ASSESSMENT OF THE LEVEL OF AWARENESS AND KNOWLEDGE OF NEGLECTED TROPICAL DISEASES AMONG PHARMACY STUDENTS AND THEIR ATTITUDE TOWARDS PARTICIPATING IN ITS PREVENTION AND CONTROL

BY

ANTHONY BLESSING ISIOMA

PHA1908465

SUPERVISED BY: PROF. (MRS) PENAERE T. OSAHON

FACULTY OF PHARMACY,

UNIVERSITY OF BENIN

NOVEMBER, 2025

ASSESSMENT OF THE LEVEL OF AWARENESS AND KNOWLEDGE OF NEGLECTED TROPICAL DISEASES AMONG PHARMACY STUDENTS AND THEIR ATTITUDE TOWARDS PARTICIPATING IN ITS PREVENTION AND CONTROL

BY

ANTHONY BLESSING ISIOMA

PHA1908465

SUPERVISED BY: PROF. (MRS) PENAERE T. OSAHON

A PROJECT SUBMITTED TO THE DEPARTMENT OF CLINICAL PHARMACY AND PHARMACY PRACTICE, FACULTY OF PHARMACY, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHARMACY (PHARM.D) DEGREE FACULTY OF PHARMACY, UNIVERSITY OF BENIN

NOVEMBER, 2025

CERTIFICATION

This is to certify that this project work titled **"Assessment of The Level of Awareness and Knowledge of Neglected Tropical Diseases Among Pharmacy Students and Their Attitude Towards Participating in Its Prevention and Control"** was carried out by **ANTHONY BLESSING ISIOMA** with matriculation number **PHA1908465**, a 600-level student of the Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City.

This work is in partial fulfillment of the requirements for the award of the degree of **Doctor of Pharmacy (Pharm.D)** in the Department of Clinical Pharmacy and Pharmacy Practice, University of Benin.

_____ _____

ANTHONY BLESSING ISIOMA DATE

(PROJECT STUDENT)

_____ _____

PROF. (MRS) PENAERE T. OSAHON DATE

(PROJECT SUPERVISOR)

_____ _____

DR. M. I. OSAREMWINDA DATE

(HEAD OF DEPARTMENT)

DEDICATION

With a heart full of gratitude, I dedicate this work first and foremost to **God Almighty**, whose endless grace, wisdom, and love have guided me through every step of this journey. Without Him, none of this would have been possible.

To my **dearest mother, ESTHER ANTHONY**, your unwavering love, prayers, and sacrifices have been the light that kept me going.

You are my greatest inspiration, and I owe every success to your strength and faith. And to my **two amazing brothers, PRECIOUS ANTHONY and STANLEY ANTHONY**, thank you for your constant encouragement, kindness, and belief in me.

Your support has made even the hardest days brighter, and I am forever grateful for you both.

ACKNOWLEDGEMENT

I give all glory, honour, and praise to the Almighty God for His mercy, strength, knowledge, and provisions which enabled me to complete this project successfully. My sincere appreciation goes to my supervisor, Prof. PT. Osahon for her dedication, guidance, and constructive suggestions throughout this research.

I also express gratitude to the lecturers and staff of the Department of clinical pharmacy and pharmacy practice Faculty of pharmacy University of Benin, for their academic support over the years.

My special appreciation goes to my colleagues for their cooperation during the study. I owe a debt of gratitude to my beloved parents, siblings, friends, and colleagues whose love, encouragement, and prayers sustained me throughout my academic journey.

To everyone who contributed in one way or another, I say a heartfelt thank you. God bless you abundantly.

ABSTRACT

Background: Neglected Tropical Diseases (NTDs) continue to pose a significant public health burden in Nigeria, disproportionately affecting underserved populations. Pharmacy students, as future healthcare professionals, are positioned to play key roles in community education, early case detection, and prevention efforts. However, gaps in awareness and knowledge may limit their contributions.

Objective: To assess the level of awareness and knowledge of NTDs among pharmacy students at the University of Benin and to evaluate their attitudes toward participating in the prevention and control of these diseases.

Methods: A descriptive cross-sectional study was conducted among 311 pharmacy students in their 500- and 600-levels. Data were collected using a structured, self-administered questionnaire. Descriptive statistics-including frequencies, percentages, and means-were used to summarize socio-demographic characteristics, awareness, knowledge, and attitudes. Results were presented in tables. Ethical approval was obtained prior to data collection.

Results: A total of 311 respondents participated (response rate: 88.9%). Awareness of NTDs was moderate, with 56.9% reporting they had heard of NTDs and 46.9% aware that Nigeria is endemic for several NTDs. Knowledge levels were also moderate; 54.3% correctly identified examples of NTDs, while misconceptions persisted, including misclassification of malaria and tuberculosis. Most respondents (88.1%) recognized rural dwellers as the most at-risk population, and 55.6% correctly identified major transmission routes. Attitudes were positive overall: 67.2% agreed that pharmacists have an important role in NTD control, and 69.4% supported including NTD-related content in the pharmacy curriculum. Willingness to volunteer for awareness programs was also high (59.8%).

Conclusion: Pharmacy students demonstrated moderate levels of awareness and knowledge regarding NTDs but expressed strong positive attitudes toward participating in their prevention and control. Strengthening pharmacy curricula, providing targeted training, and increasing opportunities for practical involvement can enhance students' preparedness to contribute effectively to national NTD control efforts.

