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Ensuring Environmental Safety through Sustainable Food Safety

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Abstract:

The Food Safety Management, represented by the section of Food Studies and Policies, in Dubai Municipality the application of best practices in food control, whether imported through land, sea, or air entry points in the emirate of Dubai or produced locally within the country. This is achieved by implementing approved control systems to ensure the sources of food comply with technical regulations, standard specifications, and approved health conditions. Necessary measures are taken to ensure their suitability for human consumption and to maintain the health and safety of consumers in the emirate.

One of the main operations in the section of Food Studies and Policies is assessing and analyzing food-related risks. To excellently achieve the strategic objectives of the Dubai Municipality, it was necessary to develop a sustainable program, including conducting food-related studies and surveys, such as examining non-compliant chemical and microbial contaminants and monitoring them to ensure the sustainability of the safety and quality of food circulating among individuals, contributing to the sustainability of cities and communities.

In this research, we present a collection of local studies in the emirate of Dubai in the field of food safety, which has contributed to providing a scientific model to sustain the health of the community by providing safe and sustainable food.

Keywords: Food sustainability, sustainable food systems, community health.

1. Introduction

In alignment with the vision of Dubai's leaders to become an advanced and pioneering nation, with a focus on individual development through an effective government that embraces innovation, enhances its government performance, and develops its natural and governmental resources, Dubai Municipality, through its Food Safety Department, has recently launched initiatives related to the safety of food products in the local markets. These initiatives aim to enrich scientific studies and research, building a comprehensive government system based on the best global practices in government work. This is intended to encourage various government entities and employees to excel in the nation.

These initiatives in food safety seek to develop and understand the relationship between food and public health. They aim to uncover the scientific, technical, managerial, policy, and legislative factors that impact not only food security but also the safety and health of the community. Dubai Municipality's Food Safety Department has developed an integrated plan to ensure the provision of safe food to improve the health of the UAE community. The overarching goal of these initiatives is to provide sustainable, high-quality, safe food and establish a scientific knowledge base for nutrition and food.

It's well-known that safe food saves lives with every bite consumed by individuals. Billions of people are exposed to risks annually, millions fall ill, and many die due to the consumption of unsafe food. Organizations and governments play a crucial role in ensuring food safety and quality.

The initiatives and programs of Dubai Municipality's Food Safety Department aim to provide all stakeholders in food safety with information to alert relevant regulatory authorities to the health risks associated with consuming contaminated or adulterated food. They also provide a sustainable approach to risk assessment through the creation of a contaminants monitoring program for food, ensuring the trade of safe, contaminant-free food that positively impacts the community.

In the future, Dubai Municipality, represented by its Food Safety Department, intends to invest in and further develop the studies conducted in the field of food safety monitoring to achieve even better outcomes. Ultimately, these food safety assessments serve national interests, and Dubai Municipality hopes to apply the system at the level of the Gulf Cooperation Council states and engage in discussions at international forums such as the Dubai World Food Safety Conference.

1.1. Research Problem and Reasons

In the past, farmers were simply asked to produce more food, but now the focus is not only on production but also on sustainable production. Due to the complex motivations and interrelated processes of urban food systems and their multi-level, remote, cumulative, and often unexpected impacts, there is currently no advanced scientific model for sustainable food systems that promote sustainability goals in the face of urban development and population growth.

The phrase "Safe Food, Safe Community" emphasizes the importance of food safety in protecting human health. Food safety includes various measures and practices to prevent contamination, reduce foodborne disease risks, maintain food quality, and ensure proper handling, preparation, storage, and transportation of food. It also involves ensuring that food products are free from harmful bacteria, viruses, chemicals, and other risks.

By promoting safe food practices, we can reduce the risks of foodborne diseases, which can cause serious health problems, especially among vulnerable populations such as children, the elderly, and those with weakened immune systems. Therefore, it is essential to prioritize food safety in our daily lives, from choosing safe and fresh ingredients to cooking and storing food properly, to ensure the health and safety of ourselves and others.

For the future of our local community and to keep pace with its development, the idea of conducting research in the field of food safety sustainability and its role in continuously preserving community health in sustainable communities has been considered.

1.2. The goal of the research

The goal of the research is to align with the United Nations' Seventeen Sustainable Development Goals, including Sustainable Cities and Communities, established by the UN General Assembly in 2015 and to be achieved by 2030. It also aims to support the United Arab Emirates' national agenda, which aligns with UN goals, by proactively managing operations within government entities to enable making the right choices to improve life sustainably for future generations and provide clear principles and objectives for all countries, local governments, and global governments to adopt according to their priorities and national plans.

