of fruits and vegetables (Agaba *et al.*, 2017). Similarly, among adolescents in Adamawa State, 87.9% of rural respondents and 83.2% of urban respondents did not meet recommended fruit and vegetable intake (≥ 5 servings per day), with no significant difference between groups ($p = 0.555$) (Jenewari and Tolulope, 2025). While most adolescents (92.3-95.1%) reported consuming fruits in the past 7 days, only 4.4-5.5% met the recommended daily servings of combined fruits and vegetables (Jenewari and Tolulope, 2025). The dietary findings reveal a consistent pattern of inadequate fruit and vegetable consumption across the Nigerian population spectrum, from adolescents to working adults, indicating a systemic nutritional challenge requiring comprehensive behaviour change strategies.

Alcohol Consumption

Alcohol use patterns showed considerable variation across study populations and age groups. Among university students in Southwest Nigeria, 51.3% reported alcohol use, with significantly higher prevalence among public university students (66.5%) compared to private university students (36.2%, $p < 0.001$) (Owopetu *et al.*, 2020). Among medical and law students, 31.9% of medical students and 35.8% of law students reported alcohol consumption, with no significant difference between groups ($p = 0.309$) (Onwasigwe and Anyaehie, 2024). Among adolescents in Adamawa State, 40.3% of rural and 44.2% of urban adolescents reported ever consuming

alcoholic drinks ($p = 0.919$) (Jenewari and Tolulope, 2025). Current alcohol consumption (within the past 30 days) was reported by 26.4% of rural and 32.5% of urban adolescents, though this difference was not statistically significant ($p = 0.967$) (Jenewari and Tolulope, 2025). Concerningly, 13.7% of rural and 16.5% of urban adolescent drinkers engaged in harmful alcohol consumption patterns ($p = 0.0846$) (Jenewari and Tolulope, 2025). The mean age at first alcohol intake was during late adolescence (17-19 years) for the majority (90.8-91.2%) of those who consumed alcohol (Jenewari and Tolulope, 2025). Gender analysis revealed consistent patterns across studies, with males having significantly higher rates of alcohol consumption. Among medical students, 43.8% of males consumed alcohol compared to 21.7% of females ($p < 0.0001$) (Onwasigwe and Anyaehie, 2024). Similar gender disparities were observed in the private university population, where 89.4% of alcohol users were male compared to 10.6% female (Owopetu *et al.*, 2020). Among university employees, 24.0% (95% CI: 21.3-27.0%) reported alcohol consumption (Agaba *et al.*, 2017).

Tobacco Use

Tobacco use prevalence was generally low across all populations but showed significant variations by educational level and setting. Among medical students, only 1.0% reported tobacco use compared to 7.4% of law students ($p < 0.0001$) (Onwasigwe and Anyaehie, 2024). In the comparative university study, current smoking rates were similar between public (3.0%) and private (3.1%) university students (Owopetu *et al.*, 2020). Among university employees, tobacco use was 2.9% (95% CI: 2.0-4.3%) (Agaba *et al.*, 2017). Among adolescents in Adamawa State, 5.2% of rural and 7.9% of urban adolescents reported ever smoking cigarettes, with no significant difference ($p = 0.171$) (Jenewari and Tolulope, 2025). Current smoking prevalence was 3.2% in rural and 4.7% in urban areas ($p = 0.339$) (Jenewari and Tolulope, 2025). The mean age at first smoking was earlier in urban adolescents (11.7 ± 2.6 years) compared to rural adolescents (13.2 ± 2.4 years), though this difference was not statistically significant (Jenewari and Tolulope, 2025). Alarming, among those who had ever smoked, 37.5% of rural adolescents initiated smoking before age 10, and 43.8% between ages 10-13, highlighting the critical need for early prevention interventions (Jenewari and Tolulope, 2025). Gender analysis consistently showed higher tobacco use among males. Among medical students, 94.4% of current smokers were male (Onwasigwe and Anyaehie, 2024), while in private universities, 78.9% of smokers were male (Owopetu *et al.*, 2020).

