Review Article

Vigilance for Food Insecurity

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Abstract

Monitoring food insecurity involves systematically tracking and assessing the availability, accessibility, and utilization of food resources within a population. This process includes gathering data on various factors such as economic conditions, social determinants, and environmental influences that contribute to food scarcity. By employing surveys, interviews, and statistical analysis, organizations and researchers can identify vulnerable groups, understand the severity of food insecurity, and evaluate the effectiveness of interventions. Continuous monitoring (**Figure 1**) allows for timely responses to emerging issues, ensuring that policies and programs are adapted to meet the changing needs of communities. Ultimately, effective monitoring is crucial for developing strategies to alleviate food insecurity and promote food security for all.
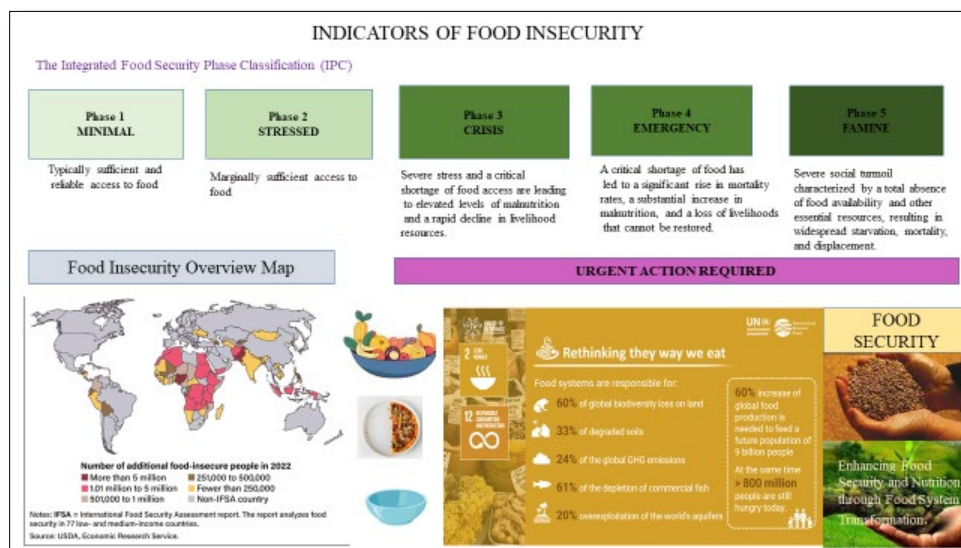
Figure 1. Graphical Abstract: Indicators of Food Insecurity.

INTRODUCTION

Definition

Vigilance is the practice of maintaining careful observation to identify and prevent potential threats or challenges. It entails closely monitoring the actions of personnel and taking prompt actions to promote ethical behavior while ensuring integrity and honesty in official interactions [1].

Objective

Some individuals may engage in unethical behavior for personal benefit, often at the organization's expense. Such actions can lead to waste, financial losses, and economic decline, while also negatively impacting others and damaging the organization's reputation and goodwill. Consequently, vigilance is essential to mitigate these harmful behaviors and protect the organization's interests [2].

- Vigilance awareness aids in:

- Deterring misconduct

- Protecting honest employees

- Promoting transparency and fairness

- Ensuring accountability

- Reducing waste and leakages

- Cultivating a culture of honesty and integrity

- Reforming systems and streamlining procedures to facilitate corruption-free operations. Vigilance as a tool to combat potential harm.

