Journal of Nutrition and Food Security
Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition
Nutrition & Food Security Research Center

eISSN: 2476-7425 pISSN: 2476-7417 JNFS 2021; 6(4): 343-351 Website: jnfs.ssu.ac.ir

Household Food Waste in A Sample of the Libyan Community

Tawfik M Hassan; PhD [*1] & Manal M Alkadrawy; BSc [1]

[1] *Food Science and Technology Department, School of Agriculture, University of Tripoli, Libya.*

ARTICLE INFO

ORIGINAL ARTICLE

Article history:
Received: 1 Nov 2020
Revised: 24 Apr 2021
Accepted: 24 Apr 2021

Corresponding author:
t.hassan@uot.edu.ly
Food Science and Technology Department, School of Agriculture, University of Tripoli, Libya.

Postal code: 13538
Tel: + 218 92 503 7007

ABSTRACT

Background: Consumer behaviors at the household level have an impact on the quantity of food waste and the economic resources of the family and the country. This study aimed to assess food waste in a random sample of the Libyan community. **Methods**: A questionnaire was designed for the study and distributed randomly through social media, short message, e-mails, and via face to face interviews from November 26 to December 21, 2019. **Results**: Forty percent of the respondents used a shopping list for food; while 15% of the respondents discarded food. The percentage of monthly expenditure on food was significantly ($P < 0.05$) associated with shopping list, income, education level, and employment. Meanwhile, the quantity of food waste was associated ($P < 0.05$) with education level and place of living. Moreover, the economic value of food waste was associated ($P < 0.05$) with the shopping list. The bread was the most food waste commodity followed by vegetables and pasta. The quantity of discarded food accounted for 2661 tons/year with an estimated value of 163 million Libyan dinars/year. **Conclusion**: To reduce household food waste by the Libyan community it is required to improve the quality of bread and raise consumer awareness of the impact of food waste on the environment, economy, and society. This could be achieved through mass media extension programs as well as seminars and workshops.

Keywords: *Household food waste; Awareness; Libya*

Introduction

The term food waste is used interchangeably in different studies to describe food loss or kitchen waste (Schneider, 2013). Food loss is defined as the food that is wasted because of spoilage, loss in quality, or improper handling across the food chain supply before it reaches the consumer (Gustavsson *et al.*, 2011). Food waste represents the edible food that is purchased for consumption but ends up in a garbage can or fed to animal or used as fertilizer because of its quality deterioration or improper storage or passing its expire date or prepared or cooked in quantity more than needed for consumption (Food and Agriculture Organization, 2019). Food waste is a component of food loss and is generated at the end of food chains by the decision and actions of retailers, food services suppliers, and consumers. However, food loss occurs during agricultural production, postharvest handling or processing. Papargyropoulou *et al.* found that

This paper should be cited as: Tawfik M Hassan, Manal M Alkadrawy. ***Household Food Waste in A Sample of the Libyan Community.*** *Journal of Nutrition and Food Security (JNFS)*, 2021; 6(4): 343-351.

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

developed countries experience food waste in the retail and consumer sectors; while developing countries encounter food loss in the production and processing sectors (Papargyropoulou *et al.*, 2014).

The number of food loss and waste varies depending on the type of food, the specific circumstances, and the local situation in each specific country or culture. Quested indicated that homes are the largest contribution to food waste in the United Kingdom that is 8.3 million tons/year, costing consumers 12 billion sterling pounds (Quested *et al.*, 2011). Jorissen concluded that the amount of food wasted in households per capita per year for different European countries is as follows: 110 kg in the UK, 108 kg in Italy, 99 kg in France, 82 kg in Germany, and 72 kg in Sweden (Jörissen *et al.*, 2015). These figures illustrate that any effective strategy to combat food waste needs to focus on the final consumer. According to Food and agriculture Organization (FAO), food loss was estimated in the Near East and North Africa region at around 250 kg/person/year and cost more than 60 billion dollars annually, although the Near East and North Africa region is a net food importer. The rate of food loss is 20% of grains, 50% of fruits and vegetables, 16% of meat, and 27% of fish and seafood (Berjan *et al.*, 2018).

