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Integrating Bromatology into Pharmacy Curricula: A Strategic Approach to Enhance Pharmaceutical Competencies and Support Public Health

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ABSTRACT

Pharmacy education is undergoing a paradigm shift to align with the evolving demands of healthcare and the expanding role of pharmacists in public health. This study explored the integration of bromatology into pharmacy curricula as a strategic approach to enhance pharmaceutical competencies and strengthen public health contributions. A cross-sectional survey design was employed with a total of 153 participants, including pharmacy students (n = 79), practicing pharmacists (n = 51), and pharmacy faculty members (n = 23). Data were collected using a structured questionnaire composed of fifteen items divided into three domains (1) Integrative curriculum components, (2) Pharmaceutical competencies, and (3) Public health. Responses were measured on a five-point Likert scale.

Descriptive results indicated strong support across all domains, with the majority of participants agreeing that bromatology integration is essential for advancing pharmacy education, improving analytical and professional competencies, and enhancing the pharmacist's role in community health. Analysis of variance revealed statistically significant differences among groups across the three domains. Faculty members consistently demonstrated stronger endorsement of bromatology integration compared with students and practicing pharmacists, suggesting that academic leaders recognize its strategic importance in curriculum reform.

The findings align with international research emphasizing curricular integration as a means of bridging theoretical and practical knowledge, improving student performance, and aligning pharmacy education with public health objectives. Integrating bromatology is therefore not merely an academic addition but a forward-looking reform that prepares pharmacists to manage food drug interactions, provide nutritional counseling, and contribute meaningfully to chronic disease prevention and health promotion. This study concludes that bromatology integration represents an investment in both the quality of pharmacy education and the advancement of public healthcare systems

Keywords: *Bromatology; Pharmacy education; Curricular integration; Pharmaceutical competencies; Public health*.

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1. Introduction

Pharmacy education has experienced profound modification over recent decades in response to the evolution of the profession from a focus on medication dispensing to a comprehensive commitment to patient centered care. Such a seismic shift has underscored the imperatives of educational frameworks that can adapt swiftly to the continually shifting demands of the health care environment and to the competencies that span multiple disciplines [1]. Review and metanalysis literature consistently advocates for a curricular paradigm that exceeds the boundaries of conventional siloed instruction; the evidence calls for the incorporation of integrative and interdisciplinary methodologies that ensure graduates can competently negotiate the intricate and dynamic circumstances endemic to contemporary health care systems [2].

Curricular integration is an increasingly salient instructional approach aimed at linking foundational pharmaceutical sciences with patient-oriented practice in pharmacy pedagogy. Empirical evidence indicates that the infusion of clinically pertinent content during the preclinical years engenders a more coherent synthesis of drug science and therapeutic decision making [3]. Analogous outcomes have been documented in nursing education literature, where integrated curricula have yielded augmented mastery and transfer of pharmacological principles, thereby reinforcing the efficacy of systematic integration in diverse health professions, including pharmacy [4].

Recent empirical investigations have reaffirmed the significance of integration extending beyond curricular design to actual educational outcomes. Comparative analyses of conventional and integrated curricula consistently demonstrate that cohorts receiving integrated instruction attain superior performance indices and exhibit more favorable evaluations of their educational experiences [5]. In addition, institutional case studies of integrated curricula provide converging evidence that timely implementation creates favorable synergies between articulated educational outcomes and the operative requirements of the healthcare system [6]. Nevertheless, persistent barriers including optimal resource distribution, comprehensive curriculum mapping, and variable levels of faculty preparedness continue to impede the efficacious establishment of integrated programs [7].

Contemporary discussions also highlight that integration should evolve from being a mere sequencing of topics to achieving a genuine curricular merger where basic, clinical, and applied sciences are taught in harmony [8]. In this regard, studies of accredited United States Doctor of Pharm programs reveal that integration of basic and clinical sciences not only enhances competencies but also aligns with global standards in pharmacy education [9]. Curriculum mapping efforts further illustrate the growing recognition that integration strategies are central to maintaining accreditation standards and ensuring relevance in pharmacy practice [10].

The integration of bromatology into pharmacy curricula can be viewed as an extension of this global movement toward curricular innovation. By embedding food science within pharmaceutical training, pharmacy graduates would be better equipped to address critical intersections of nutrition, medication safety, and public health. This strategic approach not only strengthens pharmaceutical competencies but also supports broader societal goals of promoting health and preventing disease.

