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BRIDGING CULTURES THROUGH HONEY: ETHICAL INTEGRATION OF TRADITIONAL WISDOM AND MODERN SPORTS NUTRITION IN WEST SUMATRA

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ABSTRACT
This study addresses the growing disconnection between scientific health promotion and traditional cultural practices in multicultural societies. In Indonesia, particularly in West Sumatra, indigenous health knowledge rooted in Minangkabau philosophy has long emphasized balance, respect, and communal well-being. However, in the context of globalized sports nutrition and cross-cultural communication, these values are often marginalized or misinterpreted. The challenge lies in integrating ethical communication with traditional health practices, such as the consumption of stingless bee honey (Galo-galo), into modern health and sports systems without reducing them to mere commodities. The research aims to explore the intersection of cross-cultural communication ethics, multicultural values, and sports nutrition by examining the functional role of West Sumatra honey as both a nutritional and cultural medium. Using a qualitative descriptive approach, the study analyzes how Minangkabau health traditions can be ethically conveyed in pluralistic contexts to promote athlete performance and public well-being. Laboratory findings indicate that West Sumatra stingless bee honey exhibits superior phytochemical properties, with total phenolic content ranging from 39.98 to 81.02 mg GAE/g and α-glucosidase inhibition of 67.6%, confirming its strong antioxidant and anti-hyperglycemic potential. In applied sports contexts, supplementation with Galo-galo honey correlates with stable blood glucose levels and faster heart rate recovery (HRR) in rowing and soccer athletes. By integrating Minangkabau philosophical ethics, such as duduk samo randah and *tagak samo tinggi*, the study proposes a model of ethical communication grounded in empathy and cultural humility. The results underscore that fostering cross-cultural communication ethics through traditional resources not only enhances physical performance and health but also strengthens social harmony and cultural resilience in an increasingly globalized era.

Introduction
The contemporary global landscape is characterized by unprecedented levels of human mobility, technological advancement, and socio-economic interdependence, collectively redefining the nature of intercultural interaction. Globalization has intensified the movement of people, goods, and ideas across national and cultural boundaries, creating complex webs of contact among diverse populations. This phenomenon has not only transformed the economic and political dimensions of societies but also reshaped the ethical and communicative frameworks through which individuals and communities engage with one another (Muhtarom et al., 2024; Ramadani et al., 2024). In this rapidly changing environment, effective cross-cultural communication has become an indispensable competence for navigating the interconnected systems of education, business, governance, and public health. Communication across cultures is not simply about exchanging information but about fostering mutual understanding while maintaining ethical integrity.

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The ethical dimension of cross-cultural communication becomes especially relevant in multicultural societies such as Indonesia, where hundreds of ethnic groups coexist within a shared national identity. In such settings, ethical communication functions as a moral compass that prevents misinterpretation, prejudice, and ethnocentrism, attitudes that can easily arise when individuals encounter different cultural norms or values (Meilani et al., 2024; Huda, 2022). The ethics of cross-cultural communication thus involve respect, empathy, and awareness of the other's worldview, promoting dialogical equality rather than cultural domination. Developing such ethical communication is not merely a social aspiration; it has become a strategic necessity in ensuring the sustainability of public health, education, and cultural harmony (Abdullah et al., 2024; Poltekkes Kemenkes Sorong, 2024).

Health communication, as a critical application of intercultural ethics, must adapt to diverse cultural contexts. In Indonesia, the integration of modern medical science with traditional health wisdom presents a fascinating site for such ethical negotiation. The country's multicultural nature means that traditional medicinal knowledge, ranging from herbal remedies to ethnomedical practices, coexists alongside biomedicine. Rather than treating these traditions as outdated or unscientific, contemporary scholars advocate a dialogical approach that appreciates their empirical insights and cultural meanings. This inclusive framework positions traditional knowledge as a complementary asset to scientific innovation, reflecting the ethical principle that no single epistemology monopolizes truth (Huda, 2022; Sandelowski, 2000).

Within this interdisciplinary intersection, West Sumatra honey, particularly the stingless bee variety locally known as *Galo-galo*, emerges as a relevant case study. This honey holds deep ethnomedical significance for the Minangkabau people, who have long used it as a nutritional supplement, wound-healing agent, and ritual element (Hakim, 2025; Yuhendri, 2013). The Minangkabau culture, renowned for its matrilineal system and its philosophical foundation of *Adat Basandi Syara', Syara' Basandi Kitabullah* (custom based on religion, religion based on scripture), offers a sophisticated model of how local wisdom can guide ethical health practices. In Minangkabau cosmology, nature (*alam*) is perceived as a teacher (*guru besar*), and health is viewed holistically, balancing the physical, spiritual, and communal dimensions. Honey, therefore, is not merely a food but a moral symbol of harmony, purity, and sustenance.