Socio-demographic Correlates of Behavioural Risk Factors

Age

Age emerged as a significant predictor of several behavioural risk factors, with complex patterns across different age groups. Among medical students, younger age (≤ 24 years) was significantly associated with having at least one behavioural risk factor (96.6% vs. 90.9%, $p = 0.045$) (Onwasigwe and Anyaehie, 2024). Conversely, younger medical students were 2.75 times less likely to be physically inactive (AOR = 0.36, CI = 0.15-0.88, $p = 0.026$), suggesting a complex relationship between age and different risk factors. Among adolescents in Adamawa State, urban adolescents were significantly older (mean age 15.79 ± 2.0 years) compared to rural adolescents (14.94 ± 1.9 years, $p < 0.001$) (Jenewari and Tolulope, 2025). This age difference corresponded with variations in risk factor patterns, with older urban adolescents showing higher obesity prevalence (4.5% vs. 1.7%, $p = 0.049$) and higher mean systolic blood pressure (105.5 ± 12.2 mmHg vs. 103.3 ± 11.7 mmHg, $p = 0.006$) (Jenewari and Tolulope, 2025). Among university employees, tobacco use, obesity, and dyslipidaemia all increased with age (Agaba *et al.*, 2017). The mean age of employees was 44 ± 10 years, with older individuals showing higher clustering of multiple risk factors.

Gender

Gender differences were pronounced across multiple risk factors. Males consistently showed higher rates of tobacco use and alcohol consumption across all populations (Owopetu *et al.*, 2020; Agaba *et al.*, 2017; Onwasigwe and Anyaehie, 2024). However, females in private universities had higher prevalence of unhealthy diets (55.2%) and physical inactivity (53.3%) compared to males (Owopetu *et al.*, 2020). Among adolescents, gender distribution was relatively balanced, with 42.9% males in rural and 39.9% in urban settings ($p = 0.449$) (Jenewari and Tolulope, 2025). The adolescent study did not report gender-specific analyses of individual risk factors, representing a gap in understanding gender dynamics in this age group. Among university employees, females had significantly higher rates of obesity (50.0% vs. 10.6%, $p < 0.0001$) but lower rates of tobacco use (0.3% vs. 4.8%) and alcohol consumption (9.9% vs. 33.8%) compared to males (Agaba *et al.*, 2017).

Educational Level and Socioeconomic Status

Parental education emerged as a significant predictor of behavioural risk factors across different age groups. Among medical students, those whose mothers had up to secondary school education were 3.5 times more likely to have unhealthy diets (AOR = 3.50, CI = 1.30-9.40, $p = 0.014$) (Onwasigwe and Anyaehie, 2024). Among law students, fathers' educational level of up to secondary school significantly predicted tobacco use (AOR =

6.48, CI = 1.41-29.85, $p = 0.017$) (Onwasigwe and Anyaehie, 2024). Among adolescents in Adamawa State, parental educational attainment varied significantly between rural and urban settings. Urban mothers were more likely to hold postgraduate degrees (11.1%) compared to rural mothers (9.7%, $p = 0.001$) (Jenewari and Tolulope, 2025). Similarly, fathers' educational levels were higher in urban areas, with 31.6% holding postgraduate degrees compared to 22.7% in rural areas ($p = 0.008$) (Jenewari and Tolulope, 2025). Maternal socioeconomic status was significantly higher in urban areas ($p = 0.033$), though paternal socioeconomic status showed no significant difference ($p = 0.176$) (Jenewari and Tolulope, 2025). These socioeconomic disparities may partially explain the differential risk factor patterns observed between rural and urban adolescents. Institution type also influenced risk factor prevalence among university students. Students from public universities had significantly higher rates of alcohol consumption but lower rates of unhealthy diets compared to private university students (Owopetu *et al.*, 2020). This may reflect differences in institutional policies, campus culture, and religious influences, as private universities in Nigeria often have faith-based restrictions on alcohol consumption.