Vigilance is vital in all areas of the organization, which is why it is important for every employee to adopt a vigilant mind-set. The organization's vigilance framework should identify areas prone to corruption and focus on establishing effective governance systems. Special attention should be given to units [3] where:

- Officials have considerable discretion

- There is a risk of circumventing established protocols

- Rules and procedures are excessively complex

- Accountability is insufficient

- Delays in decision-making negatively impact client interests

- Opportunities for negotiation exist [4]

Food scarcity refers to the insufficient availability of food resources to meet the dietary needs of a population. This phenomenon can arise from various factors, including environmental conditions such as droughts or floods, economic challenges that limit access to food, and social issues like conflict or displacement. The consequences of food scarcity are profound, leading to malnutrition, increased health risks, and heightened vulnerability among affected communities. Addressing food scarcity requires a multifaceted approach, including sustainable agricultural practices, improved food distribution systems, and policies aimed at enhancing food security for all individuals [5,6].

TAXONOMY OF FOOD INSECURITY

Food insecurity is an economic and social condition marked by a perceived inability to consistently access enough nutritious food essential for sustaining an active and healthy lifestyle. This issue can present itself in various ways, including chronic, temporary, or episodic instances, such as running out of financial resources at the end of the month, or as a consequence of specific events like job loss. Furthermore, the impact of food insecurity can vary among different members of a household; for instance, parents or caregivers may choose to skip their own meals to ensure that their children receive adequate nutrition. It is crucial to differentiate food insecurity from hunger, which is generally regarded as a physiological condition that individuals experience as a result of food insecurity [6-8].

In response to food insecurity, individuals may modify their food choices, seek alternative sources of food—such as grocery stores, convenience stores, or food pantries-adjust the amount of food they consume, or even skip meals entirely. The United States Department of Agriculture (USDA) provides definitions for both food insecurity and food security. Within the framework of food insecurity, "very low food security" refers to situations where some household members reduce their food intake due to financial limitations, while "low food security" indicates that households occasionally compromise the quality, variety, or appeal of their diets while still maintaining regular eating patterns. Food security itself is divided into two levels: "marginal food security," where households experience occasional challenges or anxiety regarding food access but do not significantly alter the quality, variety, or quantity of their food intake, and "high food security," where households do not encounter any issues or anxiety about consistently obtaining sufficient food [8,9].

MAGNITUDE OF FOOD INSECURITY

The Current Population Survey, carried out by the Economic Research Service of the United States Department of Agriculture (USDA), indicated that in the year 2022, a significant 12.8% of households encountered food insecurity. This statistic encompasses 7.7% of households that were identified as having low food security, alongside 5.1% classified as experiencing very low food security [8].

Alarmingly, nearly one-third of households with incomes falling below the federal poverty line are impacted by this pressing issue. Food insecurity is not merely a matter of access to food; it is intertwined with a multitude of medical, psychological, and social challenges that are particularly

pronounced among families facing economic hardship. The repercussions of food insecurity extend beyond mere hunger, as both children and adults who endure this condition are associated with a range of adverse health outcomes, highlighting the critical need for comprehensive interventions to address this multifaceted problem [10].

Food insecurity is largely influenced by poverty, which can arise from unemployment and a variety of other circumstances. Research has shown that certain demographics are particularly susceptible to food insecurity. These include households with children, especially those with young children under the age of six, single-parent families, individuals whose incomes fall below 185% of the poverty line, older adults, people with disabilities, and veterans. Furthermore, the presence of a chronic medical condition not only heightens the likelihood of experiencing food insecurity but is also associated with it [11,12].

Residents living in low-income neighborhoods are at an increased risk of food insecurity due to multiple factors, including limited access to healthy food options, a lack of full-service grocery stores, and insufficient public and private transportation services [12].

There are significant racial and ethnic disparities in food insecurity rates. According to data from the USDA, in 2022, 20% of Hispanic households, 22% of non-Hispanic Black households, and 9% of White households faced food insecurity. Although recent data for Native American and Alaska Native populations is not available, estimates from the decade preceding a 2010 report suggested that their annual food insecurity rates ranged between 20% and 30% [13].

INTENSITY OF FOOD INSECURITY IN ASIA

The scale of food security in Asia is a complex and multifaceted issue that encompasses various dimensions, including availability, access, utilization, and stability of food supplies. Asia, being the most populous continent, faces significant challenges in ensuring food security for its diverse populations [14].