However, the globalization of health markets and the rise of "functional foods" have transformed the way traditional products like *Galo-galo* honey are perceived and promoted. The global trend toward evidence-based health products demands that traditional knowledge be translated into scientific terms that meet international standards. Consequently, local producers and researchers face the dual challenge of maintaining cultural authenticity while achieving scientific validation (Ottman et al., 2023; Paakkari & Okan, 2020). This transition is not merely technical but communicative and ethical; it requires culturally sensitive messaging that avoids commodifying indigenous traditions. The process of scientific legitimation must therefore be accompanied by ethical cross-cultural communication that respects both local and global audiences (Rahmad et al., 2024; Setiawan et al., 2024).

Multiculturalism in Indonesia serves as an ideological and practical foundation for such integration. Far from viewing diversity as an obstacle, the Indonesian perspective sees it as an opportunity to enrich collective life (Huda, 2022; Aulia, 2020). Each cultural group contributes to a broader national mosaic where plural identities coexist in an egalitarian framework. The Minangkabau, in particular, embody this ethos through their social philosophy *Duduk samo randah, tagak samo tenggi* (sitting equally low, standing equally high), which encapsulates egalitarianism and mutual respect in interpersonal and intergroup relations (Repo Unand, n.d.; Surya, 2021). Within the health communication sphere, this principle translates into an inclusive approach that values both scientific expertise and community experience.

The ethical application of multicultural principles in health contexts enables the creation of what Huda (2022) calls a "healthy citizenship habitat", a communicative ecosystem where modern health science coexists harmoniously with traditional wisdom. In this habitat, individuals are not passive recipients of medical knowledge but active participants who negotiate meaning between global health narratives and local cultural logics. The challenge for health professionals and researchers lies in crafting communicative practices that neither alienate traditional communities nor oversimplify their knowledge systems. In this respect, cross-cultural communication ethics is indispensable for establishing trust, ensuring comprehension, and preventing cultural dissonance in public health campaigns.

The biological and nutritional potential of *Galo-galo* honey offers an additional layer of complexity to this discourse. Studies indicate that stingless bee honey from West Sumatra is rich in phenolic and flavonoid compounds, conferring potent antioxidant and anti-hyperglycemic properties (Setiawan et al., 2024; Fatima et al., 2022). These bioactive components are associated with preventing oxidative stress, a major factor in aging, cardiovascular disease, and metabolic disorders. For athletes, such biochemical advantages translate into improved energy metabolism, faster recovery, and reduced inflammation after strenuous activity (Murbawani, 2013; Rusdiatin et al., 2016). Experimental data from sports physiology further show that supplementation with *Galo-galo* honey stabilizes blood glucose levels during competition simulations and enhances heart rate recovery (HRR) among soccer and rowing athletes (Febrian, 2024; Rizkyrullah et al., 2024).

Nevertheless, the health product market in developing countries often suffers from what Ottman et al. (2023) describe as "colonized health discourse," wherein multinational corporations control narratives about nutrition and wellness. In such contexts, traditional products risk being stripped of their cultural meaning and repackaged merely as commodities. Corporate branding strategies may prioritize marketability over authenticity, replacing educational discourse with persuasive marketing. The result is a distortion of the ethical purpose of communication, reducing community-based wellness traditions into consumer trends. Addressing this issue requires a framework of cross-cultural ethics that emphasizes *dialogue over dominance*, a process in which traditional knowledge holders, scientists, and consumers engage in mutual learning (Paakkari & Okan, 2020).

Given these concerns, the ethical integration of indigenous products like *Galo-galo* honey into modern health frameworks is both an opportunity and a responsibility. Researchers such as Rahmad et al. (2024) and Setiawan et al. (2024) underscore that the interdisciplinary convergence of sports science, phytochemistry, and communication studies can redefine how traditional foods are valued in modern societies. Ethical communication ensures that such research serves not only commercial interests but also contributes to the collective good by preserving cultural heritage and promoting health literacy. It also opens pathways to developing culturally responsive public health programs in which information on nutrition, exercise, and well-being resonates with diverse audiences.

The Minangkabau model provides a strong ethical foundation for such endeavors. As a society deeply rooted in collective values, they offer a living example of how moral philosophy, social cohesion, and ecological awareness can inform scientific innovation. Their matrilineal structure promotes collaboration and interdependence, values that align with the cooperative nature of cross-cultural research. The proverb *alam takambang jadi guru*, meaning "nature unfolds as a teacher", captures the epistemological humility that underpins indigenous science. By approaching nature as a partner rather than a resource, Minangkabau ethics challenge modern science to adopt more sustainable and respectful methodologies (Repo Unand, n.d.; Ilmadika, n.d.).