Keywords: Neglected Tropical Diseases, Pharmacy Students, Public Health.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Neglected Tropical Diseases (NTDs) refer to a collection of infectious illnesses that predominantly affect individuals living in impoverished and rural communities across tropical and subtropical regions of the world. They are caused by a wide variety of organisms including bacteria, viruses, parasites, fungi, and toxins. These diseases are often chronic in nature and frequently result in disability, social stigma, and a reduced quality of life. According to the World Health Organization (WHO, 2023), more than one billion people globally are affected by NTDs, and about 1.5 billion individuals require preventive or curative treatment every year.

Common examples of NTDs include lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminth infections, leprosy, trachoma, dengue, rabies, mycetoma, and snakebite envenoming. WHO categorizes these diseases based on the causative organisms—helminthic, protozoan, bacterial, viral, fungal, and other neglected conditions (WHO, 2023).

1.2 Global and National Burden of Neglected Tropical Diseases

Globally, NTDs affect over one billion individuals, placing another billion at risk. They contribute significantly to the global disease burden, resulting in millions of Disability-Adjusted Life Years (DALYs) lost annually (WHO, 2023). In Africa, hundreds of millions of people continue to require preventive chemotherapy for at least one NTD, underscoring the magnitude of the problem (WHO, 2023).

Nigeria remains one of the countries with the heaviest NTD burdens worldwide, with high endemicity for lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminth infections, and trachoma. Despite the availability of safe and effective treatments, progress towards control and elimination has been hindered by factors such as limited access to healthcare, poor awareness, and inadequate implementation of national NTD programs (WHO, 2023).

1.3 Classification of Neglected Tropical Diseases and Their Common Names

Neglected Tropical Diseases represent a diverse group of infections that primarily affect vulnerable populations in tropical and subtropical areas. Based on their causative agents, they can be classified as follows (WHO, 2021; WHO, 2023):

Parasitic NTDs:

- Lymphatic filariasis – *Elephantiasis*
- Onchocerciasis – *River blindness*
- Schistosomiasis – *Bilharzia*
- Soil-transmitted helminths – *Roundworm, Hookworm, Whipworm*
- Guinea worm disease – *Dracunculiasis*

Bacterial NTDs:

- Leprosy – *Hansen's disease*
- Trachoma – *Infectious blindness*
- Yaws – *Endemic treponematosis*
- Buruli ulcer – *Mycobacterial skin ulcer*

Viral NTDs:

- Dengue – *Breakbone fever*
- Rabies – *Hydrophobia*
- Chikungunya – *Chikungunya fever*

Fungal NTDs:

- Mycetoma – *Madura foot*
- Chromoblastomycosis – *Fonseca's disease*

Ectoparasitic NTDs:

- Scabies – *Itch mite infection*

- Leishmaniasis – *Kala-azar or Skin leishmaniasis*

Non-Infectious NTDs:

- Snakebite envenoming – *Snakebite*

1.4 Symptoms of Neglected Tropical Diseases

The clinical manifestations of NTDs differ depending on the specific disease, but several common symptoms are observed. These include skin lesions, ulcers, or rashes (as seen in leprosy, yaws, or mycetoma), swelling of the limbs or genitals (in lymphatic filariasis), and visual impairment or blindness (in onchocerciasis and trachoma). Others may present with fever, fatigue, abdominal pain, and gastrointestinal disturbances, as seen in schistosomiasis and soil-transmitted helminth infections (WHO, 2021; WHO, 2023). If untreated, these diseases can lead to chronic disability, social stigma, and significant economic hardship.

1.5 Treatment of Neglected Tropical Diseases

Management of NTDs varies depending on the causative organism.

- **Bacterial NTDs:** Treated with antibiotics, such as multidrug therapy (rifampicin, dapsone, and clofazimine) for leprosy and azithromycin for trachoma.
- **Parasitic NTDs:** Managed with antiparasitic agents like ivermectin (for onchocerciasis), albendazole or mebendazole (for soil-transmitted helminths), and praziquantel (for schistosomiasis).
- **Viral NTDs:** Typically require supportive therapy or vaccination where available (e.g., post-exposure prophylaxis for rabies).
- **Fungal NTDs:** Treated using prolonged antifungal therapy and occasionally surgical removal of infected tissue.

Mass Drug Administration (MDA) remains a cornerstone strategy in endemic areas to deliver treatment to large populations at risk (WHO, 2023).

1.6 Prevention of Neglected Tropical Diseases

Prevention strategies focus on interrupting disease transmission and reducing exposure risks. These include:

- Improving sanitation and hygiene through better access to clean water and waste management.
- Vector control via insecticide-treated nets, indoor residual spraying, and environmental sanitation.
- Health education campaigns to raise awareness of NTD symptoms and prevention.
- Vaccination and prophylaxis (e.g., rabies vaccine, preventive chemotherapy).
- Community-based interventions such as school deworming and MDA campaigns.

Integrating NTD programs with water, sanitation, and hygiene (WASH) initiatives has proven effective in controlling disease spread (WHO, 2021; WHO, 2023).

1.7 Impact of Neglected Tropical Diseases on Public health

NTDs pose a major public health challenge because of their long-term effects on physical health, education, and socio-economic development. They predominantly affect low-income populations, leading to disability, stigma, and reduced productivity. Infected individuals often miss school or work, perpetuating cycles of poverty. Communities burdened by NTDs also tend to be more susceptible to other health crises. Therefore, effective control through mass drug administration, public education, and improved sanitation can greatly reduce their burden and enhance community well-being (Branda et al., 2024).

1.8 WHO's Roadmap and the Sustainable Development Goals (SDGs)

The WHO Roadmap for Neglected Tropical Diseases (2021–2030) aims to minimize the human and economic toll of NTDs and move towards their elimination as public health problems. The roadmap sets ambitious targets, including reducing by 90% the number of people requiring NTD interventions, achieving elimination in at least 100 countries, and eradicating specific diseases like dracunculiasis (WHO, 2021).

