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Original article

An Exploratory Insight into Young Tunisian Consumers' Perception of Sustainable Diet

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Abstract

Sustainable diets are defined as "*diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations*". The objective of this research was to investigate attitudes and behaviors of young Tunisian consumers toward sustainable diet. A sample of 309 Tunisian consumers aged between 20-30 years old was surveyed online. Respondents were asked about their demographic characteristics, their diet, and their concerns about environment and sustainability. Results showed that 91.6% of respondents expressed their interest to environmental issues. For 70.6% whenever it is possible, they declared adopting a sustainable diet. However, 17.8 % of respondents believed that a sustainable diet is expensive and this is dedicated to consumers with financial resources: this highlighted a misunderstanding related to different dimensions of sustainable diet. In this context, further efforts through education and communication need to be conducted.

Keywords: Sustainable Diet, Environment, Survey, Young Consumers, Knowledge, SDG-12.

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INTRODUCTION

Intensification and industrial revolution led to a significant increase in human activity which may threaten Earth resources (Engstrom et al, 2020). Planetary boundaries for sustainable food supply have been already exceeded (Campbell et al, 2017). Consumption of animal derived products (digestive system emission) and intensive farming production (farm equipment fuel, fertilizer manufacture, greenhouse gas emission…) are illustrations of planetary boundaries exceed (Dawson et al, 2019). Unfortunately, such facts contribute on global warming and climate change. World population grew continuously to reach 7.7 billion in 2019, which is 1,860-times the size of what it was 12 millennia ago when world population was around 4 million, and it is expected to reach 10 billion people by 2050 (Vandermeer et al, 2018). In 2019, 8.9% of the world's population are undernourished (FAOSTAT, 2021) while obesity tripled since 1975 to reach 13% in 2016 (World Health Organization (WHO), 2021). Thus, during last decades, efforts were conducted to feed population and to enhance proteins, carbohydrates and energy intake taking into account sustainable production system (Burlingame, 2014).

In the same context the 2030 agenda, adopted by United Nations member states, aimed to achieve sustainable development in an integrated way including economic, social and environmental dimension as illustrated by the 17 Sustainable Development Goals (SDG). Thus, to face environmental challenges and food security, there is a need to rise interest to "sustainable intensification" (SI) of good farming practices (Dawson et al, 2019). In others words, the use of process achieving "higher [and/or more stable] agricultural [food] yields whilst reducing [or reversing] the negative impact of farming [food production] on the environment" (Dawson et al, 2019). In fact, some efforts should be focused on decreasing overuse of natural resources and also greenhouse gas emission because of its impact on climate change (animal food production). According to Steffen et al. (2015), planetary boundaries are a concept that aims to define the environmental limits with which humanity can safely operate (Steffen et al, 2015). These nine planetary boundaries are: climate change, biosphere integrity, land system change, fresh water use, biogeochemical flows, ocean acidification, atmosphere aerosol, stratospheric ozone depletion and novel entities.

Sustainability concept is also adapted to nutrition and diets. The Food and Agriculture Organization of the United Nations (FAO) defined sustainable diet as "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful for biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.". According to this definition, sustainable diet takes into account not only environment but also economy and social dimension. To fulfill these criteria, some good practices need to be adapted such: reducing animal protein consumption, increasing the consumption of vegetable proteins instead of animal proteins, incorporate organic food

in diet, choosing regional and seasonal local food products, use minimally processed food, avoiding food waste, and encourage fair food trade (Dornhoff et al, 2020; Yuksel & Yalmaz Onal, 2021).

Students and young consumers would be future leaders and decision makers. It is important to understand their perception of concepts like sustainable diet, which is becoming a must, to implement efficient strategies to raise awareness on sustainability, thus impacting healthy and sustainable food production and consumption. Perception of sustainable diet among Tunisian students has not been explored yet in scientific literature. This research aimed to evaluate Tunisian students' knowledge and attitudes toward sustainable diet.

MATERIALS and METHODS

This research consisted on an online survey conducted from April 5th until April 19th, 2021.