Incorporating such perspectives into sports nutrition research enriches the discourse beyond laboratory results. It demands an understanding of health as a culturally embedded phenomenon, where diet, exercise, spirituality, and community engagement are intertwined. Scholars like Meilani et al. (2024) and Huda (2022) remind us that health communication must therefore transcend technical language and engage ethical and cultural narratives. This multidimensional approach positions communication not merely as the transmission of facts but as the co-construction of meaning that honors both science and tradition.

Methodologically, this article employs a qualitative descriptive design to analyze how ethical cross-cultural communication can facilitate the integration of *Galo-galo* honey into multicultural health promotion. Such an approach is appropriate for interpreting symbolic meanings and social practices within their cultural context. It allows exploration of how empathy, humility, and cultural sensitivity shape acceptance of traditional health resources. This study builds on the interdisciplinary work of Rahmad et al. (2025) and Yuhendri et al. (2025), who examined the intersection of sports science, ethnobiology, and public communication. Their contributions demonstrate that effective knowledge translation in health domains requires collaborative dialogue between researchers and local communities.

By synthesizing insights from communication studies, nutrition science, and cultural philosophy, this research seeks to construct a "public pedagogy" framework (Huda, 2022; Rahmad et al., 2024). Public

pedagogy here refers to an educational paradigm that extends beyond formal institutions to encompass community-based learning and participatory engagement. Through such an approach, health promotion becomes a culturally inclusive process where diverse stakeholders, scientists, health practitioners, athletes, and traditional healers co-create strategies for well-being. This participatory ethic counters the hierarchical flow of information characteristic of conventional public health models, fostering instead a dialogic exchange rooted in equality and mutual respect.

Ultimately, this study aspires to demonstrate that fostering cross-cultural communication ethics in the context of nutrition and health is not only a theoretical exercise but also a practical pathway toward sustainable development. It contributes to the global discourse on decolonizing health communication by emphasizing empathy, reciprocity, and shared agency. The case of *Galo-galo* honey exemplifies how a local product grounded in indigenous knowledge can become a global model for ethical integration of culture and science. As Indonesia continues to navigate the tensions between tradition and modernity, such interdisciplinary and ethically informed research can ensure that modernization does not entail cultural erasure but rather the revitalization of ancestral wisdom through contemporary relevance.

Materials and Methods

This study employs a qualitative descriptive research design. This approach has gained considerable prominence in the health and social sciences due to its capacity to present comprehensive and pragmatic summaries of real-world phenomena (Doyle et al., 2020; Bradshaw et al., 2017). Unlike highly interpretive traditions such as grounded theory, ethnography, or phenomenology, qualitative description (QD) emphasizes a rich, straightforward account of a phenomenon while maintaining proximity to participants' words, contexts, and experiences. It does not aim to generate new theoretical constructs but rather to describe and understand the characteristics of a situation as it naturally occurs (Sandelowski, 2000; Kim et al., 2017).

According to Sandelowski (2000), qualitative description is particularly suited for inquiries that address the "who, what, and where" of experiences rather than the "why" or "how," which require deeper theoretical abstraction. This methodological orientation is relevant to the current research, which explores the underexamined intersection between traditional nutrition practices and cross-cultural communication ethics. In this context, the goal is not to build abstract theory but to provide a grounded, empirically informed depiction of how indigenous health traditions, specifically, the use of *Galo-galo* honey in West Sumatra, can be ethically integrated into modern health communication and sports nutrition discourse. Such a descriptive lens allows the study to remain faithful to the participants' perspectives and the cultural authenticity of local practices while simultaneously interpreting them within a global framework of public health communication (Neergaard et al., 2009; Sullivan-Bolyai et al., 2005).

The philosophical foundation of this study is situated within a relativist and subjectivist paradigm, which acknowledges the existence of multiple realities shaped by individual perception, cultural background, and social interaction (George et al., 2022; Polit & Beck, 2014). Within this framework, truth is regarded as context-dependent and co-constructed between the researcher and the subject matter. Consequently, the interpretation of data in this research recognizes the epistemological validity of indigenous knowledge alongside scientific empiricism. Such a stance is essential when investigating multicultural contexts, where no single paradigm, neither traditional nor modern, can claim epistemological supremacy.

Data collection followed a multi-staged process. The first stage consisted of an extensive document and literature review of the physicochemical and bioactive properties of West Sumatra stingless bee honey (Galo-galo), as well as the philosophical principles of Minangkabau multiculturalism (Setiawan et al., 2024; Repo Unand, n.d.). The review encompassed peer-reviewed journal articles, ethnographic accounts, government reports, and local community publications that discuss the interplay between traditional health practices and contemporary scientific validation. In the second stage, the collected textual materials were analyzed using qualitative content analysis as outlined by Braun and Clarke (2006) and refined through the interpretive lens of Sandelowski (2010). This method involves systematically reading and coding texts to identify recurrent patterns, categories, and themes. Codes were developed inductively from the data and grouped into thematic clusters corresponding to three primary domains: (a) nutrition and phytochemistry,

(b) sports performance and physiology, and (c) cross-cultural communication ethics. By combining these domains, the analysis aimed to reveal how the bioactivity of *Galo-galo* honey, such as its α-glucosidase inhibition and antioxidant capacity, intersects with cultural narratives of health, ethical communication practices, and intercultural collaboration.

