Chapter 5

Public Acceptability and Perception of Sustainable Solutions for Malnutrition and Hunger: Edible Insects

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Abstract

The study's purpose is to comprehend the impacts of the industrialization of edible insects on world hunger and malnutrition, which is one of the UN's sustainability development goals. This study aims to discover the public opinion regarding using edible insects to solve world hunger and malnutrition and explores the perspectives of citizens from diverse backgrounds on world hunger, malnutrition and potential solutions to the issues in a developing economy, Turkey. Qualitative research methods are used. In total, 24 face-to-face online interviews are conducted to obtain data from different stakeholders such as industry experts, academicians, and potential customers. Findings indicate the human population on earth increases exponentially, and food resources will become short for future generations. This problem causes health issues due to a lack of nutrition. Nutrition-rich edible insects can be a part of the solution to this problem if correct processing techniques are used and food safety is ensured.

1. Introduction

The rapid rise of the world's population has huge implications for food security. As the number of people worldwide and travel for gastronomy increases (Ozer & Nazli, 2019), so does the need for food, creating challenges in maintaining a sufficient and sustainable food supply (Nazli & Onder, 2025; Onder & Nazli, 2023). This trend raises concerns about

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whether current agricultural methods can meet the rising food demand while also affecting natural resources, environmental sustainability, and social stability. In the 21st century, the use of insects for food and animal feed has become an increasingly important issue, influenced by factors such as the increasing cost of animal protein, food insecurity, nature challenges, growth in population, and the growing demand for protein, especially among the expanding middle class (Sachdeep *et al.,* 2024).

The 2030 Agenda for Sustainable Development stresses the importance of global issues such as food insecurity, hunger, and malnutrition. Although there were optimistic projections suggesting improvements in these areas between 2009 and 2015, the situation had not improved by 2022 (Silvia *et al*., 2023). The 2023 Global Hunger Index (GHI) reveals that nine countries are facing critically high levels of hunger, while hunger remains a serious issue in an additional 34 countries. In many nations, the situation has deteriorated in recent years, with hunger increasing in 18 countries since 2015. If current trends continue, 58 nations are unlikely to achieve low hunger levels by 2030 (Global Hunger Index, 2023). In 2023, over 280 million people experienced acute hunger, placing their lives at immediate risk, while approximately 733 million people faced chronic hunger, 150 million more than in 2019, consistently lacking access to safe and nutritious food. Without urgent intervention, an estimated 582 million people could suffer from chronic hunger by 2030 (United Nations Trade and Development, 2024).

Protein-energy malnutrition and micronutrient deficiencies (also known as hidden hunger) increase vulnerability to diseases. For women of reproductive age, this can affect fetal development, potentially leading to the onset of diseases later in life, as suggested by Barker's hypothesis. If a fetus is exposed to limited nutrient availability, it may develop adaptive responses that favor survival in a nutrient-poor environment. However, both nutrient deficiencies and excesses can increase the risk of diseases, such as obesity and other metabolic problems, creating a cycle where food plays a crucial role in disease development (Silveira *et al.,* 2007).

Therefore, the study aims to comprehend the impacts of the industrialization of edible insects on world hunger and malnutrition. This study also aims to discover the public opinion regarding using edible insects to solve world hunger and malnutrition and explores the views of citizens from different backgrounds on world hunger, malnutrition and potential solutions to the issues in a developing economy, Turkey.

2. Edible insects

Insects are found on every continent and inhabit nearly all terrestrial environments (Gullan *et al.,* 2014). They perform numerous essential functions in ecosystems, such as turning and aerating soil, burying dung, controlling pests, pollinating plants, and providing nutrition for wildlife (Schowalter, 2006). For example, termites alter their surroundings to promote grass growth, various beetles act as scavengers, and dung beetles help recycle organic matter, making it beneficial for other organisms (Losey *et al.,* 2006).

Humans have consumed insects for centuries, as evidenced by diets unearthed at prehistoric archaeological sites. Insect exoskeletons and several parts have been discovered in the fossilized excrement of early humans in caves in the US and Mexico (Mannino *et al.,* 2023). Cave art offers insights into the customs, beliefs, and activities of ancient communities. While animals like bison, deer, and mammoths are frequently shown in cave paintings, insects also show up in the artworks (Mithen, 1999).

