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# Knowledge and Attitude Towards Noncommunicable Diseases and Risk Factors among Undergraduate Health Science Students in Northwestern Tanzania

**Steven Mbaga[1], Stanley Mwita[2*]**

[1,2] Department of Pharmaceutics and Pharmacy Practice, Catholic University of Health and Allied Sciences, Mwanza, Tanzania
*Corresponding author

**Abstract**

**Background:** Non-communicable diseases (NCDs) are among the leading causes of morbidity and mortality. The risk of developing NCDs is increased by air pollution, unhealthy diets, excessive alcohol consumption, physical inactivity, and tobacco use. This study aimed to assess knowledge and attitude towards NCDs and risk factors among undergraduate health science students in northwestern Tanzania.

**Methods:** This study used an analytical, cross-sectional design. The study was conducted at the Catholic University of Health and Allied Sciences (CUHAS) from April to May 2023. Data was collected using self-administered semi-structured English questionnaires. The relationship between knowledge and attitude was determined using Pearson correlation analysis.

**Results:** A total of 354 students were recruited in this study. Approximately half of the participants (52.3%) possessed moderate knowledge about NCDs and their risk factors. The mean (SD) level of knowledge was 10.8 ± 2.0. Most students had a neutral attitude (60.2%) with a mean (SD) of 47.4±9.9. There was a very small correlation that was not statistically significant between knowledge and attitude scores ($r = 0.01$, $P = 0.801$).

**Conclusion:** Findings indicate a moderate level of NCD knowledge among half the students and a predominantly neutral attitude, with no clear influence of knowledge on attitude. This suggests the need for enhanced educational strategies to improve both knowledge and attitude among health science students.

**Keywords:** Knowledge, Attitude, Noncommunicable Diseases, Risk Factors, Students

## 1. Introduction

Non-communicable diseases (NCDs) are among the leading causes of morbidity and mortality. Globally, NCDs kill about 41 million people each year; 77% of all deaths are from low- and middle-income countries (LMICs).[1] In East Africa, 40% of deaths are attributable to NCDs, which are estimated to surpass

infectious diseases as the leading causes of death over the next 20 years.[2] According to the World Health Organization (WHO), NCDs account for 33% of all deaths in Tanzania.[3] The major types of NCDs are cardiovascular diseases, non-insulin-dependent diabetes mellitus, respiratory diseases, obesity, cancer, and hypertension.[4] In contrast to infectious diseases, which are frequently spread by microorganisms, NCDs usually develop gradually over time and are heavily influenced by a variety of factors, including genetic predispositions, lifestyle choices, and environmental exposures. The risk of developing NCDs is increased by air pollution, unhealthy diets, excessive alcohol consumption, physical inactivity, and tobacco use.[5]

Even though the majority of NCD cases occur in middle to late adulthood, the majority of behavioral and dietary risks begin in adolescence and early adulthood (15–24 years old).[6] Worldwide, the prevalence of risky behaviors among youth is rising; over 40% of adolescents and young adults use alcohol. [7] Young people seem to be overlooked in NCD prevention measures because their prevalence of NCDs is lower than that of older populations.[8] It is crucial to consider behavioral modification strategies for adolescents and young people.

Previous studies in Tanzania were conducted in the general community, among caregivers of cardiovascular disease patients, and among university teaching staff.[9–12] However, none of them described data about NCDs and their risk factors among university health science students. Hence, this study assessed knowledge and attitude toward NCDs and risk factors among undergraduate health science students in northwestern Tanzania. This is crucial because these students will be involved in providing healthcare in the future and teaching public health.
Designing educational interventions to enhance NCD prevention and treatment can be made easier by having a better understanding of their baseline knowledge and attitudes.

## Methods

### Study Design and Population

This study used an analytical, cross-sectional design. The study was conducted at the Catholic University of Health and Allied Sciences (CUHAS) from April to May 2023. The university is based at Bugando Hill, within the Bugando Medical Centre (BMC) premises in northwestern Mwanza, Tanzania. Its core business is training, research, and consulting services. CUHAS trains health professionals in the fields of medicine, pharmacy, medical laboratory sciences, nursing, radiology, and public health from diploma to PhD level. Undergraduate students from the following courses were the study population: Doctor of Medicine (MD), Bachelor of Science in Nursing (BSN), Bachelor of Pharmacy (BP), Bachelor of Medical Laboratory Sciences (BMLS), and Bachelor of Science in Medical Imaging and Radiotherapy (BMIR). Students who were not present in the campus area at the time of data collection or reported to have any clinically diagnosed illness were excluded.

