

## Research Article

# Food Security, Food Waste, and Food Donation and Redistribution in Jordan

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Jordan is a peaceful low middle-income developing kingdom located in the Middle East, with a semi-desert topography. The social and economical levels of the nation, characterized by low poverty and unemployment rates, and influx of refugees, are believed to affect the health and nutrition status of Jordanians. For instance, food insecurity was prevalent in 0.5% of the population, and 13% were at risk to become food insecure. Lack of food security may predispose individuals to malnutrition including deficiency of iron, vitamin B12 and omega 3 fatty acids. Unfortunately, reasons for the low levels of food security in Jordan are not fully explored. However, a possible cause for food insecurity is food waste, where at least 50% of the food is disposed. This is distressing, especially that a number of Jordanians and refugees are undernourished and have to beg or go through dumpsters for food. Yet, one approach to minimize food insecurity and food loss is food redistribution. This method reallocates surplus food to the impoverished, which numerous agencies in Jordan have adopted. Finally, future research should investigate food insecurity and the associated factors (including food waste) in various regions in Jordan. Longitudinal and cohort studies also are essential to examine food loss that occurs throughout the food supply chain, and estimate food waste among Jordanians. Lastly, interventional surveys are required to raise awareness about food waste and redistribution. Research should also assess the suggested role of food reallocation in reducing food squander and improving food security status.

**Keywords:** Jordan; Food insecurity; Food waste; Food Donation/Redistribution

## Introduction

Jordan is a peaceful low middle-income developing kingdom located in the Middle East, and surrounded by countries with ongoing conflict including Palestine, Syria and Iraq (Figure 1). This motivated the suffering nations to find sanctuary in this haven; hence, posing additional pressure on Jordan not only to meet the needs of its citizens, but also these of the refugees. This burden is characterized by the semi-desert topography of the state (particularly in the southern and eastern regions), its limited natural resources (agriculture, water, and energy), dependence on food imports [1], and incompetent infrastructure [2,3]. Moreover, the sudden raise in the number of Jordanians over the past decade worsened these challenges. In fact, the population has risen from 6 million in 2011 [4] to 10.5 million in 2019 [5]. This increase had a negative effect on the economy, causing the rate of unemployment to reach 19.2% in 2019 [5], which were 12.9% in 2011 [6]. In addition, the 2019 poverty rate was 15.7% [7], which increased by 1.7% since 2002 [8], and the annual poverty threshold was 814 Jordanian Dinars (JD) (= \$ 1,148) per capita [4].

These social and economical changes [4,9] are believed to affect the health and nutrition status of Jordanians. For instance, 37% of the population suffers from cardiovascular diseases, 12% from cancer, and 6% have type-II diabetes [10]. Moreover, the 2018 Global Hunger Index [11] and Food Security Index [12] have been estimated to be 11.2% and 4.2%, respectively. The former reflects the number of undernourished individuals, the proportion of wasting and stunted

children (< 5 years), and their mortality estimates [11]. The latter term describes the number of individuals who are hungry or food insecure depending on the amount, nutritional value, safety, and cost of the available food [12]. Furthermore, food insecurity is the lack of financial ability to buy a healthy, nutritious, and safe food in adequate amounts [13]. Thus, poverty and inaccessibility to food may predispose lack of food security, which causes malnutrition [13]. Nonetheless, food loss also is proposed to exacerbate food insecurity; especially that the world wastes about one-third of its food [14]. In response to these two social issues, several non-profit organizations developed altruistic programs that redirect surplus food to those in need. The objective of the current review therefore is to discuss food security and food waste in Jordan, and the probable role of food redistribution in solving these two problems. In addition, this paper sheds light on the gaps in research and the areas that require further investigation regarding food insecurity and food loss in this middle-eastern country.

