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Exploring Health Professional Student-Led Interventions To Address Gaps In Common Non-Communicable Disease (ncd) Screening, Management, And Self-Care Education In Ghana.

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Abstract

Background

Non-communicable diseases (NCDs) are expected to become Africa's leading cause of death by 2030. In Ghana, with its limited healthcare resources, hypertension is already the leading cause of death, contributing to 15.3% of total deaths. Student-run free clinics (SRFCs) have become essential components of healthcare systems worldwide, offering primary medical care to underserved populations. This study explores the feasibility of health professional student-led interventions in addressing gaps in NCD screening, early management, and self-care education in Ghana.

Methods

This research employed an exploratory sequential design, combining qualitative and quantitative phases. Six focus group discussions (FGDs) with 48 health professional students at two Ghanaian universities explored perceptions of NCDs, barriers to care, interest in leading interventions, and recommendations for a student-run clinic. Six key informant interviews with faculty, deans, and four Ghana Health Service (GHS) officials assessed the feasibility of an SRFC. In the quantitative phase, 316 students completed a survey based on FGD themes to evaluate factors affecting student interest, the potential impact of SRFCs, and perceived challenges. Two final FGDs with 12 community members gauged receptiveness and gathered recommendations. Qualitative data were analyzed using a descriptive thematic approach, while logistic regression was applied to quantitative data. Verbal and written consent was obtained from all participants.

Findings

Six main themes emerged:

- There was a high level of familiarity of NCDs among all stakeholders.

- There was demonstrable interest across all stakeholders in student-led interventions for NCD screening, early management, and self-care education.
- The need for onsite supervision was a key requirement from all stakeholders.
- There were other sustainability concerns and recommendations.
- There were material and immaterial stakeholder support to address elicited concerns.
- Proposed Intervention: A weekend, interprofessional, community-based, free clinic focused on NCDs screening, education, and linkage to health systems.

Interpretation

The study reveals strong interest and confidence among stakeholders for an interprofessional student-led NCD intervention and informs the development of interprofessional SRFC as a model for enhancing primary NCD care in low-resource settings. The study's strengths include its comprehensive design and stakeholder engagement, although regional focus may limit broader applicability.

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Introduction

Student-run free clinics (SFRCs) have emerged as crucial safety nets in healthcare systems, providing essential primary medical care to underserved populations who may otherwise lack access to healthcare services [1][2]. These clinics are often staffed by dedicated health professional students and volunteers, demonstrating their commitment to addressing healthcare disparities and improving public health. In countries like South Africa, initiatives like the Students' Health and Welfare Centers Organization (SHAWCO) have successfully established over 200 clinics, led by more than 1250 student volunteers across 8 provinces [2]. Similarly, in the United States, SRFCs have made significant contributions, with over 140,000 patients seen annually at 208 SRFC sites, supported by at least 75% of accredited medical schools [3].

In Ghana, where the burden of non-communicable diseases (NCDs) poses a significant challenge to public health, health professional student-led interventions hold tremendous potential. NCDs, such as chronic lung disease, cardiovascular diseases (CVDs), diabetes, and cancer, are projected to collectively become Africa's leading cause of death by 2030 [4]. Ghana, with its limited healthcare resources and fewer than one physician per 10,000 people faces significant health burdens related to NCDs [5]. For instance, about 34% of Ghana’s population has hypertension which stands as the leading cause of death and the third leading cause of admissions, contributing to 15.3% of total deaths and 4.7% of total hospital admissions in the country [6], [7]. Data from the Ghana Health Service indicates that the number of hypertension cases nationwide rose from 172,796 in 2018 to 193,099 in 2022, reflecting an 11.74% increase over four years. Similarly, diabetes cases grew from 617,563 to 622,849 during the same period [8]. The slight increase in diabetes cases likely underestimates the actual burden of the disease in Ghana, primarily due to the limited availability of diagnostic laboratory tests in certain health facilities [9].

Furthermore, routine diabetes screening, especially during pregnancy, is not commonly conducted [9], [10]. Supporting this, research has estimated that nearly half of adults with diabetes in Ghana remain undiagnosed, contributing to an underrepresentation of the national burden [11], [12].

Integrating innovative and cost-effective NCD interventions in primary healthcare has been shown to be effective in reversing disease progression, preventing complications, and reducing hospitalizations, healthcare costs, and out-of-pocket expenditures [13]. One such effective intervention capitalizes on the use of trained non-physician healthcare providers (NPHWs) and community health officers (CHOs) to carry out specific tasks traditionally done by doctors such as screening, management, and counseling in geographic areas where physicians are scarce [14]. This task-shifting principle is also the basis of the national Community-based Health Planning and Services Program (CHPs) designed primarily for the management of maternal health and childhood illness in Ghana [14]. Despite the success of the CHPS program in transforming maternal and child health over the past 20 years, it does not incorporate the requisite training, medications, and other resources to treat cardiovascular diseases and other NCDs. As such, it remains poorly equipped to respond to the NCD epidemic thus, prompting the search for innovative solutions that build on the current model and other cost-effective interventions [15].

An interprofessional team setting within SRFCs has proven to be instrumental in delivering comprehensive and effective care to underserved communities [16]. SRFCs enable health professions trainees to collaborate and work together seamlessly, allowing them to pool their unique skills, knowledge, and perspectives. This approach not only enhances the quality of care but also nurtures an environment of continuous learning and skill development [17]. In Ghana, a diverse array of health professional programs presents a rich pool of talents and expertise that can

contribute to SRFCs and their efforts to address NCDs. These programs include the medical, pharmacy, and public health schools in each of the 5 major public universities, the over 69 nursing training colleges, and other allied health disciplines [18]. Medical students bring the clinical expertise and diagnostic skills necessary for NCD screening and management. Nursing students contribute valuable patient care and counseling abilities to support patients in their self-care journey. Pharmacy students possess pharmaceutical knowledge essential for medication management and adherence. Public health students offer a broader perspective on community health promotion and disease prevention strategies. Moreover, other allied health professional students like social work, nutrition, and physiotherapy students can complement NCD care with their specialized expertise allowing the model to not just meet the standard of care but potentially improve on it. The collaboration of these health professional programs within SRFCs fosters an interprofessional approach, enhancing the quality and effectiveness of NCD care services while promoting continuous learning and holistic patient support. Leveraging their collective knowledge and enthusiasm, these students have the potential to design and implement innovative and cost-effective interventions to address the growing burden of NCDs in Ghana.

A major challenge facing primary health care delivery in Ghana is the breakdown in critical referral links between the three layers of the primary care system in Ghana: CHPS units, subdistrict Health Centers, and District Hospitals. To address this challenge, Ghana Health Service between 2017 and 2019 piloted the Network of Practice (NoP) healthcare model in 2 districts and started a nationwide scaling of the model in 2022 [19]. This network model aims to transform the fragmented healthcare landscape by promoting collaboration and efficiency among various healthcare facilities while reducing the administrative barriers and cost of efficient health delivery [19]. In this context, the integration of SFRCs holds tremendous potential.

Students can work within existing healthcare facilities or in tandem with them, focusing on critical issues like hypertension and diabetes. Nested student-run clinics within these models could provide necessary community integration and engagement and serve as referral units. They can also benefit from the networks' collaborative clinical and administrative support.

In 2013, the Government of Ghana initiated the National Health Insurance Scheme (NHIS) to enhance access to essential healthcare services [20]. However, several challenges have surfaced since its inception. Firstly, only 54.4% of the total population is covered by the scheme, with the informal sector making up less than 40% of the membership [20], [21]. Moreover, the NHIS primarily focuses on curative services, neglecting the crucial area of preventive healthcare. This imbalance in funding allocation hinders the provision of cost-effective preventive health measures. Student-run clinics can address these gaps by extending NHIS outreach through organized community registrations in underserved areas and linking complex cases to larger government health facilities. A 2024 assessment of primary care health facilities in Ghana revealed a demonstrated high readiness for basic hypertension and diabetes care, with higher availability of some essential medications and basic clinical logistics and equipment [22]. By actively engaging in screening, early management, self-care health education, and linkage to continuous care through the government’s health insurance and health facilities, these clinics can bridge the gap, reduce the burden of diseases like hypertension and diabetes, and contribute to a more balanced and effective healthcare system in Ghana.

By capitalizing on the success of SRFCs and promoting an interprofessional approach, health professional student-led interventions can be tailored to the specific needs of Ghanaian communities, ensuring effective, timely, and accessible screening, management, and self-care education for common NCDs. Such initiatives hold promise in mitigating the impact of NCDs on the nation's health and fostering a

future generation of healthcare professionals committed to community service and health equity.

Statement of Purpose

Non-communicable diseases (NCDs) are a leading public health challenge in Ghana, with hypertension and diabetes contributing significantly to morbidity and mortality. Despite the growing burden, underserved communities face substantial barriers to NCD screening, early management, and self-care education due to limited resources, fragmented healthcare delivery, and gaps in awareness.

This study seeks to explore the feasibility and impact of health professional student-led interventions in addressing these gaps. Specifically, my goal is to assess the perspectives and interests of health professional students in Ghana, evaluate institutional and sociocultural factors that shape the feasibility of student-run free clinics (SRFCs), and gauge community receptiveness to these interventions. By identifying the unique contributions of students across diverse health disciplines, I aim to develop an interprofessional, community-based model for NCD-focused SRFCs that enhances access to primary care.

Through qualitative and quantitative analyses, this research will provide actionable insights into how SRFCs can be effectively integrated within existing healthcare frameworks in Ghana. Ultimately, the study aims to foster sustainable, student-led solutions that empower communities, bridge healthcare gaps, and contribute to the fight against NCDs in resource-limited settings.

Specific Aims

1. Assess Student Perspectives and Ideas
    a. Explore health professional students' views on NCD challenges in Ghana and their interest in NCD interventions. Identify influencing factors.
    b. Elicit students' ideas for suitable interventions considering contextual factors.
2. Understand Institutional and Contextual Factors
    a. Analyze the legal and sociocultural context for student-led interventions.
    b. Evaluate the availability of institutional support through interviews with university officials.
3. Evaluate Community Receptiveness
    a. Investigate community receptiveness and affecting factors towards potential student-run clinics.

Methodology

Student Contribution

Brian Fleischer (B.F) conceptualized this thesis and consulted Dr. Jeremy Schwartz for mentorship and guidance. Together, they designed the study, selecting a mixed-methods approach for this exploratory work. B.F identified and recruited student co-investigators—Esi Berkoh (E.B), Afriyie Badu (A.B), and Bismark Amoh (B.A)—from the University of Cape Coast, the University of Ghana, and the University of California, Los Angeles, respectively. He also secured a local supervisor in Ghana, Dr. Derek Anamaale. Under the guidance of Dr. Schwartz and Dr. Anamaale, B.F drafted the study protocol and obtained Institutional Review Board (IRB) approvals from the Ghana Health Service and Yale University.

B.F led all focus group discussions and key informant interviews and transcribed them with assistance from the student co-investigators. Transcriptions were completed by B.F, E.B, A.B, and B.A, with adjustments made following respondent validation. B.F and B.A independently coded the transcripts, resolving discrepancies through discussion until full consensus was reached. In the second level of analysis, they continuously compared codes, their meanings, and interrelationships to develop comprehensive categories and themes.

B.F designed the student survey and, with assistance from E.B and A.B, disseminated it to health professional students from the University of Ghana and the University of Cape Coast. He conducted the quantitative analysis with guidance from Dr. Anamaale. B.F and E.B led the community reception interviews.

With guidance and revisions from Dr. Schwartz, B.F developed the manuscript outline, wrote the thesis, and designed all figures and tables. Under the mentorship of Dr. Anamaale and Dr. Schwartz, he also presented the study findings through oral and poster presentations at various institutions and conferences.

Study Design

This study followed a mixed-methods exploratory sequential design aimed at investigating health professional student-led interventions for addressing access gaps in hypertension and diabetes management in Ghana [23].

Qualitative Phase

- **Phase 1A: Health Professional Students' Focus Group Discussions.**
  Diverse teams of health professional students participated in focus group discussions to explore the burden of non-communicable diseases (NCDs), identify access gaps, conceptualize interventions, and highlight potential implementation barriers.

- **Phase 1B: University Faculty and Ghana Health Service Officials Key Informant Interviews.**

  Key informant interviews were conducted with university officials and Ghana Health Service officers to gain insights into the institutional and contextual factors shaping student-led interventions. Discussions focused on legal and sociocultural frameworks for addressing NCD challenges.

- **Phase 1C: Community Members' Focus Group Discussions.**

  Focus group discussions with community members and leaders assessed their receptiveness to student-led interventions, particularly a student-run free clinic (SRFC). The clinic model was customized to the Ghanaian context to address gaps in NCD screening, early management, and self-care education.

Quantitative Phase

- **Phase 2: Health Professional Students' Quantitative Survey**

  A structured survey gathered data on students' interest in a student-run free clinic, perceived clinic impact, and preferences regarding implementation details such as scheduling and scope of interventions. The survey also investigated factors influencing participation and the feasibility of the proposed intervention model.

Synthesis of Findings

Data from both qualitative and quantitative phases were synthesized to develop recommendations for feasible and sustainable student-led interventions tailored to the Ghanaian context and aimed at addressing identified gaps.

Study Sites

Interviews with students and faculty were conducted primarily at two key locations: the University of Ghana Medical School and the University of Cape Coast School of Medicine. These institutions were chosen for their diverse health professional programs and their ability to provide critical insights into student-led interventions in the Ghanaian context.

The University of Ghana, located within the Ayawaso West constituency in the Greater Accra region, the nation's capital, is the premier and largest university in Ghana [24]. Under its College of Health Sciences are the Medical School, Dental School, School of Pharmacy, School of Biomedical and Allied Health Sciences, and the School of Nursing and Midwifery [25]. It's partnership Korle Bu Teaching Hospital, the country's premier tertiary facility, dates to the establishment of the university's medical school in 1962 [26]. The teaching hospital serves 400,000 patients on average, mostly from Accra's urban, peri-urban and slum populations, but also across the country and the larger West African subregion [27].

The University of Cape Coast is located within the Cape Coast metropolis, a historic, more rural and suburban city. It's College of Health and Allied Sciences consists of the School of Pharmacy and Pharmaceutical Sciences, School of Medical Sciences, School of Nursing and Midwifery, School of Allied Health Sciences and the School of Optometry and Vision Sciences [28]. It is affiliated with the Cape Coast Teaching Hospital, a 400 bed hospital that serves the cape coast town and surrounding rural towns and villages [29].

The two sites also reflect distinct patient populations, offering a comprehensive perspective. Additional key informant interviews were held with representatives from the Ghana Health Service (GHS) at the following locations:

- Mfantseman Ghana Health Service District Directorate
- Ministry of Health
- Office of the National Presidential Advisor on Health, Jubilee House

Community member interviews were conducted in two significant community hubs:

- Oguaa Market
- Korle Gonno Townsquare

Study Population

For the qualitative phases, which included focus group discussions and interviews, the sample size was determined based on achieving thematic saturation. Participants were recruited through purposive sampling from health professional programs. Health professional students enrolled in medical, pharmacy, nursing, public health programs, social welfare, biomedical laboratory, nutrition science, and other health-related disciplines at the University of Ghana Medical School and the University of Cape Coast School of Medicine were eligible to participate in this study.

