

# Chapter 12

## Contribution of Non-profit Organizations to Food Security and Sustainability in the State of Qatar



Sana Abusin, Ebaidalla M. Ebaidalla, and Maryam F. Al-Thani

**Abstract** Despite the relatively long experience of charitable organizations in social and humanitarian aspects in Qatar, little is known about their role in food security and sustainability. This chapter sheds light on the issue of food waste and assesses the role of non-profit organizations in food security and sustainability in the State of Qatar. The analysis is based on data sourced from two active non-profit organizations working on food surplus and redistribution in Qatar, namely, Hifz Al Naema and Wahab. The results indicate that the organizations under study are exerting a considerable effort to maintain food security and to reduce food waste, and their intervention increase over time. However, despite the sizable efforts exerted by charitable organizations to sustain food security, the issue of food surplus in Qatar still is a puzzling problem. The chapter recommends that collective cooperation between academics, government entities, and civil society would help in designing an effective strategy that aims to sustain food security. Moreover, policymakers need to support and encourage charitable organizations to participate in managing, sustaining, and achieving food security. Therefore, allocating grants and facilities to organizations that operate in food waste management would stimulate the charitable societies to contribute to food sustainability.

**Keywords** Non-profit organizations · Food security · Sustainability · Food waste management · Qatar

---

S. Abusin (✉) · M. F. Al-Thani  
Social and Economic Survey Research Institute, Qatar University, Doha, Qatar  
e-mail: [sabusin@qu.edu.qa](mailto:sabusin@qu.edu.qa)

M. F. Al-Thani  
e-mail: [maralthani@qu.edu.qa](mailto:maralthani@qu.edu.qa)

E. M. Ebaidalla  
Ibn Khaldon Center for Humanities and Social Sciences, Qatar University, Doha, Qatar  
e-mail: [ebaidalla@qu.edu.qa](mailto:ebaidalla@qu.edu.qa)

## 12.1 Introduction and Motivation

In a world where consumption is increasing exponentially due to modern lifestyle and sophisticated marketing campaigns, the waste of products from different types is increasing too. On the one hand, almost one-third of the food in the world goes to waste, which is equal to 1.3 billion tons of food and costs an estimated \$1 trillion. On the other hand, many people around the world are suffering from insufficient food and hunger. According to FAO's (2021) report, the number of undernourished people in the world was around 800 million in 2020.

Food waste (FW) is defined as food that is appropriate for human consumption being discarded or left to spoil at the retail or consumption phases. Food waste occurs when consumers dispose food waste intentionally without using it or storing it until the expiration date. Often, food waste happens at the distribution and consumption stage due to technical difficulties concerning storage, processing, packaging, and marketing systems.

The organic waste leads to several environmental consequences. For instance, decomposed waste food in landfills releases methane gas and carbon dioxide. The first accumulation for a long time causes climate change. Climate change, in turn, causes the sea levels to rise putting lives and livelihoods at risk. At the same time release of these gases, causes air pollution and contributes to serious health problems, such as mortality, chronic health conditions, health deterioration, behavior problems, and poor mental health (FAO, 2011). The chronic conditions include asthma, bronchitis, and other lung diseases. In addition, food loss results in excessive greenhouse gas (GHG) emissions and unnecessary utilization of scarce resources (Luo et al., 2021).

Food waste has been a crucial topic that gained continuous attention from researchers and policymakers. Numerous regional and international initiatives have been launched in recent decades, aiming at reducing food loss and waste, and attaining food security. For instance, the United Nations Sustainable Development Goal (SDG) 12.3 aims to “halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses” by 2030.

Following the Gulf Arab rift in 2017, Qatar paid considerable attention to food security and made it a top priority. Consequently, the country has expanded and supported the local agricultural producers, aiming at achieving self-sufficiency and satisfying the increasing demand for food that resulted from rapid population growth and economic development (Karanisa et al., 2021). The Ministry of Municipality (MM) statistics show that the local agricultural production increased from 523 million Qatari Riyals (QR) in 2015 to 1.22 billion QR in 2019 (MM, 2020). Specifically, the volume of vegetable production increased from 53,000 tons in 2016 to 91,000 tons in 2019, with a growth percentage of 72% (MM, 2020). However, the expansion in agricultural production is associated with remarkable food loss and waste due to the small size of the domestic market and the sizable exports from trading partners (MM, 2020). Indeed, food waste is regarded as a prominent phenomenon in the Gulf Cooperation Council (GCC) countries (El Bilali & Ben Hassen, 2020). In Qatar, food

waste is considered a major problem, especially during the holy month of Ramadan, estimated at around 1.4 million metric tons in 2012 (mentioned by EcoMENA 2020, a volunteer-driven initiative to create mass environmental awareness).

The issue of food waste has received considerable attention from charitable organizations and associations in recent years. In this regard, many organizations engage in collecting food surplus and distributing it to needy people. It is worth to mention that Hifz Al Naema and Wahab are the most active charity organizations, working exclusively in food redistribution. These charities contribute to achieving food justice and social cohesion among members of the community by distributing valid food from producers to those who are in need. In addition, Wahab aims to reduce food waste by finding sustainable management solutions to compost wastage as well as raising awareness. However, despite the relatively long experience of these organizations in reducing food waste by redistributing food surplus, the information available on their size and contribution to food security sustainability is unknown. Therefore, this chapter aims to shed light on the issue of food waste in Qatar and the role of Hifz Al Naema and Wahab in food security.