With the global population expected to exceed 10 billion by 2050, there is a rising demand for nutritional and sustainable food supplies. To meet the needs of the expanding population, the current rate of food production must be significantly increased (Food and Agriculture Organization, 2009). A key factor driving this revival is the growing recognition of the health and environmental advantages of insect-based foods. Insects are lower in fat, higher in protein, and use fewer sources to produce than traditional animals, making them a much better sustainable choice. Furthermore, they are rich in key nutrients such as zinc, iron, and calcium that are vital for human health (Sachdeep *et al.,* 2024). Additionally, insects produce far fewer greenhouse gases than traditional livestock (Oonincx *et al.,* 2010).

Insects can break down the organic matter that is found in waste materials such as plant, poultry, straw, and livestock excrements, and daily food scraps, thereby minimizing the loss of energy and key nutrients. Beyond decomposing and recycling organic waste, the process of insect biotransformation produces insect biomass and insect manure, which may be utilized as protein-rich feed for livestock and organic fertilizer derived from insect manure (Xueying *et al.,* 2023).

3. Methodology

The questionnaire was conducted through face-to-face and online (Teams app) meetings, and it is aimed at obtaining data from various stakeholders such as industry experts, academicians, potential customers, and ordinary

citizens. Twenty-four adult individuals volunteered to participate in this pilot study. In order to reach enriched and various insights, participants were selected from diverse backgrounds. Especially, there are engineers who work for the food industry, academicians working in food safety, a cook working in tourism, and many individuals from different backgrounds.

The online interview sessions took approximately 15 minutes each to gather the relevant information from the respondents. Online surveys were distributed and collected between November 2024 and January 2025, and besides scale rankings, notes and written responses were analyzed. The demographic features of the participants are presented in terms of age, gender, working field, and their occupation. The inspirational studies concern edible insects as a protein source (Kim *et al.,* 2019), responsible consumption and production (Nazli & Onder, 2025; Onder & Nazli, 2023), and edible insects for sustainable food provision and food security (Sachdeep *et al.,* 2024), which led to the following questions.

(1) How concerned are you about the issue of world hunger?

(2) In your opinion, what are the main causes of world hunger?

(3) Do you believe that eradicating world hunger is achievable?

(4) Do you think raising awareness about world hunger can make a difference?

(5) Do you think alternative food resources impact significantly in reducing world hunger?

(6) Do you believe that edible insects would help fight hunger in the world?

(7) Do you believe that edible insects would help malnutrition?

(8) Do you think industrially processed insect products are hygienic and safe?

(9) Would you consider buying food containing edible insects to enrich nutrition?

4. Results and discussion

Based on the demographic characteristics of the participants, the avarage age of the sample is 35.8, the male respondent percentage is 62.5%. In terms of work area, 12.5% of the respondents work in the food industry, 12.5% in healthcare, 25% in engineering, 4.2% in law, 4.2% in tourism, 12.5% are housewives. The demographics information are in Table 1 below.

Table 1: Demographics

Sample	Age	Gender	Working Field	Occupation
1	29	Male (M)	Food Industry	Project Manager
2	55	Female (F)	Healthcare	Academician
3	33	M	Engineering Aviation	Academician
4	26	M	Engineering	Pilot
5	27	M	Healthcare	Salesman
6	59	M	Food Industry	Doctor
7	29	F	Cultural Studies	Academician
8	28	M	Architecture	Academician
9	28	M	Information Technology	Architect
10	28	M	Food Industry	Developer
11	30	M	General	Production Engineer
12	55	F	Healthcare	Housewife
13	33	M	Engineering	Doctor
14	27	M	Engineering	Project Engineer
15	31	F	Maritime/Tourism	Academician
16	29	M	Engineering	Captain
17	30	F	Engineering	Sales Engineer
18	30	F	Business Management	Project Engineer
19	57	F	General	Accountant
20	54	M	Tourism	Housewife
21	43	M	General	Cook
22	42	F	Engineering	Housewife
23	24	M	Law	Civil Engineer
24	31	M	Food Industry	Lawyer

In the survey scale, zero stands for the minimum, and ten represents the maximum alignment with the respondent's statement. Where zero is "strongly disagree," five is "neither disagree nor agree," ten is "totally agree."

For question number two, respondents were able to select multiple options. 87.5% of respondents indicated that the main cause for world hunger is inaccurate policies. The climate crisis, corruption, and injustice share the same percentage, which is 66.7%, wars in different regions and overconsumption are mentioned in 62.5% of the responses. Lack of awareness is 58.3%, and natural disasters received the least mention, which is 50%.