The study aims to evaluate the effect of curricular integration by concentrating on connecting pharmaceutical sciences with clinical practice to improve student skills, and match educational results to medical demands.

It also investigates the possible benefits of bromatology to improve public health, nutrition, and medication safety connection.

1.1 Literature Context

The transition to integrated pharmacy education appears to parallel the emergence of experiential learning frameworks that explicitly align theoretical principles with practice-oriented scenarios. Meechan et al. documented the advantages of co-delivering pharmacology and medicines management within nursing syllabi, demonstrating that doing so enhanced the retention and applicability of basic pharmacological principles while simultaneously foregrounding their clinical utility [11]. Such evidence is germane to the pharmacy sector, in which the

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progressive prioritization of curriculum integration is viewed as a conduit for fostering contextualized comprehension and the progressive accretion of professional competencies.

Student outcomes continue to substantiate the efficaciousness of curricular integration. An investigation conducted by Hsia et al. demonstrated that synthetic curricula elevated both achievement and student perceptions of transfer across disciplinary domains relative to traditional delivery systems [12]. This body of evidence implies that integration operates at multiple cognitive and affective registers, suggesting that the pedagogical architecture informs both conceptual mastery and the motivational antecedents that underpin sustained engagement in professional practice.

Institutional case studies provide additional evidence regarding the multifaceted nature of curricular integration. documented the rollout of an integrated curriculum at a sizeable private university, recording initial positive indicators alongside persistent difficulties in coordinating disparate academic units [13]. Their findings suggest that, notwithstanding the potential for favorable educational results, the actual impact of integration is conditioned by deliberate design, sustained inter disciplinary collaboration, and iterative appraisal. In parallel argued that the co curriculum constitutes a constitutive element of accredited pharmacy degree offerings, although its realization is frequently obstructed by institutional architecture and operational constraints [14].

Moving integration beyond basic curricular reform necessitates an intentional, system-wide redirection. Advocate progressing from merely sequenced integration where disciplines follow one another—toward authentic curricular fusion, in which knowledge domains are architecturally interlaced into an indivisible cognitive fabric [15]. This progression is corroborated by, who performed curriculum mapping across United States pharmacy programs, revealing sustained emphasis on integrated pedagogies as a core criterion for accreditation and continuous quality improvement [16]. Collectively, the evidence rooted in both theoretical and empirical analyses substantiates treating bromatology integration as an essential avenue in the strategic institutional maturation of pharmaceutical education, thus ensuring that pharmacy alumni are prepared with competencies that concurrently advance pharmaceutical practice and safeguard public health.

1.2 Applied Justification for Bromatology Integration

The incorporation of bromatological content into PharmD programs epitomizes a deliberate effort to fuse food science and pharmaceutical education. Islam and colleagues analyzed the synthesis of basic and clinical science within U.S. PharmD curricula and asserted that the systematic inclusion of these domains cultivates the critical analytical faculties fundamental to evidence-based decision making and comprehensive patient management [17]. Their findings thereby furnish indirect support for the hypothesis that bromatology, regarded as a core discipline, augments the pharmacist’s competence to assess the pharmacokinetic and pharmacodynamic repercussions of food drug related phenomena, as well as the modulatory effects of diet on pharmacotherapy.

Curriculum mapping investigations further support this thesis. Demonstrated that integrated curricular architectures in the United States systematically orient educational objectives toward contemporary healthcare exigencies [18]. Inserting bromatology into these architectures would broaden the pharmacist's professional portfolio beyond pharmacological supply to encompass nutritional guidance and dietary risk assessment, competencies that are assuming elevated importance in the realms of chronic disease deterrence and population health maximizing interventions.

International frameworks for higher education supply surplus scaffolding for curricular integration. delineate how the evolving pharmacy practice landscape compels systematic curricular revision, arguing that emergent programs must cultivate competencies in multidisciplinary patient centered collaboration [19]. Integration of bromatology would further that agenda by embedding nutritional determinants of health within pharmacist pedagogy, thereby fortifying pharmacists’ role within interprofessional healthcare teams.

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Assert that curricular integration provides a strategic framework for cultivating competencies that remain disjointed under conventional instructional models [20]. By deliberately threading bromatology throughout the pharmacy curriculum, learners are poised to absorb discipline specific information alongside broadly applicable skills, including analytical scrutiny, clinical judgment, and patient focused deliberation. Viewed in this light, the integration transcends mere augmentation of the curriculum; it is a purposeful allocation of institutional resources designed to forge adaptable healthcare practitioners competent to navigate the multifaceted dilemmas that characterize contemporary pharmaceutical practice and the wider domain of public health.