The roadmap emphasizes three strategic pillars:

1. **Integrated approaches** — combining preventive chemotherapy, vector control, and access to safe water and sanitation.
2. **Cross-cutting systems** — strengthening national health systems and delivery platforms.
3. **Country ownership** — empowering governments to take the lead in achieving elimination targets.

The Sustainable Development Goals (SDG 3.3) align with this effort, targeting the end of epidemics of AIDS, tuberculosis, malaria, and NTDs by 2030. Progress toward this goal contributes to poverty reduction (SDG 1), clean water and sanitation (SDG 6), and reduced inequalities (SDG 10).

Together, the WHO Roadmap and SDGs highlight that addressing NTDs is both a health and a development priority (Molyneux et al., 2020).

1.9 Integration of NTD Education into Pharmacy and Healthcare Practice

Incorporating NTD-related education into pharmacy curricula is essential for preparing future pharmacists to tackle these public health issues. Evidence from a study conducted in Kaduna and Ogun states revealed that healthcare workers who underwent NTD training significantly improved their ability to detect and refer cases after just two months (Lar et al., 2023).

Pharmacy students, especially in developing countries, are strategically positioned to promote disease prevention through drug dispensing, counseling, and community education. If NTD-related topics are not integrated into their training, pharmacists may lack the competence to actively support national control programs, leaving these diseases under-addressed within the healthcare system.

1.10 Roles of Pharmacists, Doctors, and Nurses in Combating NTDs

The control of NTDs demands a multidisciplinary approach involving pharmacists, doctors, nurses, and other health professionals.

- **Pharmacists:** Dispense medications, provide patient counseling, promote rational drug use, and participate in MDA programs (Oladipo et al., 2022).

- **Doctors:** Diagnose and manage cases, monitor complications, and contribute to surveillance and reporting systems (WHO, 2021).
- **Nurses:** Conduct community outreach, deliver health education, and support school health and deworming programs (Amazigo, 2019).

Collaboration among these professionals is vital for effective disease prevention, management, and public health education.

1.11 Literature Review

Several studies have explored awareness and knowledge of NTDs among healthcare students and professionals.

Htay et al. (2024) found moderate awareness but low detailed knowledge among healthcare students across five Asian countries, with education and training exposure influencing readiness to engage in NTD control.

Similarly, Ikeanyi et al. (2025) reported that pharmacy students in Nigeria had heard about NTDs but exhibited limited knowledge and negative attitudes toward participation in control programs.

In Kaduna State, Adje and Dambo (2024) observed significant gaps in knowledge among healthcare providers, stressing the need for continuous professional development.

Okeke et al. (2024) also found low awareness of female genital schistosomiasis among female medical students, recommending curriculum integration for better preparedness.

1.12 Justification for the Study

NTDs continue to pose significant health and socio-economic challenges in Nigeria. Pharmacy students, as future healthcare providers, are essential in prevention, control, and community sensitization. However, limited awareness and knowledge among them may hinder effective involvement in these efforts. This study is therefore justified as it identifies knowledge gaps and supports evidence-based recommendations for strengthening pharmacy education, capacity building, and participation in NTD programs.

1.13 Statement of the Problem

Despite being integral to healthcare delivery, pharmacy students may have limited knowledge and awareness of NTDs, which can affect their ability to educate patients, detect early cases, and support public health campaigns. Previous studies, such as that by Usman and Abdullahi (2025), showed that although NTDs are recognized as health challenges, only a small fraction of respondents had adequate understanding. This underscores the need to assess pharmacy students' knowledge and attitudes towards NTDs to inform targeted interventions.

1.14 Research Rationale

Given the persistent burden of NTDs in Nigeria, this study aims to assess pharmacy students' awareness, knowledge, and attitudes toward NTD prevention and control at the University of Benin. Identifying existing gaps will provide evidence for improving pharmacy education, developing student training initiatives, and supporting national strategies for NTD elimination (Okeke et al., 2024; Lar et al., 2023).

1.15 Research Questions

1. What is the level of awareness of Neglected Tropical Diseases among pharmacy students at the University of Benin?
2. What is the level of knowledge of NTDs among pharmacy students at the University of Benin?
3. What are the attitudes of pharmacy students towards participating in the prevention and control of NTDs?

1.16 Aim

To assess the level of awareness and knowledge of Neglected Tropical Diseases (NTDs) among pharmacy students at the University of Benin and evaluate their attitudes towards participation in NTD prevention and control activities.

1.17 Specific Objectives

1. To determine the level of awareness of NTDs among pharmacy students at the University of Benin.
2. To assess the level of knowledge of NTDs among pharmacy students.
3. To evaluate students' attitudes toward involvement in NTD prevention and control efforts.

CHAPTER TWO

METHODS

2.1 Study Design

This research adopted a **cross-sectional descriptive survey design** to evaluate the level of awareness, knowledge, and attitudes of pharmacy students toward Neglected Tropical Diseases (NTDs), as well as their involvement in prevention and control programs. The cross-sectional approach was considered appropriate because it allows for the assessment of variables of interest at a single point in time across a defined population. It also provides a cost-effective and efficient means of collecting information from a large group of respondents within an academic setting.

2.2 Study Population

The target population comprised all 500- and 600-level undergraduate pharmacy students at the **University of Benin**, Benin City. These students were selected because, at this stage of training, they are expected to have been exposed to core pharmacy courses, including those related to infectious diseases and public health.

At the time of the study, there were **213 students in the 500-level class** and **190 in the 600-level class**, making a total of **403 eligible participants**. This ensured representation of senior students who possess the academic maturity to provide informed and reliable responses.

