**A Cross-sectional Study on Attitudes of Young Health Professionals towards Herbal Medicines**: **Safety, Efficacy, Professional Relevance and Integration with Conventional Medicine**

**Abstract**

**Background:** Herbal medicine remains integral to healthcare in many countries, yet its formal integration into conventional practice is still challenged by education, and safety. This cross‑sectional study assessed attitudes toward herbal medicines among final‑year medical and pharmacy students in Nigeria across four domains: safety and efficacy, scientific validation, professional and educational relevance, and integration with conventional care.

**Methods:** A total of 375 final‑year students from six geopolitical zones completed a nine‑item Likert‑scale questionnaire. Data on personal use of herbal products, curriculum exposure, and institutional clinic availability were also collected. Responses were analysed using cross‑tabulation and Chi‑square tests (α < 0.05).

**Results:** 89% disagreed that herbal medicines lack efficacy, yet only 23% viewed them as inherently safe (majority neutral). 59% agreed that herbal remedies require scientific testing before use, and 62% doubted many manufacturers’ health claims. Medical students were more likely than pharmacy students to demand testing (78.2% vs. 50.0%, χ² = 50.33, *p* < 0.001). Approximately 70% did not consider herbal medicines a public‑health threat. Female students and those with personal or clinic‑based experience expressed the least concern (χ² = 41.90, *p* < 0.001). Over 84% endorsed the importance of herbal medicine knowledge for all healthcare professionals; 82% rejected restricting this education to pharmacy alone. Overall, 70% supported integrating herbal and conventional medicine, with pharmacy students (79.4%) and those exposed to herbal curricula (80.4%) showing strongest support (χ² = 44.56, *p* < 0.001).

**Conclusion:** While future Nigerian health professionals recognize the therapeutic promise of herbal medicines and favour their educational inclusion and clinical integration, substantial caution persists regarding safety and the need for rigorous validation. These findings underscore the need for comprehensive, evidence‑based CAM curricula and clear regulatory frameworks to ensure safe, informed integration of herbal therapies into mainstream healthcare.

**Keywords:** Attitudes, Final-year students, Herbal medicine, Integration, Medical education, Nigeria, Pharmacy students

**1.0 Introduction**

Herbal medicine, as a key component of complementary and alternative medicine (CAM), continues to play a significant role in global health care (Saad et al., 2005). Over 80% of the global population uses traditional herbal medicine for primary health care need (Bhardwaj et al., 2018)**.** This can be seen in Europe, Asia, and North America (Lam Ung et al., 2023). Likewise, in developing countries, over 70% of the population primarily relies on complementary and alternative medicine systems (Azaizeh et al., 2010). This growing interest is not only rooted in cultural heritage but also in the increasing demand patient-centred care models (Coulter & Willis, 2007; Gaboury et al., 2011; Suzuki, 2004).

Despite this widespread usage, the formal integration of herbal medicine into modern clinical settings remains limited (Teschke et al., 2015). Factors such as unclear regulatory frameworks, insufficient standardisation, and ongoing concerns about safety, efficacy, and scientific validation continue to hinder its acceptance in conventional practise (Michael Alurame Eruaga et al., 2024).

Whilst a few studies have explored the attitudes of healthcare professionals and students toward CAM in Nigeria, none have broadly and collectively assessed these attitudes among students nearing professional entry. Even fewer have examined differences across Nigeria’s diverse geopolitical zones. Conversely, this gap is critical because young health professionals particularly final-year medical and pharmacy students are at the cusp of clinical practise and policy influence. Their perceptions of herbal medicine particularly regarding safety, efficacy, and curricular relevance will configure how integrative approaches are adopted or challenged within the Nigerian healthcare

Understanding these attitudes is essential for informing curriculum development, evidence-based policies, and the safe integration of traditional therapies into modern healthcare practice. As herbal medicine continues to gain global relevance, especially in low- and middle-income countries, insights from future healthcare professionals offer meaningful direction for education reform and regulatory strategy. By highlighting the differences based on academic exposure, personal use, and programme of study, this research contributes to the wider discourse on CAM and its evolving place in contemporary medicine.

Therefore, this study evaluates the attitudes of final-year medical and pharmacy students in Nigeria toward herbal medicine, focusing on four key domains: the safety, efficacy, professional relevance, and integration with conventional care. It also probes how attitudes vary by demographic characteristics, educational exposure, and regions, with the aim of advising curriculum reform and policy decisions that support the responsible inclusion of herbal medicine in mainstream clinical practise.

**2.0 METHODOLOGY**

**Design and Setting**

This quantitative study adopted a cross-sectional method. The cohort of interest was final-year pharmacy and medical students from selected universities across the six geopolitical zones in Nigeria.

**Inclusion and Exclusion Criteria**

Participants were required to be final-year students currently enrolled in either the Medicine or Pharmacy professional programmes at the selected universities. Additionally, all participants had to be at least 18 years old at the time of the study.