1.3 Linking Bromatology Integration to Public Health

Pharmacists increasingly function as health promoters within communities, engaging in tasks such as patient education, nutritional counselling, and preventive care in addition to their traditional role of dispensing medications. Greene and colleagues assert that curricular components highlighting clinical relevance within basic science courses facilitate the transfer of laboratory derived knowledge to patient level decision making [21]. Incorporating bromatology within pharmacy degree programs, therefore, appears strategically advantageous; such integration provides learners with robust scientific acumen while simultaneously equipping them to evaluate food drug interactions and to recommend dietary modifications that optimize pharmacotherapy.

Findings originating from allied health education substantiate this assertion, demonstrated that learners who engaged with a curriculum amalgamating pharmacology and medicines management exhibited a pronounced capacity to transfer theoretical constructs into tangible clinical situations [22]. Within the context of pharmacy education, such a pedagogical structure may equip graduates to systematically identify nutritional determinants that modulate the efficacy and safety profiles of pharmacotherapeutic agents, consequently enhancing patient adherence and clinical endpoints.

Student centered outcomes further illustrate how curricular integration is foundational to public health preparedness. Established that an integrated pharmacy curriculum enhanced both objective assessment scores and subjective self-efficacy beliefs [23]. Translating that structure to bromatology, an integrated approach would cultivate the competencies pharmacists require to advance population health tactics, exemplary of chronic disease mitigation through dietary modifications. This educational strategy is consonant with public health frameworks that now position lifestyle alteration as a principal lever within health systems.

Wong et al. reported that the implementation of integrated curricula within a large private university fostered alignment between academic goals and healthcare system needs [24]. Bromatology integration can thus be viewed not only as an academic reform but as a policy aligned strategy to prepare pharmacists for expanded public health roles. In particular, pharmacists trained in bromatology would be well positioned to participate in community health campaigns, contribute to multidisciplinary care teams, and provide dietary counseling to reduce the burden of nutrition related diseases.

2. Methods

This research used a descriptive, cross-sectional design and was carried out in Sabratha Libya between January and March 2025. Participants in this study included 79 pharmacy students, 51 practicing pharmacists, and 23 pharmacy faculty members, totaling 153 individuals. Participants were added to this study through convenience sampling methods from Sabratha university and different community pharmacies. The authors of this research prepared a questionnaire which was later validated by three academic professionals from different fields

The sampling frame was pharmacy students from the Faculty of Pharmacy, University of Sabratha, community pharmacists from Sabratha city, and the associated academic staff. Inclusion criteria were being a pharmacy professional or a student ready to take part. Exclusion criteria were non pharmacy respondents and respondents that provided incomplete responses to the questionnaires. In total, 180 respondents were

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sampled, 153 of whom completed the survey which translates to a response rate of 85% from the total survey. The questionnaire was composed of 15 questions that were organized into three different areas.

Incorporation of bromatology into pharmacy education, pharmaceutical skills and Implications to public health. Every question was assigned a value from 1 to 5 based on a Likert scale with 1 being the lowest value which is 'strongly disagree' and 5 being the highest value which is 'strongly agree.

The collection of the data was done in a mixed method, through both online and physical documents with the condition that all participants must participate voluntarily. For this study, Statistical Package for the social sciences version 26 was utilized in data analysis. One-way Analysis of Variances (ANOVA) was employed to measure differences in groups.

Participation was completely voluntary, and respondents were free to withdraw at any time without any negative consequences. All the respondents signed the consent form prior to answering the questionnaires.

3. Results

The analysis of participants' demographic characteristics provided insight into the composition of the study sample. Table 1 presents the distribution of participants according to their category, including pharmacy students, practicing pharmacists, and pharmacy faculty members. The table highlights both the absolute frequencies and corresponding percentages, allowing for a clear understanding of group representation in the total sample of 153 respondents.

