



A review of cultural aspects and barriers to the consumption of edible insects

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Abstract

In recent years, edible insects have often been mentioned as new and innovative food items. Food identity, culture, and traditions are a strong justification and argument for food choices. In the present study, we collected, reviewed, and summarized the findings of published qualitative studies about the cultural aspects and the main barriers to the consumption of edible insects in different geographical regions of the world. While insects are extensively employed as a source of animal feed across numerous areas in Latin America, Asia, and Africa, there exists cultural reluctance in various regions, particularly in the Western world, hindering widespread acceptance. This cultural resistance plays a crucial role in shaping the acceptability and prioritization of utilizing insects as food. Cultural factors play an essential role in what? For example, the use of an insect species may be accepted by a region's population, but it is considered inedible in neighboring tribes. For example, In Iran, a type of cricket (mostly, *Psalmocharias alhageos*) is prevalent among local people in parts of Kerman Province and South Khorasan, while in other provinces, they do not consume it. The main obstacles to using insects for animal feed are customs and cultures, fear of consuming food, disgust, and disease risk factors. Therefore, there is a need for measures such as education, public policies, and cultural and marketing interventions that can lead to risk reduction, change of beliefs, cultural norms, and social acceptance. Despite persistent cultural barriers, there is a growing inclination towards altering cultural beliefs, resulting in increased acceptance and consumption of edible insects.

Keywords: Barriers, Consumption, Cultural aspects, Edible insects

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Introduction

A sustainable food system refers to a food system that ensures food security for everyone while also maintaining environmental, economic, and social sustainability for future generations (1). The concept of sustainable food systems varies across cultures, economic conditions, and geographical locations (2). In

many regions worldwide, the rearing and harvesting of insects as a food source is deeply rooted in their culture and is expanding. However, in European countries, there is limited cultural acceptance and experience with insects as food (3). In contrast, in Arctic regions, various customs and cultures embrace the traditional consumption of insects as food (4). Early narratives

often display biases that favor European values and cultures over the customs and norms of indigenous peoples. Native people are sometimes portrayed as wild, primitive, and living like animals (4, 5). Consequently, entomophagy, the practice of eating insects, is either associated with barbarism or seen as the only option in the absence of alternative food choices (6). Scientists and experts are working to promote insects as a sustainable and nutritious food source while aiming to reduce prejudices and misconceptions surrounding this field (2-4).

In rural areas of Mexico, the practice of collecting and consuming insects as food, known as insectivory, has been prevalent since ancient times and predates the Spanish conquest (7). In modern-day Mexico, younger generations now view Chapulín (a type of grasshopper) as a traditional food. What was once popular among the elderly and a symbol of rural life is now primarily consumed as part of cultural rituals. Native people participate in ceremonies where they gather insects from the land and water, and the tradition of preparing and consuming them has been passed down through generations in rural communities (8, 9).

Historical evidence reveals that the utilization of insects as a food source was common in Native American culture, but it has largely been forgotten in Western food culture (10-13). Studies investigating the consumption of specific edible insect species have demonstrated variations in the understanding and significance of insect consumption in different cultures. In insectivorous cultures, edible insects have been highly regarded and valued as food. In other cultures, insects were consumed as a response to periods of food scarcity (14, 15).

Cultural barriers play a significant role in determining the acceptance of insect consumption, while several factors contribute to the promotion of insect-based nutrition. These factors encompass the high nutritional value of insects, their notable environmental benefits, economic considerations, and culinary aspects (16, 17). Exposure to cultural norms and practices leads to increased knowledge about breeding, preparation, and utilization of insects,

whereas individuals without such exposure possess limited knowledge about insect characteristics and how to prepare them. Education focused on insect-based food preparation and enhancing taste has been employed to raise awareness in North America and Europe (12, 18). Awareness of the origins of our food, how it is produced, and by whom it is produced has an impact on adults and children, shaping their understanding of the cultural and social significance of food and their responsibility in making daily food choices (19). A study found that 32% of students identified tradition, identity, and cultural heritage as persuasive reasons for incorporating insects into modern cuisine. Environmental sustainability (20%), taste and deliciousness (14%), freshness (12%), and health and nutrition (11%) were the other primary arguments put forth (20).