2.3 Sample Size and Sampling Technique

A **census sampling technique** was used in this study, meaning all students in the 500 and 600 levels were invited to participate. This method was chosen to ensure inclusiveness and improve the reliability and generalizability of the findings.

A total of **350 questionnaires** were distributed, out of which **311 were correctly completed and returned**, resulting in a **response rate of 88.9%**. This high rate of response strengthened the accuracy and validity of the study outcomes.

2.4 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Undergraduate pharmacy students in the 500- and 600-levels at the University of Benin.
- Students who voluntarily consented to participate.
- Participants who filled out the questionnaire completely and correctly.

Exclusion Criteria:

- Pharmacy students below the 500-level.
- Students who declined to give informed consent.
- Incomplete or improperly filled questionnaires.

These criteria were applied to ensure that only qualified and reliable responses were included in the final analysis.

2.5 Data Collection Instrument

Data were gathered using a **structured, self-administered questionnaire** designed specifically for this study. The instrument was divided into four sections to obtain comprehensive information on the research variables.

Section A – Socio-demographic Data:

This section captured participants' age, gender, level of study, residential background, and previous educational qualifications.

Section B – Awareness of Neglected Tropical Diseases (NTDs):

This part assessed whether respondents had heard about NTDs, were aware of Nigeria's endemicity, and had ever taken part in campaigns, outreaches, or lectures related to NTDs. Responses were recorded as *Yes*, *No*, or *Not sure*.

Section C – Knowledge of Neglected Tropical Diseases (NTDs):

This section measured participants' understanding of:

- Examples of NTDs (e.g., onchocerciasis, schistosomiasis, dengue fever).
- Transmission routes (e.g., through vectors, contaminated food or water, poor hygiene).
- High-risk populations (e.g., rural dwellers).
- Barriers to effective NTD control (e.g., stigma, poor funding, and low awareness).

Section D – Attitudes Toward NTD Prevention and Control:

This segment examined respondents' attitudes using a five-point Likert scale (Strongly Disagree to Strongly Agree). Questions focused on students' willingness to participate in NTD campaigns, their perception of pharmacists' roles, and opinions on including NTD topics in the pharmacy curriculum.

The questionnaire was **pre-tested** among a small group of students outside the study population to verify clarity, relevance, and reliability. Feedback obtained was used to refine ambiguous questions and ensure the instrument was easy to understand.

2.6 Data Collection Procedure

Data collection was conducted in person. Questionnaires were distributed during lecture hours and collected the same day to ensure maximum participation and minimize non-response. Participants were briefed on the purpose of the study and assured of confidentiality before filling out the questionnaire.

2.7 Data Analysis

Completed questionnaires were reviewed for accuracy, coded, and entered into the **Statistical Package for Social Sciences (SPSS) version 27** for analysis.

Descriptive statistics such as **frequencies, percentages, and mean values** were used to summarize socio-demographic characteristics, awareness, knowledge, and attitudes.

Results were presented in **tables and percentages** for easy interpretation and clarity.

2.8 Ethical Considerations

Ethical approval for the study was sort from the **University of Benin, Ethical Review Committee**.

The following ethical principles were observed:

- **Voluntary participation:** Participation was entirely voluntary, and students could withdraw at any stage without any consequence.
- **Informed consent:** The purpose, scope, and benefits of the research were clearly explained before participants gave their consent.
- **Confidentiality and anonymity:** No personal identifiers were collected, and responses were kept strictly confidential. Data were securely stored and used only for academic purposes.

2.9 Scoring and Classification of Awareness, Knowledge, and Attitudes

Respondents' awareness, knowledge, and attitudes toward Neglected Tropical Diseases (NTDs) were assessed using structured questionnaires. Responses were scored and categorized as follows: **Awareness:** High (≥70%), Moderate (40–69%), Low (<40%); **Knowledge:** Good (≥70%), Moderate (40–69%), Poor (<40%); **Attitude:** Positive (≥60%), Neutral (40–59%), Negative (<40%). This classification allowed for standardized interpretation of the study findings.

CHAPTER THREE

RESULTS

This chapter presents the findings obtained from the questionnaires administered to pharmacy students at the University of Benin. The results are organized according to the study objectives and include analyses of socio-demographic characteristics, awareness, knowledge, and attitudes toward Neglected Tropical Diseases (NTDs).

3.1 Socio-Demographic Characteristics of Respondents (Section A)

A total of **311 pharmacy students** participated in the study. Their socio-demographic details are summarized in **Table 1** below.

Table 1: Socio-Demographic Characteristics of Respondents (n = 311)

Variable	Category	Frequency	Percentage (%)
Gender	Male	169	54.3
	Female	142	45.7
Age (years)	20–24	197	63.3
	25–29	107	34.4
	30 and above	7	2.3
Level of Study	500 Level	155	49.8
	600 Level	156	50.2
Residence Background	Rural	59	19.0
	Semi-urban	124	39.9
	Urban	128	41.2

Variable	Category	Frequency	Percentage (%)
Previous Educational Qualification	None (First degree)	306	98.4
	Diploma/OND/HND	1	0.3
	Bachelor's degree	4	1.3

Interpretation:

The gender distribution showed a slightly higher number of males (54.3%) compared to females (45.7%). Most respondents (63.3%) were aged 20–24 years, followed by 34.4% aged 25–29 years, and 2.3% aged 30 years or older. Students were almost equally represented across 500-level (49.8%) and 600-level (50.2%) groups. Regarding residence, 41.2% were from urban areas, 39.9% from semi-urban areas, and 19.0% from rural areas. Nearly all respondents (98.4%) were undertaking their first degree.