Sampling was conducted purposively, a common approach in qualitative descriptive research when the goal is to gather rich and diverse perspectives rather than achieve statistical representativeness (Neergaard et al., 2009). Furthermore, this interdisciplinary structure allows the research to connect micro-level data (such as biochemical analysis of honey's polyphenolic content and α-glucosidase inhibition rates) with macro-level themes (such as the ethical implications of commercial storytelling in promoting traditional products). For instance, findings from Setiawan et al. (2024) and Ottman et al. (2023) were juxtaposed to examine how laboratory-based assessments of bioactivity inform or contrast with marketing narratives surrounding "natural performance boosters." Such comparative analysis highlights the tensions between scientific discourse and corporate communication, underscoring the need for ethical frameworks to disseminate health-related information to multicultural audiences. The ultimate aim of employing a qualitative descriptive approach is to construct what this study terms a pluralism model. This framework integrates indigenous knowledge with contemporary scientific understanding to foster inclusive and equitable health services. This pluralism model is not prescriptive but illustrative: it maps the multidimensional relationships between cultural identity, biological efficacy, and communicative ethics (Setiawan et al., 2024; Poltekkes Kemenkes Sorong, 2024). The model aspires to demonstrate that the validation of traditional products such as *Galo-galo* honey should extend beyond laboratory authentication to include ethical, cultural, and communicative legitimacy.

In essence, the methodology aligns with the study's central objective: to bridge traditional wisdom and modern science through ethical, culturally sensitive communication. By situating empirical data within its cultural context, this research provides not only a descriptive account of *Galo-galo* honey's properties but also a reflective understanding of how knowledge is communicated, negotiated, and legitimized across cultural boundaries. The use of qualitative descriptive design thus ensures that the research remains accessible to interdisciplinary scholars while maintaining fidelity to the cultural meanings embedded within the Minangkabau health tradition.

Results and Discussion

The findings of this research highlight a profound synergy between the biochemical potency of West Sumatra honey and the ethical imperatives of multicultural health communication. This study underscores how a product deeply rooted in local tradition, the stingless bee honey known as Galo-galo, can serve not only as a functional food with measurable bioactivity but also as a medium for ethical intercultural engagement in health promotion. The synthesis of scientific evidence and cultural interpretation presented in this section reflects the central argument that health in multicultural societies must be understood as a co-construction between biological efficacy, cultural meaning, and communicative ethics.

Biochemical Characterization of West Sumatra Stingless Bee Honey

Analytical data from Setiawan et al. (2024) demonstrate that Galo-galo honey from various ecological zones in West Sumatra contains a total phenolic content (TPC) ranging from 39.98 to 81.02 mg gallic acid equivalents (GAE) per gram. These levels are substantially higher than the TPC values typically reported for commercial Apis mellifera honeys, which usually fall below 40 mg GAE/g (Rodríguez-Malaver, 2009). This high TPC reflects the unique floral diversity of West Sumatra's tropical ecosystems, where nectar sources such as Calliandra calothyrsus, Melastoma malabathricum, and Syzygium cumini contribute to a complex phytochemical profile (Agussalim et al., 2021; Setiawan et al., 2024). The combination of elevated phenolic and flavonoid concentrations provides Galo-galo honey with robust antioxidant potential. These compounds act as electron donors, neutralizing reactive oxygen species (ROS) and thus protecting cellular membranes and DNA from oxidative stress (Fatima et al., 2022; Samarghandian et al., 2017). The species Kelulut matahari demonstrated the most pronounced antioxidant effect, with the lowest IC_{50} value, an indicator of strong radical-scavenging capacity (Setiawan et al., 2024). Such antioxidant properties are crucial not only for

general health maintenance but also for sports performance, where oxidative stress plays a major role in fatigue and delayed recovery.

Moreover, Galo-galo honey exhibits significant anti-hyperglycemic activity by inhibiting α-glucosidase, reaching up to 67.6% inhibition (Setiawan et al., 2024). This enzymatic activity delays carbohydrate digestion and glucose absorption, reducing postprandial glycemic spikes. As such, stingless bee honey represents a promising functional food for individuals with metabolic disorders, particularly type 2 diabetes mellitus (Sahlan et al., 2020). From a biochemical standpoint, this property aligns with the global pursuit of natural agents that regulate blood sugar levels without pharmacological side effects.