The contribution of this chapter is fourfold. First, this chapter provides a new and significant contribution to the existing literature on the role of non-profit organizations in food security in Qatar; as to the best of the authors' knowledge, this is the first study that addresses this issue in Qatar. Second, examining the contribution of non-profit organizations to food security would provide policymakers and key stakeholders (e.g. government, NGOs, and regional organizations) with useful insights to adopt measures that help in sustaining the food sector. These measures may contribute effectively to improving food security, attaining self-sufficiency, and mitigating food waste. Third, the chapter provides an in-depth review of the potential contribution of non-profit organizations to the achievement and sustainability of food security, hence, informing policymakers on the importance of supporting and funding charities. Four, this study is timely, relevant, and quite consistent with Qatar's National Vision 2030 and the United Nations SDGs, especially, SDG 12.3. Therefore, the study's outcomes will promote sustainable food practices and improve economic efficiency to achieve national and global development strategies.

The chapter is organized into four sections, the first presents the chapter's motivation and justification by providing some stylized facts about food waste. The second section provides a background and historical context of the food sector in Qatar. How society and government contribute to food management is presented in section three with more focus on Hifz Al Naema as a charity and Wahab as a business company doing also significant charitable work. Finally, the chapter concludes by providing policy input on innovative solutions toward sustainable food security in Qatar by widening the role of non-profitable organizations and engaging them in the food sector system.

## 12.2 Social, Economic, and Environmental Impacts of Food Loss and Waste

There are social, economic, and environmental impacts of food loss and food waste in the society. From a social perspective, and according to FAO in 2020, there are between 720 and 811 million hungry people (FAO, 2021). With the increasing number of people in need of food, there is an expanding amount of food loss and food waste (Sarkozi & Rukikaire, 2020). Thus, managing food loss may reduce the amount of food waste and consequently achieve food security.

The economic impact of food waste can be highlighted through waste management costs and money wasted, given the amount of edible food disposed yearly. Cost includes the maintenance of landfills, transport costs, operation costs in treatment plants, and separation costs in some cases (El Bilali & Ben Hassen, 2020). There is a gap in the literature in analyzing the economic impact of food waste in the region, and even a bigger gap when discussing Qatar. Optimized composting facilities can bring about significant economic benefits. A study conducted in Saudi Arabia found that diverting food waste from landfills to composting facilities will feed to the Saudi economy about \$70.72 million per year (El Bilali & Ben Hassen, 2020). In Qatar, more research needs to be done on the economic impact of food waste/loss and surplus.

Food waste and food loss can have serious negative effects on the environment. For instance, a study conducted in Europe to illustrate the environmental impact of food waste found that food waste is attributed in Europe with '186 million tonnes of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub>-eq), 1.7 Mt SO<sub>2</sub>-eq. and 0.7 Mt PO<sub>4</sub>-eq' and that around three-quarters of the impacts of all food waste for global warming are created from GHG emissions throughout the production stage (Scherhauser et al., 2018). For example, 6% of the emissions come from food disposal and 7% from retail and distribution (Scherhauser et al., 2018). Similarly, Alruqaie and Alharbi (2012) investigated the environmental impact of food waste recycling in Riyadh, Saudi Arabia and found that methane gas was higher than the other types of gaseous pollutants with 99% of the total gaseous emission in the experiment.

### 12.2.1 *Historical Context of Food Security in Qatar*

In the past five years, there have been huge shifts in Qatar's food security policies. In 2017, Saudi Arabia, Bahrain, the United Arab Emirates, Egypt, Yemen, and Libya banned Qatar's diplomatic ties and imposed an economic blockade. Prior to the blockade, Qatar relied heavily on imported food, medicine, and by-products from the neighboring countries. Before 2017, Qatar imported 90% of its food, 40% of which enters through its border with Saudi Arabia, therefore, shutting air and land borders had implications on the food supply. In addition, multiple studies from different countries have found a significant link between food insecurity and psychological

disorders such as stress, anxiety, depression, and sleep problems (Arenas et al., 2019; Huddleston-Casas et al., 2009; Kirang & Frongillo, 2007; Leung et al., 2015; Martin et al., 2016; Myers et al., 2020; Yang & Matthews, 2010). The Qatari government took immediate action to address the food shortage.

The blockade compelled Qatar to restructure its food security. Qatar shifted the imports from Turkey and Iran to compensate for the blockage of the sea and air routes. Furthermore, Qatar imported thousands of cows from the United States and Europe, which has allowed it to supply 40% of its milk requirements within months. The country allocated a significant amount of financial resources to quickly achieve nearly 100% self-sufficiency. As a result, the production of vegetables, dates, red meat, poultry, eggs, fish, and green fodder has increased by 400% in one year (Abusin et al., 2020).

Local farms are putting tremendous effort to improve their agricultural production by using modern production methods such as greenhouse structure, efficient water-conserving irrigation techniques, and advanced cooling technologies to increase the shelf life of products. As a result, they have achieved high yields and met food security goals (Karina Enikeeva & Carol Khadra, 2020; Qatar National Food Security Strategy 2018–2023, n.d.). Qatar is also witnessing increasing demand for by-products, particularly vegetables and fruits.

Several Qatari farms now produce vegetables and fruits at affordable prices (Global Organic Trade Guide for Qatar, 2020). Qatar's market for packaged food and beverage consumption was estimated at 14.4 million tons in 2020. The number of farms and farmers is increasing in the country (Qatar Guide, 2020). The government encourages Qataris to invest in food growing and provides many facilities to ease farming. Qatar National Food Security Strategy 2018–2023 (QNFSS) gives special attention to the farmer support program through the farmer representative entities such as centralized procurement of inputs, crop advisory services, market and trading, warehousing, farm credit, and product traceability. It also focuses on increasing the productivity of local farms, providing an efficient go-to-market channel for local farmers, and reforming market price regulation. This creates overproduction of food, and the latter results in food surplus loss/waste.