3.2 Awareness of Neglected Tropical Diseases (Section B)

This section evaluates students' awareness of NTDs, knowledge of Nigeria's endemicity, and prior involvement in related programs. The findings are shown in **Table 2** below.

Table 2: Awareness of Neglected Tropical Diseases among Respondents (n = 311)

Variable	Response	Frequency	Percentage (%)
Have you heard of Neglected Tropical Diseases (NTDs)?	Yes	177	56.9
	No	104	33.4
	Not sure	30	9.6
Are you aware that Nigeria is endemic for some NTDs?	Yes	146	46.9

Variable	Response	Frequency	Percentage (%)
	No	113	36.3
	Not sure	52	16.7
Have you participated in any NTD campaign or outreach?	Yes	63	20.3
	No	229	73.6
	Not sure	19	6.1

Interpretation:

Slightly more than half of respondents (56.9%) had heard about NTDs, indicating **moderate awareness** according to the grading scheme. About one-third (33.4%) had never heard of NTDs, while 9.6% were unsure. Only 46.9% recognized that Nigeria is endemic for some NTDs, reflecting **moderate understanding** of national disease prevalence. Participation in NTD-related programs was low (20.3%), suggesting that awareness does not necessarily translate into involvement.

3.3 Knowledge of Neglected Tropical Diseases (Section C)

This section examined respondents' ability to correctly identify examples of NTDs, their transmission routes, risk groups, and major control challenges.

Table 3: Respondents' Knowledge of Neglected Tropical Diseases (n = 311)

Variable	Response Option	Frequency	Percentage (%)
Examples of NTDs identified by respondents	Onchocerciasis	38	12.2
	Lymphatic filariasis	15	4.8
	Schistosomiasis	9	2.9
	Dengue fever	26	8.4
	Tuberculosis (wrong)	18	5.8
	Malaria (wrong)	36	11.6
	Multiple correct responses	169	54.3
Transmission of NTDs	Through vectors	72	23.2
	Contaminated food or water	17	5.5
	Poor sanitation	35	11.3
	All of the above	173	55.6
Groups most at risk	Rural dwellers	274	88.1
	Urban dwellers	23	7.4
	High-income populations	10	3.2
Challenges in controlling NTDs	Low awareness and health education	93	29.9
	Poor funding and resources	18	5.8
	Stigma and neglect	7	2.3
	All of the above	183	58.8

Interpretation:

More than half of respondents (54.3%) correctly identified key NTDs such as onchocerciasis, lymphatic filariasis, and schistosomiasis, reflecting **moderate knowledge**. Misconceptions were observed, with 11.6% incorrectly identifying malaria and 5.8% tuberculosis as NTDs. About 55.6% correctly identified transmission routes (vectors, contaminated water, poor sanitation), showing **moderate understanding**. A majority (88.1%) recognized rural dwellers as the most at-risk group, indicating **good knowledge** of social and environmental risk factors. Regarding control challenges, 58.8% acknowledged issues like poor funding, stigma, and low awareness, reflecting **moderate knowledge** of barriers to NTD control.

3.4 Attitudes Toward Participation in NTD Prevention and Control (Section D)

This section explored students' perceptions and willingness to participate in activities related to NTD prevention and control. Responses were recorded on a five-point Likert scale**: *Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA).***

Table 4: Respondents' Attitudes toward Participation in NTD Prevention and Control (n = 311)

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)
Pharmacists have an important role in preventing and controlling NTDs	9.3	5.1	18.3	27.0	40.2
I am willing to participate in community programs on NTDs	8.0	3.5	33.4	29.6	25.4
Including NTD-related topics in the pharmacy curriculum will improve student preparedness	6.8	2.3	21.5	36.0	33.4
Adequate training/workshops should be organized for pharmacy students on NTDs	7.4	1.6	11.3	34.1	39.2
I would volunteer for awareness campaigns if given the opportunity	8.0	5.8	26.4	30.9	28.9

Interpretation:

Most respondents (67.2%) agreed or strongly agreed that pharmacists play a vital role in NTD prevention, reflecting a **positive attitude**. Over half (55.0%) were willing to participate in community programs, although 33.4% were neutral, possibly due to limited practical experience. About 69.4% supported incorporating NTD-related content into the pharmacy curriculum, and 73.3% emphasized the need for workshops to improve competence. Additionally, 59.8% indicated readiness to volunteer for awareness campaigns, further demonstrating a **positive attitude** toward engagement in NTD control.

CHAPTER FOUR

DISCUSSION

The present study explored pharmacy students' awareness, knowledge, and attitudes toward Neglected Tropical Diseases (NTDs) in Nigeria. Understanding the perspectives of healthcare students is crucial because they represent the future workforce responsible for implementing preventive strategies, community sensitization, and disease management.

4.1 Socio-Demographic Considerations

The study participants were predominantly aged 20–24 years (63.3%), with an almost equal representation of students from 500- and 600-levels. Slightly more males participated (54.3%) than females. The majority resided in urban (41.2%) and semi-urban (39.9%) areas. These demographics may influence exposure to NTD information. For instance, urban students might have more access to formal education, workshops, or online resources, whereas rural students may have firsthand experience with endemic communities. While the study did not directly correlate demographic factors with awareness or knowledge, previous studies (Htay et al., 2024) suggest that age, educational level, and urban exposure can impact readiness to engage in NTD control programs.

4.2 Awareness of NTDs

Awareness was classified as **moderate** (56.9%), consistent with prior studies among healthcare students in Nigeria and Asia (Htay et al., 2024; Ikeanyi et al., 2025). Only 46.9% recognized Nigeria as endemic for some NTDs, highlighting gaps in understanding the national disease burden. The low participation in NTD-related programs (20.3%) is concerning, suggesting that awareness does not automatically lead to involvement in control activities. Possible reasons include limited practical exposure, insufficient training opportunities, and the perception that NTDs are a "low-priority" public health issue compared to other diseases like malaria or HIV/AIDS. This mirrors findings from Ikeanyi et al. (2025), who observed that pharmacy students in Nigeria had heard of NTDs but exhibited low engagement and negative attitudes toward participation.

