**Complementary and Alternative Medicine: A Cross-sectional Study on Attitudes of Prospective Health Professionals towards Herbal Medicines**

**Abstract**

**Background:** Herbal medicine remains integral to healthcare in many countries, yet its formal integration into conventional practice is still a challenge. 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. Descriptive and inferential statistical analyses were conducted.

**Results:** A strong majority (88%) disagreed that herbal medicines lack efficacy, less that a quarter (24%) viewed them as inherently safe, but more than a third agreed (36%) that they require scientific testing before use, whilst more than three-quarters (83%) indicated that knowledge of herbal medicine is important for healthcare professionals. Close to three-quarters (70%) agreed that clinical care should integrate conventional medicine with herbal medicines, with pharmacy students (*p* < 0.001) and those exposed to the curricula (*p* < 0.001) showing more support for this view. Also, compared to the pharmacy students (51%), a higher proportion of the medical students (78%) agreed that herbal medications should not be employed for therapeutic purposes unless supported by scientific evidence (*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:** Herbal medicine, Therapeutic effectiveness, Integrative medicine, Attitudes towards herbal remedies, healthcare.

**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 (Ghorat *et* al., 2024). Over 80% of the global population uses traditional herbal medicine for primary health care needs (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 (Okaiyeto & Oguntibeju 2021). This growing interest is not only rooted in cultural heritage but also in the increasing demand for patient-centred care models (Abel *et* al., 2025; Al-Yateem *et al*., 2023; Chaachouay & Zidane 2024). Despite this widespread usage, the formal integration of herbal medicine into modern clinical settings remains limited (Ampomah *et al*., 2024; Ikhoyameh *et al*., 2024; Mutombo *et al*., 2023).

Evidence from previous studies has highlighted challenges hindering the integration of herbal remedies with orthodox medicines. A study by Eng *et al.* (2019) indicated that most clinicians are not familiar with herbal medicine and consequently do not recommend herbal therapies. Also, Kwame (2021) identified divergent medical beliefs and underlying power dynamics between traditional healers and biomedical practitioners as key barriers to the successful integration of herbal remedies into the modern medical system. In addition, poor attitudes towards herbal medicines have been reported. Adekannbi (2018) noted that there was a negative perception of traditional medicine by orthodox practitioners. Additionally, a study conducted by Nwankwo & Aghahowa (2022) revealed that pharmacists preferred orthodox medicines over herbal remedies because of clearer dose and approval by regulatory authorities. Other factors, such as unclear regulatory frameworks, insufficient standardisation, and ongoing concerns about safety, efficacy, and scientific validation of herbal interventions, continue to hinder its acceptance in conventional practice (Eruaga *et al.*, 2024; Kalariya *et al.*, 2023; Rajalekshmi &Agrawal, 2024).

Although the limitations of integrating herbal medicines with modern medicines have been documented, only a few studies have examined the attitudes of healthcare professionals and students towards CAM of plant origin in Nigeria (Ibrahima & Lawal, 2023; Onche *et al.*, 2024; Umar *et al.*, 2024). Moreover, there is a paucity of information assessing these attitudes among students nearing professional entry. Additionally, no study has been conducted on a national level across Nigeria’s geopolitical zones. It is therefore pertinent to bridge these gaps. This is because prospective health professionals, particularly final-year medical and pharmacy students, are at the cusp of clinical practice and policy influence.

The attitudes of prospective health professionals towards herbal medicine can configure how integrative approaches are adopted or challenged within the Nigerian healthcare setting. Understanding these attitudes is essential for informing curriculum development, evidence-based policies, and the successful integration of traditional therapies into modern healthcare practice. Furthermore, 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. 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 is envisaged that by highlighting academic exposure, personal use, and programme of study, this research contributes to the wider discourse on plant-based CAM and its evolving place in contemporary medicine.

**2.0 Methodology**

**2.1 Design and Setting**

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

**2.2 Inclusion and Exclusion Criteria**

Participants included in the study were final-year students enrolled in either the Medicine and Surgery/Dentistry 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.

**2.3 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 minimum sample size of 354. A convenience sampling strategy was used to recruit participants for the study.

**2.4 Study Tool**

The questionnaire was developed upon the critical review of relevant literature (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 disagree, disagree, neutral, agree, and strongly agree). 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.

**2,5 Data Collection**

Through their class representative and 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.

**2.6 Data Analysis**

The online-completed survey data were exported from Microsoft Excel spreadsheet to Statistical Package for Social Sciences (SPSS) version 23 for coding, whilst the retrieved paper-based questionnaires were entered manually into the software before statistical analysis was conducted. Univariate analysis was conducted to yield descriptive statistics, whilst inferential analysis (Chi-square test) was used to check for the association between variables and the demographics of the cohort. The statistical significance was accepted at *p* value of <0.05.

**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%) were male. Nearly two-thirds of participants (64.8%) were aged 22–25 years, whilst the least (1.9%) were 30years old or above. In terms of academic background, a higher 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 1.

**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 (n = 318 based on the choice ‘No’ to the preceding statement)** |  |
| Yes | 42(13.2) |
| No | 276(86.8) |
| **Functionality of the Herbal Clinic in School/Affiliated institution (n = 99)** |  |
| Very functional | 25 (25.3) |
| Functional | 43 (43.4) |
| I Don’t Know | 31 (31.3) |

**3.2 Attitudes towards Herbal Medicines**

**3.2.1 Safety and Therapeutic Effectiveness of Herbal Medicines**

From figure 1, views surrounding the inherent safety of herbal medicines due to their natural origin varied. Collectively, 39% of the participants disagreed with the statement, more than one-third (38%) of participants adopted a neutral stance, whilst fewer respondents (24%) expressed positive views.