**Sampling**

A target population of approximately 4,495 students was considered for this study, representing the average number of final-year pharmacy and medical students graduating annually in Nigeria. This estimate was derived from workforce reports indicating that 1,364 to 1,826 pharmacy students (Ekpenyong et al., 2018) and 2,300 to 3,500 medical students graduate each year (Awire & Okumagba, 2020), resulting in average estimates of 1,595 and 2,900, respectively. Based on this population estimate, a minimum required sample size was calculated using Epi Info™ Version 7 at a 95% confidence level, 5% margin of error, and expected frequency of 50%, yielding a sample size of 354. However, a total of 375 responses were received.

**Study tool**

The questionnaire was developed upon the critical review of relevant literatures (Alzahrani et al., 2016; Chaterji et al., 2007; Hussain et al., 2012). It consisted of two main sections: the first captured demographic information, whilst the second included nine closed-ended items designed to assess attitudes toward herbal medicine. These attitude items were adapted from existing studies and measured using a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). The questionnaire was created using Google Forms and pretested with five volunteers whose responses were excluded from the final analysis. Following refinement, the final survey link was forwarded to the target audience.

**Data Collection**

Through their class representative and their level WhatsApp social networking channel, qualified final-year medical and pharmacy students were sought out, and a Google Form survey was distributed. To accommodate participants’ preferences, some students received the Google Form link via their WhatsApp academic groups, whilst others who chose a physical format were provided with printed copies.

**Data Analysis**

Completed survey data was exported to Microsoft Excel spread sheet. Relevant data was sorted and entered into SPSS version 23 for statistical analysis. Simple cross tabulation and Chi-square was used to check for the relation between variables and the demographs of the cohort. The statistical significance was accepted at p value of <0.05.

**Ethical Consideration and approval**

Prior to the collection of data, ethical approval for this study was granted from the National Institute for Pharmaceutical Research and Development (NIPRD) Health Research Ethics Committee, Abuja (NHREC/039/21A). After being fully informed about the research, students voluntarily participated in the study by providing their consent. More so, the electronic form included a feature that restricted further access to the evaluation section provided for those who had provided consent, ensuring ethical compliance and participant autonomy. All data retrieved were handled with strict confidentiality.

**3.0 RESULT**

**3.1 Demography**

A total of 375 respondents participated in the study. Of these, the majority (63.2%) were female and slightly more than a third of the total (36.8%) male. Nearly two third of participants (64.8%) were aged 22–25 years, whilst the least (1.9%) were 30 years or older. In terms of academic programmes, a wide proportion of the cohort (64.8%) were Pharmacy students and less than half (35.2%) were in the Medicine and Surgery or Dentistry programmes. Further demographic details are provided in Table 2.

**Table 1**: Sociodemographic Characteristics of the Participants

|  |  |
| --- | --- |
| **Variable** | **Frequency (%)** |
| **Gender** |  |
| Male | 138(36.8) |
| Female | 237 (63.2) |
| **Age** |  |
| 18 – 21 | 57(15.2) |
| 22 – 25 | 243 (64.8) |
| 26 – 29 | 68 (18.1) |
| 30 or Above | 7 (1.9) |
| **Programme** |  |
| Medicine and Surgery/Dentistry | 132 (35.2) |
| Pharmacy | 243 (64.8) |
| **Herbal/Medicinal Plants in Curriculum** |  |
| Yes | 251 (66.9) |
| No | 124 (33.1) |
| **Geopolitical Zone of Educational Institution** |  |
| North-West | 63 (16.8) |
| North-East | 35 (9.3) |
| North-Central | 65 (17.3) |
| South-West | 54 (14.4) |
| South-East | 29 (7.7) |
| South-South | 129 (34.4) |
| **Use of Herbal Product** |  |
| Yes | 314 (83.7) |
| No | 61 (16.3) |
| **Availability Herbal/Traditional Medicine Clinic in School** |  |
| Yes | 57 (15.2) |
| No | 318 (84.8) |
| **Affiliation with Herbal/Traditional Clinic** |  |
| Yes | 42(13.2) |
| No | 276(86.8) |
| **Functionality of the Herbal Clinic in School** |  |
| Very functional | 25 (25.3) |
| Functional | 43 (43.4) |
| I Don’t Know | 31 (31.3) |

**3.2 Attitudes toward the Safety and Efficacy of Herbal Medicine**

**A. Perceptions of the Safety and Therapeutic Effectiveness of Herbal Medicines**

According to figure 1a, perceptions surrounding the inherent safety of herbal medicines due to their natural origin were more varied. Around 38% of participants adopted a neutral stance on this statement. Meanwhile, 30% of the participants disagreed and 9% strongly disagreed with the statement. Fewer respondents expressed positive views, with about 17% agreeing and roughly 7% strongly agreeing.