## Materials and Methods

### Search Strategy

An extensive exploration of research was conducted using the Middle Eastern and Central Asian Studies, Index Islamicus, Al Manhal, CAB Direct, PubMed, Google Scholar, ProQuest Central, Institute for Scientific Information (ISI) Web of Knowledge, Cochrane Library, and EBSCO's Academic Search Ultimate, databases. The keywords and terms used were: "food security," "undernourishment,"

“malnourishment,” “food insecurity,” “hunger,” “food loss or lost,” “food disposal,” “food waste,” “disposing or wasting food,” “throwing away food,” “food end in landfills or dumpsters,” “donating food,” “food donation,” “food rescue,” “rescuing food,” “food collection or allocation,” “food redistribution,” “food bank,” “collecting food,” “food aid,” “food assistance,” “Jordan,” and “Middle East.” The articles contained in the current literature review were published between January 1970 and November 2019, on which qualitative content assessment was conducted.

### Inclusion Criteria and Selection Process

Figure 2 describes the process of selecting the publications. Only documents that investigated food security/insecurity, food waste/loss, and/or food donation, rescue, and/or redistribution in Jordan were included in this paper. Total number of items examined was 644. We ended in 524 after the exclusion of duplicates. Evaluation of title and abstract fields identified 471 irrelevant articles. Then we studied the full-text of the remaining 53 items, which included 35 organizational reports, 11 electronic resources (i.e.; online newspaper articles and a Facebook link), 2 review articles, 3 research articles, and 1 interview. Finally, risk of bias was performed for all papers. There was a high risk for selection bias due to that only two articles conducted random selection of the population sample [15,16], yet reporting bias had a low risk as the results were in agreement with the proposed aims.

## Results and Discussion

### Food Security

The previously discussed low socio-economic status in the kingdom [4,9] is suggested to affect the levels of food security. In fact, food insecurity was prevalent in 0.5% of Jordanians [9], which is almost 40 and 20 times lower than the Arab (22%) [11,12,17] and international levels (11%) [18], respectively. But this low incidence should not be underestimated as in 2018, 12% of the population experienced malnourishment [17] and 13% were at risk to become food insecure [9]. Among the 12 governorates, Madaba and Kerak were the most food insecure (17%), Irbid, Ajloun, and Zarqa were the least food insecure (< 10%), whereas 14% of individuals living in Amman (the capital) lacked food security [19]. The State of Food Insecurity in the World (SOFI) also stated that 14% of the newborns were of low birth weight, and 8% of the children (< 5 years) suffered from stunting in 2012 [17].

Moreover, an earlier cross-sectional survey observed that 18.2% of women living in Northern Jordan were food insecure, 14% suffered from food insecurity and hunger, and 26% did not have enough money to buy food [20]. Data also showed that food secure participants had larger daily portions of fruits (1.2 vs. 0.5), vegetables (1.3 vs. 1.1), milk and dairy (1.5 vs. 1.1), and meat (3.2 vs. 2.3) than the food insecure [20]. A similar study in the Northern Badia of Jordan found that 43% of 207 households lacked food security [15]. Abuamoud and colleagues [15] demonstrated that each week the food insecure ate bread and cereals, dairy products, vegetables, fruits, poultry, meat and fish 6.1, 4.9, 4.5, 2.6, 2.4, 1.9, and 1.6 times, respectively. Furthermore, a national report has discussed the state of food security in Jordan between 2013 and 2014. Compared with the food secure, food insecure Jordanians consumed lower number of weekly servings of vegetables (3.2 vs. 5.4), fruits (0.9 vs. 4.3), dairy (1.7 vs. 5.5), and meat (1.6 vs. 6.2), but had the same portions of bread