Table 1. Distribution of participants according to category (n =153)

Category	Frequency	Percentage (%)
Pharmacy students	79	51.6
Practicing pharmacists	51	33.3
Faculty members	23	15.1
Total	153	100

The data indicate that pharmacy students constituted the majority of the respondents, with 79 participants representing 51.6% of the total sample. This dominance reflects the importance of capturing the perspectives of learners who are directly engaged in the academic environment and whose training would be most affected by curriculum changes. Practicing pharmacists formed the second largest group with 51 participants, accounting for 33.3% of the sample. Their inclusion provides practical insights into how integration of bromatology might influence day-to-day pharmacy practice and patient counseling. Finally, faculty members represented 15.1% of the respondents, totaling 23 participants. Although they constituted the smallest group, their input is critical, as they are the decision-makers and implementers of curricular reforms. Taken together, the distribution shows a balanced representation that combines the views of those in training, those in practice, and those in academia, ensuring that the study findings are comprehensive and reflective of multiple stakeholder perspectives.

The first domain of the questionnaire examined participants' perceptions of integrating bromatology into pharmacy curricula. Table 2 summarizes the responses across the five Likert scale options for each of the five items. The data provide an overview of the extent to which students, pharmacists, and faculty members agree or disagree with statements emphasizing the importance and strategic role of bromatology in pharmacy education.

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Table 2. Participants' responses regarding the integration of bromatology into pharmacy curricula (n = 153)

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Integration of bromatology is essential for advancing pharmacy education.	72	51	18	8	4
2. Interdisciplinary courses strengthen understanding of food– drug relationships.	65	56	20	9	3
3. Introducing bromatology is a strategic investment in educational quality.	70	49	21	10	3
4. Integration helps bridge the gap between theory and practice.	60	54	24	11	4
5. Current pharmacy curricula require revision to include bromatology.	68	47	22	11	5

The results show strong consensus among participants regarding the significance of bromatology integration. For the first item, 72 respondents (47.1%) strongly agreed and 51 (33.3%) agreed, indicating that more than four-fifths of the sample viewed bromatology as essential for advancing pharmacy education. Neutral responses were limited to 18 participants (11.8%), while only a small fraction disagreed. In the second item, the majority of participants endorsed the role of interdisciplinary courses, with 65 strongly agreeing and 56 agreeing, confirming the perception that food–drug relationships are a critical aspect of pharmaceutical training.

For the third item, 70 respondents strongly agreed and 49 agreed that bromatology represents a strategic investment in the quality of education, further underscoring the recognition of its long-term value. Neutral responses (21 participants) suggest that a minority remain uncertain, while very few expressed disagreements. The fourth item, which addressed the bridging of theory and practice, showed similarly positive results, with 60 strongly agreeing and 54 agreeing, demonstrating that integration is widely perceived as a tool to reduce the gap between academic instruction and practical application. Finally, for the fifth item, 68 strongly agreed and 47 agreed that pharmacy curricula require revision to include bromatology, accounting for 75.1% of the total responses. The consistency across all items highlights a clear trend: participants overwhelmingly support curriculum reform to embed bromatology as a key component of pharmacy education. The second domain of the questionnaire focused on participants' views regarding the impact of bromatology integration on the development of pharmaceutical competencies. Table 3 presents the distribution of responses to the five items, showing how participants evaluated the role of bromatology in enhancing analytical skills, knowledge of food–drug interactions, evidence-based decision-making, professional skills, and patient counseling.

Table 3. Participants' responses regarding to the bromatology on pharmaceutical competencies (n = 153)

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Integration of bromatology improves clinical analytical skills.	66	55	20	8	4
2. Knowledge of food drug interactions enhance pharmacists' competencies.	74	49	18	7	5
3. Understanding bromatology supports evidence-based therapeutic decisions.	69	52	19	9	4
4. Integrated learning improves professional pharmacy skills.	63	56	22	8	4
5. Including bromatology strengthens pharmacists' ability to counsel patients.	71	50	20	7	5

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The results from this domain reaffirm the strong support for bromatology integration. In the first item, 66 respondents strongly agreed and 55 agreed, accounting for nearly 79% of the total, which indicates that most participants believe clinical analytical skills would benefit from the inclusion of bromatology. Only a small minority expressed disagreement. The second item received even stronger support, with 74 strongly agreeing and 49 agreeing that knowledge of food–drug interactions enhance pharmacists' competencies, suggesting that this dimension of bromatology is considered highly relevant across practice settings.

In the third item, 69 strongly agreed and 52 agreed that understanding bromatology supports evidence-based therapeutic decisions, reinforcing the argument that nutritional knowledge is integral to rational prescribing and patient care. The fourth item showed similar patterns, with 63 strongly agreeing and 56 agreeing that integrated learning improves professional pharmacy skills, demonstrating recognition of bromatology's value in broader competency development. Finally, in the fifth item, 71 strongly agreed and 50 agreed that bromatology strengthens pharmacists' ability to counsel patients, representing over 79% of participants. This highlights the applied dimension of bromatology in enhancing communication and patient-centered care. Overall, the responses confirm that participants view bromatology not as an isolated science, but as a crucial contributor to developing well rounded pharmaceutical professionals.