On the question of whether herbal medicines have no true impact on the treatment of diseases, almost half (45%) of the participants strongly disagreed, whilst about 43% also disagreed. Neutral responses accounted for nearly 10%, and only a very small percentage (2%) expressed agreement. Notably, no respondents strongly agreed with this statement.

**Figure 1a**: Participants perception on the safety and efficacy of herbal medicine

**B. Perceived Need for Scientific Evidence in the Use of Herbal Medicines**

Figure 1b revealed that, In relation to the claim that the majority of health claims made by medicine manufacturers lack scientific proof, close to half of the participants (47%) agreed, and about one in six (16%) strongly agreed. Approximately one in five (18%) were neutral, whilst just over one in ten (11%) disagreed and a smaller fraction (7%) strongly disagreed.

A considerable proportion of respondents expressed agreement that herbal products not tested in a scientific manner should not be used for medical therapy with roughly one-third (35%) agreeing and about one-quarter (25%) strongly agreeing. Nearly one in four (22%) remained neutral on this view, whilst just over one in ten (11%) disagreed and a smaller proportion (6%) strongly disagreed.

**Figure 1b:** Participants perception on the safety and efficacy of herbal medicine

**3.3 Public Health Concerns and Risk**

On the other hand on figure 2, most respondents (71%) rejected the notion that herbal or traditional medicines pose a danger to public health. Whilst 17% remained undecided, only a small proportion approximately one in seven (12%), supported the statement.

**Figure 2**:Respondents perception of herbal medicine in public health

**3.4 Educational Importance and Curriculum Integration**

A substantial proportion of respondents acknowledged the academic relevance of herbal medicine, with nearly half (approximately 46%) strongly affirming that it is important for medical and pharmacy students to study herbal medicines. An additional 36% agreed with this view, whilst fewer than one in ten (8%) remained neutral. Only a small fraction, 3%, indicated disagreement

When asked whether knowledge of medicinal plants and herbal products is important for healthcare professionals, almost half (49%) strongly agreed, and roughly one-third (34%) agreed. Neutral responses were minimal at about 5%, whilst disagreement was reported by just 1%, and fewer than 11% strongly disagreed.

When asked whether the study of medicinal plants and herbal products should be restricted to pharmacy students only, more than two in five respondents (47%) disagreed with the statement, whilst fewer than one in ten (6%) agreed. About one in five (15%) were neutral, over one-quarter (29%) strongly disagreed, and only a small proportion (3%) strongly agreed. These patterns are visually represented in Figure 3.

**Figure 3**: Respondents Attitude toward the Importance and Scope of Herbal Medicine Education among Health Professional Students

**3.5 Integration of Herbal and Conventional Medicine**

Finally, overall support for integrating complementary and alternative medicine with conventional healthcare was on the high side as summarised in Figure 4. Approximately two-thirds of participants favoured this combined approach (70%) Nearly one in four respondents were neutral (18%), whilst a small minority (12%) opposed integration