Rural-Urban Differences

The adolescent study revealed important rural-urban differences in NCD risk factors that provide crucial context for behaviour change communication design. Urban adolescents showed higher rates of sedentary behaviour (25.0% vs. 13.4%, $p < 0.001$), obesity (4.5% vs. 1.7%, $p = 0.049$), and elevated blood pressure (Jenewari and Tolulope, 2025). Conversely, rural adolescents had higher rates of low physical activity (31.1% vs. 17.1%, $p < 0.001$) (Jenewari and Tolulope, 2025). These contrasting patterns suggest that urbanization is associated with both protective factors (access to structured physical activity opportunities) and risk factors (sedentary lifestyles, obesogenic environments). Religious distribution also differed markedly, with Islam being more prevalent in urban schools (63.9%) compared to rural schools (35.4%), while Christianity was more common in rural schools (59.4% vs. 29.4%, $p < 0.0001$) (Jenewari and Tolulope, 2025). These religious and cultural differences may influence health behaviours and should inform culturally appropriate behaviour change interventions.

Residence

Place of residence showed variable associations with risk factors among university students. Among medical students, 71.0% lived on campus compared to 49.4% of law students ($p < 0.0001$) (Onwasigwe and Anyaehie, 2024). However, residence location (on-campus vs. off-campus) was not significantly associated with the presence of behavioural risk factors in either group.

Clustering of Multiple Risk Factors

A critical finding across studies was the high prevalence of multiple co-occurring risk factors. Overall, 95% of medical and law students had at least one behavioural risk factor, with only 4.8% of medical students and 5.2% of law students having no risk factors (Onwasigwe and Anyaehie, 2024). Among university students in Southwest Nigeria, 99.3% had at least one behavioural risk factor (Owopetu *et al.*, 2020). The pattern of risk factor clustering showed that 50.6% of medical students and 45.8% of law students had two risk factors, while 39.7% of medical students and 35.2% of law students had three risk factors (Onwasigwe and Anyaehie, 2024). Notably, no medical student had all four risk factors, compared to 1.3% of law students. Among university employees, the median number of risk factors was three per participant (Agaba *et al.*, 2017).

Knowledge and Awareness of NCD Risk Factors

Assessment of knowledge regarding NCD behavioural risk factors revealed significant gaps. Among university students in Southwest Nigeria, excessive alcohol intake was the most often identified risk behaviour (80.5% in public universities, 69.3% in private universities) (Owopetu *et al.*, 2020). However, a significantly higher proportion of public university students (60.7%) had good overall knowledge of risk factors for NCDs compared to private university students (42.8%, $p < 0.001$) (Owopetu *et al.*, 2020). Despite high prevalence of physical inactivity across all age groups, knowledge about this risk factor appeared limited, suggesting insufficient health education on the importance of physical activity for NCD prevention. Similarly, awareness of the health impacts of unhealthy diets, particularly inadequate fruit and vegetable consumption, was not adequately addressed in health education programs.

Behaviour Change Communication and Health Education Interventions Existing Interventions

The review identified minimal evidence of systematic behaviour change communication interventions specifically targeting NCD prevention among the studied populations. Among university students, awareness of school policies on alcohol was reported by 60.8% in public universities and 46.6% in private universities ($p < 0.001$) (Owopetu *et al.*, 2020). However, only 31.5% of private university students and 23.9% of public university

students had ever attended a seminar or program on NCD prevention or management ($p = 0.003$) (Owopetu *et al.*, 2020). Exposure to health information through university radio showed low reach, with only 26.5% of private university students and 21.7% of public university students reporting that they had heard about NCD risk factors through this channel ($p = 0.089$) (Owopetu *et al.*, 2020). These findings indicate that existing communication channels are underutilized for delivering behaviour change messages related to NCD prevention. None of the studies documented behaviour change interventions targeting adolescents or employees.

Gender-Specific Communication Needs

The significant gender differences in risk factor prevalence highlight the need for gender-determinant behaviour change communication strategies. Males require targeted interventions for tobacco and alcohol use reduction, while females need specific support for addressing unhealthy dietary patterns and physical inactivity. However, none of the reviewed studies reported implementation of gender-specific BCC interventions.

Setting-Specific Approaches

The variation in risk factor prevalence across different institutional settings (public vs. private universities, medical vs. non-medical faculties, rural vs. urban schools) suggests the need for context-specific behaviour change approaches. Medical students, despite having lower rates of tobacco use and unhealthy diets, still exhibited very high rates of physical inactivity, indicating that health knowledge alone is insufficient to drive behaviour change (Onwasigwe and Anyaehie, 2024).