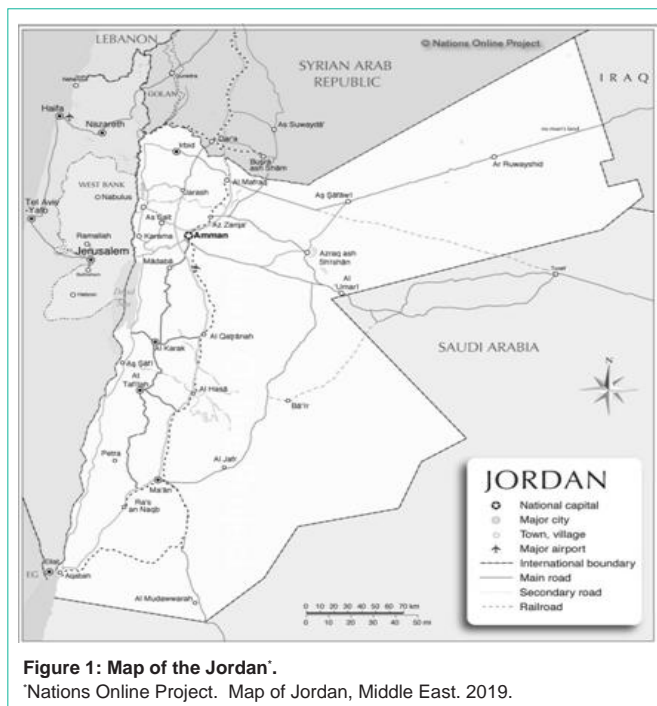


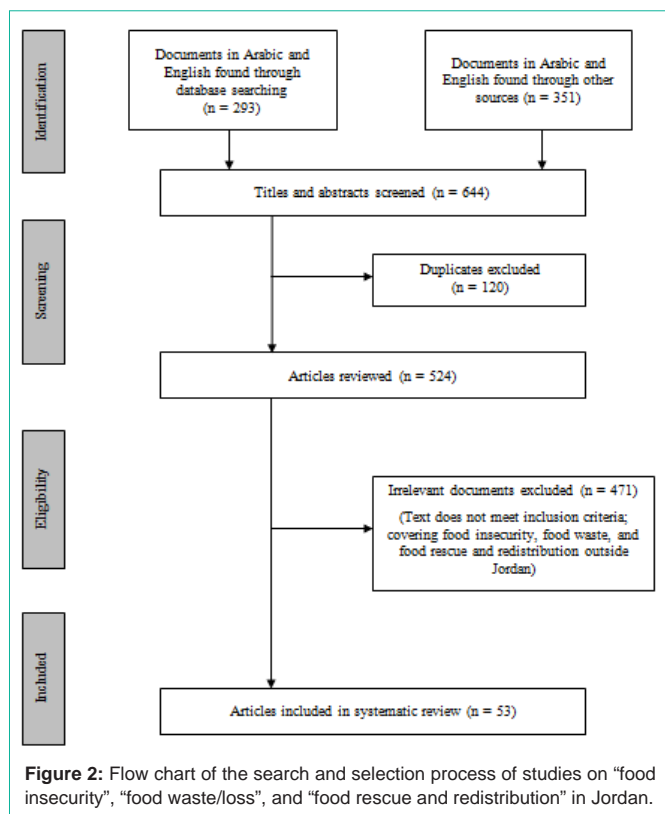
Figure 1: Map of the Jordan'.

Nations Online Project. Map of Jordan, Middle East. 2019.

and cereals (7 vs. 7) [21]. We concluded that generally, Jordanians consume lower amounts of fruits, milk and its products, beef/lamb, and seafood than the recommended [22,23]. These inadequate intakes may predispose individuals to nutritional deficiencies such as iron, calcium, zinc, vitamins B, C and D, as well as omega 3 fatty acids [24]. Therefore, solutions should be implemented to alleviate the adverse health effects of food insufficiency. In addition, future investigations should assess food insecurity occurrence in women and men, and among different age groups in various regions (i.e.: in the south, east, and west) in Jordan.

The war in Syria in 2011 also aggravated the low levels of food security in Jordan due to the influx of more than one million refugees into the country [25,26]. Also the United Nations High Commissioner for Refugees (UNHCR), World Food Program (WFP) and REACH initiative stated that 22% (27) and 66% (19) of Syrian refugees in Jordan were food insecure, and at risk to lack food security, respectively. Thus, the kingdom not only had to provide food for the 10.5 million Jordanians, but also had to double its effort to supply the needs of the displaced Syrians. This issue exerted additional economical pressure on Jordan, which is slightly comforted by the influx of international humanitarian support to aid the hosted refugees. Hence, we believe that developmental projects should be administered in the Kingdom that can create sustainable jobs (for citizens and refugees) and promote food availability.