**Figure 4**: Respondents Support for integrating herbal and conventional medicine in clinical care.

**3.6 Association between Demographic Characteristics and Attitudes toward Plant medicine**

The perception of herbal medicines as a potential public health threat varied significantly by academic programme as shown in Table 2. Female students were more likely to reject this notion, with 41.8% disagreeing and 33.3% strongly disagreeing, while male responses were slightly more varied (37.7% disagreed, 26.8% strongly disagreed) (χ² = 18.394, *p* = 0.003). Age was also significantly associated with perception (χ² = 29.475, *p* = 0.003), with younger respondents (18–21) primarily expressing disagreement (77.2%), while those aged 22–25 showed more diverse responses. Academic programme demonstrated a strong influence (χ² = 119.759, *p* < 0.001); a substantial majority of Pharmacy students either disagreed (45.7%) or strongly disagreed (43.2%) that herbal medicines are a public health risk, in contrast to Medicine and Dentistry students who were more divided, with only 38.6% disagreeing and 31.1% neutral. Similarly, curriculum exposure significantly shaped perceptions (χ² = 95.991, *p* < 0.001), with students who had studied herbal medicine largely disagreeing (43.8%) or strongly disagreeing (41.8%), while those without exposure exhibited more neutral (28.2%) or even agreeing (29.9%) responses. A significant association was also observed with use of herbal products (χ² = 32.201, *p* < 0.001), where users predominantly disagreed (42.7%) or strongly disagreed (32.2%) with the public health threat narrative. Students from schools with herbal clinics were more likely to oppose this view (χ² = 41.902, *p* < 0.001), with 47.4% disagreeing and 40.4% strongly disagreeing. Likewise, those affiliated with herbal clinics largely dismissed the idea, with 71.4% strongly disagreeing (χ² = 19.303, *p* < 0.001). The functionality of herbal clinics was also significantly associated (χ² = 15.338, *p* = 0.018), with stronger disagreement observed among those who reported that clinics were functional. Geopolitical zone showed a significant trend (χ² = 78.120, *p* < 0.001), although regional variations were very subtle.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Table 2: Cross Tabulation between demographic information and Public health concerns and Risk**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Stateent** | **Demography** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **X2** | ***df*** | ***p-value*** | | **Herbal medicine are a threat to public health** | **Gender** |  |  |  |  |  |  |  |  | |  | Male | 37 (26.8%) | 52 (37.7%) | 23 (16.7%) | 24 (17.4%) | 2 (1.4%) | 18.394 | 4 | .003\* | |  | Female | 79 (33.3%) | 99 (41.8%) | 39 (16.5%) | 11 (4.6%) | 9 (3.8%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Age** |  |  |  |  |  |  |  |  | |  | 18 - 21 | 18 (31.6%) | 26 (45.6%) | 22.8% (13) | 0.0% (0) | 0.0% (0) | 29.475 | 12 | .003 | |  | 22 - 25 | 75 (30.9%) | 105 (43.2%) | 28 (11.5%) | 26 (10.7%) | 9 (3.7%) |  |  |  | |  | 26 - 29 | 19 (27.9%) | 20 (29.4%) | 18 (26.5%) | 9 (13.2%) | 2 (2.9%) |  |  |  | |  | 30 or Above | 4 (57.1%) | 0 (0.0%) | 3 (42.9%) | 0 (0.0%) | 0 (0.0%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Undergraduate programme** |  |  |  |  |  |  |  |  | |  | Medicine and Surgery/Dentistry | 11 (8.3%) | 40 (30.3%) | 41 (31.1%) | 29 (22.0%) | 11 (8.3%) | 119.759 | 4 | ˂.001\* | |  | Pharmacy | 105 (43.2%) | 111 (45.7%) | 2 (8.6%) | 6 (2.5%) | 0 (0.0%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Herbal/Medicinal Plants in Curriculum** |  |  |  |  |  |  |  |  | |  | Yes | 105 (41.8%) | 110 (43.8%) | 27 (10.8%) | 9 (3.6%) | 0 (0.0%) | 95.991 | 4 | ˂.001\* | |  | No | 11 (8.9%) | 41 (33.1%) | 35 (28.2%) | 26 (21.0%) | 11 (8.9%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Geopolitical zone** |  |  |  |  |  |  |  |  | |  | North West | 13 (20.6%) | 23 (36.5%) | 19 (30.2%) | 6 (9.5%) | 2 (3.2%) | 78.120 | 20 | ˂.001\* | |  | North Central | 10 (15.4%) | 24 (36.9%) | 19 (29.2%) | 9 (13.8%) | 3 (4.6%) |  |  |  | |  | North East | 7 (20.0%) | 12 (34.3%) | 9 (25.7%) | 4 (11.4%) | 3 (8.6%) |  |  |  | |  | South West | 18 (33.3%) | 25 (463%) | 5 (9.3%) | 6 (11.1%) | 0 (0.0%) |  |  |  | |  | South-South | 53 (41.1%) | 62 (48.1%) | 10 (7.8%) | 4 (3.1%) | 0 (0.0%) |  |  |  | |  | South East | 15 (51.7%) | 5 (17.2%) | 0 (0.0%) | 6 ()20.7% | 3 (10.3%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Use of Herbal Product** |  |  |  |  |  |  |  |  | |  | Yes | 101 (32.2%) | 134 (42.7%) | 50 (15.9%) | 26 (8.3%) | 3 (1.0%) | 32.201 | 4 | ˂.001\* | |  | No | 15 (24.6%) | 17 (27.9%) | 12 (19.7%) | 9 (14.8%) | 8 (13.1%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Availability Herbal/Traditional Medicine Clinic in School** |  |  |  |  |  | 41.902 | 4 | ˂.001\* | |  | Yes | 23 (40.4%) | 27 (47.4%) | 7 (12.3%) | 0 (0.0%) | 0 (0.0%) |  |  |  | |  | No | 93 (29.2%) | 124 (39.0%) | 55 (17.3%) | 35 (11.0%) | 11 (3.5%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Affiliation with herbal clinic** |  |  |  |  |  |  |  |  | |  | Yes | 30 (71.4%) | 7 (16.7%) | 3 (7.1%) | 2 (4.8%) | 0 (0.0%) | 19.303 | 4 | ˂.001\* | |  | No | 63 (22.8%) | 117 (42.4%) | 52 (18.8%) | 33 (12.0%) | 11 (4.0%) |  |  |  | |  |  |  |  |  |  |  |  |  |  | |  | **Functionality of herbal clinic** |  |  |  |  |  |  |  | . | |  | Very functional | 15 (60.0%) | 0 (0.0%) | 10 (40.0%) | 0 (0.0%) | 0 (0.0%) | 15.338 | 6 | 018\* | |  | Functional | 22 (51.2%) | 0 (0.0%) | 18 (41.9%) | 3 (7.0%) | 0 (0.0%) |  |  |  | |  | I don’t know | 16 (51.6%) | 0 (0.0%) | 6 (19.4%) | 7 (22.6%) | 2 (6.5%) |  |  |  | |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