Firstly, the availability of food is influenced by agricultural productivity, climate change, and natural disasters. Many Asian countries rely heavily on agriculture, and fluctuations in weather patterns can severely impact crop yields. Additionally, urbanization and land degradation pose threats to agricultural land, further complicating food production [15].

Secondly, access to food is a critical aspect of food security. Economic disparities across the region mean that while some populations enjoy abundant food resources, others struggle with poverty and lack of access to nutritious food. Infrastructure, such as transportation and storage facilities,

also plays a vital role in ensuring that food can reach those in need [16].

Utilization refers to the nutritional quality of food and the health of individuals. In many parts of Asia, malnutrition remains a pressing concern, particularly among vulnerable groups such as children and pregnant women. Ensuring that populations not only have access to food but also to nutritious food is essential for improving overall health outcomes [17].

Lastly, stability is crucial for food security, as it encompasses the resilience of food systems to shocks such as economic downturns, conflicts, and pandemics. The COVID-19 pandemic highlighted vulnerabilities in food supply chains, emphasizing the need for robust systems that can withstand such disruptions [18,19].

In summary, the scale of food security in Asia is shaped by a variety of factors, including agricultural practices, economic conditions, nutritional standards, and the resilience of food systems. Addressing these challenges requires coordinated efforts from governments, international organizations, and local communities to ensure that all individuals have reliable access to sufficient, safe, and nutritious food [20].

WHY VIGILANCE IS IMPORTANT FOR FOOD INSECURITY?

Oversight is vital in the context of food security, as it guarantees the establishment of systems and processes that facilitate reliable access to adequate, safe, and nutritious food for everyone. Effective oversight encompasses the monitoring and assessment of food production, distribution, and consumption practices to pinpoint potential risks and inefficiencies [21].

By instituting strong oversight mechanisms, governments and organizations can identify and rectify challenges such as food waste, disruptions in the supply chain, and unequal access to food resources. This proactive strategy not only helps preserve the integrity of food systems but also builds public confidence in food safety standards and regulations [16].

Furthermore, oversight is crucial for advancing sustainable agricultural practices that safeguard the environment while addressing the increasing demand for food. It promotes transparency and accountability among all stakeholders, including farmers, suppliers, and retailers, thereby fostering collaboration and innovation within the food industry [22].

The significance of oversight in securing food availability cannot be emphasized enough. It is an essential element that bolsters the resilience of food systems, safeguards public health, and enhances the overall well-being of communities [23] (**Figure 2**).

Figure 2. Significance of Vigilance in addressing Food Insecurity.

CATEGORIES OF VIGILANCE ESSENTIAL FOR TACKLING FOOD INSECURITY

Monitoring Food Supply Chains: It is crucial to maintain oversight of the entire food supply chain, from production to distribution. This includes tracking agricultural outputs, transportation logistics, and market availability to ensure that food reaches those in need efficiently [24].

Assessing Nutritional Quality: Vigilance must also focus on the nutritional value of available food. Ensuring that food options are not only abundant but also healthy is vital for combating malnutrition and promoting overall public health [25].

Evaluating Economic Accessibility: Continuous assessment of food prices and economic conditions is necessary to determine whether individuals and families can afford adequate nutrition. This involves monitoring income levels, employment rates, and inflation, which directly impact food purchasing power [26].

Identifying Vulnerable Populations: It is important to identify and monitor groups that are particularly susceptible to food insecurity, such as low-income families, the elderly, and individuals with disabilities. Tailored interventions can then be developed to support these populations effectively [27].

Engaging Community Resources: Vigilance should include fostering collaboration among local organizations, government agencies, and community groups. This collective effort can enhance food distribution networks and provide support services to those facing food insecurity [28].

Implementing Policy Advocacy: Continuous advocacy for policies that address the root causes of food insecurity is essential. This includes promoting sustainable agricultural practices, improving social safety nets, and ensuring equitable access to food resources [29].

