Research Article

Non-communicable diseases among adolescents in Kilombero, Tanzania: Knowledge, attitudes, and practices

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ABSTRACT

Introduction: Non-communicable diseases (NCDs) include heart disease, cancer, and diabetes mellitus. Globally, NCDs account for approximately 74% of all deaths. Although once considered diseases of adults, recent evidence shows that NCDs are increasingly affecting younger populations. The study assessed knowledge, attitudes, and practices related to risk factors for NCDs among adolescents in Kilombero, Tanzania.

Method: A cross-sectional study was conducted in Ifakara, Tanzania, involving 448 students from 14 secondary schools. The study was conducted for a period of nine months (January – September, 2024). Data were collected using a semi-structured questionnaire capturing knowledge and awareness of NCD risk factors. They were analysed in SPSS to determine risk ratios for developing NCDs, and chi-square tests were used to examine associations between dependent variables (NCD indicators) and independent variables (knowledge and awareness).

Results: Most participants (n = 371) were under 18 years old. Awareness was highest for diabetes mellitus (24%). Regarding perceived causes of NCDs, 26.8% attributed them to infections and 26.6% to heredity, while 10.7% did not know. Most participants (62.1%) lacked knowledge of the importance of regular blood sugar monitoring. Diabetes was ranked the most recognised NCD (24.6%), followed by cancer (20.5%) and hypertension (19.4%). BMI classifications showed underweight (16.6%), obesity (12.8%), and overweight (11.3%). Significant associations were found between NCD indicators and stress (p=0.015), alcohol use and age (p=0.025), obesity and lack of exercise (p=0.038), and geographic location (p=0.000).

Conclusion: The findings demonstrate emerging awareness of NCDs among adolescents. Strengthened efforts in awareness, prevention, and early behavioural interventions are urgently needed to reduce NCD risks in young populations, especially in low-resource settings.

Keywords: awareness, knowledge, students, non-communicable diseases, Tanzania

Introduction

Non-communicable diseases (NCDs), principally cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes mellitus, account for approximately 70% of global deaths and represent one of the most pressing public health challenges worldwide.[1,3] Cardiovascular diseases alone contribute about 32% of all NCD-related mortality, followed by cancers (17%), chronic respiratory diseases (7%), and diabetes (3%).[1,3] These conditions are largely driven by modifiable behavioural risk factors, including tobacco use, harmful alcohol consumption, unhealthy diets, and physical inactivity, which increasingly emerge early in life.[1,4]

In sub-Saharan Africa (SSA), the increasing prevalence of NCDs has become a major public health concern. However, the true burden remains poorly documented because of weak surveillance systems and limited population-based research.[4,8] Adolescents in low-resource settings are particularly vulnerable to NCDs due to socio-economic barriers, limited access to accurate health information, and restricted NCD preventive health services that negatively influence their health-seeking behaviours. Since habits formed during adolescence strongly shape adults' health outcomes, early awareness of NCDs' risk factors is a crucial precedence.

Tanzania reflects this wider regional trend, with increasing rates of hypertension, diabetes mellitus, cardiovascular diseases, cancers, and obesity.[9–11] The combined effects of obesity, DM, and hypertension significantly contribute to the country's cardiovascular disease burden.[6,12] Although adolescents are not considered a high-risk population, emerging evidence highlights a growing prevalence of unhealthy behaviours, including physical inactivity, alcohol consumption, tobacco use, intake of sugary drinks, and poor dietary patterns.[13] Nevertheless, adolescents continue to be underrepresented in research and policy initiatives aimed at addressing NCDs.

With over 5.4 million adolescents enrolled in secondary schools in Tanzania,[14] this population represents an early entry point for NCDs awareness and prevention. Understanding their knowledge, attitudes, and awareness of NCD risk factors is essential for designing effective school-based interventions. This study therefore assessed adolescents' awareness of NCD risks, types, preventive behaviours, and knowledge of biometric indicators in Kilombero, Tanzania, to inform strategies that promote healthier future generations.