Food surplus is an issue that affects the sustainable achievement of food security in Qatar. The per capita income has increased the quality and quantity of food that the population demand (Adema, 2016). Based on the existing literature, excessiveness in food consumption is a common trend in Qatar. When it comes to traditions and customs that revolve around the food industry, Qatari culture revolves around hospitality, and Qataris are known for their generosity. Edelstein (2011) notes that the culture of generosity is largely felt across Qatari supports the sentiments. Food plays a central role when hosting parties such as weddings or any other form of communal dining, demonstrating generosity and hospitality. This act of hospitality and generosity is extended beyond private settings and into restaurants and cafes. For instance, according to Sillitoe and Al-Misnad (2014), it is highly welcoming to dine with the Qataris; a Qatari will always insist that the visitor eat or take the meal or drink respectively to the last piece or drop. Similar to other nations and cultures, family life has an influence on food consumption patterns in Qatar. All these mentioned behavior

and practices are responsible for the food surplus created because of the misunderstanding of generosity. Therefore, this surplus could be one of the key reasons for food waste in Qatar (Abusin et al., 2020; Adema, 2016; Edelstein, 2011; Sillitoe & Al-Misnad, 2014).

Consumer protection is one of the requirements to sustain food security. Consumer protective policies in Qatar relating to food quality and expiry dates are strict, with special teams designated to outtake the monitoring system. Therefore, the chapter will not go into detail on this.

### **12.3 Food Self-Sufficiency and Domestic Markets (Government's Efforts to Achieve Food Security)**

The international economic crisis of 2007–2008 shed light on the importance of food self-sufficiency (FSS) due to the food crisis and extreme food price volatility. Many countries expressed interest in improving their levels of food self-sufficiency. The FAO (2015) defines it as “a country closing its borders to all food trade—both imports and exports—and concentrating its resources on its agriculture sector so as to be able to produce all of its food requirements domestically”. Others have defined FSS as a country's ability to produce the total calorie required to meet its demand (Pradhan et al., 2014).

At the turn of the millennia, Qatar started to focus on different approaches to improve food security. The government had decided to lease or purchase arable lands in countries like Kenya and Ghana to produce food for the people in Qatar (Amery & Series, 2019). Domestically, the country invested in hydroponics and other innovative farming technologies to produce food that would not be vulnerable to supply disruptions or price volatility. In 2008, the Qatar National Food Security Program (QNFSP) was founded in order to consider strategic risk scenarios and develop a system that would improve the country's resilience to water and food supply shocks. It aimed to expand food storage capacity, diversify the food supply chains, and increase domestic food production. For example, Qatar's production of red meat and poultry skyrocketed from 10,792 tons in 2012 to 183,988 in 2016 (Amery & Series, 2019).

In January 2020, an updated QNFSS was established with the aim of building a robust food security strategy. The main target is to increase local production of perishables to secure 30–70% self-sufficiency in strategic commodities. The government has outlined four different approaches in order to achieve this goal. First, increasing vegetable production by establishing a hydroponics greenhouse cluster to reach 70% self-sufficiency in greenhouse vegetables, including tomatoes, peppers, cucumber, and squash. This is to be achieved by finalizing a greenhouse cluster infrastructure plan and developing bid guidelines, including subsidy programs for private sector operators. Secondly, expansion and improvement of production capacity for fish and red meat by fattening units and breeding farms for sheep and goats. Thirdly, to cap

production of fresh milk and poultry to 100% self-sufficiency by shifting poultry surplus to egg production by suspending any new project tenders and shifting additional capacity toward milk derivatives or frozen poultry to egg production. Finally, to reduce groundwater-based fodder production by switching to treated sewage effluent (TSE) by developing a transition plan for existing fodder producers.

As mentioned previously, the blockade against Qatar in 2017 has increased domestic markets' production. There was a 20% increase in commercial farming in Qatar, from 364 farms in 2016 to 437 in 2019. Vegetable production has increased from 58,627 in 2016 to 1,055,488 in 2019 (Awadh, 2020). There was also a direct positive correlation in the sales of local vegetables in the Central Market. Qatar has also focused on organic farming and the production of domestic markets. The number of farms and farmers' markets in Qatar is increasing. Some local farms hold international organic certifications like USDA Certification by Agrico Agricultural Development and IFOAM certification by Al Safwa farms (Karanisa et al., 2021). Karanisa et al. (2021) suggest that there are several opportunities for Qatar to improve its domestic markets by focusing on exports. The winter season in Qatar allows for the production of high-quality agricultural products that could not only satisfy local demands but also to export fresh high-quality agricultural products to countries in the Northern Hemisphere. Although, in 2019, Qatar exported products like dates, cereals, eggs, milk, and fish, the number of exports is lower in comparison to exports (Planning and Statistics Authority, 2018).

### ***12.3.1 Food Types and Management***

For the sake of this chapter, food is divided into three categories "surplus, waste or loss". The strategic commodities or perishable food include red meats, fruits and vegetables, and fresh dairy. Understanding the types of foods available simplifies the food management process. According to the literature, foods classified as perishable are those that spoil, decay, or become unsafe for consumption if not kept refrigerated at 4.4 °C or below, or frozen at -17.8 °C or below. Examples of foods that must be kept refrigerated for safety include meat, poultry, fish, dairy products, and all cooked leftovers. Foods that are perishable can only be stored for one or two days at room temperature, i.e. they have a shelf life of one or two days (Kumar & Samadder, 2017). On the other hand, non-perishable foods have a long shelf life and do not require refrigeration such as canned food, dry foods, and dehydrated foods (Kumar & Samadder, 2017).