Reasons for low food security in Jordan are rarely addressed. To our knowledge, a 2012 research was the only study which reported that limited financial resources and high prices of food were the major factors contributing to food insecurity in northern Jordan [20]. Nevertheless, the desert nature of the country, limited agriculture and water sources, low food production [3], and food waste [14] are additional variables that are believed to negatively influence food security development in Jordanians. Nonetheless,



longitudinal studies of large population samples should explore the wide spectrum of factors underlying food insecurity nationwide, and suggest solutions to this problem such as enhancing agriculture via combating desertification, building dams, and reducing taxes on locally produced foods/crops.

### Food Waste

Global food waste in Jordan ranged between 50% and 65% (Jordan Green Building Council 2016), which is greater than the international level (33.3%) [14]. However, the Jordan Green Building Council found that bread was the only food item that is recollected from dumpsters and used to feed animals [28]. This recycling practice must be encouraged as it reduces the amount of food that reaches dumpsters, but educational campaigns about techniques to reduce discarding food also should be initiated. Such interventions are important especially that Al-Domi et al. [16], who investigated food plate waste in 600 college students, reported that 13% of the purchased food is thrown away. In addition, a higher rate of food disposal in Jordan was seen in Ramadan. In fact, compared to a normal day, there was an additional daily food loss of 600 tons in Ramadan [29]. This incremental increase in food waste is critical, and requires raising awareness about the importance of purchasing and preparing the needed amount of food to prevent wasting foodstuff.

In line with this, the Ministry of Agriculture and the Food and Agriculture Organization (FAO) trained about 250 workers in the food sector to minimize food squander during the food production chain (e.g.; production, transport, and storage) [30]. The Near East and North Africa (NENA) Regional Food Loss and Waste Reduction Network also proposed a similar approach to the government to help in food disposal reduction [31]. Nevertheless, additional

efforts to decrease food loss in Jordan are needed. At the individual level, interventional programs must promote knowledge about the successful methods in minimizing food disposal such as: not to cook large amounts of food; to store food properly; and to write a shopping list. At the national level, the government should pose fines on industries and outlets that waste food, and encourage hotels and restaurants to use techniques that assist in declining food loss such as Food Watch [32] and Winnow [33], or donating their excess good-to-eat food. This is vital particularly that a number of Jordanians do not have enough means to support themselves or their families.

### Food Redistribution

Both food insecurity and waste are suggested to be diminished by food donation or redistribution of surplus food. In Jordan, a number of international organizations followed these behaviors. For instance, Action against Hunger assisted about 53 thousand low-income individuals in 2018 [25]. The World Food Program also served more than 80,000 meals to schoolchildren, where one-third of the recipients were Syrian refugees [9]. Moreover, the Agency for Technical Cooperation and Development [34], UNHCR [35], and World Renew [36] donated food and non-food items (toiletries and medicine) to more than 130,000, 80,000, and 1,000 displaced Syrians, respectively. Similarly, the Islamic Relief helped at least 62 thousand migrants in Jordan by giving them a \$ 34 e-card that can be recharged monthly [37]. A number of food-aid organizations also participated in alleviating lack of food security among the refugees in Jordan, including the: International Rescue Committee [38]; Caritas Jordan [39]; Collateral Repair Project [40]; CARE [41]; Food Parcels for Refugee Families in Jordan campaign [42]; and Islamic Relief USA [43].

Local individuals and agencies also joined forces to end hunger in Jordan by reallocation of food to those in need. For example, the Jordanian Food Bank provided food parcels to 18 thousand families in 2016 [44]. This charity also collaborated with several hotels and restaurants to collect the unused remaining food from buffets, weddings, conferences, and meetings. Then, volunteers redistributed this surplus food to the underprivileged [45,46]. Family Kitchen, which started in 2009 by a group of Samaritans and currently consists of 150 volunteers, also redirects ~ 150 meals a day to the low-income [47]. In addition, the Royal Health Awareness Society (founded in 2005) assists the Jordanian community to combat food insecurity via providing annual meals to schoolchildren (feeding ~ 20,000 students), mainly to these residing in poverty pockets [48].