These scientific findings serve a dual function: they substantiate the empirical value of indigenous Minangkabau medicinal practices and provide cultural validation for traditional beliefs. In Minangkabau ethnomedical knowledge, honey has long been conceptualized as a natural antitoxin that restores bodily equilibrium (Hakim, 2025; Yuhendri, 2013). The scientific demonstration of its antioxidant and anti-hyperglycemic mechanisms thus reinforces the epistemological legitimacy of this ancestral understanding, bridging traditional belief systems with contemporary biomedical frameworks. This integration exemplifies what Rahmad et al. (2024) call scientific indigenization, a process through which local knowledge is reaffirmed through modern research methods rather than displaced by them.

Functional Role in Sports Nutrition and Human Performance

Within the domain of sports nutrition, honey has emerged as a natural ergogenic aid, enhancing energy utilization, endurance, and recovery. Its physiological benefits derive from its unique composition of carbohydrates, amino acids, organic acids, and micronutrients. Unlike high-glycemic-index sweeteners such as glucose or dextrose, honey provides sustained energy release due to its balanced fructose, glucose, and oligosaccharide profile (Murbawani, 2013; Ali et al., 2021). A landmark study by Murbawani (2013) on adolescent soccer players revealed that consuming 200 mL of a honey-based beverage every 20 minutes during a 100-minute simulated match maintained blood glucose levels with only a 1.89 mg/dL decrease, significantly more stable than in the placebo group. The steady glucose supply delays fatigue by preserving muscle glycogen reserves, a critical factor in endurance sports (Murbawani, 2013; Rusdiatin et al., 2016). The low glycemic index (GI) of honey allows for gradual glucose uptake, supporting energy balance without triggering sharp insulin responses.

Beyond energy metabolism, honey contributes to post-exercise recovery. Febrian (2024) and Rizkyrullah et al. (2024) reported that honey supplementation in rowing athletes accelerates heart rate recovery (HRR) and reduces blood lactate accumulation after maximal exertion. These findings indicate improved cardiovascular efficiency and lactate clearance, reflecting enhanced parasympathetic reactivation. Furthermore, the anti-inflammatory effects of honey, mediated through downregulation of NF-κB and MAPK signaling pathways, reduce the expression of pro-inflammatory cytokines such as TNF-α and IL-6 (Ali et al., 2021; Chong et al., 2021). Such molecular modulation diminishes oxidative and inflammatory damage associated with strenuous physical activity, thereby shortening recovery time and improving performance consistency. From a practical perspective, *Galo-galo* honey serves as a cost-effective, locally sourced alternative to synthetic carbohydrate gels commonly used in endurance sports (Ali et al., 2021; Rusdiatin et al., 2016). Its dual function, as both a nutrient and an anti-inflammatory supplement, positions it as an ideal component of athlete nutrition programs in developing countries, where access to imported sports supplements remains limited. This finding aligns with Sustainable Development Goal 3 (Good Health and Well-being) by promoting indigenous resources that enhance both community health and economic sustainability.

Ethical Dimensions of Multicultural Health Communication

While biochemical validation strengthens the scientific credibility of traditional products, translating this knowledge into public discourse ethically remains a critical challenge. In Indonesia's multicultural context, communication about traditional health products is often influenced by differing cognitive styles, linguistic expressions, and cultural frames of reference (Meilani et al., 2024; Huda, 2022). These variances can lead to

misunderstanding or even the marginalization of local wisdom when communicated through Westernized scientific discourse.

Ethical health communication, therefore, requires cultural humility, a principle that emphasizes respect, reflexivity, and the recognition of one's cultural limitations (Huda, 2022). Cultural humility differs from cultural competence in that it is not a fixed skill but an ongoing commitment to learn from others without presuming mastery over their experiences. Meilani et al. (2024) further highlight empathy as the communicative bridge that transforms cultural diversity into collaboration rather than conflict. By applying these principles, communicators can engage in horizontal dialogue rather than top-down dissemination of information. One of the major risks in promoting traditional health products is what Ottman et al. (2023) describe as "colonized health discourse." This occurs when corporate or institutional communication reinterprets indigenous resources solely through the lens of marketability or biomedical legitimacy, stripping them of their cultural essence. Paakkari and Okan (2020) caution that such practices may inadvertently reinforce epistemic inequality by framing traditional knowledge as inferior until validated by Western science. To counter this, health communication should adopt a public pedagogy model, an educational approach that encourages critical reflection and mutual respect between scientific and cultural knowledge systems (Huda, 2022; Meilani et al., 2024). Public pedagogy situates learning within community settings, allowing cultural narratives and health information to coexist without one dominating the other.