The Sustainable Development Goals are interconnected, and success in achieving a specific goal in addressing a particular issue often leads to the achievement of other goals. In this research, the focus is on making cities and communities sustainable by achieving comprehensive health

coverage, including protection from food contaminants, to ensure the health and sustainability of food supplies in urban and rural communities.

1.3. The importance of the research

The importance of the research lies in proposing a local model that reflects the comprehensiveness of sustainable healthy food and can be applied by organizations and countries. It emphasizes that no country can achieve social and economic growth solely within its borders, highlighting the need for cooperation among nations to achieve global goals and sustainability.

1.4. Questions about the research topic include:

- Is there a definition for methods of food production, distribution, and consumption?

- Do sustainable cities and communities require a safe and healthy sustainable food system?

- Have the necessary services been provided to enable consumers to make informed and responsible food choices in a smooth and sustainable manner?

- Is there a local or global policy to create a thriving economy by providing employment opportunities and labor in the field of sustainable healthy food to contribute to the development of cities and communities?

- Is there an innovation center and a testing platform where companies can develop, showcase, and implement new sustainable food technologies that can be scaled up to improve our food systems?

1.5. The hypotheses include:

- Scientific studies and research in food safety and sustainability may have developed strategies or redefined food systems, such as production and consumption, in response to changing global conditions.

- A safe, healthy, and sustainable food system can encompass the comprehensiveness of sustainable cities and communities.

- There are direct and indirect services to empower individuals in the community to live healthier lifestyles and make more sustainable food choices.

- Local economies are expected to diversify their sources to rely on local resources to support food security.

- International organizations and entities related to human health and the surrounding environment launch global initiatives and programs that include a roadmap for implementing sustainability for private and government entities and community members.

1.6. Study Terminology

Food: Any substance or part thereof, whether raw or primary, or manufactured, intended for human consumption by eating or drinking, including beverages, bottled drinking water, pickles, spices, and chewing gum, and any substance used in the manufacture, preparation, and processing of food, except for cosmetics, tobacco, or substances used only as medicines. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Consumer: Anyone who uses food to satisfy their personal needs or the needs of others. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Food Safety: Ensuring that food does not cause harm to the consumer when traded or consumed for its intended use. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Technical Regulation: A document specifying the characteristics of a service or product, production methods, management systems, terminology, symbols, data, packaging, labeling, and requirements for the declaration of conformity applicable to the product or its production methods or limited to any of them and which conformity with it is mandatory, according to the specifications and standards applicable in the country. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Control: A mandatory regulatory activity aimed at protecting consumer health, ensuring the safety of food and feed at all stages of their circulation at any stage of the food chain, and ensuring their compliance with health and quality requirements, and their precise and clear labeling, in accordance with the provisions of this Law and the regulations and decisions issued. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Food Safety Systems: Organized scientific methods and approaches aimed at identifying in advance the sources of hazards, assessing them, and taking control measures to ensure food safety. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Risks: The possibility of negative effects on human health due to exposure to a hazard source in food or feed at any stage of the food chain. (Federal Law No. (10) of 2015 on Food Safety, United Arab Emirates).

Pests: Living organisms that cause harm.

Contaminants: Any component or substance not primarily added to food and present in it as a result of production processes (including processes that occur during crop growth or animal and bird breeding and veterinary treatments), manufacturing, preparation, processing, handling, packaging, transportation, or trading of this food as a result of exposure to environmental contaminants. (UAE GSO-CAC-107-2007-A Standard for Data Sheet for Food Additives When Sold Individually).

Food Security: Available when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Based on this definition, four dimensions of food security can be identified: food availability, economic and physical access to food, food utilization, and stability over time (Food and Agriculture Organization, 1996, 2009).

Sustainable Food Systems: Preventative food systems that respect biological diversity and ecological systems, are culturally acceptable, accessible, economically fair and affordable, nutritionally adequate, safe, and healthy, while enhancing natural and human resources (Food and Agriculture Organization, 2012).

Sustainable Food System: Provides food security and nutrition for all in such a way that the economic, social, and environmental bases that generate food security and nutrition for future generations are not compromised (High-Level Panel of Experts on Food Security and Nutrition, 2014). The sustainable food system can feed the world and nourish it using the fewest possible resources while improving the availability and accessibility of food resources and their use over time.

Sustainable Development: Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development calls for concerted efforts to build a future for people and the planet that is inclusive, sustainable, and resilient.

The eradication of poverty in all its forms and dimensions is an indispensable requirement for sustainable development. To achieve this goal, it is necessary to promote sustainable, inclusive, and equitable economic growth, create more opportunities for all, reduce inequality, raise basic

living standards, promote fair and social inclusion, enhance integrated and sustainable natural resource management, and improve resource efficiency (United Nations).