Faculty members and deans of the participating health professional schools within both universities were eligible to participate. Officials from various levels of the Ghana Health Service were invited to participate. Two nurses from the Mfantseman District Health Directorate, the director of the directorate and the former director of the Ghana Health Service, who currently serves as the National Presidential Advisor on Health were interviewed.

Community members from the district in which the medical schools are located will be eligible to participate. Only individuals above the age of 18 with capacity to consent were included. Vulnerable populations, such as minors, pregnant individuals, or individuals with compromised mental capacity, were not included in this study. Participation was entirely voluntary, and participants were fully informed about the study's objectives and procedures before providing consent.

Outcome Variables

1. Health Professional Students' Perspectives on NCD Burden and Access Gaps in Screening, Management and Self-Care Education: Assesses students' perceptions of the burden of common NCDs in Ghana and their insights into access gaps related to NCD screening, management, and self-care education.

2. Students' Interest Level in Leading an Intervention: Measures the level of interest and enthusiasm among health professional students in taking a leadership role in NCD-focused interventions, identifying factors influencing their willingness to participate. We adapted a Likert interest level assessment scale.

3. Key Requirements: Identifies the necessary elements for a successful student-led intervention.

4. Level of Institutional Support for Interventions: Assesses the extent of institutional support (financial and technical/supervisory resources) for student-led interventions addressing NCD access gaps. This variable is qualitative and was gathered through key informant interviews.

5. Community Receptiveness to Student-Led Interventions: This variable investigates the initial receptiveness of the community towards potential student-led interventions aimed at addressing NCD-related healthcare needs. It aims to gauge the community's willingness to engage with and benefit from these initiatives. We will qualitatively explore community receptiveness through focus group discussions.

These variables collectively offer a comprehensive assessment of health professional student perspectives, stakeholder perceptions, and community readiness regarding student-led interventions to address NCD access gaps in Ghana.

Data Analysis

Qualitative Phase (Focus Group Discussions and Key Informant Interviews): The qualitative data collected from focus group discussions and key informant interviews were analyzed using thematic analysis. Interviews and focus group discussions were transcribed by B.F, E.B, A.B, and B.A with adjustments made following respondents' validation. The transcripts were then imported into NVIVO, a qualitative data analysis program. Two researchers, B.F and B.A, independently coded the transcripts, and any differences in coding were discussed until full consensus was reached. In the second level of analysis, the researchers continuously compared the codes, their meanings, and their interrelationships to form comprehensive categories and themes.

Quantitative Phase (Structured Surveys): Descriptive statistics were used to summarize demographic information, familiarity with NCDs, and interest in participation, as well as perception of SRFC effectiveness. Chi-square tests were conducted to assess differences in interest among students from various programs and academic levels. Additionally, logistic regression was employed determine whether familiarity with NCDs influences students' willingness to participate in the proposed intervention.

Ethical and Safety Considerations

Ethical clearance was obtained from the Ghana Health Service and Yale University Institutional Review Boards**.** Before consent forms were signed, participants were provided with an information sheet that was read and explained to them. Data collection was only conducted after participants signed the consent form (see consent form in Module III). The potential risks to participants included emotional or psychological discomfort that might arise during focus group discussions and interviews, particularly when discussing personal experiences related to NCDs. To mitigate these risks, sensitive and respectful communication strategies were employed, and participants were assured of their voluntary participation and the confidentiality of their responses.

Participant confidentiality was strictly maintained throughout the study. All collected data were de-identified, and personal identifiers were removed from transcripts and survey responses. Data were securely stored on password-protected servers or in locked cabinets, accessible only to authorized research personnel. A comprehensive data management plan ensured the secure storage, access, and use of collected data, and the research team adhered to all data protection regulations.

Participants were informed that participation was entirely voluntary and that they could withdraw at any time without penalty. They were assured that their decision not to participate or to withdraw would not affect their treatment or participation in any other aspect of the study. While participants were not compensated for their involvement, refreshments were provided during focus group discussions. The duration of the interviews was kept reasonable (20-40 minutes), respecting participants' time and well-being. Participants were informed in advance of the estimated time commitment.

Clear guidelines on data ownership were established, outlining the rights and responsibilities of both the participants and the research team. Participants were informed about how the data would be used and any potential sharing arrangements. The research team fully disclosed any

potential conflicts of interest that could influence the study. This declaration was made in both the research documentation and any subsequent publications.

Results

Participants Demographics

From January to March 2024, we conducted all focus group discussions and key informant interviews. In April 2024, we disseminated the structured survey to health professional students across the two universities. Participants were recruited through purposive sampling from health professional programs. The breakdown is as follows:

- Six Focus group discussions with a total of 48 health professional students across both universities
- Six university faculty key informant interviews from both campuses.
- Four key informant interviews with representatives from the Ghana Health Service.
- Two Focus group discussions with a total of 12 community members.

For the quantitative phase, where a structured survey is administered to 316 health professional students. Participant demographics for the quantitative phase is presented in Table 1 below.

Characteristic	Frequency, n (%)
Age	
Mean	22.29
Standard Deviation	3.11
Minimum	17
Maximum	36
Gender	
Female	167 (52.8)
Male	149 (47.2)
Health Professional Program	
Nursing	82 (25.9)
Pharmacy	81 (25.6)
Allied Health Sciences	72 (22.8)
Medicine	55 (17.4)
Optometry	17 (5.3)
Other	9 (2.8)
Academic Level	
Level 100	73 (23.1)
Level 200	65 (20.1)
Level 300	39 (12.3)
Level 400	64 (20.3)
Level 500	62 (19.6)
Level 600	13 (4.1)

Table 1: Demographic information for the health professional student survey respondents.

Themes

Six themes emerged after integrating findings from both the qualitative and quantitative phase. They are as follows.

Theme 1: High level of familiarity with NCDs and Barriers to NCD Care

1.1 Familiarity with NCDs

There was a widespread familiarity with non-communicable diseases (NCDs) across all stakeholder groups. Health professional students demonstrated their understanding by describing disease transmission mechanisms, systemic impacts, or by citing specific examples.

The most common descriptions highlighted the non-infectious or non-transmissible nature of these diseases, along with their systemic characteristics. Frequently mentioned examples included hypertension, diabetes, cancers, and stroke.

"I think non-communicable diseases are disease conditions that are not transmitted from one person to the other." (University of Ghana Focus Group 1 Student 1/UG1S1).

"If I hear non-communicable disease, well what comes to mind is a personal, more or less a systemic disorder." (University of Cape Coast Focus Group 1 Student 2/UC1S2).

"When I hear non-communicable diseases, what usually comes to mind is conditions like diabetes, hypertension, [] because they can't be transmitted from one person to the other." (UG2S3).

To further explore this familiarity, a structured survey was administered to health professional students. Results indicated that 58% of respondents rated their familiarity with NCDs at level 4 or higher on a 5-point scale (Figure 1). The most commonly reported NCDs on the survey mirrored the examples mentioned during the focus group discussions (Figure 2). Furthermore, 295 (93.4%) of the health professional student respondents believed that NCDs pose a significant health issue in Ghana.

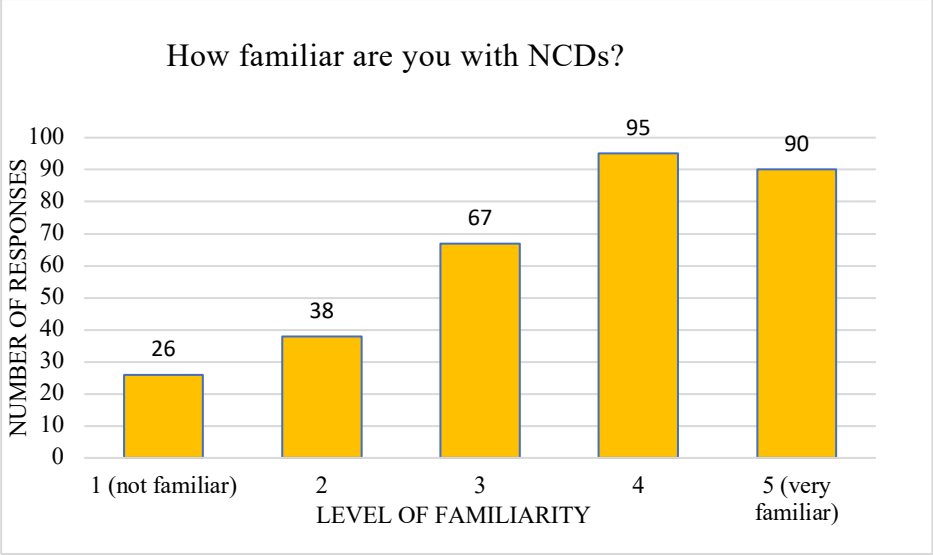

Figure 1: Health professional students' rating of their level of familiarity with NCDs with Level 1 indicating no familiarity and Level 5 indicating high familiarity.

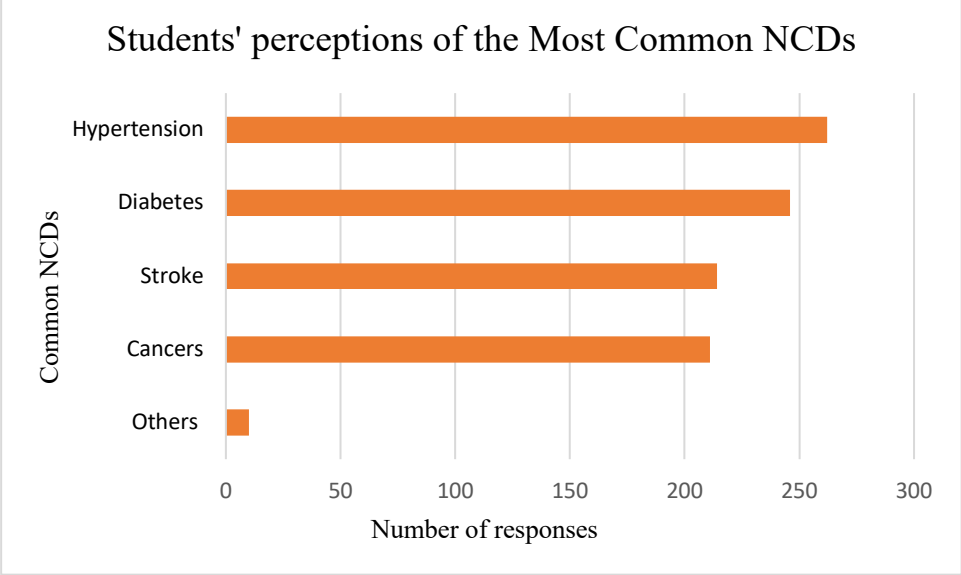

Figure 2: Health professional students' perception of the most common NCDs. "Others" include Asthma, Sickle Cell Anemia, Jaundice and Thyrotoxicosis

1.2 Health Professional Students' Experiences with NCDs.

Health professional students' understanding of non-communicable diseases (NCDs) in Ghana was deeply shaped by personal encounters, formal education, and community engagement experiences.

1.2.1 Personal Experiences.

Many participants shared personal stories about family members or acquaintances diagnosed with NCDs. These experiences often highlighted the significant challenges and hardships associated with managing these conditions.

"My father had liver cancer but before that, he had diabetes, a terminal one. So, he passed away last year." (UC2S2).

"My roommate was living with diabetes. It's not a good experience trust me". (UC1S5).

1.2.2 Formal Education and Training.

Students also pointed to formal education settings as a significant source of their knowledge about NCDs. This included classroom lessons, textbook readings, and hands-on experiences in clinical and research environments.

"Personally, I did my national service [at the] Noguchi [Memorial Research Institute] and there was only one department for noncommunicable diseases so that was [] my first introduction to the word [] what was done most of the time was cancer research." (UG1S1)

"I think all, but it started from what I learned about during my undergrad studies. Yes, like, noncommunicable diseases are growing." (UG1S3)

1.2.3 Community Engagement and Outreach Programs

Health outreach programs further enhanced students' understanding by providing firsthand exposure to the prevalence of NCDs, even among younger populations.

"We held a program in some high schools around, and it was surprising to see some of these diseases in fifteen-year-olds, sixteen-year-old children." (UC1S6).

1.3 Barriers to NCD Screening, Early Management and Self-Care Education

Across the various stakeholders, five subthemes emerged while assessing the perceived barriers in accessing screening, early management, and self-care education on NCDs in Ghana.

1.3.1 Lack of Awareness and Education on NCDs

Stakeholders also identified the lack of general awareness about NCDs as a significant barrier to accessing screening, education, and early management. They reported that many Ghanaians often experience symptoms but attribute them to minor ailments, leading to self-medication without seeking proper diagnosis.

"I think one problem with screening of NCDs is [that] most people are not aware of the conditions. [] Most of the market [women], when their head is aching, they just walk in [to a drug store] and they get [paracetamol] or something [over the counter] but that headache could be anything. [] When we make them aware that even a simple headache can be a sign of a very dangerous NCD or [create] awareness [about] the symptoms of hypertension - headache, dizziness, and all that - they would be aware and then take a step to get themselves screened." (UG2S2).

Health professional students emphasized that even when Ghanaians are aware of their diagnosis, they often lack an understanding of disease mechanisms, etiology, and aggravating factors.

"Sometimes too they know but they don't know much so maybe they probably just know the surface like ['Oh, I have high blood pressure'], or [I have diabetes] Sometimes just think that diabetes [comes from] just eating sugar [] but they don't know that eating rice and other things can also lead to cause a spike. (UG1S3).

Faculty members also underscored the asymptomatic nature of common NCDs being a major barrier. Given the lack of overt symptoms and health findings, most Ghanaians do not see the need for screening or early management. They further argued that the lack of education and awareness on the complications of common NCDs contributes to a prevailing reluctance towards preventative diagnoses and management.

"Some people may not be well-educated to understand that if you don't manage the disease well at the hospital, you can have complications that can end your life." (University of Ghana Faculty Interview 1/UGF1)

"They do not know that they have got this disease because it sometimes comes without any symptoms. So, they feel like they are also okay" (University of Cape Coast Faculty Interview 1/UCF1)

"The issue is that they also don't know the implications of it. If I harbor a disease that doesn't put me down, and I am able to go about my duties and everyday activities all the time, why must I bother?" (UCF2)

1.3.2 Socio-cultural Barriers

Stakeholders revealed that socio-cultural barriers are at the core of the challenges hindering the advancement of care—preventive, promotive, and therapeutic—for NCDs. They shared that many Ghanaians harbor beliefs and culturally ingrained notions about NCDs that deter health-seeking behaviors. Common spiritual beliefs surrounding certain NCDs prevent early screening and intervention implementations, and the strong influence of some religious leaders sometimes contradicts health professionals' recommendations.