The Qatar Second National Development Strategy 2018–2022 (NDS-2) has set two main targets in relation to waste reduction and prevention. The first target focuses on restricting the generation of domestic waste to less than 1.6 kg per capita/day between 2018 and 2022. The second target is recycling 15% of solid waste by the end of 2022. The Qatari government approved QNFSS with the aim of reducing food waste by a target of 5%, to be measured against a baseline that will be established as part of the program.



**Fig. 12.1** Food management by food type

A question may be raised about the role of non-profitable organizations and private sector in food waste management while the Domestic Solid Waste Management Centre (DSWMC) in Mesaieed is the largest composting facility in Qatar with a capacity of 550 tons of waste per day. The process in which the food waste is collected by this center does not involve the segregation of food. Therefore, charitable efforts by non-profitable organizations and private sector can assist MM, but not as a replacement.

Figure 12.1 “elaborated by authors”, links the types of food and the proposed management method in order to sustain the food sector.

Surplus food could be perishable and non-perishable to be allocated to donation to those who need it through registered and professional charities that take the responsibility of all health, legal, and quality food conditions that made it suitable for human consumption. If the non-perishable food, meets all conditions except of marketing, then the food can be allocated to processing into by-products. Food processing is very important, in this stage after agricultural expansion, there are a large amount of fruits and vegetables that are valid for consumption but not accepted by marketing. The large amount is due to overproduction. Unfortunately, there are no transformative industries to produce jams, tomato paste, etc.

Food waste that is segregated can be composted into organic fertilizers by a professional recycling company or MM Centre. After that, the composters take the decision of donating or selling it.

### ***12.3.2 Non-profit Organization Contribution to Food Security***

On the international scale, food rescue and allocation optimization have received little attention from waste management researchers until recently, regardless of its emergence as a legitimate form of food waste diversion (Reynolds et al., 2015). The logistics of Meals-on-Wheels programs mark the earliest studies on food rescue costs and optimization focused. Moreover, the work of Youn et al. (1999) discusses the food rescued by the United States’ operations; similarly, Cotugna and Beebe (2002) give a historic background to the rise of food rescue in the United States. More recently, deliveries in foodbank networks have received increasing attention, due to the complexity of their operations (Davis et al., 2014; Gunes et al., 2010; Solak et al.



2012). According to Reynolds et al. (2015), food rescue is seen as more economically costly than landfill or composting, however, is a cheaper method of obtaining food for the food insecure rather than directly purchasing with every dollar spent on food rescue enabling \$5.71 of edible food to be rescued. A few studies have focused on optimizing delivery and collection schedules (Davis et al., 2014; Gunes et al., 2010; Nair et al., 2017; Solak et al., 2014).

Charities collect foods that are still edible but are either close to becoming unfit for consumption or are classified as excess (i.e. leftovers from events) (Nair et al., 2017). Generalizations are possible although each charity operates in its own unique operations. The common factor is that these organizations receive donated foods mainly from the service sector (hospitality and events) followed by the manufacturing sector. Donated foods are transformed by the charities into meals or food parcels that are given directly to recipients in need or through secondary charities or religious organizations (Reynolds et al., 2015).

## 12.4 Role of Non-profit Organization in Achieving Food Security in Qatar

There is a well-established relationship between societal responsibilities, the services provided by charities, and the SDGs, especially SDG 12.3 on food waste reduction. Charitable societies have become concerned with their responsibilities toward societal issues, including environmental issues, in an effort to reach a better and environmentally sustainable society. Charitable organizations seek to contribute to achieving SDGs through community activities and events that they practice.

Environmental sustainability has become at the forefront of priorities, as the environment is a common denominator for living among members of society as a whole. This also includes the actors within society, such as the government, the private sector, and civil society organizations represented by charities, which have become concerned about communities and adopt local environmental issues such as pollution, waste, clean air, and conservation.

Non-profit organizations and associations are well-known for their ability to volunteer work and to identify the needs of society and the challenges they face in all aspects, the most important of which is the field of environmental development and methods of overcoming these problems and challenges. From a religious perspective, wasting food can create guilt from extravagance and is sometimes unintentional. Food waste during Ramadan is not accepted and is becoming a significant ethical dilemma in Qatar (Abusin et al., 2020). It has been identified that the larger the household, the greater the chance for food wastage (Koivupuro et al., 2012; Parizeau et al., 2015; Van Garde & Woodburn, 1987; Williams et al., 2012). A household that spends more on food purchases tends to have bigger food wasters (Parizeau et al., 2015). Consumers feel bad about food-wasting (Evans, 2012; Watson & Meah, 2012) and are concerned when they throw food away (Abeliotis et al., 2014; Graham-Rowe et al.,

2014). The Qatari culture is known for its customs that reflect people's generosity. A culture of hospitality is widely acknowledged and practiced; however, generosity may lead to overproduction. The first step to control overproduction is balancing the production with demand. Overproduction of food creates food surpluses that require redistribution by charities within a short amount of time.

In Qatar, there are two active organizations that work exclusively with food redistribution, Hifz Al Naema and Wahab. The aforementioned charities contribute to achieving food justice and social cohesion among members of the community by distributing valid food from producers to those who are in need. In addition, Wahab aims to reduce food waste by finding sustainable management solutions to compost wastage as well as raising awareness.