Table 3 shows that attitudes toward the use of invalidated herbal medicines for therapy showed significant associations with several demographic variables. Gender was associated with differing opinions (χ² = 16.624, *p* = 0.002); males leaned more strongly toward agreement (33.3%) and strong agreement (31.9%), while females had more moderate levels of agreement (36.7%) and neutrality (23.6%). Undergraduate programme was significantly associated (χ² = 50.330, *p* < 0.001), with 78.0% of Medicine and Dentistry students agreeing or strongly agreeing that only scientifically tested herbal products should be used, compared to just 51.0% among Pharmacy students, who demonstrated more neutrality (27.6%) and disagreement (15.6%). Respondents Curricular exposure also significantly influenced views (χ² = 34.840, *p* < 0.001). Those with exposure mostly agreed (34.7%) or strongly agreed (18.7%), while those without were more polarized, with 37.9% strongly agreeing but a larger proportion also strongly disagreeing (9.7%). Regional differences were also significant (χ² = 54.572, *p* < 0.001), with respondents from North-East and South-East zones expressing stronger support for scientific validation. While the availability of herbal clinics did not reach statistical significance (χ² = 14.009, *p* = 0.070), affiliation with a herbal clinic showed a marked difference (χ² = 29.088, *p* = 0.001); affiliated individuals were more likely to express neutrality (50.0%), in contrast to their unaffiliated counterparts who were more likely to support scientific validation (65.9%). Clinic functionality also influenced perception (χ² = 16.564, *p* = 0.035), with mixed responses among those unsure of their clinic's operational status.

**Table 3: Cross Tabulation between demographic information and Safety and Efficacy of herbal Medicines**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Statement** | **Demography** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **X2** | ***U*** | ***p*-value** |
|  |  |  |  |  |  |  |  |  |  |
| **Herbal products not tested in a scientific manner should not be used for medical therapy** | **Gender** |  |  |  |  |  | 16.624 | 4 | .002 |
|  | Male | 14 (10.1%) | 7 (5.1%) | 27 (19.6%) | 46 (33.3%) | 44 (31.9%) |  |  |  |
|  | Female | 10 (4.2%) | 34 (14.3%) | 56 (23.6%) | 87 (36.7%) | 50 (21.1%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Undergraduate programme** |  |  |  |  |  |  |  |  |
|  | Medicine and Surgery/Dentistry | 10 (7.6%) | 3 (2.3%) | 16 (12.1%) | 46 (34.8%) | 57 (43.2%) | 50.330 | 4 | ˂.001\* |
|  | Pharmacy | 14 (5.8%) | 38 (15.6%) | 67 (27.6%) | 87 (35.8%) | 37 (15.2%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Geopolitical zone** |  |  |  |  |  |  |  |  |
|  | North West | 8 (12.7%) | 5 (7.9%) | 14 (22.2%) | 24 (38.1%) | 12 (19.0%) | 54.572 | 20 | ˂.001\* |
|  | North Central | 5 (7.7%) | 5 (7.7%) | 13 (20.0%) | 17 (26.2%) | 25 (38.5%) |  |  |  |
|  | North East | 4 (11.4%) | 1 (2.9%) | 3 (8.6%) | 11 (31.4%) | 16 (45.7%) |  |  |  |
|  | South West | 0 (0.0%) | 9 (16.7%) | 17 (31.5%) | 13 (24.1%) | 15 (27.8%) |  |  |  |
|  | South-South | 7 (5.4%) | 21 (16.3%) | 31 (24.0%) | 53 (41.1%) | 17 (13.2%) |  |  |  |
|  | South East | 0 (0.0%) | 0 (0.0%) | 5 (17.2%) | 15 (51.7%) | 9 (31.0%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Provision for herbal study in curriculum** |  |  |  |  |  |  |  |  |
|  | Yes | 12 (4.8%) | 38 (15.1%) | 67 (26.7%) | 87 (34.7%) | 47 (18.7%) | 34.840 | 4 | ˂.001\* |
|  | No | 12 (9.7%) | 3 (2.4%) | 16 (12.9%) | 46 (37.1%) | 47 (37.9%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Availability Herbal/Traditional Medicine Clinic in School** |  |  |  |  |  | 14.009 | 4 | 0.07 |
|  | Yes | 4 (7.0%) | 13 (22.8%) | 6 (10.5%) | 17 (29.8%) | 17 (29.8%) |  |  |  |
|  | No | 20 (6.3%) | 28 (8.8%) | 77 (24.2%) | 116 (36.5%) | 77 (24.2%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Affiliation with a herbal clinic** |  |  |  |  |  |  |  |  |
|  | Yes | 2 (4.8%) | 8 (19.0%) | 21 (50.0%) | 8 (19.0%) | 3 (7.1%) | 29.088 | 4 | .001 |
|  | No | 18 (6.5%) | 20 (7.2%) | 56 (20.3%) | 108 (39.1%) | 74 (26.8%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Functionality of herbal clinic** |  |  |  |  |  | 16.564 | 8 | .035 |
|  | Very functional | 2 (8.0%) | 5 (20.0%) | 12 (48.0%) | 4 (16.0%) | 2 (8.0%) |  |  |  |
|  | Functional | 2 (4.7%) | 13 (30.2%) | 5 (11.6%) | 11 (25.6%) | 43 (27.9%) |  |  |  |
|  | I don’t know | 2 (6.5%) | 3 (9.7%) | 10 (32.3%) | 10 (32.3%) | 6 (19.4%) |  |  |  |