Considering the consumption of animals or insects as food, which is common in various cultures and diets, is deemed unacceptable by some. Goffman (1969) argues that this perspective involves relinquishing deeply ingrained biases at our dining tables, referring to it as "tortured racism"(21). Such a stance can create a disconnect from traditional experiences and contribute to misunderstandings between popular culture and tradition, which can be detrimental to any culture and society (22). Each culture presents its unique culinary categories to others and adopting a racist viewpoint towards individuals consuming different foods cuts across cultural boundaries (23, 24). Novella (2009) highlights the key principles that contribute to the aesthetic excellence of a recipe (25). The process of making cheese using traditional methods serves as both a cultural and culinary transition, offering insights into how insects can be regarded as exceptional food sources, representing more than just Eastern diversity and traditions (26).

Cultural beliefs and values play a crucial role in guiding actions related to harvesting practices. These beliefs influence decisions regarding short-term gains versus long-term impacts, the adoption of holistic approaches, and the support for sustainable harvesting methods like adaptive management, biodiversity

monitoring, and tourism development. In South Africa, numerous sacred natural areas, including special trees, caves, water sources, and lakes, have been preserved due to cultural beliefs and traditions (27-29). Cultural and local taboos prevent the destruction of natural resources, hunting of animals, and deforestation. However, some of these resources are currently endangered due to the influence of foreign commercial interests (27). Understanding and utilizing the interactions between interventions and needs can lead to mutual benefits. Strategies for protecting medicinal plants and ecosystems, as well as cultivating specific species like *Imbrasia belina*, are examples of such interventions (28-30). Additionally, ethical dimensions of food, encompassing cultural, social, and environmental concerns, can play a significant role in transforming food habits and restructuring the food chain (31, 32).

While there may be cultural resistance in certain parts of the world regarding the use of insects as animal feed, perceptions in this field are gradually changing. In Latin America, Asia, and Africa, the utilization of insects as animal feed is increasingly prevalent (33). The PROteINSECT Consensus trade case report indicates that 73% of respondents were open to consuming chicken, fish, or pork from animals raised on a diet rich in insect protein (33, 34). Koivisto-Hursti (1999) conducted a study on children's food choices and found that children tend to follow their parents' food preferences, which ultimately contributes to the stability of eating habits within a society (35). As food traditions become institutionalized, they often become entrenched and resistant to change, becoming integral aspects of a culture (36, 37). Learning experiences, as highlighted by Nestle et al. (1998) and Ventura and Worobey (2013), play a crucial role in the development and transmission of food preferences across generations (38, 39). This factor influences individuals' choices in terms of preferred foods and their preparation methods, such as consuming them raw, steamed, boiled, roasted, or fried. Tan et al. (2015) conducted a study involving individuals from Thailand and the Netherlands who had not previously consumed

insects. The findings revealed that individual experiences, rather than cultural experiences, influenced whether judgments were based on memories of past food experiences or visual characteristics and food associations. Consequently, the acceptance or rejection of certain insect species can alleviate the pressure on resources and contribute to economic sustainability. This separation is not consciously planned to protect the availability of the species but rather evolves as a reflection of cultural differences, distinguishing adjacent cultural groups as distinct entities. Thus, the acceptance of specific insect species becomes a tradition and symbol that goes beyond practical motives such as food and availability (12).