Sustainability in the United Arab Emirates: The United Arab Emirates has a rich record in sustainability through pioneering initiatives and projects that reflect the strong values of environmental conservation, social traditions, and other authentic heritage values.

The UAE government has implemented many policies and practices to promote sustainable development at both local and global levels.

After decades of progress and development, the country takes a collective approach to achieving a sustainable future through various initiatives and achievements in many areas and sectors, including supporting initiatives to achieve climate neutrality and enhancing efforts to preserve wildlife and marine life (Sustainable UAE).

2. Previous Studies

2.1. Studies and research on the sustainability of food systems and the sustainability of cities and communities.

United Nations System Standing Committee on Nutrition (2017), Title: Sustainable dietary patterns for healthy people and planet

Within this discussion document affiliated with the Institute of Environment and Sustainability at the University of California, Los Angeles, the term "sustainable dietary patterns" was mentioned. It was concluded that sustainable and healthy dietary patterns can bring mutual benefits for the environment, people's well-being, and their nutritional status. It is essential to integrate nutritional considerations into the climate change agenda. The international government body concerned with climate change also emphasized the shared benefits of measures that reduce climate-altering emissions while simultaneously improving health.

International Livestock Research Institute and Research Program on Agriculture for Nutrition and Health (2017), Title: Food Safety and Sustainable Development Goals.

This brief was prepared by the International Food Policy Research Institute and is derived from previous studies on food safety in developing countries. The brief states that food safety is an integral part of food security and a priority for sustainable development. It is time for food safety to be included in the sustainable development agenda. The brief provides examples of foodborne diseases such as cholera and aflatoxins, which pose risks to food safety. It also discusses how food

safety can contribute to achieving sustainable development goals, both directly and through its link to other factors required for goal attainment and improvement. Finally, it examines challenges and concerns that impact goal achievement.

agr.gc.ca (2017), Title: Sustainable Development Strategy at the Departmental Level 2017-2020.

This strategy describes the objectives and plans of agriculture and agricultural food in Canada for sustainable development according to its jurisdiction. It outlines the department's vision and decision-making process for sustainable development, specifies its contribution to achieving the goals of the federal sustainable development strategy, and discusses the application of strategic environmental assessments.

science.gc.ca (2023), Title: Northern Contaminants Program.

The Northern Contaminants Program (NCP) was established in 1991 in response to concerns about human exposure to high levels of contaminants in wildlife species vital to the traditional diets of northern Indigenous peoples. Recent studies have found a wide range of substances, many with no sources in the Arctic or Canada, yet they have unexpectedly reached high levels in the northern ecosystem.

The goal is to reduce contaminants in traditionally harvested foods and eliminate them where possible while providing information to help individuals and communities make informed decisions about their food use.

European Union (2023), Title: Sustainable Food Systems.

This brief presents a pre-legislative synthesis of national and regional government organization positions on the upcoming proposal by the European Commission regarding sustainable food systems. It provides a summary of the pre-legislative state and pre-consultation on a set of key priorities of the European Commission and a study on the functioning of current policy and identifies best practices and ideas for the future.

The brief concludes that policy issues related to sustainable food systems are multifaceted and interconnected, with sustainability being a priority goal in a wide range of national, regional, and local government policies, alongside environmental measures. More of these measures are expected to be implemented in the near future.

2.2. Previous local studies related to pesticide residues in food products.

Dubai Municipality (2021), Title: Pesticide Residue Results in Imported Rice Varieties Available in the Local Market of Dubai.

In this study, the Food Studies and Policies srction of Dubai Municipality presents the results of the analysis of pesticide residues in food products in the local market, including Basmati rice, according to the technical regulations set by the Emirates Authority for Standardization and Metrology for maximum allowable pesticide residues and the residual concentration in agricultural and food products. The results analyzed raise concerns about consumer health, and the study proposes several recommendations to enhance the efficiency of control systems by the relevant regulatory authorities to address pesticide residue exceedances in rice.

Ajman Journal of Studies and Research (2022), Title: Pesticide Residue Results in Imported Grains, Pulses, Seeds, and Nuts through Dubai Emirate Port and the Local Market of Dubai.

Another study, conducted by the Food Safety Studies and Policies section of Dubai Municipality, presents the results of pesticide residue analysis in food products in the local market, including grains, pulses, seeds, and imported nuts, according to the technical regulations specified by the Emirates Authority for Standardization and Metrology (UAE.S MRL 1: 2017). The analysis is based on monitoring activities conducted by the Food Safety Department, and the study identifies non-compliant varieties with pesticide residue standards in agricultural and food products.

elsevier.com (2022), Title: Pesticide Residues in Fresh Vegetables Imported to the UAE.