The topic of food waste has received special attention and has been highlighted greatly in recent years. A report issued by FAO indicated that the annual amount of global food loss and waste is 1.3 billion tons, equivalent to one third of the total food produced globally, which is 4 billion tons annually. However, 800 million people are suffering from hunger, and recovering half of food waste can feed the whole world (Berjan *et al.*, 2018). Food waste at the household level accounts for a significant share of total food waste in developed countries (Gustavsson *et al.*, 2011).

Food waste causes undue pressures on the environment and natural resources used in food production, and is the basis for the depletion of land, water, energy, and capital resources and causing pollution. Consequently, FAO addressed the issue of food waste within the context of sustainable development goals and achieving food security. Where goal 12.3 (responsible production and consumption) call for sustainable development goals to halve per capita global food waste at retail and consumer level by 2030 (Food and Agriculture Organization, 2019).

Given the absence of studies in Libya on food waste at the household level, this study aimed to identify the consumer's shopping behavior, the amount and value of food wasted, the causes of food waste and the type of food commodity wasted.

Materials and Methods

Study design: A voluntary survey was used in this study using a questionnaire. The questionnaire was designed using the Q survey program. The contents of the questionnaire were adapted to the Libyan context from previous questionnaires and studies on food waste (Berjan *et al.*, 2018, Elmenofi *et al.*, 2015, Sassi *et al.*, 2016). The questionnaire consisted of 20 questions, which included a group of single-choice questions and multiple-choice questions, divided into 3 sections. In the introductory part of the questionnaire, the meaning of food waste in this study was introduced to inform the respondents. The first section of the questionnaire consists of questions about the demographic information of the study subjects. In the second section regarding food purchase behavior, respondents were asked about shopping habits in terms of whether they use a shopping list, frequency of shopping, and means of using leftover food. In the third section of the questionnaire, the respondents were asked about their monthly expenditure on food, quantity, and types of food commodity wasted, and the economic value of food waste.

The validity of the questionnaire was checked by distributing it to a random sample of 50 individual and their response were reviewed to make any corrections to achieve the objectives of the study. The tool used to perform the survey

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

was online through a link via Facebook and Viber social media as well as short messages and by face to face interview. The survey was performed from November 21 to December 23, 2019. The total number of volunteers who participated in the survey was 751. Eighty percent of them responded through the Q survey link; while for 20% of the total respondents face-to-face interviews were performed.

Ethical considerations: This research was conducted accordance with the Scientific research ethics document issued by University of Tripoli-Libya, that the answer to the questionnaire and participation in the study should be voluntary, while maintaining the confidentiality of the source of the information and using it for study and research purpose only.

Data analysis: The data were analyzed using descriptive statistics to calculate percentages of respondents to each question and a chi-square test for independence was used between the questionnaire axes using Ja movie software version 1.1.19 (Sydney Australia www.Jamovi. com).

Results

The main characteristics of the subjects are shown in **Table 1**. The total number of the participants was 751, 87% of them were from the western part of Libya, 3% from the middle region, 8% from the East, and 1% from the South region. **Table 1** also shows that 62% of the participants were female and 38% male, indicating that most men in the Libyan community consider food issues as part of female's responsibilities. The age of respondents ranged 18-55 years. Most of them (31%) were within the age range of 25–34 years; while 22% and 21% were within the age ranges of 18-27 and 35-44 years, respectively. The age ranges of 45-54 and >55 years represented 17% and 10% of the total participants in the study, respectively. The majority of the respondents (88%) were University degree holders. Additionally, 63% of them had full-time or part-time jobs; while 3% were retired and 14% were either students or unemployed. Forty-five percent of the participants were married, 42% were singles living with their parents, 22% were married and had children and 1% were partnered. Regarding the family size of the participants, 36% had family size of 5-6 members, 27% had 3-4 members and 8% had > 8 members. Concerning the monthly income of the participants, 38% had salary range of 450 -1000 Libyan dinars, 21% had 1000-2000 Libyan dinars, 19% did not have any salary, 8% had > 2000 dinars/month, and 6% had salary range of < 450 dinars.