Utilizing Data and Technology: Leveraging data analytics and technology can enhance the ability to predict food shortages and assess the effectiveness of interventions. This includes using geographic information systems (GIS) and other tools to analyze food access and distribution patterns [30].

By focusing on these categories of vigilance, stakeholders can develop comprehensive strategies to effectively address and mitigate food insecurity in communities [12].

ROLE OF VIGILANCE AS A PREVENTION AID TO FOOD INSECURITY

The opportunity to mitigate the negative consequences of food insecurity can be greatly improved through sustained and focused efforts. By adopting strategic initiatives and encouraging a proactive mind-set, both communities and individuals can take significant steps toward decreasing the incidence of food insecurity. This may encompass a range of actions, including enhancing access to healthy food options, optimizing food distribution networks, and implementing educational programs that equip individuals with the

knowledge to make healthy dietary decisions. Additionally, fostering collaboration among government entities, non-profit organizations, and local communities can establish a strong support system dedicated to tackling the underlying issues contributing to food insecurity. With perseverance and dedication, it is indeed feasible to lessen the effects of food insecurity and foster a healthier, more sustainable future for everyone [31].

GREENING THE FUTURE CHALLENGES

The focus of global food policy trends is moving toward tackling sustainability, nutrition, and food security. The long-term sustainability of food systems in the face of climate change and other problems, lowering food waste, and making nutritious diets more affordable and accessible are important areas of study. In order to handle the intricate issues that food systems face, there is a tendency toward integrating food policies with other fields, including agriculture, health, and the environment. Policies that prioritize both short-term respite and long-term fixes are being created to fight hunger and enhance food access for disadvantaged groups. Food systems need to be changed to be more sustainable, considering social, economic, and environmental factors. This is becoming increasingly apparent smallholder farmers and underprivileged groups face major obstacles in many food systems, which are marked by injustices. It is necessary to implement policies that integrate across many sectors and governmental levels in order to address the complexity of food systems [32-34] (**Figure3**).
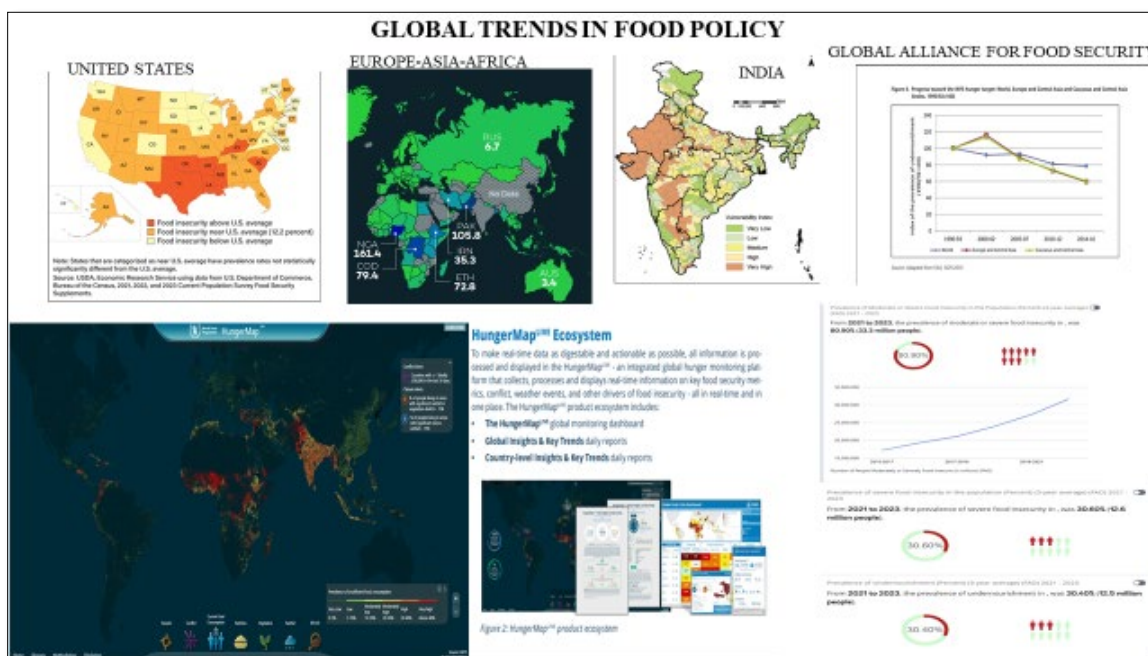