4.3 Knowledge of NTDs

Respondents demonstrated **moderate knowledge** (54.3%) in correctly identifying major NTDs such as onchocerciasis, lymphatic filariasis, and schistosomiasis. Misclassifications (malaria 11.6%, tuberculosis 5.8%) indicate persistent misconceptions. Transmission knowledge was moderate (55.6%), with students understanding vectors, contaminated water, and poor sanitation as key routes. Awareness of high-risk populations was stronger, with 88.1% correctly identifying rural dwellers. Knowledge of control challenges was moderate (58.8%), reflecting awareness of poor funding, stigma, and low community awareness. These findings align with Adje and Dambo (2024) and Okeke et al. (2024), who noted knowledge gaps among healthcare providers and medical students. Moderate knowledge suggests that while theoretical exposure exists, there is a need for practical, hands-on education and experiential learning to correct misconceptions and deepen understanding.

4.4 Attitudes Toward NTD Control

Attitudes were classified as **positive** (67.2%), with most students acknowledging pharmacists' roles in prevention and control. A majority were willing to participate in community programs (55.0%) and volunteered for awareness campaigns (59.8%). Importantly, students expressed strong support for curriculum integration of NTD content (69.4%) and additional workshops/training (73.3%). This indicates that students are motivated to contribute but may lack the skills, opportunities, or confidence to act. Positive attitudes in the face of moderate knowledge and awareness suggest that targeted interventions could effectively convert willingness into active participation.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study assessed pharmacy students' awareness, knowledge, and attitudes toward Neglected Tropical Diseases (NTDs) in Nigeria. The findings revealed **moderate awareness** and **moderate knowledge**, indicating that while students are somewhat familiar with NTDs and their control, gaps remain in understanding specific diseases, transmission routes, and control challenges. Encouragingly, respondents demonstrated a **positive attitude** toward participation in prevention and control activities, with most recognizing the pharmacist's role, supporting curriculum integration, and expressing willingness to engage in community programs.

Overall, the study highlights that pharmacy students represent a motivated group with the potential to contribute effectively to NTD control, provided they receive targeted education, practical training, and opportunities for hands-on involvement. The gap between knowledge and participation underscores the need for interventions that convert motivation into actionable engagement.

5.2 Recommendations

Based on the study findings, the following recommendations are proposed:

- **Curriculum Integration:** Incorporate comprehensive NTD-related content into pharmacy programs, including epidemiology, transmission, risk factors, and control strategies. This will address knowledge gaps and enhance preparedness.
- **Practical Training and Workshops:** Organize workshops, seminars, and field visits to endemic communities to provide students with hands-on experience and improve their competence in NTD prevention and control.
- **Community Engagement Opportunities:** Facilitate student participation in awareness campaigns, outreach programs, and national NTD control initiatives, enabling them to translate positive attitudes into real-world action.

- **Continuous Professional Development:** Encourage ongoing training for students and recent graduates through short courses or certifications on NTDs to reinforce knowledge and practical skills.
- **Policy Support:** Collaborate with universities, professional associations, and public health authorities to formally involve pharmacy students in national NTD prevention and control efforts.
- **Future Research:** Conduct longitudinal and interventional studies to evaluate the effectiveness of educational and training interventions in improving awareness, knowledge, and engagement among pharmacy students.

5.3 Contribution to Knowledge

This study contributes to existing knowledge in several meaningful ways:

- **Empirical Data on Pharmacy Students in Nigeria:** While several studies have explored awareness and knowledge of Neglected Tropical Diseases (NTDs) among healthcare students globally, there is limited data specifically on pharmacy students in Nigeria. This study provides current, context-specific insights into their awareness, knowledge, and attitudes toward NTDs.
- **Assessment of Knowledge Gaps and Misconceptions:** By identifying moderate knowledge levels and specific misconceptions (e.g., misclassifying malaria and tuberculosis as NTDs), the study highlights precise areas where educational interventions are needed. This can inform curriculum development and targeted training programs.
- **Linking Attitudes to Potential Engagement:** The study demonstrates that even with moderate awareness and knowledge, pharmacy students exhibit a positive attitude toward participation in NTD prevention and control. This insight emphasizes that motivation exists and can be harnessed through structured education and practical opportunities.
- **Guidance for Curriculum and Policy Development:** The findings provide evidence-based recommendations for integrating NTD-related content into pharmacy education, organizing workshops, and involving students in community programs. These contributions can inform both academic institutions and public health policy makers on strategies to strengthen the role of pharmacy students in national NTD control efforts.

- **Baseline for Future Research:** This study establishes a baseline for future research on the effectiveness of educational and intervention strategies aimed at improving awareness, knowledge, and participation in NTD control among pharmacy students.