Data collection

The survey was carried out through a self-administered questionnaire in French language (academic language in Tunisia) through the Google website (www.google.com). The questionnaire consisted on three main sections: (1) Habits, (2) Opinions and perceptions regarding sustainable diet and (3) Socio-demographic characteristics. The main interest was accorded to young consumers in this research. Therefore, responses of respondents whom age was under 20 years or above 30 years were excluded.

Data analysis

Microsoft Excel software for frequency analysis of data and Chi-square tests of independence were used to test for associations with demographic variables, using GraphPad Prism (version 8, 2019). Statistical significance was determined by $p<0.05$.

RESULTS and DISCUSSION

Profile of respondents

Demographics (Table 1) indicate that 67.9% of respondent are aged between 20-25 years old, 68.9% are women and 77.7% are living in urban area. In general, women are more likely to participate in surveys than men (Moore & Tarnai, 2002). Online surveys are not expensive, easy to use and rapid (Bigot et al, 2010; Deutskens et al, 2004). During this study, respondents were selected on a voluntary basis which may explain observed profiles.

Table 1. Survey respondents profile (n=309)

		% of respondents
Age (years old)	20-25	67.9
	26-30	32.1
Gender	Men	31.1
	Women	68.9
Status	Student	78.7
	Other	21.3
Geographic origin	Rural area	22.3
	Urban area	77.7
Number of meals per day	1	0.6
	2	18.5
	3	66.3
	4	14.6
Type of diet	Mixed	74.4
	Vegetarian	6.8
	Semi-vegetarian	6.8
	Ovo-lacto-vegetarian	3.2
	I do not know	8.7

Regarding eating habits 66.3% had three meals per day while more than one third declared to eat more or less than three meals. Such results could be expected based on respondents' age as young consumer might have bad eating habits. When asked about their diet, 74.4% of respondents declared to have a mixed diet. This fact is probably related to the historical background of respondents: despite the growing evolution into "Western diet" and nutritional transition (Abassi et al, 2019), heritage of Mediterranean diet is still preserved in Tunisia. Main respondents, since childhood, used to eat vegetables, fruits, legumes, nuts, beans, cereals, grains and fish. However, changes would be expected in these habits as they become more and more independent and no more living with their families.

Youth perception of natural resources

Young people constitute a large part of the world's population: In 2020, among world's population around 1.21 billion are aged between 15-24 years and in Tunisia, 1.61 million (Ourworld in data, 2021). These young people can play an active role in protecting and improving the environment for the upcoming generations. In this survey, when asked if they are concerned about the environment, 91.6% affirmed they do. Moreover, significant relation was observed between reported concerns and gender, as women were more concerned. These results could be related to globalization. In fact, all over the world there are many rules, laws and conventions related to environment during last decades and information was spread through press, news, and social media to raise citizens' awareness.

Despite the high concerns about environment (Table 2), a clear vision about current situation seems absent among young respondents: when asked about sufficiency of current resources, averages were closer (46.3% yes and 53.7% no) while more than a half of respondents (60.2%) believe that these resources will not be enough for future generations. These findings reflect an awareness of environmental situation due to the communication related to environmental issues. However, this communication did not provide enough specific information: Young respondents are aware of the scarcity in natural resources but they do not have a precise vision to which extent availability of natural resources would satisfy the global demand.

Table 2. Respondents attitude towards environment and natural resources (n=309)

		Total (%)	**Gender (%)**		**Age (%)**	
			Men	Women	20-25 years old	26-30 years old
Do you feel concerned about the Environment?	Yes	91.6	85.4	94.4	91.8	91.1
	No	8.4	14.6	5.6	8.2	8.9
	Chi square		*4.71*		*0.00*	
	P value		*0.02*		*>0.99*	
Do you think that the food resources currently available are sufficient for all the inhabitants of the Earth?	Yes	46.3	53.1	43.2	46.2	46.5
	No	53.7	46.9	56.8	53.8	53.5
	Chi square		*2.02*		*0.00*	
	P value		*0.15*		*>0.99*	
Do these resources guarantee the sufficiency of future generations (50 years)?	Yes	39.8	40.6	39.4	38.9	41.6
	No	60.2	59.4	60.6	61.1	58.4
	Chi square		*0.02*		*0.43*	
	P value		*0.88*		*0.66*	

These results highlight the need to implement new strategies in communication, at national and international scales, focusing on description of current situation. Moreover, dealing with young, it would be useful to implement in educational system topics related to environmental issues to get students familiar with. In this context, there would be a need to clearly communicate about some scientific concepts such: global warming, planetary boundaries (Steffen et al., 2015) and Earth Overshoot Day: the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year.