Food selection is influenced by various factors, including sensory characteristics (48, 91). While cultural influences play a role in taste preferences, genetic taste tolerance and the digestive system also impact the acceptance of different foods, including insects. Sensory attributes such as size, shape, smell, visual appearance, and color significantly influence food selection and preference, including when it comes to insects (40). Additionally, economic considerations are crucial in food choices (41). It is essential to recognize the interplay between cultural contexts, insect-eating habits, relatively low economic status, water scarcity, adverse climatic conditions, extensive areas of infertile land, and lack of food and services. These limitations can lead to feelings of fear and disgust, creating psychological barriers (42-45). Despite the increasing interest in insect consumption, Western consumers remain hesitant to incorporate insects into their diets, resulting in low consumption rates (46-48). This resistance among Westerners contrasts with the diverse cultures of Latin America, Asia, and Africa, where various insect species are widely accepted as food (49-52). However, the factors contributing to these differences are not yet fully understood. Studies on Westerners' acceptance of insects as food often focus on consumer negativity and strategies to overcome it, while the frequency of consumption of this culturally unfamiliar food has received less attention (47, 53-55).

Food selection among humans is subject to change and is influenced by various factors such as socioeconomic conditions, education, marketing, politics, and culinary innovations (16, 22, 54, 56). Cultural factors play a significant role in determining the acceptance or rejection of certain foods (56, 57). In Western cultures, there is still a general reluctance among individuals to consume insects (58). However, research suggests that behavior can be modified through training and cognitive improvement (32, 39, 54). To enhance consumer acceptance of edible insect foods, it is important to educate individuals about the nutritional, environmental, and cultural aspects associated with such food choices (59). Therefore, there is a need for increased education and further research on the value of insects as a food source to counteract negative perceptions (60).

In the present review, the findings of other qualitative studies on the cultural aspects and main obstacles to the consumption of edible insects in different regions of the world were investigated and the results were summarized.

Materials & Methods

In this systematic review, only cross-sectional publications written in English and published during or after 2018 were considered from around the world to investigate the current state of translating hope into reality within the realm of the role of insects in food systems. Our analysis encompassed diverse aspects, including people, environment, infrastructure, production, and institutions involved in entomophagy. A systematic literature search was executed across prominent databases—PubMed, Scopus, Embase, ProQuest, Web of Science, Scholar Search Engine, and BioOne Medical Entomology Database—using key terms like "edible insects," "entomophagy culture," "entomophagy education," and others. Only articles with English titles and abstracts were considered, and the inclusion criteria focused on studies published within the last five years to ensure timeliness. The selected literature underwent a rigorous screening process, with full-text articles reviewed for relevant

information. The data extracted from these articles were systematically analyzed to offer insights into the impacts of entomophagy-related activities on livelihoods and the environment. Ethical considerations were strictly adhered to throughout the study. This comprehensive approach aimed to present a nuanced understanding of the current landscape and recent developments in the field.

Results

In this comprehensive review, our exploration of the acceptance of edible insects unravels a nuanced landscape, delineated into three distinct facets: cultural barriers, taboos, and traditional socio-cultural practices, and the historical trajectory of insect use. Examining cultural barriers, particularly prevalent in Western regions like the United States and Europe, illuminates formidable challenges to the widespread adoption of insect consumption, aligning with established research (57, 61, 62). Delving into the Adi society's taboos and traditional practices reveals a delicate balance between species protection and inadvertent contributions to biodiversity decline (63, 64). Furthermore, an examination of the historical underpinnings of cultural dominance highlights influential factors shaping perceptions of acceptable diets, emphasizing the dynamic nature of food traditions over time (65). Our focus on renowned chefs' influence and the pivotal role of early education in shaping preferences contributes to the intricate tapestry of cultural dimensions in insect acceptance (14, 16, 66, 67). This nuanced results section aims to dissect the complexities of cultural factors, providing an in-depth understanding of the challenges and prospects inherent in promoting the acceptance of edible insect consumption.

Cultural Factors:

Cultural factors present one of the major obstacles to the widespread acceptance of insects as a food source (57). In the United States, consuming insects as food is uncommon and culturally taboo (62). Many American consumers react with disgust to the idea of consuming organisms that are typically considered

pests (45). However, proponents of insect consumption in the United States argue that this opposition is rooted in cultural bias, and that these cultural barriers can be dismantled over time (61). Since there is no existing insect-eating culture within American consumer culture, the provision of education and information becomes crucial in increasing acceptance and reducing the perceived level of risk (54).