"So, a challenge to non-communicable disease screening and implementing intervention would be the patient's spiritual beliefs. Some people are strongly attached to their religious affiliations and religious leaders such that, even when the doctor has told them that you are predisposed to this condition, you should live your lifestyle as such. And if you don't do that, you're wasting your condition. Because your pastors or religious leaders told them that, oh no, as a child of God, you don't believe in the Holy Spirit, that kind of thing, the Holy Spirit will prove you, you can't have such a condition, they incline their attention towards what their spiritual leaders say and do not focus on what the doctor is telling them to do." (UG2S6)

Health professional students pointed out the apathy and indifference toward NCDs, given how common and asymptomatic they can be. They argued that this lack of urgency surrounding NCD care results in a lackadaisical approach toward preventive care and early management of even diagnosed conditions.

"Last semester, when we were having our internship at one of the clinics, we realized that [for] most of the people aged 45 and upwards, we are not able to check their refractive errors because most of them had a high level of sugar in their system. [] When you talk to them, they will be like they don't know or 'ye be wu nti yenda?'. [translation: is it because we will die that we will not sleep?] They are indifferent about it." (UC3S3)

Other students also expressed that many Ghanaians were unwilling to make the lifestyle changes, particularly dietary modifications, needed to prevent or even address common NCDs like hypertension and diabetes. This resistance to change, some participants argued, prevents many from seeking health-promotive screening and assessment in the first place.

"My cousin checked his blood group and then based on that they told him that there are some certain types of food groups that are not good for him and then he came home and asked me whether I have checked mine and I told him that I haven't. He replied me saying that I shouldn't go and check because if I go, they will restrict you from taking in your favorite foods." (UG1S6)

Faculty members also highlighted the cultural significance of seeking healthcare at a hospital and the stigma it sometimes carries. One faculty member noted that because seeking preventive care is uncommon, there is a connotation that one is very sick when visiting the hospital, leading to social stigma.

"In our setting, going to the hospital has a connotation- [that]you are a sick person. It's even worse with mental health. When [you visit] to the mental hospital, then it means that you are a mad person. That is even worse". (UCF1)

1.3.3 Health System Challenges

Stakeholders identified the lack of health infrastructure, such as hospitals and CHPS compounds, and the scarcity of health professionals, particularly in rural communities, as major barriers to accessing care for NCDs. Health professional students lamented that most CHPS compounds are staffed by only one nurse, who cannot often attend to the variety of cases, necessitating referrals and transfers to larger district, municipal, or regional hospitals, which are often kilometers away. Additionally, the poor condition of roads leading to these facilities further impedes access. Participants also mentioned that the lack of requisite screening and diagnostic tools impedes access to care for NCDs even for those interested in routine screening and early management.

"Last month, we went for [Community-based Experience and Service (CoBES) expedition]. In the villages, some of the things I personally realized was most people after screening they were suffering from high blood pressure and looking at our data we had [], they don't have access to health facilities." (UC3S4)

"The village people actually want to visit the clinics but here is the case even if they have a CHPS compound there, they don't have health professionals there. They will have, let's say, only one nurse or something." (UC3S2)

"After educating some of them, they have to go to the clinic for screening. And here is the case [where] most of the clinics lack the important equipment for the various screening." (UC2S6).

Among university faculty members, the long wait times at the health centers, due to a shortage of trained health professionals, lack of adequate diagnostic and treatment tools, a fragmented medical system, or workflow inefficiencies, is a significant barrier to NCD care. They reported that patients had to report as early as dawn and spend several hours at the

hospital, often forgoing a day's activities. This leads to a loss of income and serves as a major deterrent to seeking preemptive preventative services such as early screening and management.

"So, basically, you see, the waiting times of hospitals are quite long, and patients wouldn't want to stay in queues for a very long time. So, if they can't go to herbalists and get medication in a few seconds, they would rather prefer to wait there." (UGF1).

"If you go to the hospital today, [] you have to forgo whatever you have to do and then sit at the hospital, sometimes [from] dawn. You have to go there at dawn [] because if you wait and go at the normal time when you expect the other people, some people [would] have already gone there [around] 4 [AM], so by the time you go there, you are number 50." (UCF2).

Finally, stakeholders decried the dysfunctional scheduling and appointment system, which often contributed to the long wait times and led to a loss of follow-up care. Participants raised concerns about poor communication between health professionals and patients and the loss of patients to follow-up, often due to long travel times and distances to access health services.

"I think the check-up systems [and] the follow-up system is Ghana is not so proper []. Sometimes [the health professional] just call one or twice [and] they give up [and] lose contact." (UG1S3).

"Sometimes the communication between the health professional and the person checking the BP is not effective." (UC1S5).

1.3.4 Financial Challenges

All stakeholders identified the cost of healthcare as a significant barrier to seeking and accessing NCD care in Ghana. Due to the rising healthcare costs and recent economic declines, many Ghanaians reportedly opt for cheaper alternatives, often turning to traditional treatment methods like herbalists. This trend is especially prevalent in rural areas, where there is widespread perception that visiting a hospital invariably incurs financial charges, regardless of the illness, discouraging people from seeking professional medical help.

"Currently in Ghana, with how our economic status is, most people would not prefer to visit the hospitals because of the rate at which bills are being increased at the hospitals. [] Because of that they rather prefer the traditional methods of treatment." (UC2S3).

"The perception [the villagers] have when they go to the hospital is that the professionals there will not allow them to come back without paying something." (UC1S1)

Stakeholders also emphasized that the cost of medications, particularly for NCDs requiring long-term treatment, constitutes another major financial barrier. Although the National Health Insurance Scheme covers some medications for common NCDs, not all are included, and their costs, relative to the average income levels in rural areas, can be prohibitive.

"Let's say the patient presented with a headache, but the patient has a high blood pressure, hypertension. He comes to the clinic, you tell the person that 'you have hypertension, you have to take this medication for six months or for a lifetime'. Because of the cost [], the patients wouldn't necessarily stick with the intervention you've provided because most of them do [low paying] jobs and the money they get at the end of the month would usually be spent on medication [] when they have bills to pay." (Ghana Health Service Interview 2/GHS2)

"The drugs too will be an issue [especially for] somebody who is from a rural area. The person has come to the hospital. Now you've written a prescription for this person and that drug is not covered by the National Health Insurance Scheme. [] Let's say the drug is listed [as] 50 Ghana Cedis. The person's wage for the whole day is 5 Cedis. The person has come to the hospital with just 10 Ghana Cedi), and you expect the person to go and buy a drug that costs 50 cedis?" (UC1S2)

To further understand what how widespread these perceptions of the barriers to accessing screening, education, and early management of NCDs in Ghana, health professional students were assessed in the survey. Results revealed in Figure 3 below reveal that the most common barriers were the high cost of healthcare services, the lack of healthcare facilities and the limited awareness and education on NCDs in Ghana each with more than 200 of the 316 agreeing.

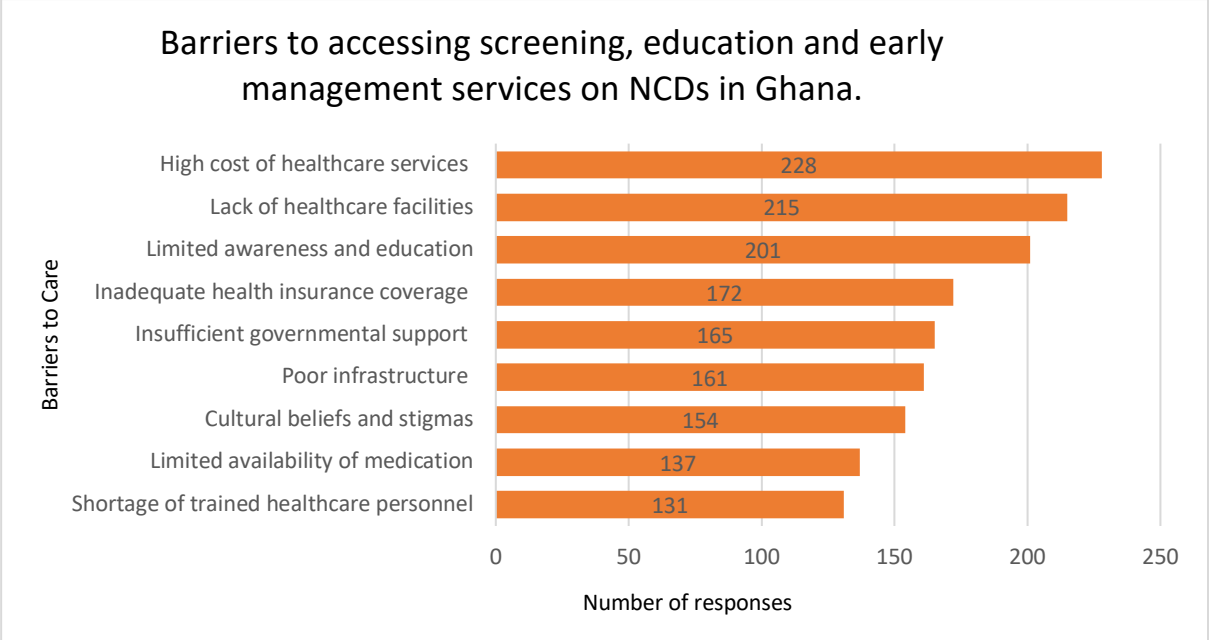

Figure 3: Health professional students' assessment of the barriers to accessing screening, early management and self-care education on NCDs in Ghana.

Theme 2: Demonstrable Interest in Student-led Interventions for NCD Screening, Early Management and Self-care Education

2.1 Interest Among University Faculty and GHS Officials

There was strong interest and support for student-led interventions in NCD care across all stakeholder groups, including health professional students, university faculty and leadership, Ghana Health Service (GHS) officials, and community members. Stakeholders acknowledged the severity of NCDs as a public health concern and recognized the potential of student-led initiatives to bridge access gaps, particularly in screening, early management, and self-care education. Four subthemes emerged regarding the reasons for this interest among faculty and GHS officials.

2.1.1 Alignment with Institutional Mission and Plans

University faculty, deans, and GHS officials emphasized that such interventions align with their institutions' missions of addressing critical health challenges and serving communities.

"The University itself, University of Ghana promotes this multidisciplinary research and collaboration, and the available funding also promotes this. So, we have actually a center at the university of Ghana established to manage and control NCDs." (UGF1).

"Well, you see, UCC is an equal opportunity university, for all, whether students or staff. Again, UCC is known for its community service. For instance, at the School of Pharmacy, we do CoBES, where students go into the community and then, yes, render healthcare services. Some of the things they do is to educate the public, and again, to monitor some of these diseases, and do the referrals where appropriate. [] So, on our standards, we should encourage [any student-led initiative]" (UCF3).

"What students can do is to also form associations like what is in existence in our medical schools in the public universities. So once a year, when there's the association's week celebrations, you move to a community where you think the community residents don't have access or opportunity to maybe get doctors to advise them. So, when you get there, you set up a tent and do medical screening and then you can also educate them. This is what the GHS sets out to do, so if students want to help and we can do this together, it will really help." (GHS4)

University faculty emphasized how student-led initiatives complement interprofessional education goals and align with institutional plans to integrate interprofessional courses into the curriculum. They noted a growing realization among students of the need for

interprofessional collaboration and highlighted ongoing advocacy efforts to incorporate this approach into academic programs.

"It is a very good idea. It is something everybody should embrace and it's something we should all encourage. Last year, if I may remember, the College [of Health and Allied Sciences] started trying to put up interprofessional courses and programs. The curriculum is, should I say, the courses are ready, It has been discussed at the college level. But there are some few challenges we have to overcome which are basically administrative. This is a new course we are introducing to the curriculum. The [current] curriculum has been accredited for some period of years [and] you can't just introduce programs into it. So, we have to wait. When we are undergoing re-accreditation, we can infuse some of these programs. It's something we are looking at and we know the advantages it will offer the students. (UCF3).

"Yes, I was in a particular meeting for instance, and that meeting, I think the medical student brought up those ideas [for interprofessional collaboration]. They [went] to the community, and they realized that if the nurses were there, it would have been a great experience than [] being limited to only themselves. So, they even decided to even from a healthcare association or like health students' association at the level of college, where it will involve almost all the leaders from the various schools so that they can coordinate." (UCF2).

2.1.2 Expanding Access to Care for NCDs.

Faculty members also highlighted the initiative's potential to expand healthcare services to underserved communities by utilizing student efforts under supervision. One faculty member emphasized the resource challenges in establishing satellite clinics and how student involvement could address these gaps:

"Currently, UCC is building satellite campuses. One is at Agona Nyarkrom [where] we will have nursing students, pharmacy students, [and] other students. If we have student-led clinics with supervisors, it will greatly help." (UCF2)

"We know that the staff at the hospital is actually not enough to support the cases on campus. Again, the hospital also serves communities around the university. There are a lot of people coming there. That is one. Then, two, we take our students there for rotations. And they always complain the place is choked. So, we need to expand the services. So, we [can] have a student clinic here which is student-led." (UCF3).

Ghana Health Service (GHS) officials similarly acknowledged the role students could play in expanding access to care, particularly through collaboration with their Wellness Clinics. These clinics, established by the GHS in rural and underserved communities, focus on essential NCD screening, early management, and self-care education. Officials highlighted

the potential for students to contribute meaningfully by supplementing ongoing activities at these clinics.

"When we mention our health promotion efforts, it's necessary to mention that we love to collaborate. So, by all means, we'll collaborate because one cannot do the work all alone. Students can partner with the Wellness Clinics and support the work we do. That will surely increase access for so many people." (GHS2)

"It'll be a supplement. A supplement because you're coming with your own resources, it's something we want to achieve but we're unable to. No, it's not even a supplement but a complement, you're complementing what we're doing. That's how I see it personally. It will help. It's part of my objectives for the year and I am not able to achieve this because of lack of resources. Students are trained by and will be supervised by their supervisors to do the same thing I want to do. It'll help make my work easier." (GHS3)

2.1.3 Demonstrated Students' Capacity

Faculty members highlighted that students already engage in various community health initiatives, laying a strong foundation for expanded roles in an NCD-focused student-led intervention. They shared examples of successful past and current student-led initiatives, such as the annual "Health Weeks," emphasizing their confidence in students' ability to lead and sustain such efforts.

"We believe students can contribute to identifying these disease conditions early and also promote health awareness through health education, outreaches to let the community-dwelling citizens be aware that these are conditions that are mainly manageable and could prevent complications." (UGF1.)

"Medical students at the University of Ghana medical school have a vibrant student association which have been working over the years and I happen to have been the general secretary during my time in school, so I actively followed with what they do. We have a week set aside, we call it the health week, where students on their own are sent to different regions and different areas of the country. Usually, we come up with a theme, whether it's Malaria prevention or hypertension prevention and then the students go out and contribute through community engagement activities in line with the theme of the year. (UGF2).