The survey results in **Figure 1** show that 41% of the respondents always used a shopping list when shopping, and 37% used a shopping list sometimes; meanwhile 22% did not use a shopping list. Concerning the frequency of food shopping by the subjects,

Figure 2 shows that the majority of the respondents (64%) go shopping once a week; while 11% and 20% of them go shopping daily or every other day. Chi-square test results in **Table 2** revealed that using a shopping list reduced the economic value of food waste (P = 0.01) and the percentage of monthly income spending on food level (P = 0.03).

The results shown in **Figure 3** reveal that 15% of the participants disposed uneaten food in the trash, meanwhile, 4% and 31% of them managed food in a good way by sharing it with others and using it in other meals, respectively, while 44% of them feed it to animals and 5% used it as fertilizer for plants.

The survey data indicated that 43% of the subjects spent 38% of their income ranged 450-3000 Libyan dinars on food, equivalent to 494 Libyan dinars, calculated based on the estimated average income of the participants at 1300 dinar. However, 40% of the respondents spent more than 50% of their income on food equivalent to 786 dinars, and 17% spent less than 25% of their average income on food (**Figure 4**). This means that Libyans spent more than a third of their salary on food only.

Statistical analysis of the results from this study revealed that there was a significant association (P < 0.05) between percent of

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]
[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

monthly expenditure on food with education level, employment, and monthly income of the respondents (**Table 2**).

Concerning estimation of the amount of discarded food in grams while it is still fit for human consumption, the results in **Figure 5** show that 60% of the respondents did not discard any leftover food that is still consumable and 25% discarded less than 250 grams/week. However, 15% discarded more than 250 grams of food weekly, and by calculating these numbers on Libya families, the amount of waste food annually is estimated at 2661 tons. Chi-square test indicated a significant association ($P < 0.05$) between the quantity of waste food and the education level and place of living of the participants in the study (**Table 2**).

Figure 6 reveals that 65% of the participants in the study wasted about 1729 tons of bread annually; while 10% and 11% of the participants wasted vegetables or pasta, respectively. Moreover, 4%, 3%, 2%, and 1% of the participants wasted dairy, rice, bakery goods, and fruits, respectively.

The survey showed that 63% of the participants wasted food with an economic value less than 25 Libyan dinars/month/family (less than 6 US $ dollars), i.e. account for about 167 million dinars annually. Moreover, 26% of the participants wasted home food with an economic value ranging between 25–70 Libyan dinars; while 12% of them discarded food with a value of more than 70 dinars (**Figure 7**). The results of chi-square indicated a significant association ($P < 0.05$) between the employment of respondents and the policy of shopping in terms of using prepared shopping lists with the economic value of waste food (**Table 2**).

Table 1. Demographic characteristics of the subjects

Demographic variables		N	%
Gender	Male	287	38
	Female	464	62
Age category (y)	18 – 24	163	22
	25 – 34	228	31
	35 – 44	155	21
	45 – 54	126	17
	≥ 55	79	10
Education level	Before college	88	12
	University degree holder	663	88
Employment	Student	149	21
	Full time/part-time employee	474	63
	Unemployed	106	14
	Retired	22	3
Marital status	Single lives with parents	318	42
	Married	248	45
	Married have children	156	21
	Partnered	9	1
Place of living	West region	661	87
	Middle region	19	3
	East region	61	8
	South region	10	1
Family size	2	74	10
	3 – 4	203	27
	5 – 6	268	36
	7 – 8	145	19
	> 8	60	8

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

Table 1. Demographic characteristics of the subjects

Demographic variables		N	%
Monthly income (Libyan Dinar)	Nil	141	19
	< 450	43	6
	450 – 1000	289	38
	1000 – 2000	157	21
	2000 – 3000	60	8
	> 3000	61	8

Table 2. Chi-square test (P-value) for independence between the questionnaire axes

Demographic variables	% monthly expenditure on food	Quantity of food waste (g)	Economic value of food waste	Commodity wasted
Age	0.4	0.37	0.20	0.07
Educational level	0.001	< 0.001	0.41	0.17
Employment	0.002	0.21	0.004	0.44
Place of living	0.11	< 0.001	0.77	0.77
Income	< 0.001	0.80	0.50	0.63
Shopping list	0.03	0.45	0.01	0.67