Minangkabau Philosophy and Ethical Health Dialogue

The Minangkabau philosophy provides an ethical and cultural foundation for inclusive communication. The maxim *Duduk samo randah, tagak samo tenggi* (sitting equally low, standing equally high) encapsulates the principle of egalitarianism and mutual respect in dialogue (Repo Unand, n.d.; Meilani et al., 2024). Applied to health communication, this principle calls for equitable participation among all stakeholders, researchers, health practitioners, community leaders, and local producers. It rejects the hierarchical model in which experts unilaterally dictate norms and instead promotes dialogical reciprocity.

Similarly, the indigenous concept of *Sipakatau*, which translates roughly as "recognizing the humanity in others", encourages empathy and kinship in interpersonal relations. These local ethical frameworks resonate strongly with modern theories of intercultural communication that emphasize relational ethics, trust-building, and mutual recognition (Surya, 2021; Widodo et al., 2022). Integrating such values into health counseling and public health campaigns enhances adherence to treatment and fosters community empowerment, particularly in underserved rural areas (Setiawan et al., 2024). In practice, ethical multicultural communication also involves linguistic inclusivity and symbolic sensitivity. Health messages must be translated not only linguistically but semantically to align with local metaphors of health and well-being. For instance, referring to honey as *obat alamiah penawar bisa* (natural antidote) rather than simply as a "nutritional supplement" maintains the spiritual and moral connotations valued in Minangkabau cosmology. Such framing supports a holistic conception of health that integrates biological, emotional, and communal dimensions.

Interdisciplinary Collaboration as Ethical Praxis

The interdisciplinary collaboration among the current research team illustrates how ethical principles can be operationalized in practice. Yuhendri's botanical investigation of *Curcuma sumatrana* established the taxonomic and microscopic validation methods essential for authenticating indigenous materials in scientific research (Yuhendri et al., 2025). Hari Adi Rahmad's application of Multimodal Critical Discourse Analysis (MCDA) to food branding offers insight into how companies can ethically promote local products without engaging in cultural appropriation or consumer deception (Ottman et al., 2023).

Meanwhile, Wahyudi Rahmat and Rifkah Fitriyah have explored the social dimensions of Islamic philanthropy and community resilience, demonstrating how collective values facilitate sustainable health behaviors and social welfare (Rahmat et al., 2025; Usman et al., 2020). Azri's ethnobiological documentation of stingless bees further supports the ecological sustainability of honey production. Collectively, these contributions exemplify what Huda (2022) and Meilani et al. (2024) conceptualize as "ethical interdisciplinarity", a mode of collaboration that values plural knowledge systems while upholding ethical coherence. This body of work

reinforces the understanding that health is both a biological and social achievement. As such, promoting health cannot rely solely on medical or biochemical interventions but must also address communication, education, and community engagement. Ethical interdisciplinarity fosters a space where nutrition, sport, and culture intersect to form a holistic ecosystem of well-being.

The findings also underscore the importance of education as a vehicle for cultivating ethical intercultural communication. Integrating multicultural education into the national curriculum is critical to preparing future generations who appreciate pluralism and local wisdom (Huda, 2022; Ramadani et al., 2024). Such education should move beyond mere tolerance of diversity to embrace active engagement with cultural differences as opportunities for learning. Teachers and health professionals must be trained in inclusive pedagogical competencies, which include the ability to design learning environments that reflect cultural heritage, respect linguistic diversity, and employ culturally resonant teaching strategies (Kuswaya, 2010; Widodo et al., 2022). In clinical and educational settings, this might involve the use of culturally relevant metaphors, local narratives, and participatory learning methods that empower individuals to articulate their experiences.

In the era of digital globalization, information technology plays an essential role in facilitating trans-local dialogues about health, culture, and identity. Online platforms can be leveraged to connect researchers, practitioners, and communities across geographic boundaries, creating a digital agora for knowledge exchange (Fitriyani et al., 2024; Huda, 2022). However, this digital expansion also necessitates ethical vigilance to prevent misinformation, cultural misrepresentation, or the commercialization of sacred traditions. Public health communicators must thus combine digital literacy with cultural sensitivity to sustain authenticity in the virtual sphere.

Toward a Multicultural Model of Nutrition, Sport, and Ethics

Bringing these findings together, this research proposes a multidisciplinary model that integrates nutrition science, sport physiology, and ethical communication to empower multicultural communities (Setiawan et al., 2024; Rahmad et al., 2024). The model operates on three interconnected levels:

1. Biological Integration – recognizing the biochemical efficacy of indigenous products such as *Galo-galo* honey as legitimate contributors to scientific nutrition.
2. Communicative Ethics – ensuring that health promotion respects cultural narratives, employs empathetic dialogue, and avoids epistemic domination.
3. Educational Transformation – embedding multicultural literacy and ethical reflexivity into both academic and professional training programs.