5.4 Limitations of the Study

While this study provides valuable insights into pharmacy students' awareness, knowledge, and attitudes toward Neglected Tropical Diseases (NTDs) in Nigeria, several limitations should be acknowledged:

- **Cross-Sectional Design:** The study employed a cross-sectional design, capturing respondents' knowledge and attitudes at a single point in time. This limits the ability to establish causality or examine changes in awareness, knowledge, or attitudes over the course of their academic training.
- **Self-Reported Data:** Responses were based on self-reporting, which may be influenced by social desirability bias. Participants might overestimate their knowledge or positive attitudes toward NTD prevention, affecting the accuracy of the findings.
- **Limited Generalizability:** The study focused on pharmacy students from a specific institution or region. As a result, the findings may not fully represent all pharmacy students in Nigeria or healthcare students in other disciplines.
- **Lack of Correlation Analysis:** The study did not statistically examine the relationships between socio-demographic factors (such as age, gender, level of study, or residence) and awareness, knowledge, or attitudes. Such analyses could have provided deeper insights into determinants of NTD-related knowledge and engagement.
- **Potential Recall Bias:** Some questions, particularly regarding past participation in NTD-related activities, relied on respondents' memory, which may not always be accurate.
- **Scope of Knowledge Assessment:** The knowledge section primarily focused on identification of NTDs, transmission, risk groups, and control challenges. Other aspects, such as clinical management or global NTD trends, were not assessed and may limit a comprehensive understanding of students' knowledge base.

5.5 Suggestions for Further Studies

Based on the findings and limitations of this study, several areas for future research are recommended:

- **Longitudinal Studies:** Conduct longitudinal studies to track changes in pharmacy students' awareness, knowledge, and attitudes toward NTDs over the course of their academic training. This will help determine how education and practical exposure influence their preparedness and engagement over time.
- **Interventional Research:** Implement and evaluate the effectiveness of educational interventions, workshops, and community outreach programs in improving knowledge and translating positive attitudes into active participation in NTD prevention and control.
- **Comparative Studies Across Disciplines:** Extend the research to include students from other healthcare disciplines, such as medicine, nursing, and public health, to compare awareness, knowledge, and attitudes toward NTDs and identify interdisciplinary opportunities for collaborative control efforts.
- **Socio-Demographic Correlations:** Investigate the influence of socio-demographic factors (age, gender, level of study, and urban/rural residence) on awareness, knowledge, and attitudes, using robust statistical analysis to identify key determinants of preparedness for NTD control.
- **Assessment of Practical Competence:** Explore students' practical skills and competencies in NTD prevention and control, such as participation in community campaigns, health education delivery, and clinical management of NTDs, to complement self-reported awareness and knowledge.
- **National and Regional Scope:** Conduct multi-institutional studies across Nigeria and other endemic regions to obtain broader and more representative data on pharmacy students' perspectives and engagement with NTD control programs.
- These further studies will help build a more comprehensive understanding of the role of pharmacy students in NTD prevention and control and provide evidence for designing effective training, policies, and community interventions.

REFERENCES

Adje, D.U. & Dambo, E.D., 2024. Knowledge of tropical diseases and response capabilities of healthcare providers in Kaduna State, Nigeria. *International Health*, 16(1), pp.45–51.

Akinsolu, F.T., Abodunrin, O.R., Olagunju, M.T., Adewole, I.E., Rahman, N.O., Dabar, A.M., Njuguna, D.W., Soneye, I.Y., Salako, A.O., Ezechi, O.C. & Varga, O.E., 2023. Community perception of school-based mass drug administration program for soil-transmitted helminths and Schistosomiasis in Ogun State, Nigeria. *PLoS Neglected Tropical Diseases*, 17(7), p.e0011213.

Amazigo, U.V., Leak, S.G., Zoure, H.G., Okoronkwo, C., Diop Ly, M., Isiyaku, S., Crump, A., Okeibunor, J.C. & Boatin, B., 2021. Community-directed distributors—the "foot soldiers" in the fight to control and eliminate neglected tropical diseases. *PLoS Neglected Tropical Diseases*, 15(3), p.e0009088.

Aribodor, O.B., Mogaji, H.O., Surakat, O.A., Azugo, N.O., Jacob, E.C., Obikwelu, E.M., Nebe, O.J. & Jacobson, J., 2023. Profiling the knowledge of female medical/para-medical students, and expertise of health care professionals on female genital schistosomiasis in Anambra, South Eastern Nigeria. *PLoS Neglected Tropical Diseases*, 17(2), p.e0011132.

Bangert, M., Molyneux, D.H., Lindsay, S.W., Fitzpatrick, C. & Engels, D., 2017. The cross-cutting contribution of the end of neglected tropical diseases to the sustainable development goals. *Infectious Diseases of Poverty*, 6(1), p.73.

Branda, F., Ali, A.Y., Ceccarelli, G., Albanese, M., Binetti, E., Giovanetti, M., Ciccozzi, M. & Scarpa, F., 2024. Assessing the burden of neglected tropical diseases in low-income communities: challenges and solutions. *Viruses*, 17(1), p.29.

Chinelo Nneka Ikeanyi, Ngozi Prinsca Onuigwe, Jane Osareme Ogugua, Bilkisu Mohammed Kuchazi, 2025. Assessment of pharmacy students' awareness of neglected tropical disease and their attitude towards participating in its prevention and

control. *World Journal of Pharmaceutical Science and Research*, 4(4), pp.334–341. https://doi.org/10.5281/zenodo.16888846

Elfar, E., Asem, N. & Yousof, H., 2020. The awareness of neglected tropical diseases in a sample of medical and nursing students in Cairo University, Egypt: A cross-sectional study. *PLoS Neglected Tropical Diseases*, 14(11), p.e0008826.

George, N.S., David, S.C., Nabiryo, M., Sunday, B.A., Olanrewaju, O.F., Yangaza, Y. & Shomuyiwa, D.O., 2023. Addressing neglected tropical diseases in Africa: a health equity perspective. *Global Health Research and Policy*, 8(1), p.30.