P < 0.05

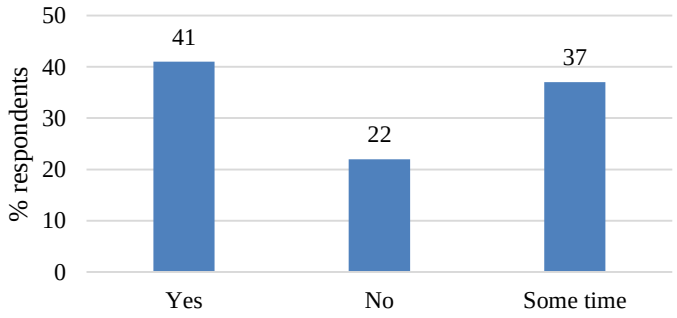


Figure 1. Using previously prepared shopping list

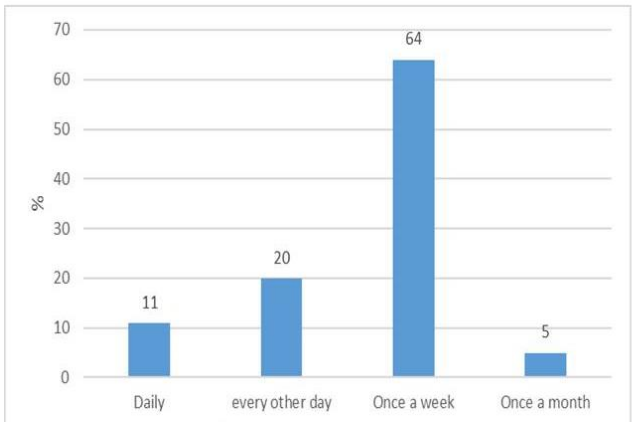


Figure 2. Frequency of food shopping.

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]
[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

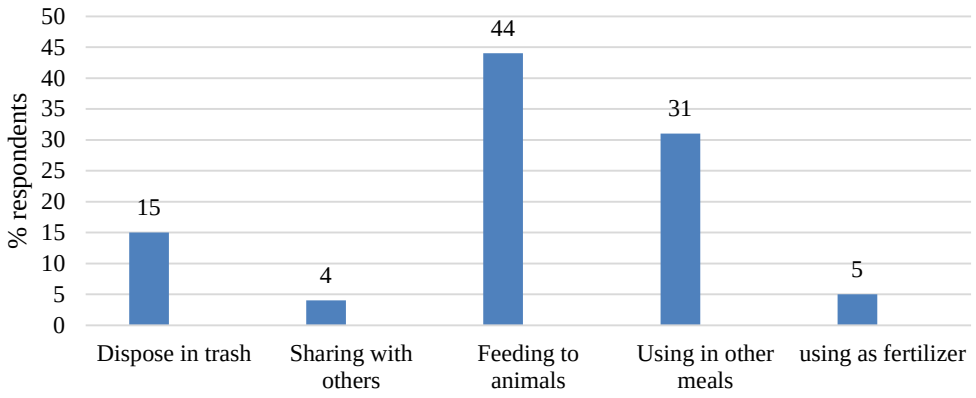


Figure 3. Means of using left over food

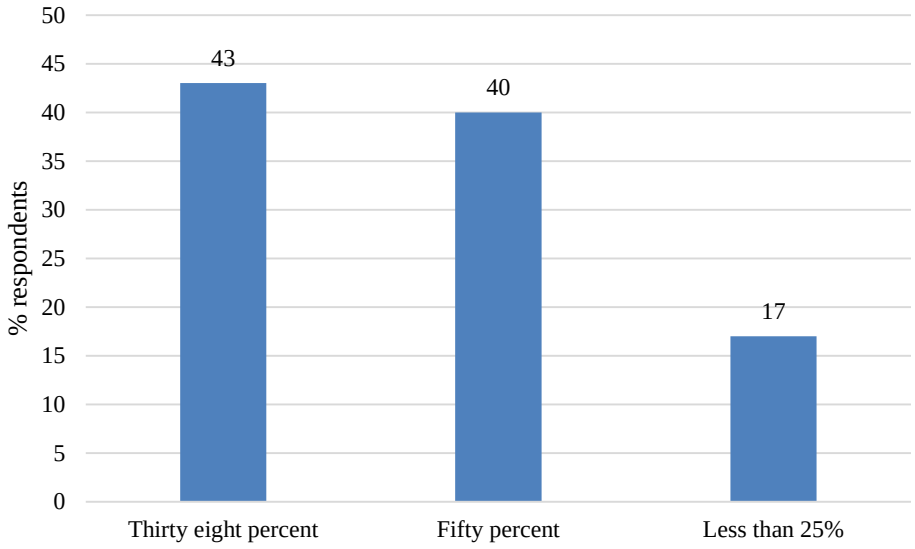


Figure 4. Monthly income spend on food (%)