This integrative approach redefines "health" not merely as a biomedical state but as a cultural performance of harmony, where body, mind, and community interact within a balanced ethical system. By promoting locally sourced functional foods through ethical communication, the framework contributes to sustainable health sovereignty, reduces dependence on imported supplements, and enhances local innovation capacity.

In conclusion, the findings affirm that biochemical excellence and ethical communication are mutually reinforcing pillars in the pursuit of equitable public health. West Sumatra's *Galo-galo* honey exemplifies how indigenous biodiversity, when studied and communicated ethically, can enrich global knowledge systems without sacrificing cultural integrity. Through its dual role as a scientifically validated product and a culturally meaningful symbol, honey becomes an instrument of both nourishment and dialogue, a sweet manifestation of how science and tradition can coexist to serve humanity's shared well-being.

Discussion

The discussion of this research underscores that health, as conceptualized in multicultural and plural societies, cannot be reduced to biomedical mechanisms alone. It must be understood as a dynamic and ethical relationship among biological efficacy, cultural meaning, and social participation. The integration of nutrition science, sports physiology, and ethical communication, as presented in this study, illustrates a model of health that bridges empirical validation with cultural resonance. Such an approach reveals how traditional knowledge, when communicated ethically and interpreted scientifically, contributes to both public health and intercultural understanding (Setiawan et al., 2024; Rahmad et al., 2024). The case of West

Sumatra's Galo-galo honey, a natural product long used in Minangkabau tradition, serves as a paradigm for this synthesis, in which the biochemical and the symbolic meet to redefine health in both scientific and cultural dimensions.

In the biological dimension, the research findings show that Galo-galo honey possesses exceptional nutritional and therapeutic qualities. Its high total phenolic and flavonoid contents, as well as its anti-inflammatory and antioxidant activities, confirm that indigenous natural products can meet modern standards of scientific evidence. However, the implication extends beyond laboratory validation. The biological integration discussed here represents an epistemological stance: that local biodiversity can serve as a legitimate contributor to global nutrition science. Recognizing the biochemical potency of indigenous products is therefore not only a scientific act but also an ethical one, affirming the equal standing of traditional knowledge systems within global scientific dialogue. This integration resists the colonial tendency to treat indigenous materials as raw data for external industries and instead positions them as coequal partners in knowledge creation.

The second aspect of the model, communicative ethics, is equally significant. Health communication that involves traditional resources often encounters cultural misinterpretation, commercial exploitation, or epistemic domination, in which indigenous perspectives are reframed through external narratives. Ethical communication seeks to correct this imbalance by emphasizing cultural humility, empathy, and dialogical equality (Huda, 2022; Meilani et al., 2024). It repositions communication not as persuasion but as participation, a process in which multiple voices co-construct shared meaning. Within this framework, the act of communicating about Galo-galo honey is transformed from mere promotion into cultural dialogue. Instead of framing honey solely in terms of its biochemical efficacy, communicators highlight its spiritual and communal significance in Minangkabau society, where food and medicine are intertwined with moral values and ecological consciousness. Such communicative practice enables mutual recognition between scientific and cultural epistemologies and encourages the public to view health as a collective cultural enterprise.

This ethical orientation has broader implications for public health in Indonesia and beyond. In a nation as culturally diverse as Indonesia, health campaigns often struggle with linguistic differences, varying worldviews, and unequal access to education. Ethical communication rooted in multicultural understanding can reduce these barriers by framing messages in ways that are locally meaningful. For example, health educators may use traditional metaphors or proverbs, such as duduk samo randah (sitting equally low) and tagak samo tenggi (standing equally high), to illustrate egalitarian collaboration in health management. By appealing to familiar cultural values, communicators cultivate trust and agency among communities that might otherwise feel marginalized by technical or bureaucratic discourse. This dialogical ethics fosters inclusivity and ensures that modernization does not entail cultural erasure.

The third component of the model, educational transformation, expands the discussion to the institutional level. Education is the social mechanism that sustains and disseminates ethical and multicultural values. Integrating multicultural literacy into curricula ensures that future health professionals, teachers, and researchers develop intercultural sensitivity and reflexivity. Such training helps professionals understand that health is not a one-size-fits-all concept but a socially negotiated practice influenced by belief systems, rituals, and community structures. Ethical reflexivity also compels practitioners to examine their positionality and the power dynamics embedded in their communication. This form of education aligns with the concept of public pedagogy, which extends learning beyond classrooms and into communities, encouraging dialogue between experts and citizens about health, culture, and sustainability. In this way, the academic sphere becomes a catalyst for social transformation, cultivating professionals who respect pluralism and are equipped to implement culturally grounded health interventions.