### Sample Size and Sampling Procedure

The Taro Yamane formula (i.e., n=N/(1+N(e)2)) was used to obtain a minimum sample size of 354 because this study was conducted in a finite population with a known population size.[13] The total number of undergraduates was 3100, and the acceptable sampling error was 0.05. Participants were selected by convenience sampling from the undergraduate students until the desired size was obtained.

**Data Collection**

Data was collected using self-administered semi-structured English questionnaires. Three experts from public health and pharmacy schools pretested and validated the questionnaires. The best questions in terms of accuracy and clarity were chosen by the panel. Also, the panel helped determine and assess the items' content validity (relevance, coverage, and representativeness) that were initially selected for the questionnaire. The methodology of previous studies was followed in developing the questionnaire utilized in this study and scoring the knowledge and attitude.[14–17] Before distributing the questionnaires, the researchers gave a verbal explanation of the research's purpose to the respective class. The researchers verified the completeness of the questionnaires before data collection.

The questionnaire consisted of three sections: (1) socio-demographic characteristics; (2) general knowledge of NCDs; and knowledge of NCDs and risk factors; (3) attitude towards NCDs and risk factors. 15 questions assessed the level of knowledge. Each correct response was given 1 mark, and each wrong response was given 0. The level of knowledge was graded as poor for less than 50%, moderate for 50–75%, and good for more than 75%. Attitude was determined using a 5-point Likert scale: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The minimum score was 15 and the maximum score was 75. The scores were graded as follows: 15 to 38 were negative, 39 to 56 were neutral, and 57 to 75 were positive. The social demographics were the independent variables, and knowledge and attitude scores were the dependent variables.

**Data analysis**

The data were coded and entered into IBM Statistical Package for the Social Sciences (SPSS) version 27 for analysis. Descriptive statistics, such as frequencies, percentages, and mean (standard deviation), were computed and presented in tables. The chi-square test or Fisher's exact, where appropriate, was used for the statistical analysis of categorical variables. A p-value of less than 0.05 was considered statistically significant. Also, the relationship between knowledge and attitude was determined using Pearson correlation analysis.

**Results**

**Social demographic information of participants**

A total of 354 students were recruited in this study. As revealed in Table 1, the majority of respondents, 59.6%, were females, aged between 18 and 24 years (83.3%) with a mean (SD) of 22.9±2.4, and single (94.9%). About 41.8% were third-year students.

**Table 1. Sociodemographic characteristics of participants (N= 354)**

| Characteristic | | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Sex | Male | 143 | 40.4 |
| | Female | 211 | 59.6 |
| Age (Years) | 18-24 | 295 | 83.3 |
| | ≥25 | 59 | 16.7 |
| | Mean (SD) | 22.9±2.4 | |

| | | | |
|---|---|---|---|
| Marital status | Single | 336 | 94.9 |
| | Married | 18 | 5.1 |
| Year of Study | First-year | 83 | 23.5 |
| | Second year | 90 | 25.4 |
| | Third year | 148 | 41.8 |
| | Fourth and fifth years | 33 | 9.3 |

**General knowledge of undergraduate students about NCDs and risk factors**

Approximately half of the participants (52.3%) possessed moderate knowledge about NCDs and their risk factors. The mean (SD) level of knowledge was 10.8 ± 2.0. The level of correct responses for specific questions ranged from 55.9% to 95.5%. The majority (95.5%) had the knowledge that NCDs are not transmitted from person to person. More than three-quarters were able to define the NCD (84.2%) and mentioned examples of NCDs (88.1%). NCD risk factors that were least known by study participants were unplanned urbanization (55.9%) and exposure to harmful radiation (57.6%). (Table 2).