Gaps in Behaviour Change Communication Strategies

Several critical gaps emerged from the synthesis:

1. **Absence of Comprehensive BCC Programs:** None of the studies reported implementation of comprehensive, evidence-based behaviour change communication programs systematically addressing the four major NCD risk factors.
2. **Limited Physical Activity Promotion:** Despite physical inactivity being the most prevalent risk factor (17.1-91.0% across age groups), there was minimal evidence of structured physical activity promotion programs or environmental interventions to facilitate active lifestyles.
3. **Inadequate Nutritional Education:** With 20.6-94.6% of populations having unhealthy diets, particularly inadequate fruit and vegetable consumption, there is clear need for intensive nutritional behaviour change interventions across all age groups.
4. **Weak Multi-Sectoral Coordination:** No evidence was found of coordinated multi-sectoral approaches involving health, education, sports, and student affairs departments to comprehensively address NCD risk factors.
5. **Absence of Peer Education Programs:** Despite the target populations being largely young adults and adolescents in educational settings, ideal contexts for peer-led interventions, no peer education programs for NCD prevention were documented.
6. **Limited Use of Digital/Social Media:** There was minimal evidence of leveraging digital technologies and social media platforms for behaviour change communication, despite these being primary communication channels for young populations.
7. **Lack of Monitoring and Evaluation:** No studies reported systematic monitoring and evaluation of behaviour change interventions, making it impossible to assess effectiveness of existing efforts.
8. **Absence of Early Prevention Interventions:** Despite evidence of smoking initiation before age 10 among some adolescents (37.5% of rural smokers), no primary prevention programs targeting pre-adolescents or primary school children were documented.
9. **Missing Life-Course Approach:** No interventions were documented that addressed risk behaviours across the developmental continuum from adolescence through adulthood.

IV. Discussion

Prevalence and Patterns of NCD Risk Factors

This review reveals alarmingly high prevalence of behavioural risk factors for NCDs among Nigerian populations across the life course, from in-school adolescents to working adults. The finding that 95-99% of individuals have at least one behavioural risk factor (Owopetu *et al.*, 2020; Onwasigwe and Anyaehie, 2024) highlights the urgent need for comprehensive behaviour change interventions. Physical inactivity emerged as the most prevalent risk factor, affecting 17.1-91.0% of populations across studies, consistent with global trends showing sedentary lifestyles as a growing public health challenge (Guthold, Stevens, Riley, & Bull, 2018; Hallal *et al.*, 2012). The high prevalence of unhealthy diets, particularly the finding that 83.2-94.6% of populations had inadequate fruit and vegetable intake (Agaba *et al.*, 2017; Jenewari and Tolulope, 2025), aligns with broader patterns observed across sub-Saharan Africa (Ronto, Wu, & Singh, 2018). This is particularly concerning given

strong evidence linking inadequate fruit and vegetable consumption to increased risk of cardiovascular diseases, certain cancers, and other NCDs (Aune *et al.*, 2017; World Health Organization, 2003).

Life-Course Perspective on NCD Risk Factors

The inclusion of the adolescent study provides valuable life-course perspective on NCD risk behaviour development in Nigeria. The findings reveal that risky health behaviours begin early, with 5.2-7.9% of adolescents having tried smoking (Jenewari and Tolulope, 2025), 40.3-44.2% having consumed alcohol (Jenewari and Tolulope, 2025), and 83.2-87.9% having inadequate fruit and vegetable intake (Jenewari and Tolulope, 2025). More concerning, among those who smoke, 37.5-43.8% initiated before age 13 (Jenewari and Tolulope, 2025), highlighting the critical importance of early prevention interventions. The progression from adolescent to adult risk behaviours is evident when comparing across age groups. While tobacco use remains relatively low among adolescents (3.2-4.7%) (Jenewari and Tolulope, 2025), it persists at similar low levels among university students (1.0-7.4%) (Owopetu *et al.*, 2020; Onwasigwe and Anyaehie, 2024) and working adults (2.9%) (Agaba *et al.*, 2017). Alcohol consumption shows a more marked increase, from 26.4-32.5% among adolescents (Jenewari and Tolulope, 2025) to 31.9-66.5% among university students (Owopetu *et al.*, 2020; Onwasigwe and Anyaehie, 2024) and 24.0% among employees (Agaba *et al.*, 2017). This escalation highlights the need for comprehensive, age-appropriate behaviour change communication strategies targeting critical transition periods.