Figure 3. Global trends in Food Policy [35,36].

i)   Trends in Food Policy within the United States

Food Insecurity Overview as per US standards [37,38]

Access to food is a vital social determinant of health, necessary for a healthy lifestyle.

- About 1 in 7 U.S. households (13.5%) faced food insecurity, affecting 47.4 million people.

- Food insecurity is higher among Black and Hispanic households, with rates of 23.3% and 21.9%, respectively.

- Both urban and rural residents are vulnerable, with food insecurity rates of 15.7% and 15.4%.

- Women living alone have a food insecurity rate of 16.2%, while single-mother households report rates up to 34.7%.

- One in five pregnant individuals faces food insecurity.

A notable trend that has emerged in state legislatures, spanning the entire political spectrum, is the enactment of food freedom laws. These laws provide exemptions for retailers from complying with established food safety regulations, thereby facilitating the sale of food products at various venues such as farmers' markets, farms, seaside docks, and even uninspected retail establishments. This situation raises significant concerns regarding the potential for serious foodborne illnesses, as public health officials at both state and local levels find themselves unable to regulate, inspect, or prohibit the sale of these unregulated products [39].

In parallel, it is estimated that approximately 35 percent of food produced in the United States is wasted, leading to an astonishing total of over 100 million tons of food waste each year across various sectors, including retail, food service, residential, and manufacturing. This troubling statistic starkly contrasts with the more than 80 million households projected to face food insecurity in the U.S. in 2023. Such developments pose a serious threat to the safety, health, and overall well-being of the American populace [38].

ii) Food policy in Europe

Recent trends in European food policy emphasize sustainability, resilience, and the need to tackle issues such as climate change and food security. A significant initiative in this regard is the European Green Deal's Farm to Fork Strategy, which seeks to establish a more sustainable and equitable food system [40].

Here is a closer examination of these trends:

1. Sustainability and the Farm to Fork Strategy:

The Farm to Fork Strategy, a pivotal component of the European Green Deal, aims to shift towards a sustainable food system that prioritizes health, environmental stewardship, and fairness. It acknowledges the interconnections between the well-being of individuals, communities, and the planet. The strategy seeks to ensure that the entire food supply chain, from production to consumption, has a neutral or beneficial environmental impact, contributes to climate change mitigation, and promotes food security, nutrition, and public health. Additionally, it strives to maintain food affordability while ensuring fair economic returns throughout the supply chain [40,41].

2. Addressing Climate Change and Environmental Impact:

The European Union is actively working to lower greenhouse gas emissions from the food sector by advocating for sustainable agricultural practices, minimizing food waste, and promoting plant-based diets. The zero-pollution action plan and the EU biodiversity strategy for 2030 are integral components of the policy framework established by the European Green Deal. The emphasis is on ensuring that the food supply chain has a neutral or positive environmental footprint, thereby aiding in climate change mitigation and adaptation [42].

3. Food Security and Nutrition:

A primary focus of the EU is to guarantee food security, nutrition, and public health, ensuring that all individuals have access to adequate, nutritious, and sustainable food options. Efforts are underway to enhance food safety and quality while addressing challenges such as food waste and malnutrition. The European Food Safety Authority (EFSA) plays a crucial role by providing independent scientific guidance on food-related risks, which informs European legislation, regulations, and policy development [43].