Young Consumers and sustainable diet

After exploring youth knowledge related to environment, a focus was addressed to sustainable diet (Figure 1). At a first step, respondents were asked about the interconnection between food and environment and its causes. Young consumers are aware about the link between food and environment (91.3%) and the impact of human behavior consequences (Figure 1). The quality of adapted diet might

impact the environment. The real challenge would be improving diet quality while simultaneously reducing environmental impact (Conrad et al, 2018).

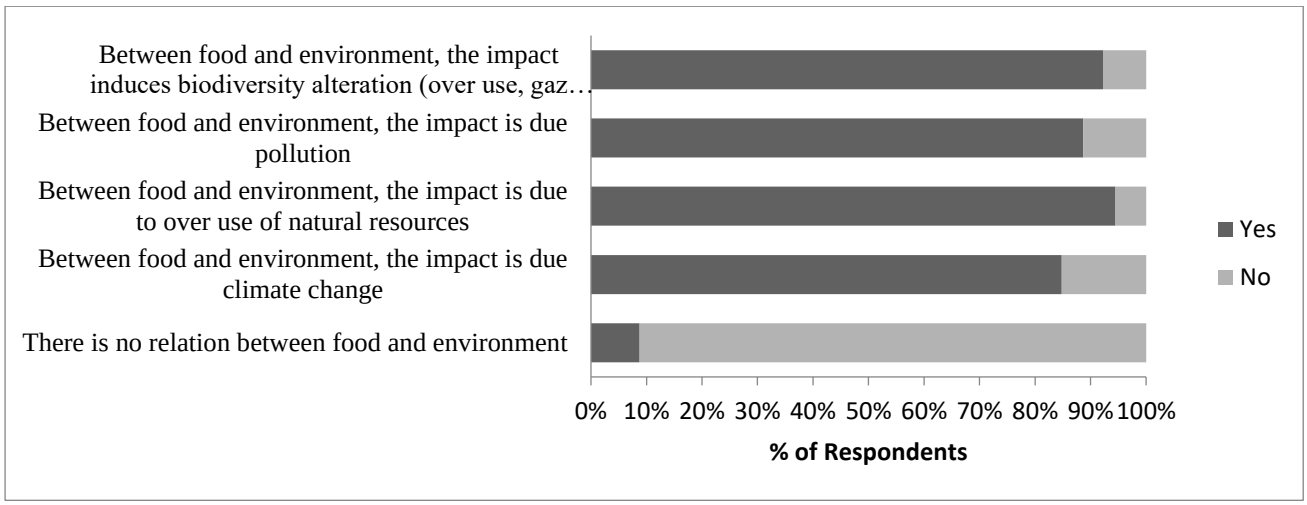


Figure 1. Causes of food environmental impacts according to young Tunisian consumers (n= 309)

On a second step, respondent were asked about the impact of food on environment (Table 3). Interestingly, over 82.9% of respondents declared that food has an important impact on the environment (39.5% huge and 43.4% too much impact). A significant relation was observed with gender and age, particularly with women and younger respondents (20-25). Moreover, when asked about their diet, only 2.9% reported that they always have a sustainable diet while 22.7% stated the difficulty to follow a sustainable diet. Regarding the reasons (Table 3), 17.8% of respondents perceived that a sustainable diet is expensive and this is reserved for consumers who have the financial resources. These finding are in line with those of a previous survey research indicating that 23.3% of Turkish students reported sustainable nutrition as expensive (Yuksel & Yalmaz Onal, 2021). Furthermore, for 28.2% of respondents, although sustainable diet could be more costly, it is important to foster it in order to eat better and to protect the planet. Interestingly, for 47.2%, this diet would not be pricier if eating habits are changed accordingly. These results highlighted two main facts: firstly, the concept of sustainable nutrition is ambiguous for majority of interviewed young consumers, and ways to achieve it appeared to be not clearly defined. Secondly, this survey was conducted with young adults. This category generally has bad eating habits (Yuksel & Yalmaz Onal, 2021). If around one third of respondents (28.2%) agree with the importance of sustainable diet for health and environment despite its cost, this is a clear manifestation of awareness. Altogether, these results reflect the urgent need to clearly communicate about sustainable diet at its different dimensions. A better understanding would encourage young consumers to improve their current eating habits. For instance, eating seasonal and local products does not cost more while it supports sustainable diet.