Another example cited was a student-led initiative by the Student Representative Council (SRC) that improved access to medications through partnerships with local pharmacies. This initiative demonstrated students' capability to identify healthcare challenges and implement practical solutions:

"The Student Representative Council, which is the SRC, took the initiative of trying to ease access to health care for the students, especially when it comes to purchasing their medications. At first, you had to come to University Hospital and get your drugs from there, and then if the drugs are not covered by the insurance, then the university will reimburse. The students have taken the initiative to [forge] a partnership or MOU with some major pharmacy shops in the metropolis so that the student can access their drugs from those places, and the money will be brought, or the bill will be sent to them for them to reimburse. That is a student-led initiative." (UCF2).

2.1.4 Opportunity for Students Education and Training

University leaders also emphasized the potential for student-led initiatives to provide valuable learning and training opportunities. Through these programs, students could enhance their clinical knowledge, patient interaction skills, and practical experience, ultimately improving their job readiness and transition into the workforce.

"We have a student clinic on UCC campus. The student clinic is not necessarily managed by students, but it's for students. Now, we also believe that it's an opportunity for some of our students in clinical years to also be there to understudy their senior colleagues." (UCF2).

2.2 Health Professional Students' Motivating Factors

Health professional students expressed clear interest in participating in a student-run free clinic (SRFC) focused on NCD screening, early management, and self-care education. This interest was evident during focus group discussions and supported by survey results, where 274 (86.7%) of the student respondents indicated willingness to participate in the SRFC initiative.

Quantitative analysis using a chi-square test showed no significant association between students' willingness to participate and their academic programs or levels. However, logistic regression analysis revealed that familiarity with NCDs is a significant predictor of interest in SRFCs ($\beta = 0.345$, $p = 0.007$). Specifically, for every unit increase in familiarity with NCDs, the odds of willingness to participate increased by approximately 41% (odds ratio = 1.41).

These findings suggest that interest in SRFCs is widespread among health professional students, regardless of their academic background or program. However, greater familiarity with NCDs significantly enhances students' interest in engaging with initiatives like SRFCs to address gaps in access to care.

Academic Program Vs. Willingness to Participate

Academic Program	Yes	No
Allied Health Sciences	60	12
Nursing	65	17
Pharmacy	75	6
Medicine	51	4
Optometry	16	1
Other	7	2
Total	274	42
Chi-Square (χ^2)	10.25	
P-value	0.069	

Table 2. Chi-square analysis of students' academic program of study versus their willingness to participate in a SRFC. The chi-square test ($\chi^2 = 10.25$, $p = 0.069$) indicates a marginally non-significant association between health professional students' academic program and willingness to participating in a SRFC.

Academic Level Vs. Willingness to Participate

Academic Level	Yes	No
Level 100	63	10
Level 200	57	8
Level 300	34	5
Level 400	56	8
Level 500	55	7
Level 600	9	4
Total	274	42
Chi-Square (χ^2)	3.77	
P-value	0.583	

Table 3. Chi-square analysis of students' academic program of study versus their willingness to participate in a SRFC. The chi-square test ($\chi^2 = 3.77$, $p = 0.583$) indicates no significant association between health professional students' academic level and their willingness to participating in a SRFC.

Familiarity with NCDs vs. Willingness to Participate

Parameter	Coefficient	P-value	Odds Ratio
Intercept	0.7058	0.1102	2.0254
Familiarity with NCDs	0.3454	0.0071	1.4126

Table 4. Logistic regression analysis of students' familiarity with NCDs versus their willingness to participate in a SRFC. Significant positive relationship between NCD familiarity and interest (odds ratio = 1.41, p = 0.007).

When health professional students were asked about the reasons for their interest in participating in the clinics, four major subthemes emerged.

2.2.1 Community and Social Impact

The most frequently cited motivation was the opportunity to make a meaningful contribution to communities. Many students expressed enthusiasm for giving back and acknowledged the clinic's potential to address the rising burden of NCDs in Ghana. Some students mentioned that they had already envisioned or initiated similar initiatives, underscoring their genuine interest in the cause.

"Yeah, I absolutely would. It's great to give back to the community. And it looks good on the resume. It gives me experience in the clinic as well." (UG2S5)

"Early last semester level 300 second semester, I had this idea about we the students alone establishing something like this. So, I told my friend. He is also a Medical Laboratory student. He was like UCC, it will be tough. It's something I [already] had in mind so when I saw it. I was like 'yes!'. [] I am really interested. I will ensure everything that is needed and just like ensuring that it's good." (UC3S1).

2.2.2 Academic and Professional Development

Students valued the opportunity to apply theoretical knowledge in a practical setting. They recognized how the clinic could enhance their resumes, employability, and skills, including leadership and patient interaction.

"Personally, I would also join if there is an opportunity because one, it will help me to learn me to learn and two, help me to build connections, not only with the health professionals but also with the students and [] the patients that will come." (UC2S4).

"I think it's a great opportunity that should be implemented, because even with administrative work, we have held students who are already into leadership positions, who already performed some form of administrative duties. So, it gives them another opportunity to further their skills and then bring that on board." (UC2S1).

2.2.3 Opportunities for Interprofessional Collaboration

Many students highlighted the lack of current opportunities to collaborate with peers from other health professional programs. The SRFC was viewed as a platform to foster interprofessional learning and teamwork.

"I have not gotten the chance to I mean attend program with different health professionals. So even seeing that people from different health areas are coming together for such a program like this, I think it will be wise to be a part of this so that we all share knowledge and learn from each other" (UC1S7).

2.2.4 Incentives

Students also mentioned that tangible incentives, such as refreshments, paraphernalia, or other forms of recognition, could increase participation and sustain engagement.

"Students want 'item 13' [refreshments] and T-shirts. So, if you provide that, I will keep showing up". (UG3S2)

To determine how prevalent these motivating factors were among health professional students, we evaluated them through the survey. As shown in Figure 4, all four motivating factors resonated with at least half of the respondents. Notably, "Community and Social Impact" and "Academic and Professional Development" emerged as the most influential, with over 200 of the participants endorsing these factors.

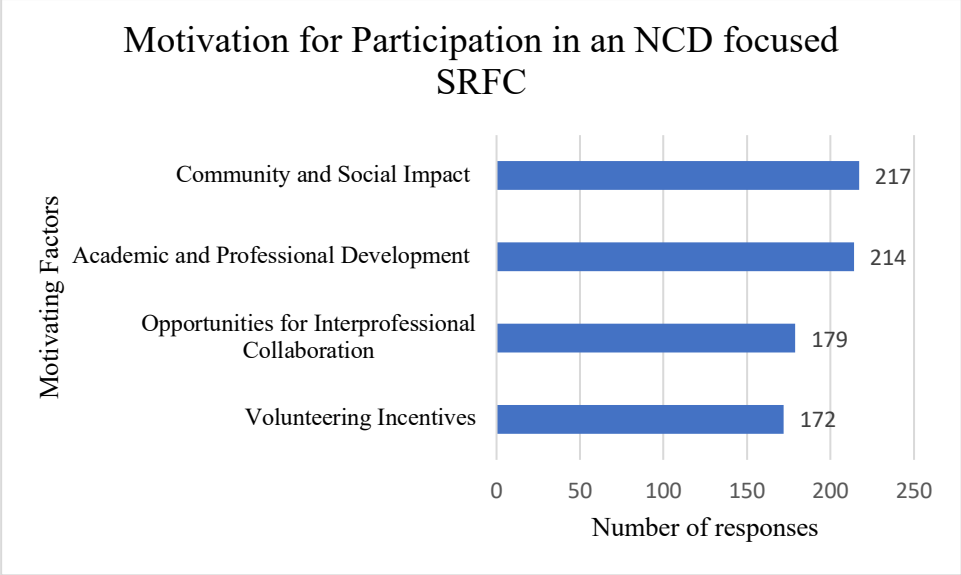

Figure 4: Motiving factors to participate in an NCD focused student-run free clinic among health professional students.

2.3 Health Professional Students' Discouraging Factors

We also assessed the factors that could potentially discourage students from participating in the clinic, and three major subthemes emerged.

2.3.1 Academic Obligations and Conflicts

The first, and by far the most common reason, was competing academic obligations. While most students were excited to be part of the initiative, there was a widespread sentiment that their schoolwork came first and would be a key determinant of their availability and ability to participate. Some students also expressed frustration with their packed school schedules and curricula, which left little room for meaningful extracurricular activities. Additionally, students noted that a lack of collaboration among peers, which could result in excessive workloads, would also discourage participation.

"Okay, for me personally, if it doesn't clash with any of my academic activities, why not? Because I am enthused about helping." (UC2S1)

"I feel I'll be interested but maybe like I was saying, if it's going to against my academics or I'm going to get stressed out or something, I'm sure I'll drop out at some point". (UG1S3)

2.3.2 Resource Demands

Another subtheme was the resource demands of participating in the clinic. More specifically, health professional students expressed concerns about the financial resources required for transportation. They noted that if they had to cover transportation costs themselves, they would be less likely to participate. Similarly, students mentioned that a lack of necessary resources for screening and education would discourage their involvement.

"Assuming we are to go to a place and then you tell me to use my own money to fund my own transportation, I mean those things are demotivating factors. Because after all, I'm going to share my knowledge, my time, and now my pocket too?" (UC1S1).

"If there is no means of transport and I will have to spend to go there, I won't be that happy to go for the thing. I will be reluctant. As well as availability of resources to work with" (UC2S7)

2.3.3 Safety Concerns

The final subtheme was safety concerns, particularly regarding the location of the clinic. Students shared that those concerns about security, such as the risk of conflicts or theft, would discourage them from participating in the clinics.

"I will also say the security. [] I wouldn't go to a place where I know they can attack me anytime. Certain areas when you go there you know they can attack you" (UC2S5).

To assess how widespread these motivating and discouraging factors were, we surveyed health professional students during the quantitative phase. Results showed that community and social impact, as well as opportunities for academic and professional development, were the main drivers of students' interest, with more than 210 students agreeing. Conversely, the most significant demotivating factor was academic conflict.

Similarly, we evaluated the prevalence of these discouraging factors through the survey. As illustrated in Figure 5, "Academic Conflicts" emerged as the most significant discouraging factor, standing out as the only factor cited by more than half of the 316 respondents.

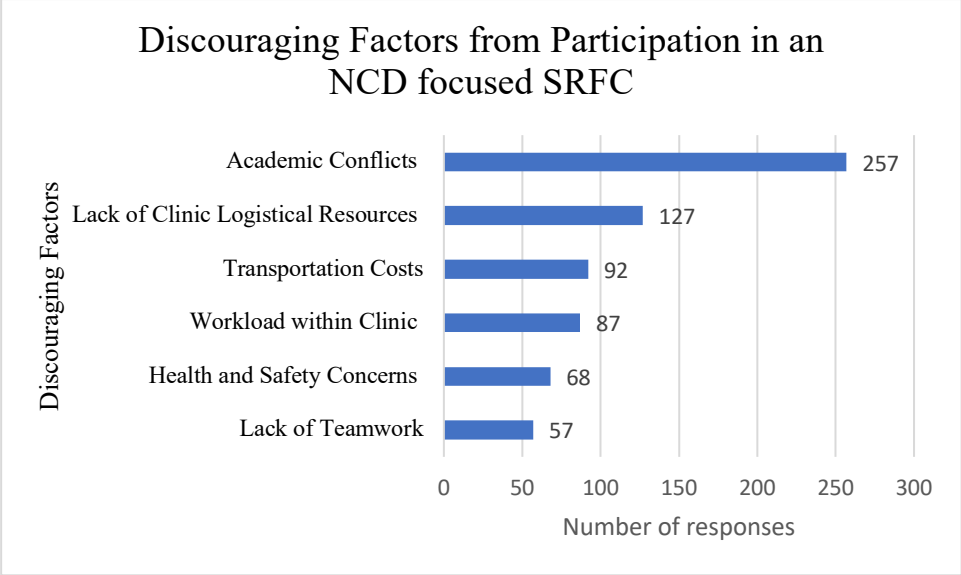

Figure 5: Factors that may discourage health professional students from participating in an NCD focused student-run free clinic.

2.4 Health Professional Students' Perception of the Effectives of SRFCs in Addressing Gaps in NCD Screening, Early Management and Self-care Education

Students' perceptions of the effectiveness of SRFCs in addressing barriers to accessing screening, early management, and self-care education for NCDs in Ghana were evaluated through the survey. Participants rated the perceived effectiveness of SRFCs in improving NCD screening, early management, and education separately (Figures 6, 7, and 8) on a scale of 1 to 5, where 1 represented "not effective" and 5 represented "very effective." Regarding the effectiveness of SRFCs in enhancing NCD screening and early management, 197 out of 316 students (62%) reported a confidence level of 4 or 5. For the effectiveness of SRFCs in improving NCD education, the number rose to 225 respondents, with 109 specifically assigning the highest rating of 5.

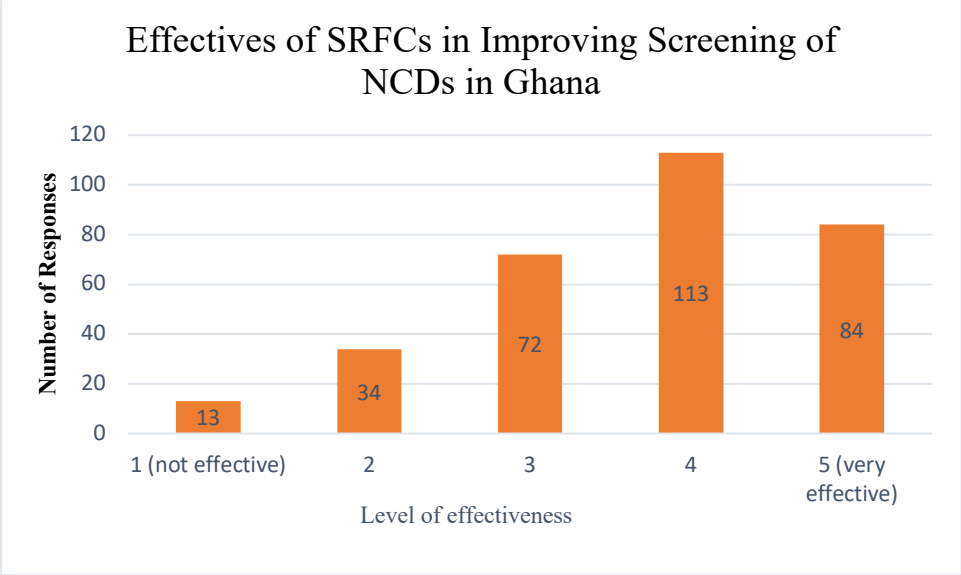

Figure 6: Health professional students' perception of the effectiveness of SRFCs in improving screening of NCDs in Ghana. Level 1 = Not Effective; Level 5= Very Effective

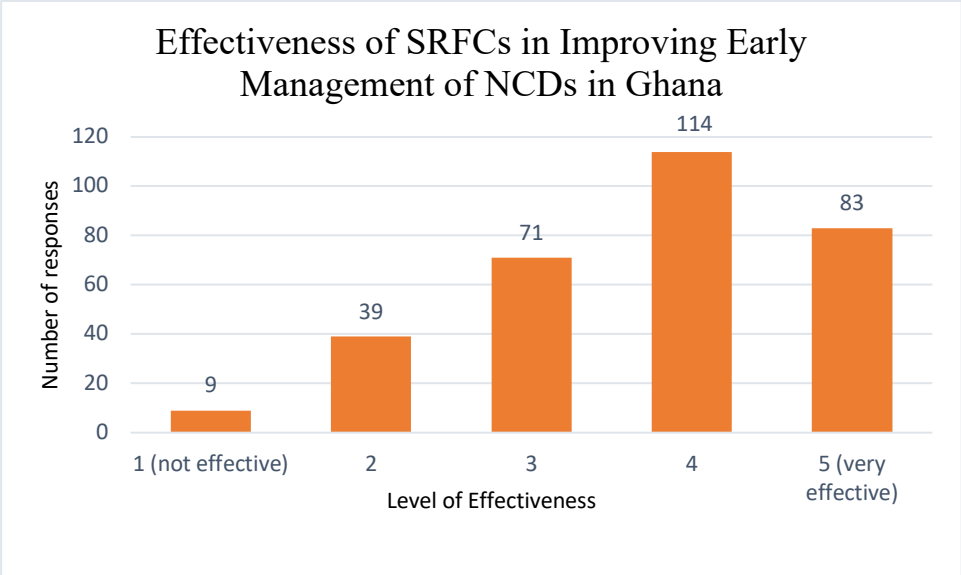

Figure 7: Health professional students' perception of the effectiveness of SRFCs in improving early management of NCDs in Ghana. Level 1 = Not Effective; Level 5= Very Effective.