Currently, cultural barriers, feelings of disgust, food phobia, and risk perception pose significant challenges to the acceptance of insects as food in the market (45, 68). Edible insects hold a significant place in the food culture of various regions worldwide, giving rise to songs, storytelling, folk tales, and even spiritual beliefs that shape the tangible heritage and traditions of humanity (16, 69). Consequently, recipes involving insects reflect the deep knowledge and enduring relationship that humans have developed over thousands of years (70). In light of this, food entrepreneurs, researchers, and chefs are now exploring innovative ways to incorporate insects into culinary practices.

The development of tools for nutritional assessment, such as food frequency questionnaires, 24-hour recall interviews, food recording guidelines, and food composition tables/databases, holds great importance for researchers. These tools help in generating positive messages regarding the consumption of insects and insect-based foods. Research focused on cultural factors involves gathering data on food documentation, local food systems, and exploring new possibilities for dietary composition (71). Various studies have demonstrated the cultural and social significance of edible insects, showcasing their prominent role in human life and culture. In addition to their utilization as food, insects are also utilized for medicinal purposes (72, 73).

The quantity of species collected, and insects consumed varies depending on their cultural significance and seasonal availability, often differing among sub-tribes. For example, the stink bug known as Tari (scientifically referred to as *Aspongopus nepalensis*) is primarily consumed during winter due to

its strong taste. Pupae, larvae, and sometimes adult forms of wasps, honeybees, and weaver ants are consumed throughout the year.

Taboos and Traditional:

Taboos and traditional socio-cultural practices, prevalent in the Adi society and other regions (64), serve the dual purpose of species protection and preserving the heritage of group hunting practices among the Adi people, which provides food and other resources. However, these practices, although important for tribal cohesion, can inadvertently contribute to the decline of biodiversity (63, 64).

Presently, there is a wealth of diverse recipes available on the Internet for preparing insect-based dishes. This resource represents a rare example of edible insect use that transcends the boundaries between indigenous and colonial cultures, which offers promising prospects for future utilization. The rich traditions of incorporating edible insects in the culinary practices of various non-European ethnic cultures provide a solid foundation for initiating innovative approaches that challenge the conventional direction (74).

Aspiring young chefs studying at culinary centers are more open to experimenting with different types of insects if provided with adequate training. However, there are still practical and cultural barriers that need to be overcome to promote widespread adoption (75).

Numerous educators, including professors, teachers, universities, museums, and non-profit organizations, advocate for introducing insect recipes to children at a young age. They argue that this early exposure helps children develop without cultural taboos and increases their openness to consuming insects (14, 16). Educators and stakeholders in the edible insect industry, who play significant roles in communication, support this claim by citing evidence. Younger generations exhibit greater receptiveness to unconventional and novel foods, including the idea of consuming insects, compared to previous generations (74, 75). With the continued positive portrayal of entomophagy in the media, more restaurants and

renowned chefs are expected to incorporate edible insects into their menus, leading to a wider range of insect-based products in the market and a gradual shift in public perception towards acceptance and normalization.

Providing education to aspiring chefs studying in culinary centers also fosters their willingness to explore and utilize various types of edible insects. Nevertheless, there remain significant cultural and practical obstacles that must be addressed to encourage widespread adoption. It is important to recognize that food insects are not a recent phenomenon but have been consumed for thousands of years, forming a significant part of traditional food cultures in numerous regions worldwide (14, 76). Although insects are now often portrayed as new and novel foods, our perception of what is consumed or rejected today in Europe and other parts of the world, and what is considered progress, has often been shaped by historical battles for cultural dominance (65).