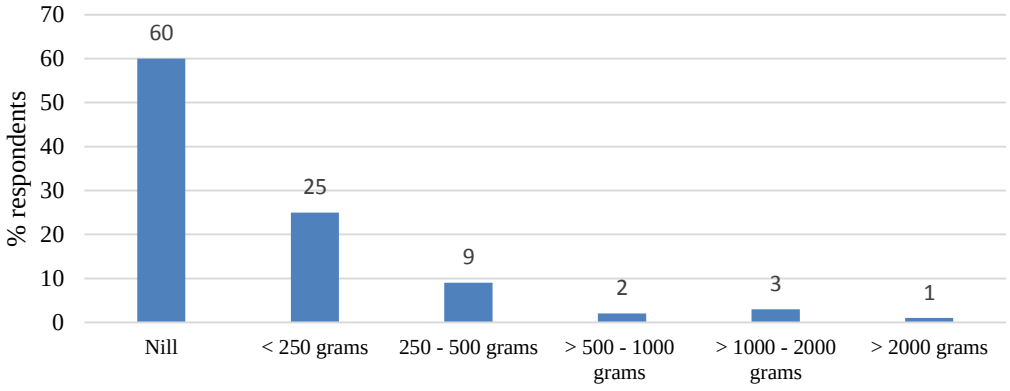


Figure 5. Quantity of food wasted by respondent while it is fit for consumption

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

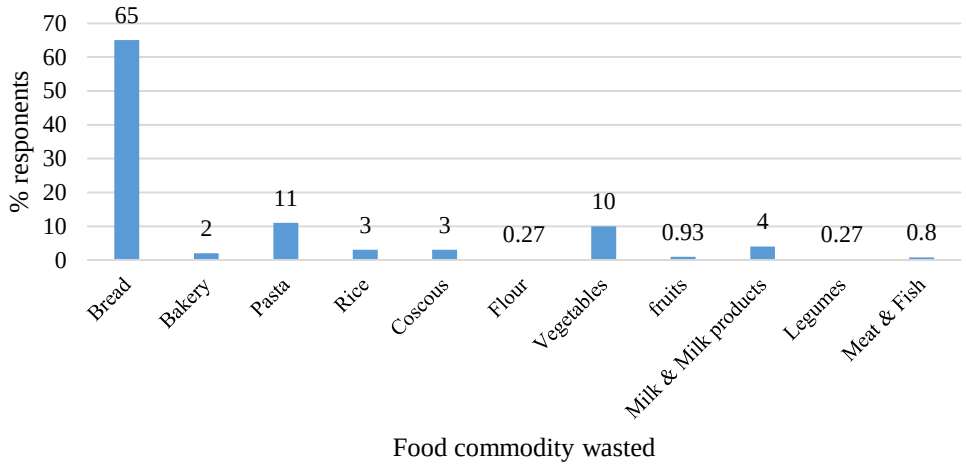


Figure 6. % of respondents concerning type of food waste

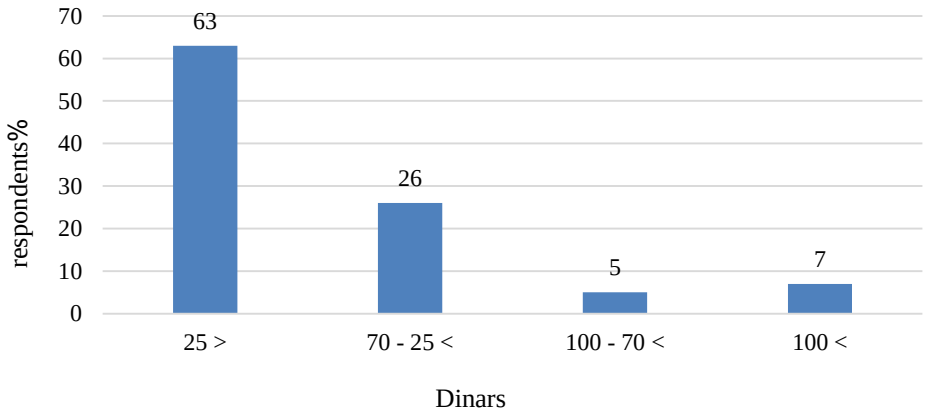


Figure 7. Economic value of wasted food

Discussion

Libya is a food importer country; therefore, studies on food loss and food waste are important to explore factors that might play a role in reducing food waste at the household level. The findings of this study have to be seen in the light of the limited ability to get sample size that represents the actual populations of the targeted region in this study. The instability and security situation of the country at the time of performing this study was the main limitation to access volunteers for this study through a face-to-face interview. Therefore, the questionnaire was put on social media websites and distributed through short message and e-mails. However, the 750 volunteers who participated in this study were almost enough compared to the sample size used in other studies (Arous *et al.*, 2017, Elmenofi *et al.*, 2015).

The results of this study revealed that less than 50% of the subjects used a shopping list. This reflects the unawareness of the effect of using the shopping list on proper management of food expenditure and thus reducing food waste. These findings are consistent with the results of (Elmenofi *et al.*, 2015) in Egypt, who found that 40% of the participants used a shopping list. The study indicated that 70% of the studied households used a shopping list and their amount of food waste decreased by 20% compared to

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]
[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

households who did not use a shopping list (Jörissen *et al.*, 2015).

The percentage of the subjects who disposed uneaten food in the trash (15%) was lower than the results reported by (Abouabdillah *et al.*, 2015, Arous *et al.*, 2017, Elmenofi *et al.*, 2015). They showed that 46% of Algerians, 69% of Moroccans, and 35% of Egyptians threw uneaten food in the trash. These results indicated that Libyan households appropriately managed their uneaten food compared to households in Algeria, Morocco, and Egypt. The improper management of uneaten food will have significant financial and environmental consequences. Food waste imposes considerable costs on the community through waste collection, waste disposal, and the greenhouse gas emissions associated with rotting food. Furthermore, it causes undue pressure on natural resources used in food production and is considered a basis for the depletion of land, water, energy, and capital resources. The percentage of monthly income spent on food by the participants was more than 30% compared to 20% in Morocco (Abouabdillah *et al.