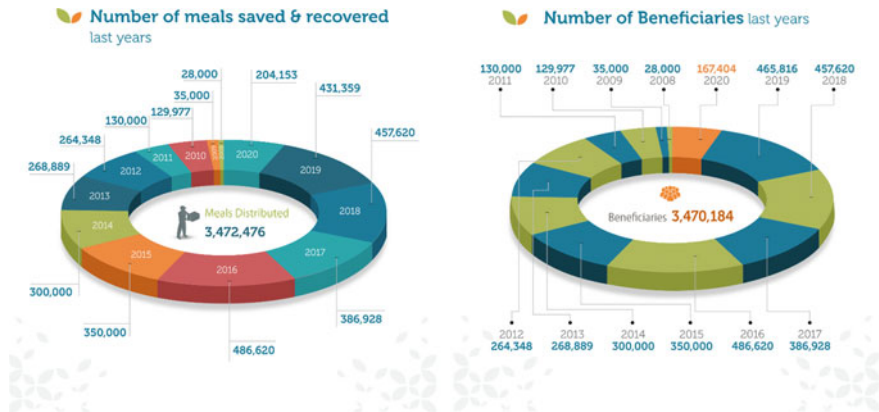
### ***12.4.1 The Role of Hifz Al Naema in Achieving Food Security***

Qatar has a total of fourteen charitable organizations in which some are working on food management, including Red Crescent, Qatar charity, Hifz Al Naema, and many other initiatives such as ones in Education City and Georgetown University, but because it is beyond the capacity of the chapter to review each one separately, we will concentrate on Hifz Al Naema for surplus management and Wahab for surplus and raise awareness (a non-profitable activity they carry out), recycling and composting service (profitable activity).

Hifz Al Naema is a charity established in Qatar in 2008 with the main goal of redistributing food surplus to those in need. It is considered the first food bank in Qatar that reprocess the access food to deliver it to people in need. Its main role is to collect food surplus from all different sources and distribute it inside Qatar. There are two main services in the center (a) food bank and (b) charity exhibition. The food bank collects the food surplus from the restaurants, banquets, and funerals and then redistributes it to the people in need. It also accepts individual donations such as Zakat al-Fitr and wraps them appropriately to be distributed later as meals. The number of registered families in 2018 was approximately 700.

The organization contacts the beneficiaries and brings the donations to classify them based on their type and situation. In addition, it sells the surplus at low prices and donates the financial return to low-income families. In 2018, Hifz Al Naema has participated in helping the people in need during Ramadan. It has distributed about 1000 meals on a daily basis as a fasting breakfast meal. Moreover, the center supports low-income families on certain occasions, such as Eid Al-Adha. For instance, in 2021, it distributed 700 sacrifices to 1400 families (*The Peninsula*, 2021) (Fig. 12.2).

The first figure explores the trend in number of meals distributed during the period 2010–2020. The amount of food or meal distributed increased dramatically from the year 2010 up to 2019. Interestingly by 2020, the number of meals distributed was halved which reflects the government efforts that followed 2017 Blockade on the achievement of self-sufficiency in food.



**Fig. 12.2** (Hifz Al-Naema Charity, 2018) numbers of meals distributed and beneficiaries since its foundation

The second figure presents the number of beneficiaries during 2012–2020, the figure shows the positive increase of beneficiaries up to 2019. After that, the number decreased to less than half. It is clear that the self-sufficiency strategy and increase in local food production is the main reason.

Hifz Al Naema has helped to improve life in Qatar in many aspects. From one perspective, it is helping the people in need by providing food. It is also assisting in solving one of the biggest problems that affect life in Qatar, which is the environmental issue. Food waste along with the other types of waste are extremely harmful to the environment. Hifz Al Naema is doing a type of recycling the products “other than food” and reusing them.

The above statistics reflect the great role that Hifz Al Naema plays in controlling food surplus and reducing the amount transported to landfills. Additionally, reducing the Methane emission and therefore contribute to fighting climate change. The main challenge that Hifz Al Naema faces is that they work at full capacity, but the donated foods are a lot more. They are left with two options: to increase their resources in terms of the number of food cars and human resources and to start recycling the amount of food that gets spoiled intentionally due to temperature or handling. The compost then is distributed for free to grow food and hence contributes to achieving food sustainability.<sup>1</sup>

<sup>1</sup> The authors are very thankful to Ali Al-Gahtani, the Executive manager of Hifz Al Naema Center, for being very generous and cooperative to provide all information in this session.

### ***12.4.2 The Role of Wahab in Achieving Food Security***

Wahab is an award-winning company that fights food waste and climate change in Qatar by implementing the 3 R's of food waste—Reduce, Reuse, and Recycle. To address the issue of food waste, Wahab believes that first and foremost, awareness of achieving food security is important. In this regard, it has held more than 20 awareness sessions for a combined audience of 4000 plus individuals, targeting schools, universities, and hospitality industries and events, both onsite and online (Wahab, 2021). Over the last three years, it has helped to redistribute more than 500 tons of surplus food to the community, by tying up with food banks and local NGOs. Instead of hiring paid workers, Wahab fully relies on community volunteers. Through its 150 plus group of volunteers, they have demonstrated a well-knit organized group that has worked with various establishments including McDonalds, Siemens, KEO, Lulu, Mall of Qatar as well as schools. They were also nominated by Qatar tourist Authority (QTA) to be the official partners to redistribute the food surplus during Qatar International Food Festival 2018 and 2019 (Wahab, 2021).

In the absence of efficient and cost-effective food waste recycling solutions, Wahab has stepped in to fill the gap in food waste management solutions in Qatar. It has introduced food waste recycling solutions of various capacities and technologies, ranging from machines intended for large-scale commercial institutions to small compost bins for urban homes (see Table 12.1 for recycling machines capacity). By composting inedible food like vegetable scraps and chicken bones and returning valuable nutrients back into the soil, which is key to growing the next generation of crops. Wahab's actions come in line with QNV 2030, which aims to achieve self-sufficiency in food production. However, the community organization lacks a wide infrastructure as it depends fully on volunteers. Moreover, the food recycling industry in Qatar is still new, therefore, there is no clear guidance and conditions in which a company like Wahab can operate under.<sup>2</sup>

Despite the fact that government support and attention are increasing toward sustainability and food security in Qatar, and despite the sizable efforts exerted by charitable organizations to sustain food security, only little attention is given to them regarding their challenges and difficulties in continuing to provide and maintain this great services.