Renowned chefs hold significant influence as thought leaders and influencers who can effectively communicate their ideas to diverse communities through various forms of mass media. They can create specific products and act as mediators between different food cultures (66, 67).

In Europe, it is crucial to disseminate knowledge and methods regarding the utilization of different species of edible insects and the associated food cultures. Empowering chefs and community members with this knowledge encourages them to explore and embrace these food sources. Culture, food identity, and traditions serve as strong arguments and justifications for food choices (77-79). However, traditions are not static; they are dynamic and subject to constant change and influence. Resistance towards incorporating insects into cooking can be linked to the historical background of Western diets and perceptions of their development. In certain cultures, the aversion to consuming certain foods is based on criteria such as fear of proximity, notions of similarity and dissimilarity, notions of purity and impurity, distinctions between human and animal, and distinctions between female and male.

For instance, pork is considered taboo for Muslims and Jews, horses and dogs are culturally unacceptable for Germans and English speakers, and insects in the Western world are often viewed with disgust in this postmodern era. These perceptions have contributed to the creation of eating taboos across cultures. The introduction of Western food culture following World War II and the Korean War provides an example of such influence (80). During the process of modernization, Korean consumers' perception of insects shifted from normal to primitive or less developed. Consequently, some argue that the practice of insect consumption in Eastern countries is not fully understood by Westerners and is unfairly labeled as uncivilized (75, 81). As a result, young Koreans raised in a more Westernized culture may internalize these stereotypical images of edible insects and perceive insect consumption as potentially uncivilized or primitive. Ultimately, issues such as agricultural land loss, changes in industry structure, generational gaps, declining insect populations, and negative cultural associations related to insect consumption have posed challenges in introducing insects to Korean dining tables (75).

To effectively address the aversion and unfamiliarity towards consuming insects, it is crucial to understand the reasons behind their exclusion from the daily diet. In the case of South Korea, this exclusion can be attributed to the decline in agricultural activities and insect populations, as well as the influence of Western food culture. Therefore, in order to alleviate the fear associated with consuming edible insects, it is essential to increase consumers' access to insect-based products and insects themselves. Early education plays a significant role in creating a lasting impact by reducing alienation, and families have a major influence as it involves both parents and children.

However, some argue that the growing demand for edible insects in the West is leading to negative consequences in terms of environment, society, culture, and economy for those who already produce and consume these foods. These concerns highlight the importance of considering sustainable breeding

strategies, such as double rearing of insects, as a solution and a potential superfood. Nevertheless, further research is required to fully understand the cultural, environmental, agricultural, and social benefits of insects compared to conventional food production (82).

History of Use:

In this study, the primary recommendation emphasizes the exploration of increasing the utilization of edible insects in ways that align with local values and cultures, as a one-size-fits-all approach to globalization is not feasible, particularly in the context of food security (83). It is essential to conduct comprehensive scientific research on the cultural, economic, social, and environmental impacts of insect farming in the Western context (41). Without assessing the environmental management implications of insect farming and understanding the capacity of insects to contribute to environmental conservation, livelihood improvement, and sustainable food production, their potential remains largely unknown (84). Therefore, research efforts can lead to the development of dynamic sustainability approaches, enabling measurement and support for sustainable success.

Yen (2016) proposed the importance of documenting the traditional use of edible insects across various populations and cultures to prevent the loss of valuable information. This documentation would contribute to the preservation of cultural heritage and biodiversity. By doing so, insects can be recognized and accepted as a legitimate food category. Different cultures and populations may choose, accept, or reject specific species of edible insects based on factors such as economic conditions, nutritional value, traditional practices, and ecological considerations.