Table 3. Young consumers and sustainable diet perceptions and attitudes (n=309)

		Total (%)	**Gender (%)**		**Age (%)**	
			Men	**Women**	**20-25 years old**	**26-30 years old**
Do you think that food has an impact on the environment?	Huge impact	39.5	31.3	43.2	42.8	32.7
	Too much impact	43.4	47.9	41.3	43.3	43.6
	Fair impact	14.6	17.7	13.1	12	19.8
	Slight impact	1.3	1	1.4	1.4	1
	No impact	1.3	2.1	0.9	0.5	3
	Chi square		*3.90*		*4.99*	
	P value		*0.04*		*0.02*	
Do you think you have a sustainable diet?	Yes always	2.9	3.1	2.8	3.9	1
	Yes whenever I can	70.6	53.6	78.3	74.9	61.8
	No it is so complicated	22.7	39.2	15.1	16.4	35.3
	No I do not feel concerned	3.9	4.1	3.8	4.8	2
	Chi square		*9.11*		*4.39*	
	P value		*0.00*		*0.03*	
Do you think that a sustainable diet is?	Expensive and reserved for consumers with financial means	17.8	15.8	18.7	18.3	16.8
	Pricier but important to favor it to eat better and protect the planet	28.2	31.6	26.6	30.3	23.8
	Does not cost more if we change eating habits (buy seasonal products, made in Tunisia, waste less)	47.2	40	50.5	44.2	53.5
	Costs less (buy from producers, do not throw food away)	6.8	12.6	4.2	7.2	5.9
	Chi square		*0.55*		*0.44*	
	P value		*0.45*		*0.51*	

To confirm previous hypotheses, respondents were asked about their consumption habits and frequency (Figure 2). More than 60% of respondents reported to always or often consume fast foods. Such high rate of fast food consumption among young adults was previously reported (Larson et al, 2008). Interestingly, for legumes, local and seasonal products consumption, high rates were observed if compared with reported above results (Table 3) where 22.7% estimated that a sustainable diet is complicated to achieve and 46% believed it is expensive (17.8%) or pricier (28.2%): these data might

seem contradictory. This contradiction does corroborate the misunderstanding in young consumers' mind, related to sustainable diet achievement.