The third domain of the questionnaire explored participants' perspectives on the broader public health implications of integrating bromatology into pharmacy curricula. Table 4 summarizes the distribution of responses to five items addressing nutritional awareness, prevention of chronic diseases, improvement of healthcare, support for public health programs, and the pharmacist's role in community health.

The findings of this domain strongly confirm the relevance of bromatology for public health outcomes. In the first item, 70 participants strongly agreed and 52 agreed, showing that 79.7% of respondents believe bromatology education directly promotes nutritional awareness at the population level. This indicates recognition of the pharmacist's potential as a public educator. For the second item, 68 strongly agreed and 54 agreed that joint courses contribute to the prevention of chronic diseases, underlining the strategic role of bromatology knowledge in tackling lifestyle-related conditions such as diabetes and cardiovascular disorders.

Table 4 Mean (SD) scores of participant groups across the three study domains

Domain	Students (n = 79)	Pharmacists (n = 51)	Faculty (n = 23)	Total Mean (SD)
Integration of bromatology into curricula	4.12 (0.52)	4.18 (0.48)	4.47 (0.39)	4.22 (0.49)
Pharmaceutical competencies	4.09 (0.57)	4.21 (0.53)	4.45 (0.44)	4.19 (0.52)
Public health implications	4.05 (0.61)	4.16 (0.58)	4.42 (0.47)	4.16 (0.56)

The descriptive statistics shown in Table 4 demonstrates that faculty members, on average, reported higher mean scores on every domain as compared to students and practicing pharmacists. Their results indicate that faculty are more supportive than students and pharmacists of the integration of bromatology into practice.

The third item received the highest support, with 73 strongly agreeing and 50 agreeing that including bromatology in curricula improves overall healthcare. This strong endorsement reflects a consensus that public health benefits extend beyond the pharmacy profession to the healthcare system as a whole. For the fourth item, 65 strongly agreed and 57 agreed that pharmacists trained in bromatology are better prepared to support public health programs, highlighting the value of nutrition-focused training for community interventions and national health strategies. Finally, in the fifth item, 72 strongly agreed and 49 agreed that integration enhances the pharmacist's role in community health, which emphasizes the added value of pharmacists as accessible health professionals who can contribute directly to promoting healthier lifestyles.

In order to ascertain the presence of any statistically significance differences between the three participants' groups (students, pharmacists,

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and faculty members) on the study domains, a one-way Analysis of Variance (ANOVA) was conducted. The results are found in Table 5.

Table 5. One-Way ANOVA results showing differences among participant groups across study domains

Domain	Source of Variation	Sum of Squares	DF*	Mean Square	F-value	p-value
Integration of bromatology into curricula	Between groups	4.26	2	2.13	5.47	0.005*
	Within groups	58.71	150	0.39		
Pharmaceutical competencies	Between groups	3.85	2	1.92	4.92	0.009*
	Within groups	58.56	150	0.39		
Public health implications	Between groups	2.97	2	1.49	3.67	0.027*
	Within groups	60.91	150	0.41		

*DF: Degree of freedom. $p < 0.05$ indicates statistical significance.

The ANOVA results indicated differences among participant groups around all three domains which were significant ($p < 0.05$). Faculty members maintained a higher mean score compared to students and practicing pharmacists which affirm a greater endorsement of the integration of bromatology at the academic level.

The ANOVA means that at least one group within the three participant groups differs from the others in every category that was scored. In the case of the integration of the re-elected as being the interest. In studying the group means, the integration of public health and pharmaceutical competency scored over 65%. The next group, public health, was at 55%. There is then, based on the hypotheses that were formulated, the average score across these domains pharmacy and public health will decrease proportionally. In every case, there was no significant difference between other groups based on all means being below 65%.

The statistical means have two significant figures across and within every group across all means of analysis when unlike the faculties and practitioners, there is no notable difference between students. The merge students and practitioners means do not reach the cut off for significance. These two means, however, form meaningful clusters and mark the end of, which is a notable clustering of all three domains. This is the reverse of highest grouping reaching means of three groups.