The students' responses to herbal medicines having no true impact on the treatment of diseases indicated that a strong majority (88%) of the participants did not support this view. Neutral responses accounted for 10%, and only 2% expressed agreement.

**Figure 1**: Safety and efficacy of herbal medicine

**3.2.2 Scientific Evidence for Herbal Medicines Utilisation**

From findings presented in Figure 2, close to two-thirds of the study cohort (63%) opined that the majority of health claims made by herbal medicine manufacturers lack scientific proof. Also, a similar proportion (60%) felt that herbal remedies that have not undergone scientific evaluation should be avoided in medical treatment.

**Figure 2:**  Scientific evidence in herbal medicine utilisation

**3.2.3 Public Health Concerns and Risk**

As presented in Figure 3, majority of the respondents (71%) were against the notion that herbal medicines threaten the health of the general public, whilst 17% remained undecided, and only a small proportion (12%) supported the statement.

**Figure 3**:Risks of herbal medicine to public health

**3.2.4 Educational Importance and Curriculum Integration**

Regarding curriculum integration, about three-quarters of the medical and pharmacy students (76%) disagreed with the restriction of studies on medicinal plants and herbal products to pharmacy students. Conversely, a strong majority (86%) felt that medical and pharmacy students should be taught about herbal medicines.

Additionally, majority of the respondents (83%) indicated that knowledge of medicinal plants and herbal products is important for healthcare professionals. Further details are presented in Figure 4.

**Figure 4**: Importance and Scope of Herbal Medicine Education

**3.2.5 Integration of Herbal and Conventional Medicine**

Collectively, 80% of the study participants supported integrating plant-based complementary and alternative medicine with conventional healthcare, as summarised in Figure 5. Only a minority of the students (12%) opposed this view.

**Figure 5**: Integration of herbal and conventional medicine in clinical care

**3.3 Association between Demographic Characteristics and Respondents' Attitudes toward Herbal Medicines**

The perception of herbal medicines as a potential public health threat varied significantly across all the sociodemographic characteristics. 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 the 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. Further details are presented in Table 2.

**Table 2:** Cross-tabulation between demographic information and participants’ views

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Statement** | **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%) | 21 (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%) |  |  |  | |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

Also, 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** | ***df*** | ***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%) |  |  |  |

Additionally, 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 provides insight into prospective health professionals’ views towards herbal medicines across four important areas, comprising safety and efficacy, scientific validation, educational relevance, and integration with conventional medicine. More than three-quarters of the students disagreed that herbal medicines have no true impact on diseases, demonstrating a positive attitude regarding the therapeutic potential of plant-based complementary and alternative medicines. This aligns with the findings of Umar et al. (2024), where over 70% of pharmacy students in Nigeria believed that herbal medicines have beneficial health effects for disease management. Participants in this study, however, were divided on the safety of herbal remedies due to their origin from natural sources. The proportion of students who did not support the assertion was similar to that reported in Nigeria by Nworu et al. (2015). Conversely, less than a third agreed that the interventions are safe. This distribution contrasts with the findings of Zaida et al. (2022) in Saudi Arabia, where close to half of the public agreed that plant-based medicines are not harmful. It is also different from the study conducted by Awad & Al-Shaye (2014) in Kuwait, where more than half of the study cohort supported the view. The reason for these divergent perspectives can be attributed to the fact that the participants in this study were students in healthcare programmes and are more likely to exhibit safety concerns towards medical interventions.

It emerged from this study that majority of the students felt that most herbal medicines lack scientific validation for the health claims made by the manufacturers. This is similar to the findings reported by Ali et al. (2024) and suggests the need for improved research on plant-based complementary and alternative medicines that aligns with the best international standards and practices. Verifying claims of herbal medicine manufacturers can help identify effective treatments and understand the patterns of herb-herb or herb-drug interactions. It can also provide insight into the pharmacodynamics and pharmacokinetics of herbal remedies, thereby enhancing patient care. This is pertinent, as more than half of the participants, especially the medical students, indicated that herbal remedies not tested scientifically should not be used for medical therapy, thereby highlighting a possible decline in the economic value of unvalidated herbal medicines in the near term.

Despite participants' indication of concerns on the safety of herbal medicines and the need for validatory research, over two-thirds of the students did not perceive herbal medicine as a public health threat. This may be attributed to the cultural presence and routine familiarity with traditional medicine across Nigeria, given the high proportion of participants who acknowledged using herbal remedies. Notably, there was a significantly lower risk perception among respondents affiliated with herbal clinics, majority of whom disagreed with the idea that herbal medicine is harmful, suggesting 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 by (Awad *et al.*, 2012; James & Bah, 2014; Saha *et al.*, 2017). Also, majority of the participants supported the integration of herbal medicine with conventional medicine in clinical care, suggesting a positive attitude in this regard similar to the findings of Ibrahim *et al*. (2023). However, the preference for interdisciplinary rather than exclusive training among participants in pharmacy programmes signal the need for integrated curricula that reflect the collaborative nature of modern healthcare. Also, 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. Moreover, integrating traditional and complementary medicine into health systems can improve patient experience and population health (WHO, 2013).

Furthermore, the location of the students’ academic institution by geopolitical zone influenced perspectives regarding the integration of herbal remedies with orthodox medicines. Respondents from the South-East and South-South showed the highest support for integration, 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

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 advance in age.

Personal use and clinic affiliation were also consistent predictors of more positive 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.

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.

**5.0 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.

**Ethical Approval and consent**

Prior to the collection of data, ethical approval for this study was granted by 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 for those who had not provided consent, ensuring ethical compliance and participant autonomy. All data retrieved were handled with strict confidentiality.

**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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