Method

Study area and design

This cross-sectional study was conducted in Kilombero District, Morogoro Region, Tanzania, with a population of 290,424 according to the 2022 national census.[14] The study was conducted over nine months (January – September, 2024). It involved secondary school students from 14 schools across Ifakara Township and nearby urban, peri-urban, and rural settings. Schools were grouped by location, and students were categorised by class levels (ordinary level, advanced level), study streams (science, commerce, or arts), mode of transport to school, type of physical activity at home, dietary habits, school type (day or boarding), and ownership (public or private). In addition, the study examined adolescents' knowledge, attitudes, and practices regarding non-communicable diseases as dependent variables, while independent variables comprised contextual and behavioural factors, including household characteristics, lifestyle behaviours, school environment, and sources of health information

Sampling and data collection

Ethical approval was obtained from the St. Francis University College of Health and Allied Sciences Institutional Review Board (SFUCHAS-IRB), and permission was granted by local authorities. Study teams visited each school to introduce the study, randomly selected participants, and obtained informed consent. Trained enumerators collected anthropometric data using World Health Organization guidelines for NCD risk assessment.[16] A semi-structured questionnaire was pretested and administered to students. Each school contributed 32 students, randomly selected from year 3 and 4 of secondary school, or from year 5 and 6 of secondary school education, where applicable. A total of 448 students participated in the study.

Inclusion and exclusion criteria

Students were eligible if they had no prior diagnosis of an NCD. Excluded participants included those with known NCDs, school dropouts, and students in years 1 and 2 of secondary education. Participation was voluntary, and only students with signed consent were included.

Data analysis

Data were coded in Microsoft Excel and analysed using SPSS version 20. Descriptive statistics summarised

participants' socio-demographic characteristics and levels of knowledge, attitudes, and practices (KAP) related to NCDs. Associations between categorical variables were assessed using chi-square tests. Variables with $p < 0.20$ at bivariate analysis were entered into multivariable logistic regression models to identify factors independently associated with adequate NCD knowledge, positive attitudes, and appropriate practices. Results are presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs) and p-values. Model fit and explained variation were assessed with a statistical significance set at $p < 0.05$.

Results

A total of 448 secondary school students aged 15–21 years from 14 schools in Ifakara participated in the study. The distribution of respondents across schools was balanced, with slightly more male than female participants. Most students were enrolled in social science subjects. The demographic data of the participants are presented in Table 1.

Knowledge of NCD types and diagnostic measures

DM was the most frequently mentioned NCD, followed by cancer and hypertension, whereas stroke was the least mentioned. A small proportion (4.7%) incorrectly identified HIV as an NCD. When asked about diagnostic units, most students lacked knowledge of blood sugar readings, with 62.1% unable to interpret glucose values. Similarly, the majority (63.2%) did not recognise body mass index (BMI) as an important indicator for overweight or obesity. Only 36.8% demonstrated awareness of BMI as a key diagnostic measure (Table 2).

Awareness of NCD risk factors, aetiology, clinical signs, and information sources

Lack of physical activity was the most frequently reported risk factor for NCDs (32.8%), followed by alcohol use (22.5%). When ranking prevalent NCDs, students identified DM as the most common (24.6%), followed by cancer (21.0%), with hypertension ranked lowest (11.8%). Regarding perceived causes of NCDs, 26.8% attributed them to infections, 26.6% to heredity, while 10.7% were unsure. Weight loss was the most recognised clinical sign (28.8%), followed by headaches (21.0%), whereas paralysis and lethargy were rarely mentioned. Media sources were the primary source of NCD information (40.6%), followed by healthcare workers (28.8%), as shown in Table 3.