This study highlights the significant increase in the use of pesticides in many countries, with excessive use having potentially harmful effects on health and the environment. The study evaluates pesticide residues in vegetable samples that entered the United Arab Emirates through Dubai Emirate ports in 2018 and 2019. The monitoring results are based on Maximum Residue Limits (MRLs) set by the European Union regulations for each pesticide in each product, revealing residues exceeding the maximum allowable limits.

2.3. Discussion of Previous Study Results:

The studies presented in this research show various activities carried out by countries, organizations, and health authorities related to food control. These activities include strategies, policies, research, studies, and recommendations that improve people's lives in multiple ways, from addressing diet-related diseases to supporting startups and building stronger communities

while protecting the environment. These efforts by government and non-governmental organizations contribute to creating a sustainable food environment for society.

At the local level, particularly within the Food Safety Department, there are scientific studies stemming from annual surveys that focus on assessing the presence of chemical residues, such as pesticide residues, in food and agricultural products and their impact on human health and the environment. This extends the work of the Food Studies and Policies Department's programs for monitoring and controlling pesticide residues in food, aiming to assess the contamination of food with pesticides, identify the most contaminated food types and sources, and detect the use of unregistered and prohibited pesticides in imported foods, ultimately reducing pesticide residues in food products.

3. Research Strategy and Methodology:

The research objectives were achieved through strategies including:

1. Descriptive/Qualitative Strategies: To highlight the research topic, describe and identify the phenomenon or problem, and establish the relationship between environmental sustainability, food sustainability in communities, and their impact on consumer health.

2. Qualitative Strategy: To define the research goal, which is the sustainability of cities and communities, in line with the United Nations 2030 agenda.

3.1. Research Sources:

- Library Sources: Relevant books related to the research topic were consulted, along with scientific studies published in Arabic and foreign journals.

- Electronic Sources: These included websites, research reports, scientific journals, as well as official government publications from ministries and relevant entities related to the research topic. Data and information from the Food Safety Department at Dubai Municipality were also included.

3.2. Data Processing:

The available data consisted of a plan for food sample surveys, which encompassed the expected food contaminants in products available for trade in the local market.

3.3. Study Boundaries:

- Temporal Boundary: This involved presenting a model of the annual survey plan in the Food Studies and Policies section of the Food Safety Management over the past years.

- Field Boundary: The survey plan included collecting food samples for laboratory analysis from various geographical locations in Dubai's food establishments to ensure the safety and quality of food and drinking water, as well as animal products.

Food Surveillance Plan in the Emirate of Dubai

The implementation of surveys and field studies, as well as the collection of samples for analysis, to ensure the safety and quality of food, drinking water, and traded animal products.

Food Safety Management primarily relies on accredited local laboratories to perform chemical and biological examinations on food and drinking water samples to determine their compliance with relevant specifications and technical regulations.

The steps of the food surveillance plan in Food Safety Management are as follows:

- Study and evaluate food contaminants within a survey card model. This card explains the reasons for the need for the survey throughout the year, the survey's objectives, sample descriptions, and their quantity.

- Enumerate all the tests that the annual survey plan will cover within one template so that these tests are repeated throughout the year on food products and their various types from different geographic locations."

The relationship between pesticide use in agricultural production and its impact on human health and the environment is overseen by the World Health Organization (WHO) in collaboration with the Food and Agriculture Organization (FAO). They are responsible for assessing the risks of pesticide residues on humans, whether through direct exposure or through residues present in food. They also issue necessary recommendations to ensure protection measures.

A team of international scientific experts, represented in the joint meeting of FAO and WHO, conducts risk assessments specific to pesticide residues in food. These assessments rely on all the data provided at the national level worldwide, as well as peer-reviewed scientific studies published in journals. After risk evaluation, this joint committee establishes safe intake limits to ensure that the levels of pesticide residues people are exposed to through their food consumption over their lifetimes do not have harmful health effects.

These acceptable daily intake levels are used by governments and international risk management bodies, such as the Codex Alimentarius Commission (the international governmental body responsible for food standards), to set maximum limits for pesticide residues in food.

The Codex Alimentarius standards serve as a reference for food trade at the international level, ensuring consumers everywhere can trust that the food they purchase meets safety and quality standards, regardless of where it was produced. It's worth noting that there are currently standards for over 100 different types of pesticides.