Furthermore, ETAAM (i.e.; feeding) [49] and Tkiyet Um Ali (i.e.; the Shelter of Ali’s Mother) [50] are other organizations that responded to food insecurity via donating food boxes to the impoverished living in the 12 Jordanian governorates. Moreover in 2019, “Nubul” agency supported the inauguration of “Kushk El-Kheir” (i.e. the Good Booth) at the University of Jordan. This venture targeted employing university students of both genders to sell (self-prepared) goods, where half of the profits are used to help the poor scholars [51].

Finally, Mahmoud Nabulsi established an innovative charitable project called Ezwitti in 2015. This is a solidarity restaurant in downtown Amman, where customers can buy a meal for needy strangers [52]. Ezwitti is a Jordanian expression that literally means



my support group. The concept of Ezwitti is to ask customers if they like to pay for an additional meal or a sandwich in the form of a voucher, which is pinned on a board, to be consumed by the poor [52]. Nabulsi stated that “Ezwitti consists of 20 volunteers, whom most of them come once a week to prepare and serve food. On average, 20 to 25 meals (with a total value of 15 JD = \$ 21.16) are offered to the underprivileged per day” [53]. Mahmoud also commented, “The ingredients of these meals are bought from women living in rural areas” [53]. After the success of this charity, another branch of Ezwitti was opened in Deir ‘Alla [52]. Accordingly, this act of kindness helps in ending hunger in a considerate way to the Jordanian culture, without offending the needy or injuring their pride. In all, food assistance and redistribution are prevalent in Jordan, which are believed to help in minimizing food insecurity and food loss. Therefore, the government should support such charities and promote food donation, via media campaigns, and tax reduction for donors. Yet the previous assumption must be examined in the future.

## Strengths and Limitations

This is the first meta-analysis that discussed food security, food waste, as well as food donation and/or redistribution in Jordan. In addition, we included research and review articles, organization documents, newspaper articles, and a personal interview. Moreover, this paper consisted of documents published in Arabic and English. On the other hand, limitations of the current review are the scarcity of peer-reviewed research articles (the use of only three scientific papers, as research in Jordan is still limited); the design of the extracted papers was cross-sectional; and lack of financial resources. Thus, further research is essential to perform cohort studies that assess food security, food redistribution, and food waste in Jordan.

## Conclusion

Food insecurity and undernourishment are prevalent in Jordan. Several factors may contribute to these health problems including poverty, limited agriculture resources, high prices of food, and influx of refugees. Malnourishment exasperated the challenges that Jordan currently is facing including improving its socio-economic status and infrastructure, searching for other natural resources (e.g.; digging artisan wells, desalination of seawater, and combating desertification), importing food commodities to cover the demands of Jordanians and immigrants, and monitoring exports of extra foods (e.g.; vegetables) to maintain its affordability and prevent a rise in its local prices.

In addition, food waste may cause food insecurity in Jordan, where at least half of the food is disposed. This is distressing, especially that a number of Jordanians and refugees are underprivileged and have to beg or go through dumpsters for food. Therefore, the kingdom has to implement solutions to minimize food loss via improving food production chain conditions; displaying fines on industries that throw away food; and encouraging food redistribution by reducing taxes on food donors. The latter scheme, which numerous agencies have adopted, is important as it assists in reusing surplus food to feed the impoverished; hence relieving hunger and decreasing both food scarcity and waste.

Finally, future research should investigate food insecurity and the associated factors (including food waste) in various regions in Jordan,

particularly in the southern part of the country, where poverty pockets reside. Longitudinal and cohort studies also are essential to examine food loss that occurs throughout the food supply chain, and estimate food waste among Jordanians. Lastly, interventional surveys are required to raise awareness about food waste and redistribution. Research should also assess the suggested role of food reallocation in reducing food squander and improving food security status.

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