Table 1. Respondents' socio-demographic characteristics

Demographic factors	Characteristics	Frequency, n (%)
Location	Peri-urban	141 (31.5)
	Rural	153 (34.2)
	Urban	154 (34.4)
Age (years)	Above 18	77 (17.2)
	Under 18	371 (82.8)
Gender	Female	215 (48.0)
	Male	233 (52.0)
Class	Ordinary level	320 (71.4)
	Advanced level	128 (28.6)
Opted subjects	Others opted subjects	80 (17.9)
	Natural sciences	107 (23.9)
	Social sciences	261 (58.3)

Table 2. The distribution of types, causes and knowledge on units to diagnose NCD

Category	NCD Type	Frequency, n (%)
Types of NCD	Cancer	92 (20.5)
	Coronary Heart Disease	65 (14.5)
	DM	110 (24.6)
	HIV - AIDS	21 (4.7)
	Hypertension	87 (19.4)
	Others	37 (8.3)
	Stroke	36 (8.0)
Category	**Causes of NCD**	**Frequency, n (%)**
Aetiology of NCD	Bewitched	94 (21.0)
	Don't know	48 (10.7)
	Infections	120 (26.8)
	Inherited	119 (26.6)
	Radiations	67 (15.0)
Category	**Units used in NCD diagnosis**	**Frequency, n (%)**
Body Mass Index	Yes	165 (36.8)
	No	283 (63.2)
Blood sugar	Yes	170 (37.9)
	No	278 (62.1)
Blood pressure	Yes	236 (53.7)
	No	212 (47.3)

Physical activity and BMI distribution

Students engaged in various physical activities after school, including cycling (20.3%), athletics (16.6%), and farming (11.3%). Most participants had a healthy BMI (20.3%), although notable proportions were underweight (16.6%), obese (12.8%), or overweight (11.3%). BMI was compared by age, sex, education level, and school location. Healthy BMI categories were more common among students in urban schools than those in rural or peri-urban settings, as shown in Table 4.

Table 3. Respondent awareness on NCD risk factors, clinical signs and source of information

Factors considered on NCD	Category	Frequency, n (%)
Associated risk factors	Alcoholism	101 (22.5)
	Obesity	71 (15.8)
	Others	59 (13.2)
	Stress	70 (15.6)
	Lack of physical exercises	147 (32.8)
Respondent ranking	Cancer	94 (21.0)
	CHD	82 (18.3)
	Diabetes mellitus	110 (24.6)
	Hypertension	53 (11.8)
	Others	43 (9.6)
	Stroke	66 (14.7)
Aetiology	Bewitched	94 (21.0)
	Don't know	48 (10.7)
	Infections	120 (26.8)
	Inherited	119 (26.6)
	Radiations	67 (15.0)
Clinical signs associated	Blurred vision	75 (16.7)
	Headache	94 (21.0)
	Lethargy	37 (8.3)
	Don't know	76 (17.0)
	Paralysis	37 (8.3)
	Weight loss	129 (28.8)
Source of information	Taught in class	82 (18.3)
	Media (radio and social media)	182 (40.6)
	Others	55 (12.3)
	Physicians	129 (28.8)

Furthermore, multivariable logistic regression identified key factors associated with adolescents' knowledge, attitudes, and practices (KAP) regarding NCDs. Adequate NCD knowledge was significantly more common among females (AOR = 1.38; 95% CI: 1.01–1.89), adolescents aged 16–19 years (AOR = 1.67; 95% CI: 1.14–2.45), and those who had received prior NCD education (AOR = 2.08; 95% CI: 1.41–3.07). This model explained 29% of the variation in knowledge (R^2 = 0.29). Positive attitudes towards NCD prevention were independently associated with adequate knowledge (AOR = 2.54; 95% CI: 1.71–3.77) and physical activity (AOR = 1.89; 95% CI: 1.25–2.85), accounting for 24% of the variation (R^2 = 0.24). Appropriate NCD-related practices were strongly associated with positive attitudes (AOR = 2.76; 95% CI: 1.84–4.13) and adequate fruit and vegetable intake (AOR = 1.63; 95% CI: 1.10–2.43). This model explained 31% of the variation. All models showed acceptable goodness-of-fit ($p > 0.05$). In addition, the results of the multivariable analysis are displayed in Table 5.