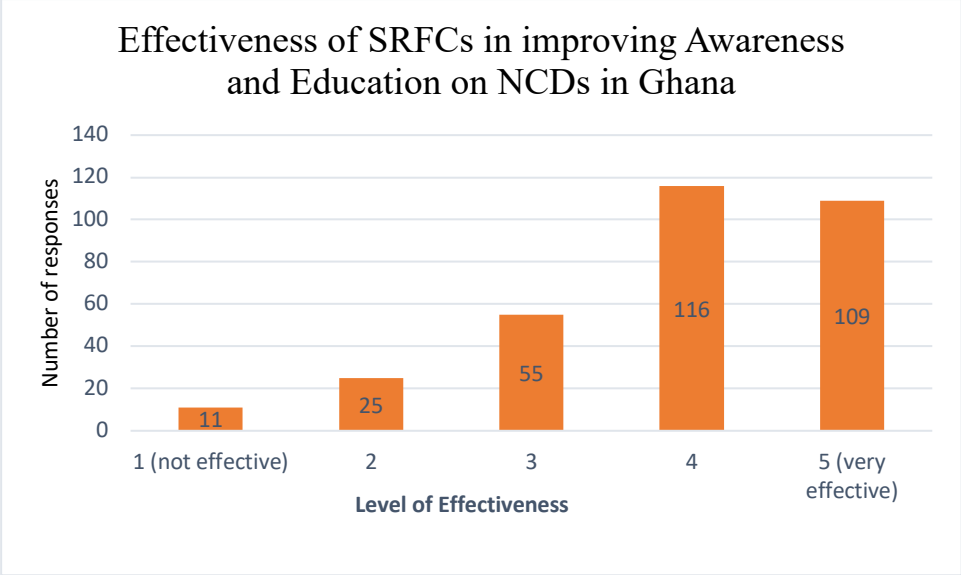

Figure 8: Health professional students' perception of the effectiveness of SRFCs in improving education of NCDs in Ghana. Level 1 = Not Effective; Level 5= Very Effective.

Results from Figure 9 indicate that students perceived SRFCs as most effective in addressing the top three barriers they identified. These barriers included the high cost of healthcare services, the lack of healthcare facilities, and the limited education and awareness of NCDs.

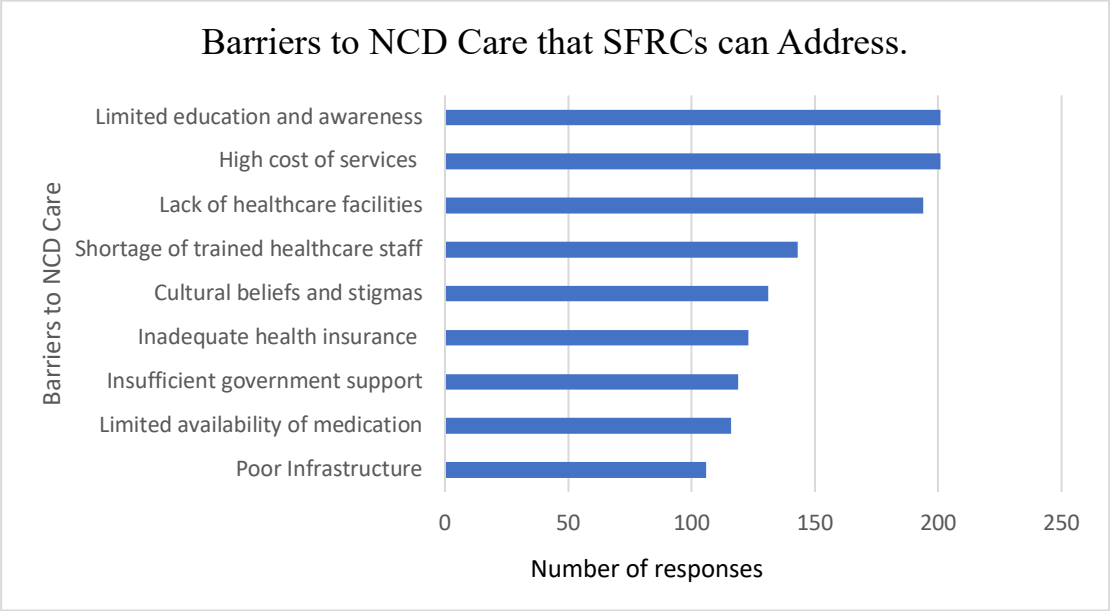

Figure 9: Barriers to NCD screening, early management, and self-care education that SRFCs can address.

2.5 Community Leaders and Members Reception

From the community members and leaders' FGDs, the idea of an NCD-focused student-run free clinic was generally welcomed. Four subthemes emerged when probing the reasons for this positive reception:

2.5.1 Positive Prior Experiences

The first subtheme was the community's previous positive interactions with students through similar student-led initiatives. This familiarity had earned the trust and acceptance of many community members, who looked forward to future initiatives. Some members shared anecdotes of past experiences and how they helped students with simple clinic-related tasks, such as setting up and taking down the clinic canopies and materials. They also assisted in promoting the sessions through official announcements and informal word of mouth. These community members appreciated that students had more time and patience to listen, answer questions, and provide care that felt truly patient-centered. This extra attention fostered a strong, endearing relationship and trust.

"Whenever these students come around, we help them assemble the canopies. They have time and take care of us, and this has been very helpful for us. Through this, we've been able to establish a sort of connection with these students as well." (Community Reception Interview 1 Participant 6/CR1P6)

2.5.2 Necessity of the Initiative

The second subtheme was the recognition of the initiative's necessity. Community members viewed the student-led initiative as a crucial response to the gaps in NCD care. Specifically, they valued the screening, awareness creation, education, treatment planning, management, and follow-up that students would provide within the framework of an SRFC. They noted the lack of such services in their communities and strongly emphasized the need for this kind of care.

"Right now, the only thing that we believe could be of immense help will be the education and guidance. These diseases are killing us, but we don't know. So, if "little doctor" can tell us, do this, don't do that and they can explain the reason to us. It will help" (CR2P3).

"When this initiative is established and we go for screening and some discoveries are uncovered, we will then be able to address it. But until then, we won't know. We need this very urgently." (CR1P1)

2.5.3 Opportunities for Students Education and Training

Community members also viewed the clinic as a valuable opportunity for students' education and training, and they were eager to support this endeavor. They recognized the importance of practical training in students' educational journeys and saw value in students gaining experience through SRFCs. They also acknowledged that these students would eventually become the healthcare professionals the community would rely on, making it in their best interest to support their training.

"These students are coming to practicalize what they have been taught in taking care of us. And if these students are not given the requisite practical training, how then will they be able to effectively go about with their future career which entails taking care of us? So, for me, I am not bothered at all." (C1P3)

2.5.4 Confidence in Experts' Supervision

Lastly, community members were reassured by the assumption that the student-led clinic would be under expert supervision. Their past experiences with students had built trust in the students' institutions and supervisors, making them more receptive to the idea. Many community members were familiar with the practice of students working under supervision in teaching hospitals and training facilities, so they felt comfortable with the idea of students providing care in a similar context.

"These students are going to operate under the auspices of a supervisor, right? Which implies that should in case an emergency pops up, these supervisors will be available to help right? Then I have no problem." (C1P2).

2.6 Other Stakeholders' Perception of Community Reception

To assess other stakeholders' perspectives on community reception of an NCD-focused Student-Run Free Clinic (SRFC), faculty and Ghana Health Service (GHS) officials were asked during the focus group discussions. Most expressed confidence in a positive community reception.

"The community reception is very great, you see. [] When you have students going into the community to educate them, they see 'small doctors', 'small pharmacists', so they are inspired to see such people." (UCF3)

However, they acknowledged that some community members might view students as inexperienced, slow in completing assessments, or incapable of addressing their needs. Despite this, they believed that the number of receptive community members would outweigh the hesitant ones. They suggested that faculty supervision, GHS endorsement, and the onsite support of well-known community health workers and community leaders could help reassure those who might be initially skeptical.

"Some of our clients [tend] to have their own reservations because students [attending to] them can be slow because they are still learning. So, the students will take a longer time seeing them. [] And what even makes the student slower is that we don't let them to miss any steps. [] Yes, they do complete databases." (UGF3).

The reactions from students were similarly mixed. Many students expressed confidence in achieving positive community reception, citing prior personal experiences with community-based student-led initiatives. Many of these students reported that community members often couldn't distinguish between trainees and health professionals. If they were receiving free care, they didn't mind who was providing it.

"From my experience, when we go to a community, usually they (community members) are happy. [] At that point, they can even call you "doctors". They will share whatever is wrong with them. They want your advice." (UC2S3)

"They receive the students very well, better than [they receive] the staff nurses. We went for a community health visit, and they said [] the students have time for them but the staff nurses, they will always be insulting them and shouting at them." (UC3S4)

However, some students voiced concerns about community reception, sharing experiences where community members refused care from a health professional student.

"Initially they won't take you seriously. [] Because even in the clinic, when you want to help with taking their refractive errors, they will tell the doctor not to let the 'children' see them. So definitely starting something like this will be bit difficult." (UC3S3)

Theme 3: The Need for Onsite Supervision

Across all stakeholder groups, the need for onsite supervision was identified as a key requirement for the feasibility and success of any student-led initiative aimed at addressing NCDs. This requirement was rooted in concerns about the legal implications of unlicensed medical practice. Faculty and Ghana Health Service (GHS) officials emphasized that, according to Ghanaian law, health professional students are not licensed to treat patients and would need to operate under the supervision of licensed healthcare professionals. Some deans voiced concerns that the term "student-run" could imply autonomy, raising questions about the legal and ethical implications of operating without proper oversight.

"So, for me, the issue is that these are students, and students are not doctors. And if you say a student-led clinic, then the regulator comes in. What can they do and what can they not do? So, if you want to do all these things, then you need to sit in the context of a school program where you have facilitators always present." (UCF1)

"As for medical screening, yes, they can do medical screening and that's not a problem. But we don't want a situation where people will also start setting up such clinics when they have not obtained any form of legal rights to do that. So, once you are embarking on such an initiative, you should have some qualified nurses and health professionals around to supervise." (GHS1)

This concern was also echoed by health professional students during the focus group discussions. They acknowledged the ethical and legal ramifications, especially in cases of adverse patient outcomes. Their apprehension was also linked to a lack of experience, and they feared that without onsite supervision, the clinic would lose credibility.

"I think for them to accept us, first of all, we can't just go and say we are students doing it. The supervisor must be beside us. There should be a supervisor to introduce it. So once the supervisor introduces it, the next time you go there they will accept us." (UC3S1)

In addition to onsite supervision, faculty members and university leadership stressed that any student activity should fall within existing university frameworks that guide student groups. This was deemed essential for securing approval and ensuring that the initiative operated within institutional policies.

"They also need to take into consideration institutional policies. You may have a very good idea that you may want to implement, but if there is no institutional framework to cover you up, it will mean that you are exposed. Should do find yourself in any mess, because health care we are talking about. And depending on where you find yourself, it can be, it can be a very good ground for legal issues and all kinds of things. So, if there's a framework, then you know that the students are covered enough so that they are not exposed to a lot of risk. So, these are the two things I would." (UCF2)

Theme 4: Sustainability Concerns and Recommendations

The sustainability of a Student-Run Free Clinic (SRFC) aimed at addressing gaps in NCD screening, early management, and self-care education was a prominent concern in every focus group discussion (FGD) and key informant (KI) interview. While there was a general belief that such a student-led initiative could be sustainable, stakeholders emphasized the need for careful planning and collaboration.

"Yes, they can be very sustainable. We have seen students lead initiatives that have lasted more than decades now. But you know, it takes strategic planning [] There must also be a collaboration among all health professional schools for funding." (UGF3)

Despite this optimism, faculty members identified several factors that could threaten the sustainability of an NCD-focused SRFC and offered recommendations to address these concerns. These challenges and their proposed solutions can be categorized into five subthemes.

4.1. Interprofessional Collaboration

While students demonstrated enthusiasm and potential, there were fears around leadership bias, particularly in terms of scheduling and recruitment. Some students worried that leaders from certain health professional schools might dominate decision-making processes, leading to inequities in volunteer selection and clinic operations. Ensuring that leadership is equitable and transparent was seen as vital for the long-term success of the initiative.

"I would say the criteria in picking, it should be fair [when] picking the kind of students who are going to run the clinic. It should be a fair selection. I say this because I fear some leaders from some specific [health professional] schools may dominate and choose people from their own circles or set the schedule to suit them" (UG1S2)

To address these challenges, faculty members and students recommended that a student leadership board be set up with equitable representation from all the health professional schools. This structure, they hoped, would ensure that the needs and schedules of each health

professional school are adequately represented and that leadership decisions are made transparently and collaboratively.

"So personally, since the leadership board should be interprofessional, I think it should be under the College of Health Sciences. If one group dominates, say under medicine or under nursing, the other professions will feel left out [] the timetable may favor that particular professional school. But if it is interprofessional, they know what to favor everyone." (UC2S1)

4.2 Students' Difficulties Communicating a Clear Vision

Faculty members also expressed concerns about students' ability to communicate their vision and goals effectively to the broader university and health community. Clear communication of intentions and goals was identified as a key factor for obtaining approval and support for student-led initiatives.