Htay, M.N.N., Swed, S., Elsayed, M.G., Arafat, S.Y., Marthoenis, M., Marzo, R.R., El-Abasiri, R.A.A., Naing, Z.Y., San, L.P.P., Thantry, A.D.K. & Kyaw, T.M., 2024. Knowledge and awareness of neglected tropical diseases and control strategies among healthcare students in five Asian countries: A cross-sectional study. *Clinical Epidemiology and Global Health*, 27, p.101576.

Lar, L.A., Chowdhury, S., Umunnakwe, C., Yahemba, D., David, A., Omitola, O.O., Haruna, S., Lawal, S., Isiyaku, S., Shuaibu, J. & Albarka, J., 2023. A mixed methods evaluation of an integrated training package for skin neglected tropical diseases in Kaduna and Ogun, Nigeria. *International Health*, 15(Supplement_1), pp.i75–i86.

Okeke, A.O., Ekwunife, C.A., Okeke, C.E., Okeke, A.I., Okwelogu, I.S., Uzuke, C.A. & Okoye, E.P., 2024. Knowledge, attitude and practices toward female genital schistosomiasis among community women and healthcare workers in Anambra State, Nigeria. *South Asian Journal of Parasitology*, 7(3), pp.275–284. https://journalsajp.com/index.php/SAJP/article/view/191

Oladipo, H., Muili, A., Rashidat, Y. & Rokibat, A., 2022. The role of pharmacists in strengthening the health system in Nigeria. *Innovations in Pharmacy*, 13(2), pp.10–24926.

Usman, A. & Abdullahi, A., 2025. Public awareness on eliminating neglected tropical diseases (NTDs) among people in Kurfi Town of Katsina State, Nigeria. *Dutse Journal of Pure and Applied Sciences*, 11(1a), pp.68–75.

World Health Organization (WHO), 2021. A road map for neglected tropical diseases 2021–2030. Available at: https://www.who.int/publications/i/item/9789240010352 [Accessed 28 August 2025].

World Health Organization, 2023. Global report on neglected tropical diseases 2023. World Health Organization.

QUESTIONNAIRE: TO ASSESS THE LEVEL OF AWARENESS AND KNOWLEDGE OF NEGLECTED TROPICAL DISEASES AMONG PHARMACY STUDENTS AND THEIR ATTITUDE TOWARDS PARTICIPATING IN ITS PREVENTION AND CONTROL

Instructions: This questionnaire is strictly for research purposes. Please answer honestly. Your responses will remain anonymous and confidential. Tick (✓) where appropriate.

Section A: Socio-Demographic Information

1. Gender:
    - ☐ Male
    - ☐ Female
2. Age:
    - ☐ 20–24
    - ☐ 25–29
    - ☐ 30 and above
3. Level of Study:
    - ☐ 500 Level
    - ☐ 600 Level
4. Residence Background
    - ☐ Rural
    - ☐ Semi-urban
    - ☐ Urban
5. Highest Educational Qualification Prior to Current Program
    - ☐ None (This is my first degree)

- ☐ Diploma / OND / HND
- ☐ Bachelor's degree (e.g., B.Sc., B.Pharm)
- ☐ Master's degree
- ☐ Other (please specify) _____

Section B: Awareness of Neglected Tropical Diseases (NTDs)

(Answer Yes or No)

1. Have you heard of Neglected Tropical Diseases (NTDs)?
   - ☐ Yes
   - ☐ No
2. Are you aware that Nigeria is endemic for some NTDs?
   - ☐ Yes
   - ☐ No
3. Have you ever received any lecture or seminar on NTDs during your pharmacy training?
   - ☐ Yes
   - ☐ No
4. Have you participated in any campaign, outreach, or community program related to NTDs?
   - ☐ Yes
   - ☐ No
5. Do you think more awareness about NTDs is needed among pharmacy students?

- ☐ Yes
- ☐ No

Section C: Knowledge of NTDs

(Tick the correct option. Multiple answers may apply where relevant)

1. Which of the following are examples of NTDs?
   - ☐ Onchocerciasis (River blindness)
   - ☐ Tuberculosis
   - ☐ Lymphatic filariasis
   - ☐ Malaria
   - ☐ Schistosomiasis
   - ☐ Dengue fever
2. How are NTDs commonly transmitted?
   - ☐ Through vectors (e.g., insects, snails, flies)
   - ☐ Through contaminated food or water
   - ☐ Through poor sanitation and hygiene
   - ☐ All of the above
3. Which of the following groups are most at risk of NTDs?
   - ☐ Rural dwellers
   - ☐ Urban dwellers
   - ☐ High-income populations
4. Which of the following is a major challenge in controlling NTDs?
   - ☐ Low awareness and health education

- ☐ Poor funding and resources
- ☐ Stigma and neglect
- ☐ All of the above

Section D: Attitudes Towards Participation in NTD Prevention and Control

Please indicate your response by ticking (✓) the option that best reflects your opinion.

Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Pharmacists have an important role to play in the prevention and control of NTDs.	[ ]	[ ]	[ ]	[ ]	[ ]
I am willing to participate in community programs aimed at reducing the burden of NTDs.	[ ]	[ ]	[ ]	[ ]	[ ]
Including more NTD-related content in the pharmacy curriculum will improve students' preparedness.	[ ]	[ ]	[ ]	[ ]	[ ]
Adequate training and workshops should be provided to pharmacy students on NTDs.	[ ]	[ ]	[ ]	[ ]	[ ]
I would volunteer for awareness campaigns or outreaches on NTD prevention and control if given the opportunity.	[ ]	[ ]	[ ]	[ ]	[ ]

Thank you for taking the time to complete this questionnaire. Your responses are highly valuable and will contribute to a better understanding of pharmacy students' awareness, knowledge, and attitudes towards Neglected Tropical Diseases (NTDs). The information you have provided will be kept strictly confidential and used solely for academic purposes.