WHO and FAO together have established the International Code of Conduct on Pesticide Management. The latest version of this voluntary framework, published in 2014, guides governmental regulatory bodies, the private sector, civil society, and all stakeholders on best practices in pesticide management throughout their life cycle, from production to disposal. (Published by the Public Health Organization on February 19, 2018).

Impact of Pesticides on Humans, Water, Soil, and Air:

Pesticides can enter the human body through various means, including the respiratory system, skin, and, most commonly, food consumption. They accumulate in human tissues and can disrupt cell division, leading to genetic changes and affecting organs like the liver, which plays a significant role in bodily functions.

Pesticides also play a crucial and significant role in contaminating water and soil. Pesticides can settle on the soil surface during spraying operations, becoming a source of water pollution. Heavy rainfall after spraying can accelerate pesticide movement into soil particles and, subsequently, into the aquatic environment. The extensive use of pesticides in agriculture has led to contamination of water bodies and, in some cases, groundwater.

Pesticides can impact soil by disrupting the formation of nitrogen-fixing bacterial nodules, upsetting the balance of soil organisms.

Furthermore, pesticides can affect air quality, potentially harming human, animal, and plant health and their activities in the environment.

In summary, the environment, including land, water, and air, is exposed to chemical residues, including pesticides used in agriculture. These residues can accumulate in the environment over the long term, affecting environmental sustainability and communities.

This research has reversed a local model by providing a practical model that contributes to supporting local food systems and preserving food safety by examining pollutants in locally traded foods annually. This ensures the provision of safe and healthy food to the community. However, this program also has broader implications at both the local and global levels.

For example, when monitoring the results of pollutant surveys in food, it was observed that there were positive results for certain chemical pollutants, such as pesticide residues, exceeding the allowed limits for food production according to local and international regulations. This has implications for human health in the community in the short and long term, as well as potential effects on the environment due to random use by producers (farmers).

The Food Safety Department in Dubai Municipality has taken a positive and radical step in addressing food and environmental issues by collaborating with local federal authorities responsible for health and environment matters. They also engage with importing countries of food products that do not meet regulations and specifications, discussing issues that threaten human health and the environment, including pesticide residues in imported foods, and addressing this challenge at both the local and global levels.

4. Research Results

The research has yielded numerous results that can be utilized in sustaining food and a healthy environment, contributing to the goal of urban and community sustainability.

Firstly, the research addressed topics and proposals that answer questions and hypotheses at the beginning of the study. There are guidelines for a sustainable approach to food consumption that assist in raising sustainability indicators, including environmental and community sustainability in cities.

Secondly, based on previous research and studies discussed in this research, there are initiatives and programs in food systems, both at the local level in specific countries and as systems established by health-related organizations concerned with food safety, the environment, and sustainability. Each entity prioritizes taking steps towards food system sustainability, creating roadmaps to achieve this goal, providing solutions to challenges, addressing issues related to food, environment, public health, and striving to establish comprehensive infrastructure and systems covering all sustainability goals globally.

Thirdly, at the local level in the Emirate of Dubai, global practices in food safety and regulation have been adopted, which, in turn, play a crucial role in other areas, including individual health and the surrounding environment. This is part of Dubai's vision and strategy for implementing sustainability across various sectors, including the implementation of a sustainable program serving local food systems, particularly in monitoring food pollutants.

Fourthly, the study highlighted random practices by farmers and food producers in the misuse of pesticides without following recommended instructions from pesticide manufacturers. This may be due to a mistaken belief among farmers that adding more pesticides is effective in increasing production. This is related to the cultural level of farmers in certain countries. Also, the use of pesticides in developing countries facing food crises is attributed to the lack of awareness and regulation by exporting countries, and as a result, these improper practices have a significant impact on the environment and its sustainability.

5. Recommendations:

- Develop and implement a standardized model for sustainable food systems at the local and federal levels.

- Prepare a local guide (Sustainable Healthy Markets) to achieve sustainable food systems by all members of society, food producers, consumers, and responsible authorities.

- Transition to a sustainable society by building a strong vibrant community, one of the pillars of achieving the vision of the United Arab Emirates, by developing strategies and policies for the urban food system and its sustainability. Promote sustainable urban expansion through community reliance on local resources and sustainable provision of local production (food security) for future generations.

- Enact laws and regulations that align with the sustainability of cities and communities.

- Develop and innovate a comprehensive system for food, environment, and public health sustainability.

- Encourage participation in the innovation of sustainable health systems.

- Implement local scientific studies and research in the field of sustainable health systems.

- Governmental and leadership excellence in creating jobs and services that enhance the sustainability journey.

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