"Sometimes their ability to clearly communicate their thoughts, ability to clearly communicate what their intentions are, is not great. We need to understand so we can follow and help. UCC, I believe, always wants to support good initiatives. It depends on how you are able to justify or to defend whatever proposal you are putting at the table. (UCF3).

Faculty suggested that the student leadership focus on crafting a clear vision and mission for the clinic, along with strategic plans and milestones. This would help to ensure that stakeholders understand the goals of the clinic and can offer the necessary support. Additionally, a governing body of students from all professional schools, under the College of Health Sciences, would allow for autonomy while maintaining alignment with university goals.

"So, there should definitely be a body of students. Something like a governing body of students with representatives from all health professional schools under the College of Health and Allied Sciences. Then, they can be autonomous. Because students should be allowed to think freely, make decisions freely. They will set the mission and presents their requests present that to the College Board" (UCF3)

4.3 Student Leadership Transitions and Volunteer Retention

Faculty members also expressed concerns regards student leadership training and transitions as well as volunteer retention. They indicated that often, as leadership boards change, the new ones may bring new ideals that conflict with previous boards, which could disrupt the clinic's

progress. Additionally, students highlighted that they often face the challenge of balancing academic commitments with the demands of volunteering, leading to potential burnout or disengagement.

"It's mainly leadership and sometimes you know they stay only for as long in the training and when a particular leadership group changes and another group takes over, they may not be as interested in those ventures as possible. So one of the key challenges will be ensuring sustainability and therefore whatever structure we put in should be developed such that it becomes something that's sustainable such that every student group or leaders that comes will buy into the idea and then move along." (UGF2)

"Motivation on the students' part is also an issue because like coming to combine studying can be tough. Some people leave maybe Saturdays for learning, so now let's say like you are coming to run clinics on Saturday, then it's like I'm busy throughout the week." (UC2S5)

Faculty members also recommended a volunteers training program that all new recruits needed to go through to familiarize themselves with the culture and expectations of the clinic and learn the necessary clinical and patient engagement skills needed for the clinic's work. They also recommended ongoing mentorship program where experienced volunteers and student leaders, particularly upperclassmen, identify, guide and teach newer volunteers and groom them to take over leadership roles. Lastly, they suggested establishing partnerships with existing SRFCs where students can learn from best practices from established and experienced sources. University deans were excited about the prospects for international collaboration and learning and welcomed the idea the notion of such partnerships.

"Those in the lower years should understudy those in the clinical years. So, they shadow and be mentored. By the time 500 and 600 students are exiting, we have people who are trained to take over leadership." (UCF2)

"It is always good to learn from experience and best practices elsewhere and then the North-South collaboration is always useful in using the capacity and experiences that exists. So, they (students) can build collaborative partnerships with existing student-led clinics that will support and guide what initiatives we will want to start. That will be very beneficial." (UGF1)

4.4 Community Engagement Factors

The second subtheme focused on engaging community members and leaders, the primary beneficiaries of the clinic. Despite overall confidence in positive community reception,

faculty members worried about students' knowledge of and adherence to mandatory cultural protocols that differed from community to community. They recommended first paying homage to the chiefs and traditional to seek their permission and support before embarking on the clinic set up. They also recommended student leadership working in partnership with GHS officials within the communities and the traditional leadership to engage them on the mission and details of the initiative. This key stakeholder endorsement and an immersive community engagement is not only crucial to fostering trust and confidence in the SRFC but can expose other opportunities for effective partnerships on existing projects especially where goals are aligned.

"If I'm leaving here and I'm going to a district, it's like you are entering somebody's house. You have to knock. It's protocol. Sorry, we are Ghanaians, and we have our way of life. So, you can't just enter my room without knocking because you're not a member of that particular household. So, when it happens that way, you will go to the chiefs and then district assembly. From the district assembly, [you] will be sent to probably the health director. The essence is to get stakeholders' buy-in". (UGF1)

"We have to go and meet the opinion leader, the Chiefs. We have gone to meet the Oguamanhene (Oguaman King). We have gone to meet the Metro Assembly. We are going to be the RCC, that is the Regional Coordinating Council. We have gone to meet all of them. [] In fact, we're able to collaborate even with them. Sometimes they maybe we have an existing program that they can fit you in." (UCF2)

Similarly, community members also noted that students and their leaders would need to adhere to established protocols. These included seeking approval from traditional leaders and investing time in ensuring the community understood what the screening would involve and why it was being done. They also emphasized the importance of having clinics located within the community, close to people's homes and workplaces. Many community members expressed that they would be deterred from attending the clinic if it required traveling long distances.

"For us, we are located in an urban setting which is different. But going into the rural community and villages requires you to see the king so as to make the necessary arrangements. That is the ideal way." (CR2P3)

"I must say that the only challenge will be us leaving our comfort zone to these clinics outside. But if these student-led clinics are brought closer to us in our communities, then we will be very happy and comfortable." (CR1P4)

4.5 Financial Challenges

Another key concern, and the final subtheme, was the financial resource demands of setting up and sustaining of the student-led intervention. Students and faculty members expressed that, given the free nature of the clinic, it could do well to fill the gaps in addressing care for NCDs but faced the reality of being financially constrained. They were concerned about the financial resource demands of a SRFC from purchasing the clinic's logistics to providing key student's need like transportation and refreshments.

"I think funding too will be a problem because, yes, if it's supposed to be free, I don't know, unless there is something that is sustainable. With setting up and everything, it might be difficult to actually continue long-term." (UG1S2)

"Well so of course logistics. So, all the resources: financial, material, human. Because financially, you are bringing all these people on board. How to manage them? [] You are going to screen, you need tools that you will do the screening, probably some laboratory equipment, some medicines." (UCF1)

GHS officials expressed concerned about projects' survival and continuation after their funding cycle. One official shared an example of projects that were started for specific durations, which were difficult to sustain once the donor agency had left.

"Yes, most of the time, we have good ideas [] but it's always a challenge when it comes to sustainability. Like an NGO will come in, or a donor partner will come in and support a program. [] Now [to] continue then becomes a challenge [when] the donor agency [leaves]." (GHS2)

There was confidence in students' ability to identify potential donors and appeal for funds, especially if they employed a united approach. This collective fundraising strategy was not only seen as viable but was heavily recommended, capitalizing on the novel interprofessional nature of the SRFC. Some students also suggested an interprofessional approach to fundraising, adding that a united front made a stronger case during sponsorship appeals. They also argued that a pooled strategy, where each health professional school seeks sponsorship and then pools together their funds to cover the clinic's needs, could also be effective.

"Because they are students, they are more powerful [and] can engage partners outside for funding []. We encourage them to come together and appeal for funds from corporate and private donors to support this and they will get it" (UCF1)

"So, you see, usually the medical students have their association. Pharmacy students have their association. Nursing students have their association. What usually happens is that I think the medical students have something they call MoMIC, where they organize screenings within certain communities. The pharmacy students have theirs, and the nursing students have theirs. When medical students are having MoMIC, they usually go for sponsorship right? So that they will be able to cover some of their financial costs. Pharmacy students do the same. If it's interprofessional and we are together, we can put our funds together and organize something bigger, instead of it being smaller within different, different schools." (UG2S3)

During the focus group discussions, students suggested several potential funding options for the clinic. To further evaluate the confidence in these options, the survey included a question on the perceived feasibility of various funding sources. The results, presented in Figure 10, demonstrate strong student confidence in fundraising events, corporate sponsorships, and government grants as feasible funding sources.

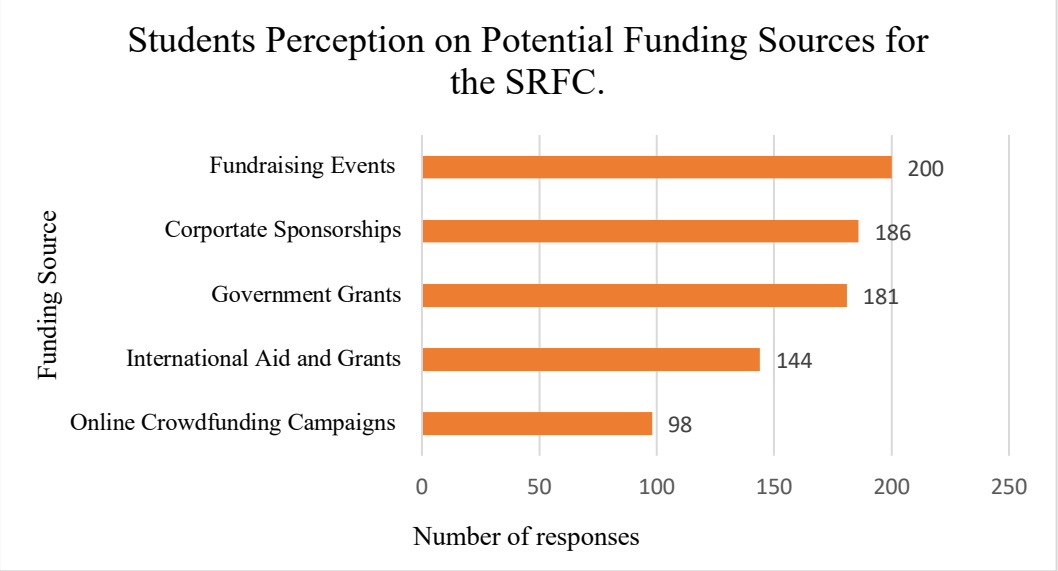

Figure 10: Health professional students' perception on the feasibility of potential funding sources for the SRFC.

Theme 5: Material and Immaterial Stakeholder Commitments to Address Elicited Concerns

In addition to the recommendations provided by stakeholders to address the projected sustainability challenges, the availability of direct material and immaterial institutional support was assessed. Three subthemes emerged that delved into the available support each stakeholder could provide to this student-led initiative.

5.1 University Support

5.1.1 Institutional Endorsement and Administrative Assistance

University faculty and deans were willing to provide endorsement and needed "administrative support" to the student group. This included but was not limited to making necessary community entry introductions, providing brand identity, and allowing the initiative to operate under the banner of the university's name. This backing, per the faculty members and deans, would not only boost the initiative's credibility but provide protection and legal and institutional coverage in the unfortunate event of adverse circumstances.

"We are also willing to give them administrative support. What I mean by administrative support is that I know [] you have to go and see the chiefs, you have to go and see opinion leaders []. The students would be doing [the work], but with the backing from the university. So, it is University of Cape Coast coming, and it gives them the weight." (UCF1)

5.1.2 On-site Supervision and Practical Learning Opportunities

University faculty members and deans were also supportive of providing on-site supervision and guidance. Despite the busy schedules of faculty, the deans saw this initiative as a valuable opportunity to expand students' learning through practical experience. Some deans expressed willingness to provide necessary instructional materials for use within the clinic and even organize simulations prior to clinic sessions.

"The institution can provide and can also assign some faculty or senior personnel to guide." (UGF1)

"We have residents who are in training and are postgraduate students who as part of their training are required to teach medical students both as lectures and also at the bedside and clinical learning activities and these are things that can be factored in for senior physicians or trainee supervision of the activities of the medical students." (UGF3)

"Every course will come with the teaching materials - with the learning aids or the visuals. So, whatever you need to make, because it shouldn't be just classroom base. It's not just for theory. It should have some form of practical aspect attached to it, some form of simulations where they work together as a team on cases. So, if they will need rooms for simulations or simulation rooms. The university will have to provide it. It's something that we are prepared for." (UCF3)

5.1.3 Flexibility in Curriculum to Support Participation

University faculty and deans acknowledged the challenging academic schedules and heavy curricula that limited students' ability to engage in extracurricular activities. Recognizing the educational value of this initiative, some deans committed to making curricular adjustments to ensure students were given ample time to participate in meaningful activities like this clinic.

"And also, our curriculum is designed in such a way that it's very heavy and it's quite packed and therefore students have very limited time to engage in some extracurricular activities. So, I'll also mention a challenge from the institutional side of things. [] The medical school can support in terms of structure, space, and flexible timing for the students to be able to actively take part across all the levels." (UGF1)

"We may have to structure it such that it will not coincide with the time of the active clinic and we say that this student led clinic activities will happen in the afternoon when the clinic is almost non-operational, because they may close around two to three pm and then we can structure it such that the student led activity happens in the afternoon and also when most of the students have finished with their regular classes." (UGF3)

5.1.4 Material Support for Operations

In addition to logistical support, some university faculty and deans were willing to provide material resources, such as transportation, office space for on-campus administrative work, and funding—provided that the project was officially supported by the university.

"Also, in our part of the world, resources are always a challenge; how much do they have unless they are able to have sponsorship to be able to do this? But if it is institutionalized and then it becomes part of the structure of their training: we can route funding for this. If they engage in this activity weekly, bi-weekly, that is quite less resource intensive." (UGF1)

"We have a medical school clinic that has the capacity and space to accommodate, if for example we say a student led clinic and they will need a room where they can provide these services, the medical school will be able to help." (UGF2)

5.2 Ghana Health Service Support

5.2.1 GHS Endorsement and Community Buy-In.

Officials from the Ghana Health Service (GHS) pledged their support in facilitating collaboration at the community level and providing the necessary endorsement to secure the community's buy-in and patronage. This endorsement was seen as essential for the success of the clinic and the broader initiative.

"The Ghana Health Service freely goes out to areas like the rural settings and in fact the district zones. In fact, there are a lot of where they do these, they actually deal with community health professionals. So already, the goodwill is there, all you need is to just tap into it." (GHS4)

"The goodwill support is guaranteed. On our end, we can let the communities know that this clinic has our blessing and their universities'. Any push we can give, we will". (GHS2)

5.2.2 Collaboration and On-site Supervision

In addition to endorsement, GHS officials highlighted the necessity of a collective approach to improve access to screenings, early management of NCDs, and education. Nurses and health officials at Wellness Clinics were particularly enthusiastic about collaborating with students, as their mission aligned with the SRFC's goals. Specifically, they were willing to offer on-site supervision, similar to what faculty members would provide, as they were trained health professionals who frequently supervised new health professionals or trainees at their clinics.

"When you mention health promotion, it's necessary to mention that we love to collaborate. So, by all means we'll collaborate because one cannot do the work all alone." (GHS3)

"When the students come, we can guide them. With the simple tasks like blood glucose screening, BP checks, and the education, we can supervise them. We do that already" (GHS2).

5.3 Community Support

5.3.1 Publicity and Awareness

Community members and leaders expressed their willingness to serve as ambassadors for the clinic, helping to increase awareness of the clinic's mandate and popularize its services among others in the community. This collective effort often led to a natural division of tasks, with members taking on specific responsibilities for outreach and publicity.

"In terms of publicity, we have a PA system which is currently faulty and needs replacement. If purchasing is impossible, the only means will have to be to conduct in person outreaches about the initiative. We are happy to do that." (CR1P7)

"Whenever these students come around, we help them assemble the canopies. They have time and take care of us and this has been very helpful for us." (CR1P6)

5.3.2 Clinic Location and Space

Community members were eager to offer spaces for the clinic, suggesting often-used public areas such as town council centers, churches, mosques, schools, and market squares. These spaces were strategically chosen for their high traffic and proximity to homes and workplaces, making them ideal for the clinic's operations.