Rural-Urban Dynamics in NCD Prevention

The rural-urban comparison among adolescents reveals important contextual factors for behaviour change communication design (Jenewari and Tolulope, 2025). Rural adolescents face challenges related to limited access to structured physical activity opportunities, as evidenced by higher rates of low physical activity (31.1% vs. 17.1%). However, they also benefit from lower rates of sedentary behaviour (13.4% vs. 25.0%) and obesity (1.7% vs. 4.5%), possibly due to more active daily lifestyles and traditional diets. Urban adolescents, while having better access to recreational facilities and higher engagement in moderate-to-high intensity physical activity, face different challenges including increased sedentary time (possibly related to screen time, motorized transport, and urbanization), higher obesity rates, and elevated blood pressure (Jenewari and Tolulope, 2025). These patterns suggest that behaviour change interventions must be context-specific, addressing the unique challenges and leveraging the protective factors present in each setting. The socioeconomic disparities between rural and urban areas, reflected in parental education, occupation, and family socioeconomic status (Jenewari and Tolulope, 2025), also necessitate equity-focused approaches to ensure that health communication reaches and effectively engages disadvantaged populations.

Early Initiation and Critical Windows for Intervention

A particularly alarming finding is the early age of initiation for risky behaviours. Among adolescent smokers in rural Adamawa, 37.5% initiated smoking before age 10, and 43.8% between ages 10-13 (Jenewari and Tolulope, 2025). The mean age at first smoking (11.7-13.2 years) falls within the critical developmental period when behaviour patterns are being established. This early initiation has profound implications for behaviour change communication, suggesting that prevention efforts must begin in primary school, well before the typical onset of adolescence. Similarly, while the majority of adolescents who consume alcohol initiated during late adolescence (17-19 years), a small proportion began before age 13 (Jenewari and Tolulope, 2025). These patterns highlight the need for age-staged prevention messages that are developmentally appropriate and delivered through channels accessible to pre-adolescents and early adolescents.

Behaviour Change Communication: A Critical Gap

The most striking finding from this review is the near-absence of systematic, evidence-based behaviour change communication strategies for NCD prevention in Nigerian educational and occupational settings across all age groups. While 99.3% of university students had at least one behavioural risk factor (Owopetu *et al.*, 2020), only 23.9-31.5% had attended any NCD prevention program (Owopetu *et al.*, 2020). No BCC interventions were documented for adolescents or employees. This represents a profound disconnect between the magnitude of the problem and the public health response. Effective behaviour change communication requires multi-level interventions that address individual knowledge and motivation, social and cultural norms, environmental facilitators and barriers, and supportive policies (Baugh Littlejohns & Wilson, 2019; Golden & Earp, 2012). The reviewed studies provide no evidence of such comprehensive approaches being implemented in Nigeria. Instead, the limited interventions identified, such as alcohol policies and occasional seminars, represent fragmented efforts that fall far short of what is needed to address the complex drivers of NCD risk behaviours.

Lessons from Global Best Practices

International evidence demonstrates that successful NCD prevention requires integrated behaviour change communication strategies operating at multiple levels (Heller *et al.*, 2019; Murphy *et al.*, 2018). These include:

Mass Media Campaigns: Large-scale media campaigns have proven effective for increasing awareness and motivating behaviour change related to physical activity, healthy eating, and tobacco cessation (Wakefield, Loken, & Hornik, 2010; Senteio & Magsamen-Conrad, 2025). The finding that only 21.7-26.5% of Nigerian university students had heard about NCDs through university radio (Owopetu *et al.*, 2020) suggests massive underutilization of communication channels.

Environmental Interventions: Creating supportive environments, such as accessible recreational facilities, healthy food options in cafeterias, and walkable campuses, is essential for facilitating behaviour change (Sallis, Owen, & Fisher, 2015; Woods *et al.*, 2025). None of the reviewed studies documented such environmental interventions in Nigerian universities or schools.