4. Resilience and Adaptation to Crises:

The European Union is actively enhancing its food supply chains to better prepare for and address potential crises. In this context, the European Food Security Crisis Preparedness and Response Mechanism (EFSCM) was established as part of the "Contingency Plan for Ensuring Food Supply and Food Security in Times of Crisis." Key trends emerging in this area include regenerative agriculture, alternatives to meat, targeted nutritional solutions, resilience in technology and food systems, and the reduction of food waste [44,45].

iii) Policies regarding Food in the Asian subcontinent

Food policies across Asia are changing to tackle various issues such as food security, nutrition, and sustainable methods. Significant trends involve a movement towards healthier eating habits, greater attention to plant-based options, and the incorporation of technology within the food system. Moreover, there is an increasing focus on local sourcing, sustainable farming, and the reduction of food waste [46].

The trends include:

1. Movement Towards Healthier Eating Habits:

- **Dietary Shift:** Numerous Asian nations are witnessing a shift from traditional, grain-centric diets to more heavily processed foods, resulting in a rise in obesity and diet-related chronic diseases.

- **Focus on Plant-Centric Diets:** The popularity of plant-centered diets and substitutes for animal products is increasing, as consumers seek healthier and more sustainable food choices.

- **Growing Intake of Animal Products:** Although there is a movement towards plant-based diets, there is also an uptick in the consumption of animal products, such as meat, eggs, and dairy, which can affect sustainability and food security [47].

2. Technology and Sustainability:

- **Integration of Technology:** Asian food policies are adopting technology to enhance food traceability, boost production efficiency, and minimize food waste.

- **Sustainable Sourcing and Agriculture:** There is an increasing focus on sustainable farming techniques, which include reducing the use of chemical inputs, encouraging crop diversity, and supporting local farmers.

- **Food Traceability and Transparency:** Consumers are more frequently seeking assurances of safe and transparent food supply chains, prompting the creation of food traceability systems [48,49].

3.   **Tackling Food Security and Affordability:**

- **Emphasizing Food Self-Sufficiency:** Certain Asian nations are focusing on food self-sufficiency to lessen dependence on imports and enhance food security.

- **Tackling Affordability Challenges:** Many households in the region find nutrient-rich foods to be too expensive, highlighting the need for policies that ensure nutritious diets are affordable and accessible.

- **Minimizing Food Waste:** Food waste is a major concern in Asia, leading to the implementation of policies aimed at decreasing waste throughout the food supply chain [48,50].

iv)   **Food policies in Subsaharan Africa**

One distinctive feature of African food policy is that they are frequently based on political and economic agendas, favoring urban populations and winning over elites above farmers' demands. As a result, farming communities are impacted by policy outcomes that alter social and economic trends in rural areas [51].

1. Using policy as a tool: In Africa, food policies are frequently employed as a tool to accomplish political and economic objectives that go beyond ensuring food security, such as upholding social order and winning over influential factions [52,53].

2. Emphasis on Urban Needs: These policies usually give priority to the food requirements of urban dwellers, possibly ignoring the concerns and interests of rural farmers, who are the mainstay of food production [54,55].

3. Rural Area Transformation: Rural communities may experience unforeseen repercussions from the implementation of non-farmer-centric food policies, which could change their social and economic structures in ways that are detrimental to the agriculture industry [56,57].

4. Instances of Policy Impact: This could involve modifications to market accessibility, land ownership, and crop varieties, all of which can impact farming communities' means of subsistence [58,59].

v)   **Emerging trends in food policy in India**

India has consistently ranked low on the Global Hunger Index, highlighting a severe hunger crisis in the country. In the 2021 Global Hunger Index, India ranked 101st among 116 nations [60].

National Food Security Act (NFSA): The NFSA aims to provide subsidized food grains to a significant segment of the population through the Targeted Public Distribution System (TPDS) [61].