**Table 2. General knowledge of undergraduates about NCDs and risk factors**

| S/N | Variable | Frequency (n) | Percentage (%) |
|---|---|---|---|
| 1 | Definition of NCDs | 298 | 84.2 |
| 2 | Examples of NCDs | 312 | 88.1 |
| 3 | NCDs are not transmitted from person to person | 338 | 95.5 |
| 4 | Age & NCDs | 213 | 60.2 |
| 5 | Habit of smoking & NCDs | 316 | 89.3 |
| 6 | Physical inactivity & NCDs | 305 | 86.2 |
| 7 | Obesity & NCDs | 297 | 83.9 |
| 8 | Family history & NCDs | 300 | 84.7 |
| 9 | Unhealthy diets & NCDs | 306 | 86.4 |
| 10 | Excess salt intake& NCDs | 288 | 81.4 |
| 11 | Alcohol consumption & NCDs | 234 | 66.1 |
| 12 | Modification of lifestyle can prevent the development of many NCDs | 285 | 80.5 |
| 13 | Unplanned urbanization & NCDs | 198 | 55.9 |
| 14 | Exposure to harmful radiation & NCDs | 204 | 57.6 |
| 15 | Stressful conditions & NCDs | 229 | 64.7 |
| | **Overall level of knowledge** | | |
| | Good | 141 | 39.8 |
| | Moderate | 185 | 52.3 |
| | Poor | 28 | 7.9 |

Table 3 presents the influence of social demographic characteristics on knowledge of NCDs and risk factors. Among male participants, 30.1% had good knowledge, whereas among females, 46.4% had good knowledge, indicating a significant relationship between sex and knowledge level (P < 0.001). Age was also significantly related to knowledge level (P = 0.001); students aged 18–24 showed a higher proportion of good knowledge (46.5%), while the majority of those aged 25 or older had moderate knowledge (72.9%). Marital status was not significantly related to knowledge level (P = 0.065), although married participants exhibited a higher proportion of poor knowledge (27.8%) compared to single participants (6.8%). Year of study demonstrated a significant relationship with knowledge level (P = 0.002). The level of knowledge improved progressively with each year of study. First-year students exhibited the highest percentage of poor knowledge (14.7%), whereas nearly half (51.5%) of the fourth-year and fifth-year students demonstrated good knowledge.

**Table 3. The influence of social demographic characteristics on knowledge of NCDs and risk factors**

| **Social demographic characteristics** | | **Good (N= 141)** | **Moderate (N=185)** | **Poor (N=28)** | **P - Value** |
|---|---|---|---|---|---|
| | | n (%) | n (%) | n (%) | |
| Sex | Male | 43 (30.1) | 88 (61.5) | 12 (8.4) | <0.001 |
| | Female | 98 (46.4) | 97 (46.0) | 16 (7.6) | |
| Age | 18-24 | 137 (46.5) | 142 (48.0) | 16 (5.5) | 0.001 |
| | ≥25 | 4 (6.8) | 43 (72.9) | 12 (20.3) | |
| Marital Status | Single | 135 (40.2) | 178 (53.0) | 23 (6.8) | 0.065 |
| | Married | 6 (33.3) | 7 (38.9) | 5 (27.8) | |
| Year of Study | First-year | 17 (20.5) | 54 (64.8) | 12 (14.7) | 0.002 |
| | Second year | 37 (41.1) | 48 (53.4) | 5 (5.5) | |
| | Third year | 70 (47.3) | 69 (46.6) | 9 (6.1) | |
| | Fourth and fifth years | 17 (51.5) | 14 (43.2) | 2 (5.3) | |

**Undergraduates' attitudes towards NCDs and risk factors**

Most students had a neutral attitude (60.2%) with a mean (SD) of 47.4±9.9. The majority of respondents strongly agreed that regular physical activity is essential in preventing NCDs (43.2%), a healthy diet is crucial for preventing NCDs (33.7%), they were well-informed about the risk factors associated with NCDs (28.0%), and lifestyle changes can significantly reduce the risk of developing NCDs (26.6%).