"They can host it here at the market square. Or right behind the taxi station. Or even the church when it is not being used. Getting the space won't be a problem at all once our leaders agree" (CR2P2)

5.3.3 Facilitation of Cultural and Traditional Requirements

Recognizing the importance of community entry and the necessary cultural protocols, community members were willing to facilitate introductions to traditional authorities, such as chiefs and assemblymen. This step was seen as crucial for securing the necessary approvals and endorsements for the clinic to operate smoothly within the community.

"With the student clinic, it is going to be established in a community setting. But every community has its own set of culture and traditions. Although we are within the community, going inside to towns like Aboah and other towns, you will need to see the king for necessary arrangements to be made." (CR2P1)

"And even with that, you need to first see the assemblyman for him to lead you to the king. The assembly man is always found at the lorry station so accessing him should not be a problem at all. Even during weekends. Should you go and you don't see him, you can go to see the chief through the secretary as well". (CR2P3)

5.3.4 Financial Support and Contribution

Acknowledging the financial challenges of running a free clinic, community members expressed a willingness to contribute in any way they could, including covering the cost of medications. Despite financial constraints, there was a strong sense of collective responsibility and a desire to support the initiative in any manner possible.

"We know running the clinic will be costly. And we appreciate all your help setting it up. So, if there's any way we can contribute, even if it is helping to pay for our medications when you prescribe, we will try. Times are tough, but we will try" (CR2P2)

Theme 6: Recommendations for the model of the intervention

During the health professional FGDs and faculty KIs, we explored the specificities of the structure and functions of the SRFCs to tailor the model to the local context. Six subthemes emerged, offering functional, organizational, and operational recommendations for the intervention.

6.1 Appropriate Student Roles Within Clinic

6.1.1 NCD Screening and Education

This subtheme focused on defining appropriate student interventions and the limitations of what students can perform within the clinic. Health professionals expressed confidence in students conducting basic health services, such as screening for NCDs, leading self-care education on NCDs, counseling on medications, and organizing community outreach and awareness campaigns. These roles were based on experiences during annual "Health Weeks" in their health professional programs, where students engage in health screenings and awareness campaigns for various diseases, including common NCDs.

"So, I think that if we have nursing students, they [can] also have stations there. I don't think BP (blood pressure) checking needs a license or using the glucometer needs a license. You just help the person; you explain things to the person" (UC1S6)

"I think students can take the history, get to a diagnosis, the differentials" (UG2S5)

"Students can educate patients or people that come to student-led clinics about some interventions, like non-pharmacological interventions that can be put in place to help with their condition, such as their diet, the kind of things they do, if they have rest, that kind of, they can do that." (UG3S3)

Faculty members and Ghana Health Service (GHS) officials also supported the idea of students conducting basic screening and providing health education.

"And then we move to the secondary level of prevention which is early diagnosis and treatment. Students are able to probably get involved or students-led clinics basically [can] screen and diagnose readily some of these conditions: hypertension,

diabetes, where we can use very simple clinical technique and devices such as blood glucose testing monitor device []. These are things students can manage". (UGF1)

"We need to identify some of these risk factors early as we call it, primary prevention and therefore if we have any student led initiative that will educate, that will create awareness to the general public on some of these risk factors, that will be key" (UCF3)

"Students can help in the normal health screening like the BP check, [for] diabetes, the blood sugar check, they can do the fastening blood sugar check and all those things". (GHS3)

6.1.2 Linkage to Larger GHS

Health professional students expressed interest in fostering patients' linkage to care at GHS health facilities within the communities or regions. Specifically, for patients who presented with emergencies or required a level of care beyond the capacity of the student-run clinic, students felt comfortable collaborating with faculty and GHS officials to coordinate referrals and transfers of care. Faculty members also expressed confidence in students' ability to identify patients who needed referrals and assist with the process.

"Yes, I mean that [linkage to care] is the purpose of screening. Screening is specifically done to detect and treat. because we are students, we can refer especially cases we can't handle." (UC1S1)

"We train our students to identify and triage patients. Either you refer them to the GHS or after screening, you can administer medication based on the knowledge that you have under supervision." (UCF2)

Students also showed interest in assisting with NHIS registration. Since the NHIS covers medications for common NCDs, including hypertension and diabetes, students saw NHIS registration as a means of ensuring sustainable care. They were eager to increase awareness of NHIS and help facilitate patient registrations.

"Students can register people to the NHIS if only they are trained to do so. [] This is how we register people to the NHIS. Because let's say we have limited number of professionals who can actually do the registration, students can help. It will actually make it faster and they can register more people within a limited time." (UC2S4)

"You see the NHIS covers most of the basic medications for hypertension and diabetes. So, we can facilitate their access to these drugs by doing their registrations. Maybe we can support with the little for the premiums." (UG2S1)

6.1.3 Administrative and Ancillary Roles

Students also expressed interest in taking on administrative and ancillary roles related to the clinic's operations. These roles included patient scheduling and follow-up, translation and interpretation, student volunteer recruitment and training, faculty recruitment, pharmacy inventory management, and fundraising, as previously mentioned. Students who had experience in leadership roles within other student organizations highlighted their confidence in managing similar responsibilities. Others saw these tasks as valuable exposure to skills they would need in their future careers, viewing them as opportunities for professional development. Additionally, these roles were seen as a way to enhance resumes and increase competitiveness in the job market.

"I think it's a great opportunity that should be implemented, because even with administrative work, we have held students who are already into leadership positions, who already performed some form of administrative duties. So, it gives them another opportunity to further their skills and then bring that on board." (UC3S5).

"Yes, [these administrative roles] exposes students to a lot of things. In the sense that, comparing two people who let's say one has not been involved in any students run clinic before, no outreach, no screening nothing and has graduated, compared to another person who has always been actively involved in this stuff and both of them have been exposed to the outside world in the hospital. I feel like the other person who has been involved has a bigger advantage and because he has gained experience, expertise, he has gained the skills in doing a lot of things. Like money time, everything he can go about his duties simples and the other one will be struggling." (UG2S1)

6.2 Limitations on Diagnosis, Management Plans, and Prescribing Medications

While students were seen as capable of performing basic screenings and health education, there were mixed reactions regarding students making diagnoses, creating management plans, and prescribing or administering medications without direct faculty or licensed health professional supervision. Medical and pharmacy students, in particular, were more likely to express confidence in dispensing these roles without supervision. However, all health

professionals agreed that a faculty member or licensed health professional should always be involved in patient care. Conducting basic procedures without supervision was almost unanimously considered inappropriate for health professional students.

"For me, I would say that students can suggest that maybe you are at risk of getting hypertensive. But you can't just get up and say straight forward that that you are hypertensive" (UC2S5)

"I think a student can [diagnose]. I mean if you checked the BP for like three consecutive time and it is skyrocketing for three consecutive time, won't anything prick me that it's hypertension?" (UC2S3)

"But when it comes to their medication, there's legal aspects to it because if I give someone medication and something happens to the person, I'll be in trouble. As a student, I'm not in a position to be prescribing medication so I can be held accountable for something. If there's a supervisor there, you could run it through the supervisor, that, 'okay, this is the person's condition, this is what I'm recommending, what do you think about it?'. And with that, the students would be able to go out and learn and pick up information." (UG2S1)

"Basic procedures; no-go area for students". (UC1S7)

6.3 Cost to Patients

When evaluating the costing model for the clinic, particularly whether it should be free, most health professional students favored a free model. They highlighted that the cost of NCD screening and management is a significant barrier to access, and charging patients would undermine the clinic's mission to provide accessible services. Some students also noted that charging for services could reduce the clinic's credibility, as patients might perceive student-run clinics as inexperienced or less trustworthy.

"I think the clinic should be free because that's one big barrier for them, so if it's not free, then it's not really fixing the solution." (UG1S2)

"The patient is not going to the hospital because of financial constraints. Now, if you are running a student-led clinic, and you want the patient to come there to pay when the patient is already questioning the credibility of the facility, they won't come." (UG2S3)

However, there were concerns about the financial sustainability of a completely free clinic. Some students suggested a subsidized model to address these concerns, recognizing the potential challenge of donor fatigue. Others proposed that patients should contribute to the cost of medications, while a few students suggested that the clinic could operate like a regular health facility with fees.

"I rather think it should be subsidized. [] Because for the purpose of sustainability. We cannot always rely on donors because [there is] going to be donor fatigue, and they'll not be willing to give as much as they did from the initial stages. So, if you are reducing the price for them, then they will see the need to come. Because if you are receiving the same quality of care you get from hospitals, but then at a subsidized price, you definitely opt for that." (UG2S1)

"They can come for their treatment and support with the cost of drugs and things like that." (UG2S4)

"I think in that regard, then we'll have to run it as a regular hospital, charging patients." (UG3S4)

6.4 Location of Clinic

There was overwhelming support among health professional students for a community-based clinic. Students emphasized that hosting clinics within the communities would address many barriers to accessing NCD care, such as the lack of accessible health facilities and trained professionals, as well as the high costs and time required for travel. A community-based clinic would not only reduce travel distance and expenses but would also facilitate community-based interventions, such as door-to-door awareness campaigns and patient home visits. Additionally, it would improve patient mobilization before and during clinic sessions.

Students also pointed out that the high prevalence of NCDs within communities makes a community-based clinic an ideal setting for education and outreach. It would provide the appropriate context for engaging with the community and enhancing the educational value of the sessions.

"When you establish the clinics outside the community, people will still have to move. The patient will still have to spend and move a long distance in order to seek

medical care which would create problems. But when you bring these clinics to the community level, where we have different schedules and times for when these health professionals will come and cater or care for them, I think that will be the best option" (UC1S1)

"The prevalence of these noncommunicable diseases is higher within the community [] because of the age and the lifestyle behaviors. We tend to have people living unhealthy lifestyles [] This will allow us to help more people and get a more [enriched] practical experience. (UC2S1)

Additionally, most students advocated for a mobile clinic rather than a fixed structure. They argued that a mobile setup would allow the clinic to rotate between multiple communities, extending its reach and impact.

"Per my experience, if we make it static within the community, then we are only just reaching out to only a few people around. But if we find destinations and then we decide to and we are able to move between communities wise [], I think it will be of great help." (UC1S6)

6.5 Clinic Schedule and Duration of Sessions

When discussing the clinic's schedule and duration, health professional students had varied opinions. Most participants favored a once-weekly or bi-weekly schedule, with time commitments ranging from 3 to 8 hours per session. Due to this variability, we decided to assess these preferences further through student surveys. Results showed that 230 of the 316 respondents, presenting 72.7% preferred a weekend clinic and 132 of the 316, representing 41.8% preferred a weekly schedule.

6.6 Interprofessional Student Volunteer Teams

6.6.1 Provision of Holistic and Timely Care

A clear majority of health professional students expressed strong support for an interprofessional team, underscoring the importance of addressing the multifaceted nature of non-communicable diseases (NCDs). They noted that NCDs often require a comprehensive care plan involving various specialists such as nutritionists, pharmacists, doctors, and nurses.

An interprofessional student volunteer team would allow for integrated care that addresses all aspects of a patient's condition, thus improving the quality of care provided.

"Let me bring in the manifestation of systemic diseases. So, let's say someone has a syphilis. There is a genital manifestation of a syphilis, supposed it's one directed, and then you take it to a medical doctor. He will check. He will do all that he could do. But then the ocular syphilis, should be referred to an optometrist or ophthalmologist. So that kind of interprofessional setup may be helpful." (UC2S3)

"If it shouldn't be inter-professional, then there is no need for us to be treating patients because a patient [does] not only have an eye. A patient does not only need drugs; a patient does not only need some blood testing or some medical laboratory testing okay. A patient needs all of these and there are different health professionals that have been trained solely for these purposes. So, because of that circumstance, it needs to be inter-professional. (UG1S3)

Moreover, students recognized that the current healthcare system is fragmented, with long distances between different types of care, leading to delays and inefficiencies. Bringing together trainees from diverse health professions would streamline the care process, reduce delays, and facilitate access to a broader range of expertise in one location.

"So let me just refer to the CoBES again. Though we were only medical students doing it, we were to take blood samples. We were to use the microscope to check the sickling status and all that. So, I believe that if all the different health professionals were there. Let us say the Medilab people were there, they will quickly do the lab and the sickling everything. And the nurses will be there to take the blood sample and all that. Like so with that one, it will facilitate the process. So, at the end of the day, some of us too were acting as, let's say doctors, counseling. So, when the results are ready, they will just look at the results and then explain to the patient. So, I think in a setting where we have people from the various health professionals will just actually make the process faster for the patient." (UC3S2)

6.6.2 Learning from and Appreciating Each Other's Expertise

Students expressed a strong desire to learn from each other within an interprofessional team. Acknowledging the limitations of their own training, they viewed the clinic as a valuable opportunity to gain insights from students in other health professions. This collaborative environment would allow them to expand their knowledge base, improve their understanding of patient care, and develop a more comprehensive approach to healthcare.

"It should be interprofessional. Because if you are holding a clinic [] and have people from different professional backgrounds there, you have different expertise talking about the thing. And they will know more, and they will be able to explain it better. And we can also learn from each other" (UC2S5)

Not only did they see such an avenue as an opportunity to learn from other health professionals and build connections, but they also alluded to the fact that such a clinic can be grounds to foster early collaboration among the different health professional trainees well before they enter the work force. They decried that the current health work force is characterized by feelings of superiority, unfriendliness and sometimes overt conflict that derail progress and affect patient care.

"Well, I think there's a lot of friction in the health sector when it comes to the professionals, those already practicing where some professionals think that, okay, they are at the top of the health system. You don't have to really work with the others, or even if they are going to work, they see themselves as superior." (UG2S3)

If such an opportunity is started where students are working interdisciplinarily, it gives them the experience to appreciate the contribution of others towards the health sector. Such that even when they are out there and they are working as professionals, they'll recognize that this person contributes towards the healthcare. So, I shouldn't neglect this person's contribution and think that I should work alone. And it will also be an opportunity for students to learn skills even before they get into the professional setting. (UG2S4)

6.6.3 Efficient Division of Labor

The students highlighted the importance of dividing responsibilities effectively to manage the workload and ensure smooth clinic operations. An interprofessional team allows for the distribution of tasks according to each student's area of expertise, making the clinic more efficient. Furthermore, this division of labor would help ensure that students are not overwhelmed, especially during busy academic periods when their time is limited.

"Yeah, I also think it would take the burden off, like a particular group of students. Because everyone is also studying so if you are going to pour everything on just one group it could be difficult for them to actually handle it. So, if everyone is doing something, maybe on the part altogether, I think it would work." (UG1S2)

Discussion

This study explores the feasibility and potential impact of student-run free clinics (SRFCs) in addressing gaps in non-communicable diseases (NCDs) care in underserved communities in Ghana. The overarching themes that emerged from this research include: the role of health professional students in providing primary care, the evident stakeholder interest and confidence in a student-led NCD focused intervention, the opportunity for and benefits of interprofessional collaboration, the challenges of a sustainable clinic operations, and the critical importance of community-based care to enhance access to NCD services.