There are some measurements that need to be taken into consideration to sustain food security which may include, cooperation between governmental entities and food actors in both private and public sectors. Facilitating coordination between academics, ministries, and charities is needed to achieve sustainable ways of managing food redistribution and food waste. In addition, government support for economic diversification through opening opportunities for recycling companies and the control of food production, i.e. balancing food supply and demand is vital to improve food security. Charities, responsible ministries, and specialized academics must set a clear goal to reduce food waste and discourage sending food waste to

---

<sup>2</sup> The authors are very thankful to Wardah Mamukoya, the Executive Director of Wahab Company, for being very generous and cooperative to provide all information in this session.

**Table 12.1** Wahab recycling machines capacities and specifications summary 2021 (Wahab, 2021)

	EP-25	EP-50	EP-100	EP-250	EP-500	EP-750
Nominal capacity per day (kg)	25	50	100	250	500	750
Machine weight when empty (kg)	600	650	1,000	1,700	2,200	3,400
Size (L x W x H) cm	115 × 80 × 108	171 × 102 × 145	224 × 117 × 132	297 × 134 × 170	350 × 155 × 195	470 × 176 × 205
Power rating (KW)	3	5	7	10	15	18

EP stands for EcoProbe, the name of the food recycling machine. EP-50 means the machine can compost 50 kg of organic waste daily

landfills. Charities help to reduce the number of those who need quality food and raise awareness about the donation of surplus food and recycling of wastes. The role of academics is to provide data and statistics about quantities of food and identify gaps in research on food security.

## 12.5 Policy Implications

The huge efforts and participation of charities and non-profit organizations though are appreciated inside and outside Qatar, no literature or documentation of these significant works in terms of achievement and contribution to food security. This chapter tries to provide some useful information on the issue of food waste and present some of the contribution of non-profit organizations to food security and sustainability in the State of Qatar. The chapter benefited from the experiences of two active non-profit organizations working on food surplus and redistribution in Qatar, namely Hifz Al Naema and Wahab. It has been noted that the organizations under consideration are paying a lot of efforts to maintain the food security and to reduce the food waste, and their intervention increase over time to try to cover the increasing number of beneficiaries taking all health, legal and humanitarian responsibilities on dealing with those in need.

The way forward to help improve the sustainability of the food sector in Qatar should consider the following:

- Encouraging other charities to engage in waste management and providing them opportunities to contribute to sustainable food security in the country will add a lot of value given their long experience.
- Segregation of organic food from total waste to be composted and reused for growing food is vital to sustaining food security.

- Establishment of two collection and distribution points is necessary to manage food waste on a national level. The collection point will take the responsibility of classifying the food into two categories: surplus valid for human consumption to be sent to people in need and food loss to be sent to transformative industries and transferred to another valuable products such as animal feed or canned products. The collection point could work within the ministry of public health section and/or department of Standardization. This will take the total health and legal responsibilities of food redistribution.
- The distribution point will save effort and time by providing food cars that are well-prepared and take into consideration, health risks that might happen during food distribution. Also from legal aspect, manage illegal markets that may appear from food distributors by selling food items at a low price.
- The responsibility of food waste should be taken by the Ministry of Municipality (MM), Centre for waste treatment and recycling by offering a prepared truck to take segregated food waste for composting.
- Engagement of charities in food management will help in providing daily statistics on the amount of food waste, loss, and surplus. Therefore, support the calculation of the footprint of Qatar. It will also help to reduce the risk associated with donating unsellable, edible food.
- Finally, raising awareness is a very important step toward food management. Civil society and organizations in Doha could enhance their efforts in engaging with volunteers for awareness-raising and recycling activities. The media could further highlight the implications of food waste on the environment. One of the best tools to raise awareness would be through social networks, which are being used by about 95% of the country's population. As mentioned in a UNEP report 2021 that "life satisfaction is not the source of the owned goods, but rather the good social interactions that stimulate the exchange of feelings, such as the feeling of the other".

**Acknowledgements** This [chapter] is part of Qatar University Q-grant-H3P ["QPH3P-SESRI-2021-450"]. The findings achieved herein are solely the responsibility of the authors.

## References

- Abeliotis, K., Lasaridi, K., & Chroni, C. (2014). Attitudes and behaviour of Greek households regarding food waste prevention. *Waste Management & Research: The Journal for a Sustainable Circular Economy*, 32(3), 237–240. <https://doi.org/10.1177/0734242X14521681>
- Abusin, S., Lari, N., Khaled, S., & Al Emadi, N. (2020). Effective policies to mitigate food waste in Qatar. *African Journal of Agricultural Research*, 15(3), 343–350. <https://doi.org/10.5897/AJAR2019.14381>
- Adema, S. (2016). *Food Waste Woes in Qatar*. EcoMENA. <https://www.ecomena.org/food-waste-in-qatar/>
- Alruqaie, I. M., & Alharbi, B. H. (2012). Environmental advantage assessment of recycling food waste in Riyadh, Saudi Arabia. *Research Journal of Environmental Sciences*, 6, 230–237.