Peer Education: Young adults and adolescents respond particularly well to peer-led interventions, where trained peer educators deliver behaviour change messages and provide social support (Barclay, Hilton, Fossey, Ponsford, Downing, Analytis, & Ross, 2025); Huitink, Poelman, Seidell, Twisk, & Dijkstra, 2025). The absence of peer education programs in the reviewed studies represents a missed opportunity for leveraging social influence to promote healthy behaviours.

Digital Health Interventions: Mobile health (mHealth) and social media-based interventions show promise for delivering personalized behaviour change support at scale (Free *et al.*, 2013; Laranjo *et al.*, 2015). Given Nigeria's high mobile phone penetration and social media usage among youth, digital BCC strategies could reach large populations cost-effectively.

Gender and Age Considerations in BCC

The significant gender differences observed in risk factor prevalence (Owopetu *et al.*, 2020; Agaba *et al.*, 2017; Onwasigwe and Anyaehie, 2024) necessitate gender-tailored behaviour change communication strategies. Males require interventions addressing social norms around alcohol consumption and tobacco use, while females need support for healthy eating and physical activity that addresses time constraints, safety concerns, and cultural expectations (Popeska *et al.*, 2025; Ickes & Sharma, 2012). The finding that younger age predicted both higher overall risk factor prevalence and lower physical inactivity among medical students (Onwasigwe and Anyaehie, 2024) suggests complex age-related dynamics requiring nuanced communication approaches. Early adulthood represents a critical window for establishing lifelong health behaviours, making university-based BCC interventions particularly strategic (Bourke, Brown & Kwan, 2025; Jankowiak *et al.*, 2025).

Implications for Multi-Generational BCC Strategies

The life-course data spanning from in-school adolescents (Jenewari and Tolulope, 2025) through university students (Owopetu *et al.*, 2020; Onwasigwe and Anyaehie, 2024) to working adults (Agaba *et al.*, 2017) reveals the need for multi-generational behaviour change communication strategies.

Knowledge-Behaviour Gap

The finding that medical students, who presumably have greater knowledge of health risks, still exhibited very high rates of physical inactivity (91.0%) (Onwasigwe and Anyaehie, 2024) highlights the well-documented knowledge-behaviour gap (Sheeran & Webb, 2016; Orbell & Sheeran, 1998). Knowledge alone is insufficient for behaviour change; effective interventions must address motivation, self-efficacy, social norms, and environmental barriers (Michie, van Stralen, & West, 2011; Conner & Norman, 2026).

This highlights the need for theory-based behaviour change communication that goes beyond information provision to actively build skills, reshape norms, modify environments, and provide ongoing support for behaviour maintenance (Bandura, 2004; Abraham & Michie, 2008). Frameworks such as the Health Belief Model, Theory of Planned Behaviour, Social Cognitive Theory, and the COM-B model provide theoretical foundations for designing such interventions (Rosenstock, Strecher, & Becker, 1988; Ajzen, 1991).

Cultural and Religious Considerations

The significant religious differences between rural and urban adolescents in Adamawa State (Jenewari and Tolulope, 2025) highlights the importance of culturally and religiously sensitive behaviour change

communication. With Islam predominating in urban areas (63.9%) and Christianity in rural areas (59.4%), faith-based approaches to health promotion may be particularly effective. Religious leaders and faith institutions could serve as trusted messengers for health information and facilitators of behaviour change. Similarly, the faith-based alcohol restrictions observed in private universities (resulting in significantly lower alcohol consumption) (Owopetu *et al.*, 2020) demonstrate that religious values can be protective factors. Behaviour change communication strategies should leverage these protective cultural and religious assets while being respectful of diverse belief systems.

Multi-Sectoral Coordination Challenges

Consistent with findings from broader African contexts (Juma *et al.*, 2018; Ngwira, Mwangomba, & Nkhata, 2017), the Nigerian studies revealed absence of coordinated multi-sectoral action for NCD prevention. Effective BCC for NCD prevention requires collaboration across health, education, agriculture, trade, sports, urban planning, youth development, and other sectors (World Health Organization, 2013; Wickramasinghe *et al.*, 2018). The lack of such coordination in Nigeria mirrors challenges documented throughout sub-Saharan Africa, where sectors operate in silos with limited communication and shared planning (Oladepo, Oluwasanu, & Abiona, 2018; Mohamed, Juma, Asiki, & Kyobutungi, 2018).