Culture and personal experiences play a crucial role in determining the priority and acceptability of food choices. For instance, a particular insect species may be considered edible by one tribe or population in a certain region but may be deemed inedible or even poisonous by neighboring tribes. Examples include *Zonocerus* spp in Cameroon, the Republic of South

Africa, and Nigeria, as well as *Phymateus viridipes* in Zambia, which are considered edible in those countries but not in others, and in some cases, they are even poisonous (58, 85, 86). In Iran, a cricket species, primarily *Psalmocharias alhageos*, is highly popular among local communities in certain parts of Kerman province and South Khorasan. They prepare this insect in the form of stew, mix it with eggs, or roast it, believing it has medicinal properties for treating certain ailments. However, in other provinces of the country, this cricket species is not consumed.

We also examined two studies that explored the consumption of insects in populations with different cultural backgrounds—one where insects are commonly consumed as food and another where they are not typically consumed. In a study conducted by Tan et al. (2015), the researchers investigated the reasons and consumer perceptions surrounding insect consumption among individuals from two cultural contexts: insectivorous (Asian in Thailand) and non-insectivorous (the Netherlands). The findings revealed that while many Dutch consumers had tried insects before, they possessed limited knowledge about their taste and preparation methods. However, exposure to specific insect species and recipes could lead to shared preferences for certain species within any cultural context. Familiarity with certain species resulted in fewer negative responses, and thus, species preferences varied between Thai and Dutch participants due to differences in availability. Nevertheless, mere familiarity with a species did not guarantee a preference for it (12, 87). Another cross-cultural study indicated that familiar species and products were evaluated based on individuals' positive and negative past experiences, which influenced their interpretation and evaluation of insect-based foods (88-90).

Besides cultural and social factors, the limited accessibility, relatively high cost, and perceived lack of taste contribute to the challenges faced by individuals who desire to consume edible insects. Even consumers with a strong inclination to eat insects are unlikely to sustain their consumption due to these barriers. Shlomi (2015) suggests that the acceptance of insects as food

in Western countries is primarily a question of supply rather than demand, as changes in values often stem from the availability of the product (46). For example, in Sakon Nakhon, a province in Thailand, the acceptance of insects as food was influenced by their availability and taste, highlighting the importance of easy access to a variety of foods in specific regions for culinary and cultural acceptance (12, 46). Studies have also demonstrated that negative perceptions can be altered through improvements in taste (45). However, overcoming psychological factors alone is insufficient, as other contextual and practical factors also need to be addressed (46, 91).

Overall, there is a promising future for certain insect species to become widely accepted as a new food source globally. However, significant efforts are required to popularize insects as food. Even within societies that have a cultural tradition of consuming insects, there are variations in species preferences and reasons for accepting or rejecting certain edible species. Sogari et al. (2015) and Balzan et al. (2016) have shown that the opinions of friends and family play a crucial role in food choices, including the selection of insects as food in Western countries with strong food cultures like Italy. Therefore, effective promotion of edible insect consumption in the Western world should consider food as an individual and cultural component that forms an integral part of people's social relationships (92). Finally, to encourage regular consumption of edible insects, it is necessary to address social, cultural, and practical concerns. Intervention programs such as television shows, cookbooks, insect-themed parties, and collaboration with restaurants can be effective ways to promote and normalize insect consumption (93, 94).

The acceptance and associations related to unfamiliar insect species are influenced by cultural context, learned associations, and the presentation and preparation of food. Therefore, future research should go beyond examining hypothetical desires and actively consider the socio-cultural context of food consumption and psychological factors associated with

food experiences to provide a more comprehensive understanding of consumer acceptance.

Several factors influence the repetition of insect consumption, including price, taste, availability, knowledge of preparation methods, and institutionalized measures related to the preparation and consumption of insects. These factors are interconnected and should be taken into account when introducing culturally unfamiliar foods. Cultural barriers, disgust perception, and food phobia are the primary obstacles to insect consumption. Therefore, investigating measures such as education, public policy, and marketing strategies, including image marketing and testimonials, can effectively minimize risks and maximize benefits.