Table 2: Survey Responses

No	Question	Average Result
(1)	How concerned are you about the issue of world hunger?	7.17
(2)	In your opinion, what are the main causes of world hunger?	Inaccurate Policies
(3)	Do you believe that eradicating world hunger is achievable?	4.33
(4)	Do you think raising awareness about world hunger can make a difference?	6.67
(5)	Do you think alternative food resources impact significantly reducing world hunger?	6.42
(6)	Do you believe that edible insects would help fighting hunger in the world?	5.38
(7)	Do you believe that edible insects would help malnutrition?	5.7
(8)	Do you think industrial-processed insect products are hygienic and safe?	5.2
(9)	Would you consider buying food containing edible insects to enrich nutrition?	3.2

Based on the surveys, meetings, and overall research results, the main cause of world hunger, according to the participants in the study, is inaccurate policies. Inaccurate policies often exacerbate world hunger by neglecting underlying factors, such as the unequal distribution of resources, political instability, and inadequate infrastructure, which prevent vulnerable populations from accessing sufficient, nutritious food (Global Hunger Index, 2020).

According to the United Nations World Food Program, hunger is recognized as a peace and security issue. Despite efforts and adjustments made in the 2018 resolutions, little progress has been achieved, and millions continue to suffer from hunger due to conflict. Starvation is used as a weapon of war, and additionally, the global pandemic, COVID-19, has worsened food insecurity. These key factors illustrate that policies cannot reach their objectives and highlight a lack of effectiveness during extraordinary times (United Nations World Food Program USA, 2020).

According to the results, public opinion reveals significant concern about world hunger. However, there is low confidence in the achievability of eradicating world hunger. This suggests that, from a broader perspective, governments and the United Nations need to do more to gain the public's trust in achieving Zero Hunger, which is the 2030 Sustainable Development

Goal. Respondents' answers regarding awareness of the impact of world hunger highlight the need to increase public knowledge to raise awareness and reduce global hunger (Food and Agriculture Organization, 2022).

The survey responses also suggest that the public opinion is open to alternative food sources. However, when it comes to edible insects as a solution for malnutrition and world hunger, there is limited agreement on this solution. This situation apparently shows that increased knowledge is required, and more marketing efforts should be made if this solution is to be presented to the ordinary citizens. Still, 33.3 percent of the participants mentioned that they would strongly consider buying edible insects. This suggests that there is market potential after all (Kim *et al.,* 2019).

5. Conclusion

This study emphasized the critical role that inaccurate policies play in perpetuating world hunger, with the UN World Food Program recognizing hunger as a critical issue of peace and security. Despite the global efforts, millions continue to suffer from hunger, exacerbated by conflict and the recent COVID-19 pandemic. Public awareness and trust in the achievement of the Zero Hunger goal remain low, indicating that more efforts are needed to engage and educate the public on the importance of sustainable solutions.

The potential of alternative food sources, such as edible insects, to combat global hunger and malnutrition is evident. However, the lack of strong public support for this solution highlights the need for increased education and targeted marketing campaigns. As the global population grows and traditional food production faces mounting obstacles, alternative protein sources like edible insects could have a crucial role in mitigating food insecurity. Despite skepticism, a market exists, and with dedicated efforts to raise awareness, this could become a viable solution to achieving food security and reducing malnutrition worldwide.

The key findings suggest that tackling world hunger demands a multifaceted approach that includes policy reform, public education, and the exploration of innovative food sources. Achieving Zero Hunger by 2030 is an ambitious goal, but it is possible if the global stakeholders collaborate to overcome the barriers of policy, perception, and sustainability.

Limitations and further study

This unique study has a few limitations. 1. Small sample size of 24 participants and its focus on specific professional backgrounds, which may not reflect the broader population. 2. The voluntary nature of participation

may introduce biased perspectives, and the study's geographic scope limits its generalizability, and 3. Cultural factors and the evolving nature of public attitudes were not fully explored, indicating the need for further research. Further research could expand the sample, include diverse destinations, and explore cultural attitudes toward edible insects and willingness to act accordingly. Long-term public perception and the feasibility of scaling insect-based food systems are also recommended. The marketing efforts of food and beverage organizations and tourism organizations for edible insects and related products that are nutrious will also help improve the understanding of consumers and acceptability of these key and sustainable products.

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