Taken together, these three dimensions, biological integration, communicative ethics, and educational transformation, form a holistic model of sustainable health sovereignty. The model proposes that true health independence is not achieved solely through scientific innovation but through the ethical empowerment of communities to participate in their own health narratives. Promoting locally sourced functional foods, such as Galo-galo honey, thus becomes a strategy for both scientific advancement and cultural preservation. It reduces dependency on imported supplements and industrialized health products while strengthening local economies and community self-reliance. Moreover, it contributes to global sustainability goals by

emphasizing the ecological value of biodiversity and the ethical imperative to protect indigenous environments as sources of both nutrition and knowledge.

This discussion also challenges the dichotomy between tradition and modernity that has long shaped development discourse in postcolonial contexts. Rather than viewing traditional practices as remnants of a pre-scientific past, this research frames them as dynamic systems of adaptive knowledge capable of engaging in dialogue with modern science. The validation of honey's biochemical properties does not replace traditional understanding but enhances it, offering new layers of explanation that coexist with cultural interpretation. This perspective reflects what Rahmad et al. (2024) describe as dialogic modernity, a condition where modernity itself becomes plural, composed of intersecting scientific and cultural rationalities. In this sense, Galo-galo honey is not only a local product but a philosophical metaphor for coexistence: sweet, complex, and integrative.

Furthermore, the findings highlight that ethical interdisciplinarity and collaboration across nutrition science, communication, and education create a productive space for addressing health inequities. Each discipline contributes a distinct but complementary perspective: biology provides empirical validation, communication ensures accessibility and respect, and education institutionalizes long-term transformation. When these fields converge, they produce a network of mutual reinforcement that embodies the holistic Minangkabau worldview in which body, mind, and society are inseparable. The collaborative works of researchers such as Yuhendri, Rahmad, and Rahmat exemplify this synergy. Their studies collectively illustrate how ethical research practices can generate socially responsible innovation, in which science does not merely extract value from culture but also gives value back to it through recognition, sustainability, and empowerment.

Ultimately, the discussion affirms that the convergence of biochemical excellence and ethical communication constitutes a double helix of sustainable public health. The biochemical evidence establishes credibility and trust, while ethical communication ensures inclusivity and justice. Together, they form the structural DNA of a more equitable health paradigm, one that acknowledges multiple sources of knowledge, multiple ways of healing, and multiple voices of authority. West Sumatra's Galo-galo honey, therefore, becomes more than a nutritional product; it becomes a cultural ambassador of balance and reciprocity. Its dual identity as both a scientifically validated supplement and a symbol of local wisdom exemplifies how indigenous biodiversity, when studied and communicated ethically, enriches global health discourse without sacrificing authenticity.

This integrative understanding reimagines the future of health communication and nutrition research in multicultural societies. It advocates for policies and research practices that value co-creation over extraction, education over indoctrination, and empathy over domination. The implications extend to sustainable development, ethical business, and cultural diplomacy, suggesting that the principles of multicultural ethics can serve as the foundation for global collaboration in science and health. In the context of Indonesia's rich biodiversity and cultural plurality, Galo-galo honey stands as a living testament to the fact that harmony between tradition and science is not only possible but necessary for the well-being of both people and the planet. Through its sweetness, it teaches a profound lesson: that health, like honey, derives its strength from diversity, many flowers, one hive, one shared sustenance.

Conclusions

This study concludes that integrating traditional health wisdom with modern sports science requires an ethical foundation grounded in cross-cultural communication and multicultural understanding. The exploration of West Sumatra's Galo-galo honey illustrates how indigenous biodiversity can function as both a scientifically validated nutritional supplement and a cultural symbol of harmony. Its biochemical potency, particularly in antioxidant and anti-inflammatory activities, reflects the tangible health benefits that traditional knowledge can offer when examined through rigorous scientific methods. Yet, scientific validation alone is insufficient without a parallel commitment to ethical communication that respects cultural values and promotes dialogue rather than domination. By grounding health initiatives in the principles of equality, empathy, and community reciprocity, core to Minangkabau philosophy, this study emphasizes that well-being is not only a biological achievement but also a cultural and social process. Such values nurture inclusivity and ensure that traditional practices remain alive as part of collective health promotion. The

interdisciplinary collaboration among researchers further exemplifies how integrating diverse fields, from phytochemistry and sports physiology to communication and education, can generate comprehensive and socially responsible knowledge. In essence, this research proposes a framework of public pedagogy that transforms health communication into a participatory and ethical practice. It envisions a healthy society where local resources are not marginalized by globalization but celebrated as global contributions to wellness, sustainability, and social balance. Galo-galo honey, as demonstrated here, symbolizes the possibility of aligning scientific innovation with cultural integrity to build a future in which health, ethics, and diversity coexist in mutual reinforcement.

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