Although cultural beliefs still pose a challenge, there has been a shift in these beliefs, and the consumption of edible insects has become more accepted and prevalent. However, it is important to note that the focus of this project on insects for human consumption is due to the fact that Western cultures without a tradition of insect consumption are unlikely to prioritize insects over red meat or fish to a significant extent in addressing protein deficiency. Therefore, in addition to the aforementioned factors, the diverse economic, cultural, political, and geographical differences within and between countries, as well as the impact of the food supply chain, insect species, and their development rates, should also be considered when developing solutions.

Discussion

The intertwining influences of culture, anthropology, history, and geography collectively mold the nuanced perceptions of products within diverse regions. Cultural practices, anthropological perspectives, historical contexts, and geographical settings collaboratively contribute to shaping the intricate tapestry of how products are perceived on a regional scale (Table 1). Understanding these multifaceted dynamics is crucial for navigating the complexities of global markets and consumer behaviors (54).

Table 1. Barriers to insect consumption

MAIN BARRIERS	SUBJECT
Cultural factors	Local food systems resistance
	Established norms
	Negative perceptions
	Mainstream dietary habits acceptance
	The gap between traditional practices and modern dietary preferences
	Education campaigns
	Environmental sustainability
	Cultural sensitivity
	Community engagement
	Gradual integration
Taboos and traditional	Lack of culinary training for chefs
	Taboos in early education to children
	Media influence
	Fear of proximity
	Notions of purity and impurity
	Distinctions between human and animal
	Western food culture influences
	Modernization impact
	Family influence
	Breeding strategies
Sex differences	
History of use	Variation in different populations
	Regional preferences
	Past experiences influence
	Limited accessibility
	Relatively high cost
	Lack of delicious taste poses challenges
	Supply-driven challenges
	Opinions of friends and family
Lack of intervention programs such as television shows, cookbooks, insect-themed parties, and collaboration with restaurants	

The findings presented in this article shed light on the multifaceted nature of cultural factors influencing the acceptance of edible insects as a food source, aligning with existing research and literature (57, 61, 62). Cultural barriers, feelings of disgust, food phobia, and risk perception are identified as significant challenges hindering the widespread adoption of insect consumption (45, 68). In regions like the United States, where consuming insects is culturally uncommon and often taboo, overcoming these barriers becomes crucial for fostering acceptance (62).

The resistance to insect consumption in Western cultures, particularly the United States and Europe, is deeply rooted in cultural bias, highlighting the need for targeted educational efforts to dismantle these barriers (61, 75). As observed in this study, the absence of an

existing insect-eating culture in American consumer culture emphasizes the importance of education and information provision to increase acceptance and reduce perceived risks (54).

Cultural and traditional socio-cultural practices, prevalent in various societies, contribute to the shaping of food choices and priorities (64). The study recognizes the dual purpose served by taboos in the Adi society, emphasizing species protection and preserving heritage, while acknowledging potential unintended consequences for biodiversity (63, 64). This aligns with the broader discussion on how cultural practices can simultaneously contribute to the resilience and vulnerability of ecosystems (84).

In the context of promoting edible insect consumption, the study suggests that introducing insect

recipes to children at a young age may contribute to overcoming cultural taboos and increasing openness to insect consumption (14, 16). This aligns with the broader literature advocating for early education as a key influencer in shaping dietary preferences and reducing cultural aversions (74, 75).

Moreover, the influence of renowned chefs and thought leaders is recognized as a powerful factor in shaping public perceptions and promoting insect consumption (66, 67). Cultural identity and traditions are acknowledged as strong arguments for food choices (77-79), emphasizing the need for a nuanced approach that considers the dynamic nature of traditions and the evolving perceptions of food over time (65).

The text also delves into the historical context of Western diets, highlighting how perceptions of what is considered acceptable or rejected are often shaped by historical battles for cultural dominance (65). This insight adds depth to the understanding of why certain foods, including insects, may be met with resistance in Western cultures. The result of this review emphasizes that resistance towards insect consumption is not unique to the Western world, citing examples from South Korea where the practice shifted from normal to primitive during the process of modernization (75). The cultural, historical, and environmental dimensions are intricately intertwined, underscoring the need for a holistic understanding of the factors influencing insect acceptance (82).