Policy Environment for Behaviour Change

The limited policy environment for supporting behaviour change emerged as a significant gap across all settings and age groups. While some universities had alcohol policies (known to 46.6-60.8% of students) (Owopetu *et al.*, 2020), comprehensive NCD prevention policies addressing all four major risk factors were absent. International evidence demonstrates that supportive policies, such as tobacco-free campuses, healthy food standards, mandatory physical education, and restrictions on alcohol advertising, create enabling environments for behaviour change (Sanni, Hongoro, Ndinda, & Wisdom, 2018; Mapa-tassou *et al.*, 2018). Nigeria's broader NCD policy landscape reflects challenges common across Africa, including inadequate policy development, poor implementation of existing policies, insufficient resources, and competing priorities from communicable diseases (Wisdom *et al.*, 2018; Ndinda & Hongoro, 2017). This policy vacuum constrains the effectiveness of behaviour change communication efforts, as individual behaviour change is difficult to sustain without supportive policies and environments (Unwin, Samuels, Hassell, Brownson, & Guell, 2017; Hunter *et al.*, 2019).

Implications for Behaviour Change Communication Strategy Development

Based on the findings of this review, comprehensive behaviour change communication strategies for NCD prevention in Nigeria should include:

- 1. Multi-Level Interventions:** Integrate individual-level education and counselling with social-level peer support, organizational-level policy and environmental changes, and community-level mass media campaigns across all life stages (Pronk, Woodard, Zimmerman & Arena, 2025); McLeroy, Bibeau, Steckler, & Glanz, 1988).
- 2. Theory-Based Design:** Ground interventions in established behaviour change theories and models, incorporating elements that address knowledge, attitudes, self-efficacy, social norms, and environmental facilitators (Prochaska & Velicer, 1997; Fishbein & Ajzen, 2010).
- 3. Life-Course Approach:** Develop age-staged interventions targeting critical periods from pre-adolescence through adulthood, with special emphasis on early prevention before age 13.
- 4. Context-Specific Programming:** Design separate but complementary strategies for rural and urban settings, addressing unique challenges and leveraging protective factors in each context.
- 5. Segmented Messaging:** Develop targeted messages and delivery strategies for specific population segments based on gender, age, educational background, geographic location, and baseline risk factor profiles (Weingott & Parkinson, 2025; Adorni *et al.*, 2025).
- 6. Digital Integration:** Leverage mobile technologies, social media, and digital platforms to deliver scalable, personalized behaviour change support (Riley *et al.*, 2011; Hou, Ho, Li & Lin, 2025).
- 7. Environmental Modifications:** Complement communication efforts with environmental changes that make healthy choices easier, such as improved recreational facilities, healthy food availability, and walkable environments (Sallis, Floyd, Rodríguez, & Saelens, 2012; Vizthum, 2025).

8. Faith-Based Partnerships: Engage religious institutions and leaders as partners in delivering culturally appropriate health messages and creating supportive environments.

9. Monitoring and Evaluation: Establish robust systems for tracking intervention reach, engagement, behaviour change, and health outcomes to enable continuous improvement (Glasgow, Vogt, & Boles, 1999; Green & Glasgow, 2006).

V. Limitations

This review has several limitations. The small number of included studies (n=5) limits generalizability of findings across Nigeria's diverse population. Studies were concentrated in educational settings, with limited evidence from other populations such as rural communities, older adults, or lower socioeconomic groups outside of the adolescent sample. The cross-sectional design of included studies precludes causal inference about relationships between variables and behaviour change over time.

The focus of the review on peer-reviewed publications may have missed grey literature documenting implementation of BCC interventions. Additionally, the absence of intervention studies in the included literature reflects the current gap in the field rather than a limitation of the review methodology. Finally, variations in how behavioural risk factors were defined and measured across studies complicated direct comparisons.

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