Support for integrating herbal medicine with conventional clinical care showed a wide significance across demographics as expressed in Table 4. Academic discipline played a key role (χ² = 38.327, *p* < 0.001): Pharmacy students showed strong support, with 42.0% strongly agreeing and 37.4% agreeing, while Medicine and Dentistry students were more reserved, with only 33.3% agreeing and 19.7% strongly agreeing. Curriculum exposure also had a strong influence (χ² = 44.555, *p* < 0.001), as students who studied herbal medicine overwhelmingly supported integration (41.8% strongly agreed, 38.6% agreed), compared to those without exposure (30.6% agreed, 18.5% strongly agreed). Geopolitical zone was significantly associated (χ² = 71.769, *p* < 0.001). Respondents from South-South (80.6%) and South-East (69.0%) expressed the strongest support. Use of herbal products was also a significant factor (χ² = 53.996, *p* = 0.001); among users, 76.5% supported integration, compared to just 37.7% of non-users. Availability of herbal clinics also had a notable effect (χ² = 10.595, *p* = 0.032), with stronger support among those with access (67.7%) than those without. Furthermore, students affiliated with herbal clinics overwhelmingly supported integration (χ² = 21.967, *p* < 0.001), with 64.3% strongly agreeing. Lastly, clinic functionality was a significant predictor (χ² = 18.352, *p* = 0.019), with highest levels of strong agreement (48.0%) reported among those who described their clinics as "very functional".

**Table 4: Cross Tabulation between demographic information and Support for the integration of CAM**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Statement** | **Demography** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **X2** | ***df*** | ***p*-value** |
| **Clinical care should integrate the best of herbal medicine into conventional medicine** | **Undergraduate programme** |  |  |  |  |  |  |  |  |
|  | Medicine and Surgery/Dentistry | 10 (7.6%) | 12 (9.1%) | 40 (30.3%) | 44 (33.3%) | 26 (19.7%) | 38.327 | 4 | ˂.001\* |
|  | Pharmacy | 17 (7.0%) | 27 (2.5%) | 6 (11.1%) | 91 (37.4%) | 102 (42.0%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Provision for herbal study in curriculum** |  |  |  |  |  |  |  |  |
|  | Yes | 15 (6.0%) | 6 (2.4%) | 28 (11.2%) | 97 (38.6%) | 105 (41.8%) | 44.555 | 4 | ˂.001\* |
|  | No | 12 (9.7%) | 12 (9.7%) | 39 (31.5%) | 38 (30.6%) | 23 (18.5%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Geopolitical zone** |  |  |  |  |  |  |  |  |
|  | North West | 8 (12.7%) | 11 (17.5%) | 11 (17.5%) | 25 (39.7%) | 8 (12.7%) | 71.769 | 20 | ˂.001\* |
|  | North Central | 7 (10.8%) | 3 (4.6%) | 13 (20.0%) | 21 (32.3%) | 21 ()32.3% |  |  |  |
|  | North East | 2 (5.7%) | 0 (0.0%) | 14 (40.0%) | 9 (25.7%) | 10 (28.6%) |  |  |  |
|  | South West | 0 (0.0%) | 1 (1.9%) | 8 (14.8%) | 25 (46.3%) | 20 (37.0%) |  |  |  |
|  | South - South | 10 (7.8%) | 3 (2.3%) | 12 (9.3%) | 47 (36.4%) | 57 (44.2%) |  |  |  |
|  | South East | 0 (0.0%) | 0 (0.0%) | 9 (31.0%) | 8 (27.6%) | 12 (41.4%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Use of herbal products** |  |  |  |  |  |  |  |  |
|  | Yes | 23 (7.3%) | 14 (4.5%) | 37 (11.8%) | 128 (40.8%) | 112 (35.7%) | 53.996 | 4 | .001\* |
|  | No | 4 (6.6%) | 4 (6.6%) | 30 (49.2%) | 7 (11.5%) | 16 (26.2%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Availability of herbal/Traditional Medicine Clinic** |  |  |  |  |  |  |  |  |
|  | Yes | 7 (12.3%) | 6 (10.5%) | 6 (10.5%) | 16 (28.1% ) | 22 (38.6%) | 10.595 | 4 | .032 |
|  | No | 20 (6.3%) | 12 (3.8%) | 61 (19.2%) | 119 (37.4%) | 106 (33.3%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Affiliation with a herbal clinic** |  |  |  |  |  |  |  |  |
|  | Yes | 2 (4.8%) | 0 (0.0%) | 3 (7.1%) | 10 (23.8%) | 27 (64.3%) | 21.967 | 4 | ˂.001\* |
|  | No | 18 (6.5%) | 12 (4.3%) | 58 (21.0% ) | 109 (39.5%) | 79 (28.6%) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **Functionality of herbal clinic** |  |  |  |  |  | 18.352 | 8 | .019 |
|  | Very functional | 2 (8.0%) | 3 (12.0%) | 3 (12.0%) | 5 (20.0%) | 12 (48.0%) |  |  |  |
|  | Functional | 5 (11.6%) | 3 (7.0%) | 3 (7.0%) | 18 (41.9%) | 14 (32.6%) |  |  |  |
|  | I don’t know | 2 (6.5%) | 0 (0.0%) | 3 (9.7%) | 3 (9.7%) | 23 (74.2%) |  |  |  |