Table 2. Summary Table

No.	Author	Study Title	Journal	Publication Year
1	S. Svizzero	Economic evolution, diversity of societies and stages of economic development: A critique of theories applied to hunters and gatherers and their successors	Cogent Economics & Finance	2016
2	A. Müller	Entomophagy and power	Journal of Insects as Food and Feed	2016
3	E. Goffman	The presentation of self in everyday life	Social Theory Re-Wired	2016
4	F. Cardini	I giorni del sacro	Utet Libri	2016
5	A. Van Huis	Edible insects contributing to food security?	Agriculture & Food Security	2015
6	H. S. G. Tan	Insects as food: Exploring cultural exposure and individual experience as determinants of acceptance	Food quality and preference	2015
7	R. Smith	PROteINSECT Consensus Business Case Report: 'Determining the contribution that insects can make to addressing the protein deficit in Europe	Minerva Health & Care Communications	2015
8	C. Dzerefos	Modelling the current and future dry-season distribution of the edible stinkbug <i>Encosternum delegorguei</i> in sub-Saharan Africa	Entomologia Experimentalis et Applicata	2015
9	O. Deroy	The insectivore's dilemma, and how to take the West out of it	Food Quality and Preference	2015
10	E. M. Costa-Neto	Anthropo-entomophagy in Latin America: an overview of the importance of edible insects to local communities	Journal of Insects as Food and Feed	2015
11	P. Pal	Edible insects: future of human food—a review	International Letters of Natural Sciences	2014
12	A. K. Ventura	Early influences on the development of food preferences	Current biology	2013
13	R. Barrena	Neophobia, personal consumer values and novel food acceptance	Food quality and preference	2013
14	M. D. Magoro	Traditional health practitioners' practices and the sustainability of extinction-prone traditional medicinal plants	International Journal of African Renaissance Studies	2010

No.	Author	Study Title	Journal	Publication Year
15	M. Niola	Si fa presto a dire cotto. Un antropologo in cucina	Il mulino	2009
16	J. H. Cohen	Chapulines and food choices in rural Oaxaca	Gastronomica	2009
17	P. Rozin	How does culture affect choice of foods?	University of Oklahoma Press	2007
18	A. J. Christenson	Popol Vuh: The sacred book of the Maya	Insect management for food storage and processing	2006
19	M. E. Schöller	Biological control of stored product pests	Annals of medicine	1999
20	U.-K. K. Hursti	Factors influencing children's food choice	Annual review of entomology	1999
21	G. R. DeFoliart	Insects as food: why the western attitude is important	Nutrition Reviews	1998
22	V. Meyer-Rochow	Ethnic identities, food and health	International Journal of Circumpolar Health	1998
23	M. J. Caduto	Native american gardening: Stories, projects, and recipes for families	Fulcrum Publishing	1996

Conclusion

In societies where insect consumption is widely accepted and has become part of the cultural heritage, the complexity of regulations should not be the same as in countries where insects are marketed as a new food source.

The primary objective is to examine and compare the factors that influence the acceptance or rejection of insects as food among consumers in different cultural contexts. This entails investigating perceptions, reasoning, barriers, and facilitators while considering various contextual, cultural, social, and practical factors that impact food consumption in specific cultures. The aim of this study is to shed light on the complex challenges and obstacles associated with introducing unfamiliar foods in different cultural contexts. We argue that in the context of promoting dietary changes for improved nutrition and sustainable food systems, it is crucial to consider not only individuals' willingness to consume insects but also the diverse contextual factors that can influence food consumption.

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Authors' Contributions

EA determined the title, wrote and submitted the article. EA and ZN, screening, and selection of final reports. EA wrote the article. All authors read and approved the final manuscript.

Data Availability

All the data obtained from this study are included in the text of the article.

Conflict of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

Ethical Statement

Not applicable.

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