*, 2015) and 7% in Egypt (Elmenofi *et al.*, 2015). These variations could be related to differences in average income between these countries as well as food prices. Chi-square test showed a significant association ($P > 0.05$) between percent monthly income spends on food with education level, employment, and monthly income of the participants. The per capita food waste calculated from the estimated quantity of food waste in this study was 410 grams/person/year which was less than the per capita food waste reported in Morocco (754 grams/person/year) (Abouabdillah *et al.*, 2015) and higher than the per capita food waste in Algeria (335 grams/person/year) (Arous *et al.*, 2017). However, these figures are lower than the per capita food waste reported by Jorissen (Jörissen *et al.*, 2015) in some European countries ranged 82–108 Kg/person/year. This variation reflects the fact that developed countries experience food waste in the retail and consumer sectors; while developing countries encounter food loss in the production and processing sectors (Papargyropoulou *et al.*, 2014). The bread was the most food commodity wasted by 65% of the respondents which is 1729 tons annually and equivalent to 65% of the total quantity of household food waste in this study. However, 10% and 11% of the respondents wasted vegetables and pasta, respectively. The high rate of bread waste by the respondents was due to the quality of bread prepared in bakeries as it is not preservative and to its low price compared to prices of other food commodities. These findings are in line with the results reported by (Capone *et al.*, 2016). They reported that bread and cereal products, followed by secondly vegetables, fruits, and perishable products were the most wasteful types of food in Morocco, Algeria, Tunisia, and Egypt. In a study carried out by Jorissen (Jörissen *et al.*, 2015), it was found that the largest contributors to food waste in Germany were easily perishable items like fresh fruit and vegetables followed by bakery products, dairy products, and eggs; while Italians wasted bread in the first place (Fanelli, 2019). However, Sassi reported that the most wasted food products by Tunisians were fruits, vegetables and cereal, and bakery products. These findings reflect that customs, traditions, and culture of the society have an impact on the type of wasted food (Sassi *et al.*, 2016). Furthermore, the prices of food products affect the types of wasted food; since red and white meats are more expensive and less wasted compared to other perishable foods. Chi-square test indicated that none of the demographics parameters of the study sample presented in **Table 2** affected the type of food commodity wasted by the respondents. The high rate of bread waste found in this study indicated the need to improve the quality of bread to extend its shelf life and freshness and reduce its waste.