**Table 4. Undergraduates' attitudes towards NCDs and risk factors (N=354)**

| S/N | Variable | Strongly agree, % | Agree, % | Neutral, % | Disagree, % | Strongly disagree, % |
|---|---|---|---|---|---|---|
| 1 | Well-informed about NCDs | 15.3 | 30.0 | 15.0 | 26.1 | 13.6 |
| 2 | Well-informed about the risk factors associated with NCDs | 28.0 | 34.2 | 24.0 | 7.9 | 5.9 |
| 3 | NCDs are a major public health concern | 11.6 | 22.6 | 29.4 | 24.3 | 12.1 |
| 4 | Lifestyle changes can significantly reduce the risk of developing NCDs | 26.6 | 30.8 | 28.2 | 6.2 | 8.2 |
| 5 | Smoking is a major risk factor for the development of NCDs. | 18.1 | 28.2 | 21.8 | 25.1 | 6.8 |
| 6 | Alcohol consumption is a significant contributor to NCDs. | 10.2 | 29.4 | 20.6 | 24.6 | 15.2 |
| 7 | Stress management is an important aspect of preventing NCDs. | 13.0 | 19.2 | 17.2 | 34.7 | 15.9 |
| 8 | Regular physical activity is essential in preventing NCDs. | 43.2 | 26.0 | 18.1 | 7.3 | 5.4 |
| 9 | Tobacco use is among the major contributors to NCDs. | 20.6 | 35.9 | 23.2 | 13.8 | 6.5 |
| 10 | A healthy diet is crucial for preventing NCDs | 33.7 | 24.4 | 22.2 | 15.3 | 4.4 |
| 11 | Obesity is one of the most significant risk factors for developing NCDs. | 18.1 | 29.4 | 24.3 | 14.7 | 13.5 |
| 12 | Regular health check-ups are essential in preventing or managing NCDs. | 19.8 | 22.9 | 27.5 | 18.9 | 10.9 |
| 13 | Undergraduate health science students should actively promote awareness about NCDs. | 13.6 | 38.1 | 26.8 | 14.4 | 7.1 |
| 14 | Confidence in educating others about the risk factors for NCDs. | 10.7 | 20.4 | 33.2 | 23.6 | 12.1 |
| 15 | The government and other stakeholders are doing enough to combat NCDs. | 9.3 | 16.9 | 18.9 | 29.4 | 25.5 |
| | **Overall level of attitude** | | | | | |
| | Positive | 67 | 18.9 | | | |
| | Neutral | 213 | 60.2 | | | |
| | Negative | 74 | 20.9 | | | |

The influence of social demographic characteristics on attitude towards NCDs and risk factors is presented in Table 5. Age was a strong predictor, with individuals aged 25 years or older exhibiting a significantly more positive attitude (59.3%) compared to their younger counterparts aged 18-24 (10.8%; P=0.003). Marital status was also significantly related, as married participants reported a more positive attitude (55.6%) than single participants (17.0%; P=0.001). A significant relationship was also found with sex, where female participants held a more negative attitude (25.6%) than males (14.0%; P=0.034). Furthermore, the academic year of study demonstrated a significant relationship with attitudes (P=0.012), with the most positive attitude observed in fourth-year students and above (30.6%) and the most negative attitude among third-year students (31.1%).

**Table 5. The influence of social demographic characteristics on attitude towards NCDs and risk factors**

| **Social demographic characteristics** | | **Positive (N= 67)** | **Neutral (N=213)** | **Negative (N=74)** | **P - Value** |
|---|---|---|---|---|---|
| | | n (%) | n (%) | n (%) | |
| Sex | Male | 31 (21.7) | 92 (64.3) | 20 (14.0) | 0.034 |
| | Female | 36 (17.1) | 121(57.3) | 54 (25.6) | |
| Age | 18-24 | 32 (10.8) | 196 (66.5) | 67 (22.7) | 0.003 |
| | ≥25 | 35 (59.3) | 17 (28.8) | 7 (11.9) | |
| Marital Status | Single | 57 (17.0) | 209 (62.2) | 70 (20.8) | 0.001 |
| | Married | 10 (55.6) | 4 (22.2) | 4 (22.4) | |
| Year of Study | First-year | 20 (23.7) | 51 (61.2) | 12 (15.1) | 0.012 |
| | Second year | 13 (14.9) | 67 (74.4) | 10 (10.7) | |
| | Third year | 24 (16.2) | 78 (52.7) | 46 (31.1) | |
| | Fourth-year and above | 10 (30.6) | 17 (51.5) | 6 (17.9) | |

There was a very small correlation that was not statistically significant between knowledge and attitude scores (r = 0.01, P = 0.801).

## Discussion

This study assessed knowledge and attitude towards noncommunicable diseases and risk factors among undergraduate health science students. Future healthcare practitioners must know NCDs and risk factors to encourage preventative behavior in society and alleviate the burden of NCDs. This study revealed a limited understanding of NCDs and their risk factors among participants, with only 39.8% demonstrating good knowledge. The majority (52.3%) possessed only a moderate level of knowledge. In line with this study, Owopetu et al. reported lower levels of good knowledge, i.e., 42.8% among undergraduate students in a non-medical private university.[8] However, these findings are inconsistent with the previous studies

conducted in Nigeria by Effiong et al. that reported higher levels of good knowledge, i.e., 83.3%. [18] This could be attributed to the difference in study population since the Lagos study was conducted among final-year medical students only.