**4.0 Discussion**

This study explored the attitudes of final-year medical and pharmacy students in Nigeria towards herbal medicines across four important domains: perceptions of safety and efficacy, scientific validation, educational relevance, and integration with conventional medicine. The findings reveal a nuanced yet increasingly evidence-aligned outlook among future healthcare professionals, influenced by a combination of academic exposure, personal experience, cultural background, and institutional context.

A striking 89% of participants rejected the belief that herbal medicines lack therapeutic value, reflecting a widespread acknowledgment of their efficacy in disease treatment. However, only 23% considered them inherently safe due to their natural origin, with many respondents expressing neutrality. This cautious stance toward the presumed safety of herbal products aligns with earlier findings by Nworu et al. (2015) and reflects a growing awareness of the potential risks posed by unregulated traditional therapies. It also underscores the critical need for structured education on the complexities and pharmacological implications of herbal medicine use.

In line with this, a majority of respondents (59%) affirmed that herbal products should not be used without prior scientific testing, and 62% questioned the validity of many health claims made by herbal manufacturers. These sentiments resonate with global concerns, such as those highlighted by (Ali et al., 2024), where 85% of Saudi respondents demanded greater scientific scrutiny of herbal therapies. Taken together, these findings demonstrate a shift among young Nigerian health professionals toward evidence-based practice, even in the context of traditionally accepted remedies.

Despite concerns around efficacy, most students (approximately 70%) did not perceive herbal medicine as a public health threat. This reflects the cultural presence and routine familiarity with traditional medicine across Nigeria’s regions. The significantly lower risk perception among respondents affiliated with herbal clinics 88% of whom disagreed with the idea that herbal medicine is harmful suggests that practical exposure may reduce perceived threats, potentially replacing fear with experiential understanding. Students with access to “very functional” clinics were even more likely to strongly disagree with the risk statement, underscoring the role of the availability of working infrastructure and amenities in shaping confidence.

Educational relevance emerged as a dominant theme. Over 84% of respondents agreed that herbal medicine knowledge is important for healthcare professionals, supporting earlier findings across the globe (Awad et al., 2012; James & Bah, 2014; Saha et al., 2017). The preference for interdisciplinary rather than exclusive training for pharmacy programmes signals the need for integrated curricula that reflect the collaborative nature of modern healthcare.

Demographic and academic variables significantly shaped attitudes. Pharmacy students, more likely exposed to pharmacognosy and CAM modules, were less inclined to view herbal medicine as risky and showed greater openness to integration with conventional practice. Medical students, who typically receive less CAM training, expressed more uncertainty evident in their neutral responses on several items. This supports the view of (Gaster et al., 2007), who advocated for introduction simple CAM contents into mainstream medical education to improve comprehension and acceptance.

Age differences were also apparent. Younger students (18–21) exhibited the highest disagreement with the notion that herbal medicines are harmful, whereas older students expressed more varied or neutral opinions. This may reflect growing exposure to clinical scepticism and evidence-based reasoning as students’ progress through their programmes.