- Amery, H. A., & Series, G. I. (2019). Food security in Qatar: Threats and opportunities. *Gulf Insights*, 7, 1–6.
- Arenas, D. J., Thomas, A., Wang, J., & DeLisser, H. M. (2019). A systematic review and meta-analysis of depression, anxiety, and sleep disorders in US adults with food insecurity. *Journal of General Internal Medicine*, 34(12), 2874–2882. <https://doi.org/10.1007/s11606-019-05202-4>
- Awadh, M. A. (2020). *Analysis of the Agriculture Situation before and after the Blockade for the period 2016–2019*. Agricultural Affairs Department, Ministry of Municipality and Environment.
- Cotugna, N., & Beebe, P. (2002). Food banking in the 21st century: Much more than a canned handout. *Journal of the American Dietetic Association*, 102, 1386–1388.
- Davis, L. B., Sengul, I., Ivy, J. S., Brock, L. G. III., & Miles, L. (2014). Scheduling food bank collections and deliveries to ensure food safety and improve access. *Socio-Economic Planning Sciences*, 48(3), 175–188.
- Edelstein, S. (2011). *Food, cuisine, and cultural competency for culinary, hospitality, and nutrition professionals*. Jones and Bartlett Publishers.
- El Bilali, H., & Ben Hassen, T. (2020). Food waste in the countries of the gulf cooperation council: A systematic review. *Foods*, 9(4), 463. <https://doi.org/10.3390/foods9040463>
- Evans, D. (2012). Beyond the throwaway society: Ordinary domestic practice and a sociological approach to household food waste. *Sociology*, 46(1), 41–56. <https://doi.org/10.1177/0038038511416150>
- Food and Agriculture Organization. (2011). *Global food losses and food waste. Extent, causes and prevention*. UN FAO.
- Food and Agriculture Organization. (2015). *The State of Agricultural Commodity Markets IN DEPTH 2015–16*. <https://www.fao.org/3/i5222e/i5222e.pdf>. Accessed on line in 14 May 2022.
- Food and Agriculture Organization. (2021). *The state of food security and nutrition in the world*. <https://www.fao.org/state-of-food-security-nutrition>. Accessed on 14 May 2022.
- Global Organic Trade Guide for Qatar. (2020). *Qualitative Analysis*. <https://globalorganictrade.com/country/qatar>
- Graham-Rowe, E., Jessop, D. C., & Sparks, P. (2014). Identifying motivations and barriers to minimising household food waste. *Resources, Conservation and Recycling*, 84, 15–23. <https://doi.org/10.1016/j.resconrec.2013.12.005>
- Gunes, C., van Hoes, W.-J., & Tayur, S. (2010). Vehicle routing for food rescue programs: A comparison of different approaches. In *Integration of AI and OR techniques in constraint programming for combinatorial optimization problems* (pp. 176–180). Springer.
- Hifz Al-Naema. (2018). *Number & Statistics*. HIFZ ALNAEMA. <http://hifzalnaema.com/en/index.php?page=chart>. Accessed 9 April 2022.
- Huddleston-Casas, C., Charnigo, R., & Simmons, L. A. (2009). Food insecurity and maternal depression in rural, low-income families: A longitudinal investigation. *Public Health Nutrition*, 12(8), 1133–1140. <https://doi.org/10.1017/S1368980008003650>
- Karanisa, T., Amato, A., Richer, R., Abdul Majid, S., Skelhorn, C., & Sayadi, S. (2021). Agricultural production in Qatar's hot arid climate. *Sustainability*, 13(7), 4059.
- Karina Enikeeva, E., & Carol Khadra, C. (2020). *Agrico Qafco Yara Trial and Demonstration Center*. Report on Trials Conducted on December 2019–December 2020.
- Kirang, K., & Frongillo, E. A. (2007). Participation in food assistance programs modifies the relation of food insecurity with weight and depression in elders. *The Journal of Nutrition*, 137(4), 1005–1010. <https://doi.org/10.1093/jn/137.4.1005>
- Koivupuro, H.-K., Hartikainen, H., Silvennoinen, K., Katajajuuri, J.-M., Heikintalo, N., Reinikainen, A., & Jalkanen, L. (2012). Influence of socio-demographical, behavioural and attitudinal factors on the amount of avoidable food waste generated in Finnish households: Factors influencing household food waste. *International Journal of Consumer Studies*, 36(2), 183–191. <https://doi.org/10.1111/j.1470-6431.2011.01080.x>
- Kumar, A., & Samadder, S. R. (2017). A review on technological options of waste to energy for effective management of municipal solid waste. *Waste Management*, 69, 407–422.