A high percentage of participants correctly understood that NCDs are not transmissible between individuals, reflecting strong foundational knowledge about the nature of these diseases. Additionally, a large majority were able to accurately define what an NCD is and could provide correct examples of common NCDs (such as cardiovascular diseases, cancers, and diabetes). However, two risk factors—unplanned urbanization and exposure to harmful radiation—were less well-known among the students. This suggests that while participants were generally aware of NCDs, contributing factors like environmental and infrastructural issues were not as widely understood. These findings are in line with the results of previous studies conducted in India, [19] Bangladesh, [14], and Nigeria.[8,18] This study highlights that sex, age, and year of study significantly affect knowledge levels regarding NCDs among health science students. Female students and those in more advanced years of study were found to have better knowledge. This suggests that female students, on average, were better informed or perhaps more engaged in the subject matter related to NCDs than their male counterparts. On the contrary, the study done in Sri Lanka found no association between sex and NCD knowledge levels.[20] Moreover, students gain more exposure to health-related topics and build up their knowledge base as they progress through their studies. Senior students may have had more coursework, clinical experience, and opportunities to engage with NCD-related content.

The majority of students in this study expressed a neutral attitude toward NCDs. A significant portion of respondents strongly agreed that regular physical activity is essential for preventing NCDs, maintaining a healthy diet is crucial in preventing NCDs, are well-informed about the risk factors associated with NCDs, and lifestyle changes could significantly reduce the risk of developing NCDs. Similar findings were reported in previous studies.[17,21,22] The fact that a majority of students expressed a neutral attitude may indicate a lack of strong personal engagement or motivation in relation to NCD prevention, despite being in a health-related field. This neutrality may result from various factors, including a lack of personal experience with NCDs, a sense of invulnerability, or a lack of emphasis on the importance of NCD prevention during their education. Active engagement in NCD activities could help foster more positive attitudes.[23]

Students' attitudes toward NCDs and risk factors were significantly influenced by their age, sex, marital status, and academic year. Participants aged 25 years or older demonstrated significantly more positive attitudes compared to younger participants. This difference may reflect greater perceived vulnerability to NCDs among adults.[24] Marital status was also significantly related to attitudes, with married individuals showing more positive attitudes than singles, suggesting that social and family responsibilities enhance health-conscious behaviours. Sex differences were also observed, with female participants expressing more negative attitudes compared to males. This gender disparity may point to different health beliefs, engagement levels, or perceptions of NCD risk between male and female students.[25] Further, the academic year of study was also significantly related to attitudes, with the most positive attitudes seen among students in their fourth year and above, reflecting the increasing influence of academic exposure and clinical orientation on shaping perceptions of NCDs. Conversely, third-year students demonstrated the most negative attitudes, a trend possibly linked to academic stress or transitional challenges commonly

reported during mid-program periods in health sciences education.[26] In the third year of health science programs, students experience more intensive coursework and clinical exposure and are introduced to more challenging concepts.[27] This could lead to increased stress and academic pressure, which might negatively impact their attitudes toward NCDs.

This study found a very small, non-statistically significant correlation between knowledge and attitude scores. This suggests that even though students may possess knowledge about NCDs and risk factors, it does not necessarily translate into a more positive attitude. This disconnect may indicate that simply increasing knowledge is not sufficient to change attitudes, and other factors such as personal experiences, perceptions of risk, or practical engagement with NCDs prevention may play a role in shaping attitudes.[28]

**Limitations**

This research has limitations. First, the cross-sectional design restricted the inferences of the causal relationships between the variables. Second, because the study sample is limited to undergraduate health science students, conclusions cannot be generalized to other Tanzanian university environments.

**Conclusion**

Findings indicate a moderate level of NCD knowledge among half the students and a predominantly neutral attitude, with no clear influence of knowledge on attitude. This suggests the need for enhanced educational strategies to improve both knowledge and attitude among health science students. Future longitudinal studies are needed to assess how knowledge and attitudes evolve as students advance into their professional careers.

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**Institutional Review Board Statement**

The Joint Ethics and Research Review Committee of the Catholic University of Health and Allied Sciences and Bugando Medical Center granted ethical approval (IRB approval number: CREC/2554/2023) on April 3, 2023.

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**Conflicts of Interest**

The authors declare no conflict of interest.

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