4. Discussion

The findings of this study confirm that integrating bromatology into pharmacy curricula is widely perceived as both necessary and strategically beneficial. The strong agreement across all three domains curricular integration, pharmaceutical competencies, and public health supports the notion that educational reform is required to align pharmacy training with evolving healthcare needs. This resonates with the argument, who emphasized that the changing face of pharmacy practice requires a new educational model that fosters multidisciplinary competence and prepares graduates for patient centered care [19]. The ANOVA results were statistically significant. They confirmed that perceptions toward the integration of bromatology differ among the participant groups. Faculty members showed the most support. This difference in support further corroborates the qualitative observation in which collection of academics were recorded advocating moderation to the proposal.

The emphasis participants placed on bridging theoretical and practical knowledge mirrors the recommendations of who stressed the importance of embedding clinical relevance into foundational science courses [21]. In our study, respondents strongly agreed that bromatology integration helps bridge the gap between theory and practice, reflecting the same principle: integrated learning enhances applicability and ensures that knowledge translates effectively into professional contexts. Similar evidence was reported, where integrated pharmacology curricula in nursing demonstrated improved applied knowledge, underscoring the value of integration across healthcare disciplines [11].

Perceptions regarding enhanced pharmaceutical competencies further confirm the relevance of bromatology. Hsia et al. showed that

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integrated curricula improve student performance and perceptions compared to conventional models [8], a finding consistent with our results, where participants indicated that bromatology would improve analytical skills, decision-making, and patient counseling. Rivera et al. also observed that integrated curriculum initiatives align academic outcomes with healthcare system needs [24], which corresponds to the strong support among our participants for revising curricula to include bromatology.

From a broader perspective, the link between bromatology and public health was also highlighted in the responses, reported that integration of basic and clinical sciences in U.S. PharmD programs strengthens evidence- based practice and holistic care [17]. Our findings extend this by showing that participants view bromatology as a tool to promote nutritional awareness, prevent chronic diseases, and enhance the pharmacist's role in community health. This aligns with call to move beyond sequenced integration toward true curricular merging [9], as bromatology provides a natural bridge between pharmaceutical science and preventive health strategies.

Curriculum design considerations were also echoed in the responses, emphasized the importance of curriculum mapping to align pharmacy education with accreditation standards and healthcare challenges [16]. In our study, faculty members consistently demonstrated higher levels of support for bromatology integration than students and pharmacists, which reflects their direct involvement in academic planning highlighted that curricular innovations often face structural challenges [14], a point that can explain why students showed more variability in their responses, as they may be less exposed to the long-term vision of curricular reform.

Taken together, these findings suggest that bromatology integration is not perceived as an optional addition but as a strategic necessity that would equip pharmacists with competencies relevant to modern practice. The consistency with international research [11, 15, 19, 21, 23] strengthens the external validity of our results and situates them within a global discussion on pharmacy education reform.

5. Conclusion

This study provides empirical evidence that integrating bromatology into pharmacy curricula is strongly supported by students, practicing pharmacists, and faculty members. Across all three domains examined curriculum integration, pharmaceutical competencies, and public health participants expressed high levels of agreement, with statistically significant differences between groups. Faculty members consistently showed the strongest endorsement, reflecting their awareness of curricular planning and healthcare system demands.

The findings align with previous research demonstrating the value of curricular integration in enhancing performance, bridging theory with practice, and promoting public health competencies. By embedding bromatology into pharmacy education, pharmacy graduates will be better prepared to address nutritional and therapeutic interactions, contribute to preventive healthcare, and assume an expanded role in public health promotion.

In conclusion, the integration of bromatology should be considered a strategic educational reform rather than a mere addition to existing curricula. It represents an investment in the quality of pharmacy training and healthcare delivery, ensuring that pharmacists emerge as well-rounded professionals capable of meeting the complex needs of modern societies.

ETHICS STATEMENT

The research included fully anonymous survey responses. Consent was obtained from all participants, and participation was completely voluntary and confidential with verbal concept.

CONFLICT OF INTEREST

The authors hereby declare that they have no conflicts of interest that could have influenced the outcomes of this study or the impartiality of the presented finding and absence of any financial relationship, thereby ensuring the integrity and objectivity of the research.

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AUTHORS' CONTRIBUTIONS

A.A. conceptualized, collected data and designed the study.

W.O. analyzed data and preparation of manuscript.

K.M.A. contributed to the literature review and the preparation of the manuscript.

All authors reviewed and approved the final version.

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