- Leung, C. W., Epel, E. S., Willett, W. C., Rimm, E. B., & Laraia, B. A. (2015). Household food insecurity is positively associated with depression among low-income supplemental nutrition assistance program participants and income-eligible nonparticipants. *The Journal of Nutrition*, *145*(3), 622–627.
- Luo, N., Olsen, T. L., & Liu, Y. (2021). A conceptual framework to analyze food loss and waste within food supply chains: An operations management perspective. *Sustainability*, *13*(2), 927.
- Martin, R., Sunley, P., Gardiner, B., & Tyler, P. (2016). How regions react to recessions: Resilience and the role of economic structure. *Regional Studies*, *50*(4), 561–585.
- Ministry of Municipality and Environment. (2020). *An analytical study to compare the agricultural situation before and after the blockade for the period from 2016 to 2019*. Report in Arabic, Doha, Qatar.
- Myers, C. A., Mire, E. F., & Katzmarzyk, P. T. (2020). Trends in adiposity and food insecurity among US adults. *JAMA Network Open*, *3*(8), e2012767.
- Nair, D. J., Rashidi, T. H., & Dixit, V. V. (2017). Estimating surplus food supply for food rescue and delivery operations. *Socio-Economic Planning Sciences*, *57*, 73–83.
- Parizeau, K., von Massow, M., & Martin, R. (2015). Household-level dynamics of food waste production and related beliefs, attitudes, and behaviours in Guelph, Ontario. *Waste Management*, *35*, 207–217.
- Planning and Statistics Authority. (2018). *Qatar second national development strategy—psa.gov.qa*. The Qatar National Vision 2030. <https://www.psa.gov.qa/en/knowledge/Documents/NDS2Final.pdf>. Accessed 7 April 2022.
- Pradhan, P., Lüdeke, M. K., Reusser, D. E., & Kropp, J. P. (2014). Food self-sufficiency across scales: How local can we go? *Environmental Science & Technology*, *48*(16), 9463–9470.
- Qatar Guide. (2020). *ILOVEQATAR Qatar Guide*. <https://www.iloveqatar.net/guide/living/organic-vegetable-farms-and-marketsin-qatar>
- Reynolds, C. J., Piantadosi, J., & Boland, J. (2015). Rescuing food from the organics waste stream to feed the food insecure: An economic and environmental assessment of Australian food rescue operations using environmentally extended waste input-output analysis. *Sustainability (Basel, Switzerland)*, *7*(4), 4707–4726. <https://doi.org/10.3390/su7044707>
- Sarkozi, A., & Rukikaire, K. (2020). *Food loss and waste must be reduced for greater food security and environmental sustainability*. FAO. <https://www.fao.org/news/story/en/item/1310271/icode/>
- Scherhauser, S., Moates, G., Hartikainen, H., Waldron, K., & Obersteiner, G. (2018). Environmental impacts of food waste in Europe. *Waste Management*, *77*, 98–113.
- Sillitoe, P., & Al-Misnad, S. (2014). *Sustainable Development: An appraisal focusing on the Gulf Region*. Berghan Books.
- Solak, S., Scherrer, C., & Ghoniem, A. (2014). The stop-and-drop problem in nonprofit food distribution networks. *Annals of Operations Research*, *221*, 407–426.
- The Peninsula. (2021, January 13). Hifz Al Naema humanitarian projects benefit over 167,000 in 2020. *Peninsula*. <https://thepeninsulaqatar.com/article/13/01/2021/Hifz-Al-Naema-humanitarian-projects-benefit-over-167,000-in-2020>. Accessed 9 April 2022.
- Van Garde, S. J., & Woodburn, M. J. (1987). Food discard practices of householders. *Journal of the American Dietetic Association*, *87*(3), 322–329.
- Wahab. (2021). <https://www.wahab.qa/news-1>. Accessed 9 April 2022.
- Watson, M., & Meah, A. (2012). Food, waste and safety: Negotiating conflicting social anxieties into the practices of domestic provisioning. *The Sociological Review*, *60*, 102–120.
- Williams, H., Wikström, F., Otterbring, T., Löfgren, M., & Gustafsson, A. (2012). Reasons for household food waste with special attention to packaging. *Journal of Cleaner Production*, *24*, 141–148.
- Yang, T. C., & Matthews, S. A. (2010). The role of social and built environments in predicting self-rated stress: A multilevel analysis in Philadelphia. *Health & Place*, *16*(5), 803–810.
- Youn, A., Ollinger, M., & Kantor, L. S. (1999). Characteristics of mid-Atlantic food banks and food rescue organizations. *Food Review*, *22*, 45–51.



**Sana Abusin** joined Qatar University, Social and Economic Survey Research Institute (SESRI), in 2019 as Senior Policy Analyst/Research Associate. She is an Environmental and Resource Economist in addressing environmental challenges at the international, national, sub-regional, and continent-wide levels. She is interested in policy-oriented research and analysis in sustainable development as general, focusing on issues of environmental economics-energy, renewal resources, regulatory economics, climate change, food waste management, water security and food security, sustainable agricultural production systems “Aquaponics,” and air and water pollution. She has also excellent background on regulatory economics, crime, and punishment in natural resources. Her journal publications are under natural resources in addition to SESRI publications. She participated in various sustainability international conferences worldwide. As a sustainable development desk lead at SESRI, Qatar University, she completed many survey research projects including food waste management, fish consumption, and fish processing quality and safety, and currently working on corruption in education, social, economic and environmental impacts of camping in Qatar, indoor air quality and health impacts and other socioeconomic research. Currently, she is leading a grant project of innovative mobile application to sustain food security in Qatar.

**Ebaidalla Mahjoub Ebaidalla** is Assistant Research Professor of Economics at Ibn Khaldon Center for Humanities and Social Sciences, Qatar University. He engaged in many research projects related to issues of food security, inequality, and development economics; and he received grants from a number of regional and international organizations including the Economic Research Forum (ERF), African Economic Consortium (AERC), the Global Development Network (GDN). He worked as a part-time consultant for many international organizations and NGOs, such as the United Nations Development Program (UNDP), the World Bank, the International Labor Organization (ILO), and the Food and Agriculture Organization (FAO). He has an extensive background in econometrics and quantitative analysis, and he published several papers in international journals such as Journal of Economic Cooperation and Development (JECOD), Middle East Development Journal (MEDJ), International Journal of Sustainable Economy, and the Journal of Developing Areas. He was a Visiting Research Fellow at the Humphrey School of Public Affairs, University of Minnesota (2018–2019), USA, and a Visiting Scholar at the United Nations University, World Institute for Development Economics Research (UNU-WIDER), Helsinki, Finland (April–June 2019). Before joining Qatar University in 2021, he has worked at University of Khartoum, Sudan, for more than 12 years and he was the Head of Economics Department.

**Maryam F. Al-Thani** is a Senior Research Assistant at the Social and Economic Research Institute at Qatar University, with an MA in Intercultural Communication and Education from Durham University. She has been engaged in many research projects and has many publications.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