Discussion

This study examined knowledge, attitudes, and practices regarding NCDs among secondary school students in Kilombero, Tanzania. Adolescents were chosen as the focus group because this developmental stage is pivotal in shaping lifelong behavioural patterns, making it a critical period for primary prevention of NCDs.[1,11,17] As NCDs continue to rise across Tanzania and other low- and middle-income countries, understanding how young people perceive NCD risks is essential in guiding earlier NCD prevention initiatives.[2–5]

Although NCDs have historically been viewed as conditions of adulthood, younger populations are increasingly becoming vulnerable due to early adoption of unhealthy behaviours, rapid urbanisation, dietary changes, alcohol and tobacco use, and physical inactivity.[6,9,12,17] Limited access to accurate health information also contributes to this trend.[7,31–33] This study explored students' awareness of NCD types, causes, symptoms, and risk factors, as well as their main sources of information. A school-based sample allowed for broad representation across urban, peri-urban, and rural settings, aligning with similar studies conducted in Tanzania, Kenya, and internationally.[1,11,23]

Table 3. Relation of other health status factors of the respondents to self-medication

Variable	Category	BMI interpretation				Total
		Normal weight	Obesity	Overweight	Underweight	
Age (years)	Above 18	28	16	13	20	77
	Under 18	121	78	70	102	371
Sex	Female	77	40	39	59	215
	Male	72	54	44	63	233
School level	Advanced	43	29	27	29	128
	Ordinary	106	65	56	93	320
School location	Peri-urban	51	24	25	41	141
	Rural	41	39	30	43	153
	Urban	57	31	28	38	154

Key to BMI: Underweight <18.5, Normal weight 18.5 – 24.9, Overweight 25.0 – 29.9, Obesity ≥ 30

Table 5. The results of the multivariable analysis on the factors associated with knowledge of respondents on NCD

Risk factors	Associated factors	p - value
Stress	Age susceptibility	0.015
Alcoholism	Age susceptibility	0.025
	Course of study	0.000
Obesity	Age and lack of exercise	0.038
Lack of exercise	Location, sex and age	0.000
Gender	Female	215 (48.0)
	Male	233 (52.0)
Class	Ordinary level	320 (71.4)
	Advanced level	128 (28.6)
Opted subjects	Others opted subjects	80 (17.9)
	Natural sciences	107 (23.9)
	Social sciences	261 (58.3)

Consistent with findings from other adolescent studies, DM emerged as the most commonly recognised NCD, and students demonstrated awareness of some of its symptoms, such as weight loss and frequent urination.[1,11,17] However, national and regional data show that cardiovascular diseases remain the leading contributors to NCD mortality in Tanzania, highlighting gaps in adolescent understanding of the broader NCD spectrum.[3,4,12] Students identified multiple perceived causes of NCDs, including lifestyle, heredity, and infections, which reflect mixed community knowledge and underscore the need for clearer public health messaging.[5,10,27] Physical inactivity, poor diet, obesity, and alcohol use were commonly cited risk factors, consistent with evidence that several lifestyle risks tend to cluster rather than occur independently.[13,22,23]

Mass media and social media were major sources of NCDs information, echoing findings from studies showing that digital platforms strongly influence adolescent health behaviours.[7,21,29,31–33] Given adolescents' strong engagement with these platforms, integrating digital health communication into NCDs awareness programmes could enhance reach and impact. Overall, the findings highlight the urgent need to strengthen school-based NCDs education, community engagement, and youth-friendly communication strategies to reduce future NCDs risks among adolescents in Tanzania.[5,18,24,27]

Conclusion

Adolescents in Kilombero show partial awareness of NCDs, highlighting the need for strengthened early health education. School-based NCD education, community engagement, and further research on adolescent behaviours are essential to improve understanding, promote healthier lifestyles, and support national efforts to reduce future burden of NCDs.

Study Limitations: This study relied solely on questionnaires and did not include clinical measurements to validate self-reported information. In addition, data were collected in a limited geographical area and may not represent all adolescents in Morogoro Region or Tanzania.

Despite these limitations, the study provides valuable insights for raising awareness among young people and informing policy discussions on adolescent health.

Conflict of Interest: none

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Informed Consent: Most participants were under 18 years; therefore, teachers acted as guardians and signed consent forms on their behalf. Students' identities were fully anonymised using unique codes known only to the researchers, and no personal information was disclosed.

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