Challenges: Despite some advancements, India continues to face obstacles in achieving food security, including poverty, inequality, and climate change impacts [62].

Food Safety Measures in India [63]:

Food Safety and Standards Authority of India (FSSAI):

The FSSAI serves as the regulatory authority for ensuring food safety and standards throughout India.

Key Functions of FSSAI:

- Consolidates food legislation.

- Monitors food manufacturing, processing, distribution, storage, and importation.

- Establishes food item standards.

- Regulates food additives, toxins, antibiotics, pesticides, and contaminants.

- Issues licenses and registrations for food businesses.

- Sets packaging and labeling requirements.

- Promotes consumer awareness.

Government of India Initiatives [66]:

National Food Security Act (NFSA): Guarantees access to subsidized food grains.

Public Distribution System (PDS): Supports the distribution of food grains to eligible beneficiaries.

Mid-Day Meal Scheme: Provides nutritious meals to students in educational institutions.

Integrated Child Development Services (ICDS): Focuses on improving the health and nutrition of children, as well as pregnant and nursing women.

Pradhan Mantri Fasal Bima Yojana (PMFBY): Offers crop insurance protection to farmers.

National Food Processing Mission: Promotes food processing and the development of value-added products.

vi)   **Enhancing the Food Safety network in accordance with WHO guidelines.**

Access to safe, nutritious food is essential for life and health (**Figure 4**). Contaminated food, harboring harmful bacteria, viruses, parasites, or chemicals, can cause over 200 diseases, including diarrhea and cancer. Annually, approximately 600 million people-nearly 1 in 10-suffer from foodborne illnesses, resulting in 420,000 deaths and a loss of 33 million healthy life years or Disability-adjusted life years (DALYs) [65].

The link between food safety, nutrition, and food security is significant. Unsafe food perpetuates a cycle of disease and malnutrition, particularly impacting vulnerable groups such

as infants, young children, the elderly, and those with health conditions. A stable food supply enhances food security and bolsters national economies, trade, and tourism, promoting sustainable development. Factors like global food trade, population growth, climate change, and evolving food systems affect food safety. The World Health Organization (WHO) is committed to improving the ability to prevent, detect, and address public health threats related to food insecurity [66,67].
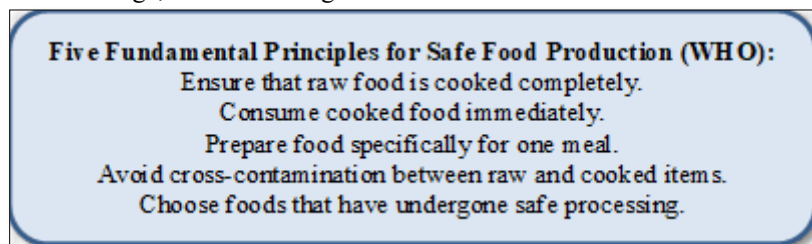

Figure 4. WHO guidelines for Food Safety Network [68].

CONCLUSION

Monitoring food insecurity entails a comprehensive and systematic approach to tracking and evaluating the availability, accessibility, and utilization of food resources within a given population. This intricate process involves the collection of data on a variety of factors that influence food scarcity, including economic conditions, social determinants, and environmental factors. To achieve this, organizations and researchers utilize a range of methodologies such as surveys, interviews, and statistical analyses. These tools enable them to pinpoint vulnerable populations, assess the extent of food insecurity, and measure the effectiveness of existing interventions.

Furthermore, ongoing monitoring is essential as it facilitates prompt responses to emerging challenges related to food insecurity. This responsiveness ensures that policies and programs can be adjusted to address the evolving needs of communities effectively. Ultimately, the significance of effective monitoring cannot be overstated, as it is vital for formulating strategies aimed at alleviating food insecurity and fostering food security for all individuals.

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Ethical declaration: This material is the authors' own original work, which has not been previously published elsewhere. All images are reproduced with permission.

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