Through focus groups and surveys with health professional students, university faculty and deans, officials from various levels of the Ghana Health Service and community members and leaders, this study assessed the feasibility of a student led intervention. It explores perspectives of stakeholders on the implementation of SRFCs, with particular attention to health professional students' ability to perform basic health assessments, manage patient care, and provide interdisciplinary care. The findings highlighted several key areas: the necessity for faculty supervision in clinical decision-making and prescribing, the overwhelming preference for a community-based approach, and the need for interprofessional collaboration to address the systemic nature of NCDs. The study also examined logistical and financial considerations, including the challenge of ensuring the sustainability of a free clinic model and the potential for exploring subsidized models or partnerships with local health systems.

This research contributes to the growing body of literature on SRFCs, particularly within low-resource settings like Ghana. While there is a significant amount of literature exploring SRFCs in high-income countries, especially in the United States with majority of the existing SRFCs in the world, research on their implementation

and feasibility in Sub-Saharan Africa remains limited [17], [30]. While SHAWCO at the University of Cape Town has long been regarded as a successful model of student-led health initiatives, its establishment predates this century when the health landscape and regulatory frameworks were significantly different [2]. Moreover, resources and institutional frameworks for SRFCs in the United States and other high-income countries differ significantly from low-resource contexts like Ghana.

One of the key contributions of this work is its focus on NCDs, which is an emerging area of concern in many low-income countries, including Ghana. The shift from infectious to chronic diseases in these regions necessitates innovative approaches to healthcare delivery, especially in rural and underserved urban areas. A recent scoping review assessing the effectiveness of SRFCs in Type 2 diabetes management across the globe found strong evidence that SRFCs are effective in the management of T2DM. However, all six studies that eventually met their search criteria were based in the United States [31]. This study thus fills a critical gap by proposing a contextualized approach to retrofitting SRFCs for NCD management, integrating interprofessional collaboration, and addressing Ghana's unique socio-cultural and healthcare challenges. By prioritizing NCD care within underserved communities, this research not only aligns with global health priorities but also establishes a foundational model adaptable to other low-resource settings across the African continent.

Thematic Expansions

High Familiarity with NCDs and Barriers: The findings demonstrate a high level of familiarity with NCDs among health professional students and stakeholders, underscoring the urgency of addressing these conditions. However, this awareness contrasts sharply with the limited knowledge and misperceptions observed within the broader community. The study highlights systemic barriers such as low awareness,

socio-cultural beliefs, and financial constraints, which impede early detection and management of NCDs. These findings emphasize the need for SRFCs to incorporate robust educational components, targeting both patients and their communities to bridge the knowledge gap and combat stigma surrounding NCDs.

Interest in Student-Led Interventions: The strong interest in student-led interventions reflects the readiness of stakeholders to embrace innovative approaches to NCD care. Faculty members, Ghana Health Service (GHS) officials, and students themselves recognize the transformative potential of SRFCs to bridge access gaps, particularly in rural and underserved areas. This enthusiasm is rooted in the alignment of these initiatives with institutional missions and the demonstrated capacity of students in past health outreach programs. The widespread support among stakeholders suggests a fertile ground for piloting and scaling SRFCs within Ghana's healthcare landscape, further establishing their potential as a cornerstone of NCD care.

By highlighting the role of interprofessional collaboration among students from various health disciplines, this study also builds on existing literature that emphasizes the importance of team-based care in managing complex conditions[32], [33]. However, the literature often focuses on professionalized teams, and this research uniquely explores the feasibility of such collaboration at the student level. Despite the numerous advantages and push for interprofessional education and training by organizations such as the Africa Interprofessional Education Network, it is still not well established in developing countries, particularly in Sub-Saharan Africa, where the burden of disease is greater[34], [35]. Thus, this study provides additional evidence for the interest and need for an interprofessional collaboration among health professional students. Additionally, the study's focus on the community-based setting

of SRFCs addresses a critical gap in understanding how such initiatives can be tailored to local contexts, where access to formal healthcare services is often limited.

Onsite Supervision: The need for onsite supervision emerged as a pivotal requirement for the feasibility and success of SRFCs. Legal and ethical concerns regarding the autonomous practice of unlicensed health professional students necessitate a framework of supervision by licensed healthcare providers. This critical requirement is not surprising as many existing SRFCs across the globe also have this requirement and are such supervised by licensed faculty and experts. This supervision not only ensures adherence to regulatory standards but also instills confidence among community members, who may initially question the credibility of student-led initiatives. By embedding SRFCs within existing institutional and healthcare structures, the model addresses these concerns while fostering trust and accountability.

Moreover, the presence of onsite supervisors significantly enhances the educational experience of health professional students [36]. A 2023 systematic review examining learning outcomes from participation in SRFCs highlighted improved clinical skills, interprofessional collaboration, empathy for underserved patients, and leadership development as key benefits [37]. Supervisors provide real-time feedback, bridging the gap between theoretical knowledge and practical application. Students gain hands-on experience in clinical decision-making, patient interaction, and interprofessional collaboration under the guidance of seasoned practitioners. This mentorship not only improves technical competencies but also nurtures critical thinking and problem-solving skills, preparing students for independent practice. Furthermore, the collaborative learning environment fostered by onsite supervision contributes to the holistic development of future healthcare professionals. Notably, this research also addresses a recommendation from the authors of the systematic

review to expand SRFC studies beyond North American contexts, thereby broadening the understanding of their global applicability.

Sustainability Concerns: Sustainability is a recurring theme across stakeholder discussions, highlighting both challenges and opportunities. Concerns regarding leadership transitions, volunteer retention, and resource mobilization underscore the importance of interprofessional collaboration and strategic planning. These concerns have been well documented in literature assessing challenges of existing student run clinics across the globe [17]. Ensuring equitable representation across health professional schools, establishing mentorship programs, and fostering partnerships with local and international SRFCs are key strategies for sustaining these initiatives. These measures not only promote continuity but also enhance the capacity of SRFCs to adapt and thrive in dynamic healthcare environments.

This research contributes to the discourse on the sustainability of SRFCs, specifically in terms of financial models. While many studies have explored the operational challenges of SRFCs in affluent settings, this work brings attention to the financial barriers in low-resource settings and the potential for subsidized models to ensure long-term viability.

Stakeholder Support: The study identifies a mix of material and immaterial support from stakeholders, ranging from logistical resources to advocacy and community endorsements. Faculty members and GHS officials expressed willingness to collaborate, leveraging their networks and expertise to facilitate the successful implementation of SRFCs. Such partnerships are instrumental in addressing identified barriers, including financial constraints and infrastructural limitations. By aligning the goals of SRFCs with those of institutional and governmental

stakeholders, the model gains credibility and scalability, enhancing its impact on NCD care.

Proposed Intervention: Finally, the proposed weekend, interprofessional, community-based clinic model represents a pragmatic and contextually relevant solution to the NCD epidemic in Ghana. By focusing on screening, education, and linkage to existing health systems, the intervention addresses critical gaps in care while fostering a culture of preventive health. The community's positive reception of this model, coupled with the enthusiasm of health professional students, reinforces its feasibility. This initiative not only aligns with global best practices but also tailors these practices to Ghana's unique healthcare context, paving the way for sustainable improvements in NCD care.

Implications

The implications of this study are significant for both healthcare delivery and medical education in Ghana, as well as for the broader field of global health, particularly in low-resource settings.

One of the most important implications of this research is the potential for SRFCs to improve access to care for underserved populations, particularly in rural and peri-urban areas where access to healthcare is limited. The high prevalence of NCDs in Ghana, such as hypertension, diabetes, and cardiovascular diseases, is a growing concern. With the healthcare system often overwhelmed by infectious disease burdens and the limited availability of trained healthcare professionals, SRFCs present an innovative solution to bridge the gap. By engaging health professional students in the provision of care, these clinics offer an opportunity to reach individuals who might otherwise not have access to essential screening and management services. The focus on community-based care further reduces barriers

such as transportation costs and long wait times, making healthcare more accessible and less burdensome for patients.

Another key implication is the potential for SRFCs to enhance the quality of health professional education. In many countries, including Ghana, healthcare professionals often work in silos, with limited opportunities for interdisciplinary collaboration. SRFCs provide a platform for students from different health disciplines (medicine, nursing, pharmacy, nutrition, and laboratory sciences) to work together in a real-world setting. This interprofessional approach allows students to better understand the role and expertise of their peers, fostering mutual respect and collaboration, which are essential skills for effective healthcare delivery. Furthermore, it provides students with the opportunity to apply their academic learning in a practical setting, thereby improving their clinical skills and understanding of patient management in real-world contexts. The experience of working in a team-based model also prepares students to become more adaptable and collaborative healthcare providers when they enter the professional workforce.

The findings also suggest that SRFCs can be sustainable and scalable with proper planning and support. While the financial constraints of a completely free clinic model are clear, the research indicates that partnerships with local health systems, NGOs, and private sectors could provide the necessary resources to ensure long-term sustainability. Additionally, the study highlights the importance of a mobile clinic model, which can rotate across communities and reach a broader population, further enhancing the scalability of SRFCs. These findings open up pathways for SRFCs to evolve from small, community-based initiatives into larger, more integrated programs that can address NCDs across multiple regions of the country.

The study also has important implications for healthcare policy in Ghana. The successful implementation of SRFCs could serve as a model for how to engage the next generation of healthcare professionals in addressing pressing public health challenges. Policymakers could consider integrating SRFCs into the national healthcare system as a complementary service to formal healthcare institutions, particularly in underserved areas. Additionally, the study's exploration of the financial sustainability of SRFCs could inform policy on how to fund and support such initiatives, encouraging public-private partnerships and alternative funding models. Such policy changes could lead to a more integrated, accessible, and sustainable healthcare system, especially in rural and underserved urban areas.

On a global scale, the research contributes to the growing field of student-led healthcare initiatives, particularly in the context of low-resource settings. It emphasizes the importance of interprofessional education and provides a framework for other countries in Sub-Saharan Africa and other low-income regions to explore the feasibility of SRFCs. By demonstrating the potential benefits of such programs, this research encourages a rethinking of medical education and community-based healthcare delivery in countries facing similar challenges.

Strengths and Weaknesses

This research has several strengths that enhance its contribution to the field and ensure the reliability and relevance of its findings. One of the study's major strengths is its mixed-methods design, combining qualitative data from focus group discussions (FGDs) and key informant interviews from multiple stakeholders including health professional students, faculty members, officials from various levels of the Ghana Health Service as well as community members and their leaders. These diverse qualitative data sources, combined with the quantitative data from surveys allows for a more nuanced understanding of the feasibility of SRFCs. The integration

of both data types provides a comprehensive picture of the perceived benefits and challenges of SRFCs and strengthens the robustness of the findings.

The research is grounded in the perspectives of the health professional students themselves, who are the key stakeholders in the proposed SRFC model. By gathering insights directly from students, the research captures their readiness, concerns, and ideas for improving the implementation of SRFCs. This focus on the students' voices ensures that the study reflects their real-world experiences and provides actionable recommendations for designing and implementing SRFCs that are both feasible and effective in addressing the needs of the communities they aim to serve.

Another strength of the study is its focus on interprofessional collaboration. The research highlights the importance of working in teams, drawing from the expertise of various health professionals such as doctors, nurses, pharmacists, and nutritionists, to provide holistic care for patients with systemic diseases like NCDs. This is an area that is often overlooked in traditional healthcare delivery models, especially in low-resource settings, but the study's findings demonstrate how student-led interprofessional teams could provide more comprehensive and coordinated care. The emphasis on interdisciplinary learning also adds an educational dimension to the study, further contributing to the development of future healthcare leaders who are prepared to work effectively in collaborative environments.

The study's focus on Ghana and its local healthcare context is another strength. By investigating SRFCs in Ghana, the research provides valuable insights into how these clinics could be adapted and implemented in Sub-Saharan Africa, a region that faces unique healthcare challenges, including a high burden of NCDs, limited resources, and inadequate access to care in rural areas. The findings are therefore highly relevant to policymakers, healthcare providers, and educators in Ghana and similar

countries, offering practical solutions for improving healthcare access and training the next generation of healthcare professionals.

The study's findings have the potential to drive long-term changes in both healthcare delivery and medical education. By demonstrating the benefits of SRFCs in improving access to care and enhancing student learning, the research provides a clear pathway for scaling up such initiatives. The study's emphasis on sustainability and scalability, particularly through mobile clinics and partnerships with local health systems, ensures that the model can be adapted and expanded to meet the growing demand for NCD care across Ghana and beyond.

However, there are some limitations to this study. The sample size, while sufficient for the purpose of this research, may not fully represent the diversity of perspectives within the broader health professional student population in Ghana. Another limitation is the lack of in-depth exploration of the challenges related to the implementation of SRFCs, particularly regarding logistical and infrastructural constraints. While the study touches on the financial sustainability of SRFCs, further research is needed to understand how these clinics can overcome practical barriers such as access to medical supplies, faculty supervision and transportation. Lastly, the regional focus may limit broader applicability.

Dissemination

The findings of this research have been disseminated through multiple platforms to engage stakeholders, foster dialogue, and promote actionable solutions to address non-communicable disease (NCD) care gaps in Ghana.

To ensure local relevance and foster institutional engagement, I presented the research findings to Provosts, Deans, and student participants at the University of Ghana and the

University of Cape Coast. Additionally, I engaged key national stakeholders, including the Office of the Ghana National Presidential Advisor on Health and the Ghana Health Service, to discuss the study's implications for policy and practice.

At Yale, I shared preliminary findings with faculty and peers during a session of the Equity Research and Innovations Center (ERIC) as part of their Research and Projects in Development (RAPID) series. Upcoming presentations include the Yale Global Health Council Meeting on February 4th, 2025, and a poster presentation at the Consortium of Universities for Global Health conference on February 21st, 2025.

I plan to further share this work at the Yale Office of Global Health Virtual Poster Presentation scheduled for March 25th, 2025, and at the Yale School of Medicine Students Research Day in May 2025. To contribute to the broader academic discourse, I will submit a manuscript for publication in an acclaimed journal, ensuring the findings reach a global audience.

These dissemination efforts aim to foster dialogue across academic, policy, and community domains, promoting sustainable, student-led interventions for enhancing primary NCD care in underserved settings.

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Appendix

List of Abbreviations

CHOs – Community Health Workers

CHPs – Community-based Health Planning and Services

CVDs – Cardiovascular Diseases

NCD – Non-Communicable Diseases

NHIS - National Health Insurance Scheme

NOP – Networks of Practice

NPHWs - Non-Physician Healthcare Providers (NPHWs)

SHAWCO - Students' Health and Welfare Centers Organization

SRFC – Student Run Free Clinic