Personal use and clinic affiliation were consistent predictors of more positive or moderated attitudes. Users of herbal products, especially females who commonly apply traditional remedies for culturally accepted conditions like menstrual regulation (Almech et al., 2024) tended to view herbal medicine as safer and more acceptable. This gendered trend aligns with (Jawahar et al., 2012), who described women as custodians of traditional herbal knowledge. Conversely, male students showed stronger preference for scientific validation, which may reflect gender differences in health seeking behaviour and exposure.

Regional and geopolitical factors further influenced perspectives. Respondents from the South-East and South-South showed the highest support for integration and scientific testing, while those from the North-East and North-West were relatively more sceptical. These patterns reflect Nigeria’s ethnic diversity and the role of regional norms, beliefs, and curricular differences in shaping attitudes. Moreover, the geopolitical zones in Nigeria are home to diverse ethnic groups, each with unique cultural practices. Students are often admitted into universities outside their native regions, resulting in a rich mix of cultural identities within academic institutions. This intercultural composition may foster both convergence and divergence in beliefs whilst some students may share similar cultural norms, others may hold distinct or even contrasting perspectives on health practices such as herbal medicine. Such cultural variation, shaped by regional values, traditions, and degrees of exposure to traditional therapies, could have meaningfully influenced the differing attitudes observed in this study

Curricular exposure consistently emerged as a moderating influence. Among students who had formally studied herbal medicine, attitudes were more balanced indicating a more thoughtful engagement rather than polarised acceptance or rejection. In contrast, students without such exposure were more extreme in their views, either strongly advocating scientific testing or rejecting it entirely. This highlights the educational value of CAM modules in cultivating critical, evidence-informed perspectives.

Affiliation with herbal medicine clinics had a profound effect. Affiliated students were more likely to express neutrality or disagreement regarding the need for scientific testing, suggesting that first-hand experience may shape reliance on traditional knowledge systems over formal research protocols. Interestingly, students from institutions with less functional clinics were more inclined to demand validation, pointing to the influence of institutional exposure and trust-building.

Support for integration of herbal and conventional medicine was robust, particularly among pharmacy students (nearly 80%). This aligns with findings from (Abbott et al., 2011; Awad et al., 2012; Chaterji et al., 2007),, all of whom reported strong student support for integrative models of care. Students with clinic affiliations or herbal education were significantly more likely to support integration, reaffirming the joint importance of academic training and experiential learning in shaping favourable attitudes. Even among students without prior clinical exposure, integration received considerable backing, indicating the potential impact of curriculum alone in shaping openness to CAM.

The influence of prior herbal product use was especially significant (χ² = 53.996, p = 0.001). Users were twice as likely to support integration compared to non-users, reinforcing the idea that personal and cultural familiarity fosters confidence in traditional remedies. Similarly, students from schools with “very functional” clinics showed the highest levels of support for integration, suggesting that institutional legitimacy matters in promoting CAM acceptance.

Regional differences again played a notable role. Students from the South-East and South-South showed the strongest support for integration, a likely reflection of stronger traditional medical practices in these zones or higher exposure to CAM-oriented curricula. In contrast, support was lower in the North-West and North-East, which may reflect regional disparities in education delivery or cultural orientation toward conventional medicine.

Overall, the study reveals that attitudes toward herbal medicine among Nigeria’s future healthcare professionals are complex, multifaceted, and strongly shaped by education, personal experience, institutional context, and regional culture. These findings echo conclusions by (Bousquet et al., 2011) (Foley & Steel, 2017), who noted a global shift among young health professionals toward more holistic, patient-centred models of care.

**Conclusion**

Final-year medical and pharmacy students in Nigeria demonstrate a high level of recognition for the therapeutic value of herbal medicines and broad support for their inclusion in health professional education and clinical integration. However, significant caution persists regarding safety and scientific validation. This was driven by limited curriculum exposure, variable personal experience, and regulatory uncertainty. Therefore, to realise the promise of integrative care, stakeholders must bridge these gaps through structured, evidence-based CAM training, clear regulatory pathways, and stronger academia industry collaboration.

**Limitation**

While this study offers valuable insight into how future Nigerian health professionals view herbal medicine, several limitations warrant consideration. Social desirability may have influenced responses, with students offering answers they felt were expected of them rather than their candid beliefs. Secondly, by using only close ended questions, we miss the rich, nuanced explanations that could tell us why students think as they do; follow‑up interviews or open‑ended prompts would allow for better information.

**Recommendation**

To build on the findings of this study, future research should incorporate qualitative methods such as face-to-face interviews or open-ended questions to capture profound insights into students' beliefs and motivations. The establishment do CAM education across all health professional curricula and not just pharmacy will promote interdisciplinary competence. Strengthening ties with approved herbal clinics and supporting functional on-campus units will enhance experiential learning and fund confidence in integrative care. Finally, educational strategies must also address regional and gender specific differences, ensuring culturally relevant and inclusive content.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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