The economic value of waste home food per month reported in this study was higher than the average monthly economic value of waste home food in Egyptian families (2 US Dollars) (Elmenofi *et al.*, 2015) and less than the economic value of food waste generated monthly by

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]

Tunisians which was more than 6 US Dollars (Sassi *et al.*, 2016). This indicates that Libyan families waste food with higher value and this could be related to the average level of living of Libyans as well as employment compared to Egyptians. Meanwhile, food prices in Libya are less than the food prices in Tunisia.

Conclusion

Consumer behaviors related to food affect the quantity and value of food waste. The results of this study revealed that 15% of the subjects discarded food. The bread was the most wasted food commodity followed by vegetables and pasta. The estimated quantity of wasted food accounted for 2661 tons/year. To reduce household food waste in the Libyan community, it is required to improve the quality of bread and raise consumer awareness concerning the impact of a well-planned shopping policy through mass media on reducing household food waste.

Conflict of interest

There was no conflict of interest in this study.

Authors' contribution

Hassan TM designed the study, statistical analysis, and wrote the paper. Alkadrawy MM conducted the survey, collected and organized the data from the questionnaires.

References

Abouabdillah A, et al. 2015. Household food waste in Morocco: An exploratory survey. In *Book of Proceedings of the VI International Scientific Agriculture Symposium "Agrosym*, pp. 1353-1360.

Arous SA, et al. 2017. Exploring household food waste issue in Algeria. *AgroFor.* **2 (1)**.

Berjan S, Capone R, Debs P & El Bilali H 2018. Food losses and waste: A global overview with a focus on Near East and North Africa region. *International journal of agricultural management and development.* **8 (1)**: 1-16.

Capone R, et al. 2016. Bread and bakery products waste in selected Mediterranean Arab countries. *American journal of food and nutrition.* **4 (2)**: 40-50.

Elmenofi A, et al. 2015. An exploratory survey on household food waste in Egypt. In *Book of Proceedings of the VI international scientific agriculture symposium "Agrosym*, pp. 15-18.

Fanelli RM 2019. Using causal maps to analyse the major root causes of household food waste: Results of a survey among people from Central and Southern Italy. *Sustainability.* **11 (4)**: 1183.

Food and Agriculture Organization 2019. Moving forward on food loss and waste reduction. In *The State of Food and Agriculture 2019*.

Gustavsson J, Cederberg C, Sonesson U, Van Otterdijk R & Meybeck A 2011. Global food losses and food waste. FAO Rome.

Jörissen J, Priefer C & Bräutigam K-R 2015. Food waste generation at household level: Results of a survey among employees of two European research centers in Italy and Germany. *Sustainability.* **7 (3)**: 2695-2715.

Papargyropoulou E, Lozano R, Steinberger JK, Wright N & bin Ujang Z 2014. The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of cleaner production.* **76**: 106-115.

Quested TE, Parry A, Easteal S & Swannell R 2011. Food and drink waste from households in the UK. Wiley Online Library.

Sassi K, et al. 2016. Food wastage by Tunisian households. *Agrofor.* **1 (1)**.

Schneider F 2013. Review of food waste prevention on an international level. In *Proceedings of the Institution of Civil Engineers-Waste and Resource Management*, pp. 187-203. ICE Publishing.

[Downloaded from jnfs.ssu.ac.ir on 2026-11-08]

[DOR: 20.1001.1.24767417.2021.6.4.7.5]
[DOI: 10.18502/jnfs.v6i4.7618]