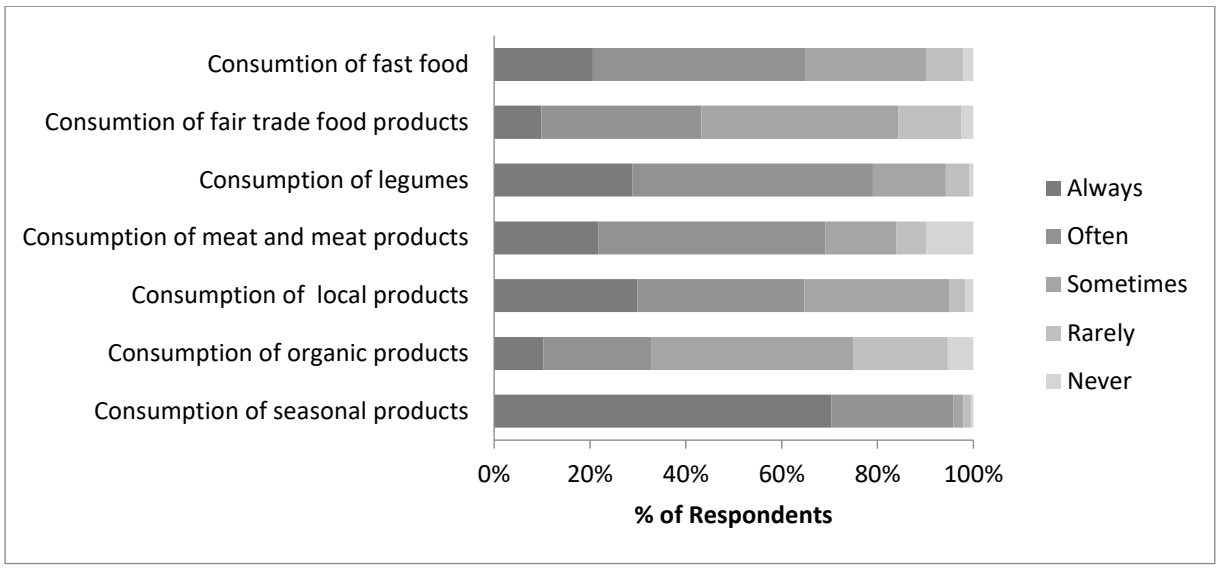
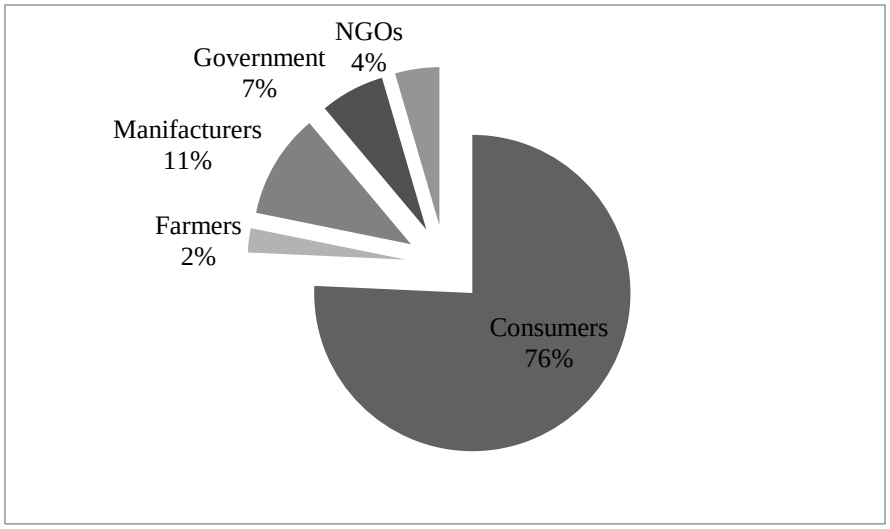


Figure 2. Respondents consumption habits and frequency (n=309)

Environmental and nutritional sustainability

In this survey research respondents were asked about the actors fostering the transition toward sustainable nutrition. As shown in Figure 3, most of respondents (76%) affirmed the role of consumers as the main actor in this process. This is promising since respondents are aware by their responsibility as consumers in reaching a sustainable diet: a clearer vision would be sufficient to achieve the target. As mentioned previously, a better communication would be promoted in this context and would particularly help consumers to optate better-informed choices. According to Burkhart et al. (2020), young consumers are more familiar with environmental sustainability concept and with the interrelationship between diet and environment. In fact, it has been reported that higher quality diets would have a positive environmental impact through lower green gas emissions, water and cropland uses (Conrad et al, 2018).



NGOs: non-governmental organization

Figure 3: Effective actors to achieve sustainable diet

At their scale, respondents are only consumers, not yet active nor decision maker. Thus, they have a significant contribution on food waste rather than strategies making and operating. In a context of sustainable diet, it is important to improve the food quality, and to preserve natural resources, but also to reduce food waste. For this purpose, an interest was accorded to food waste and implication of young consumers. Respondents were asked about the amounts of food products they discard. Results showed that 41% esteemed to through away little amount of food products and 16% affirmed not waste food. These findings may be related to the impact of Covid-19 pandemic. In fact, previous results of Ben Ismail et al. (2021) highlighted the positive impact of Covid-19 crisis on improving students' behaviors toward food waste and rising awareness.

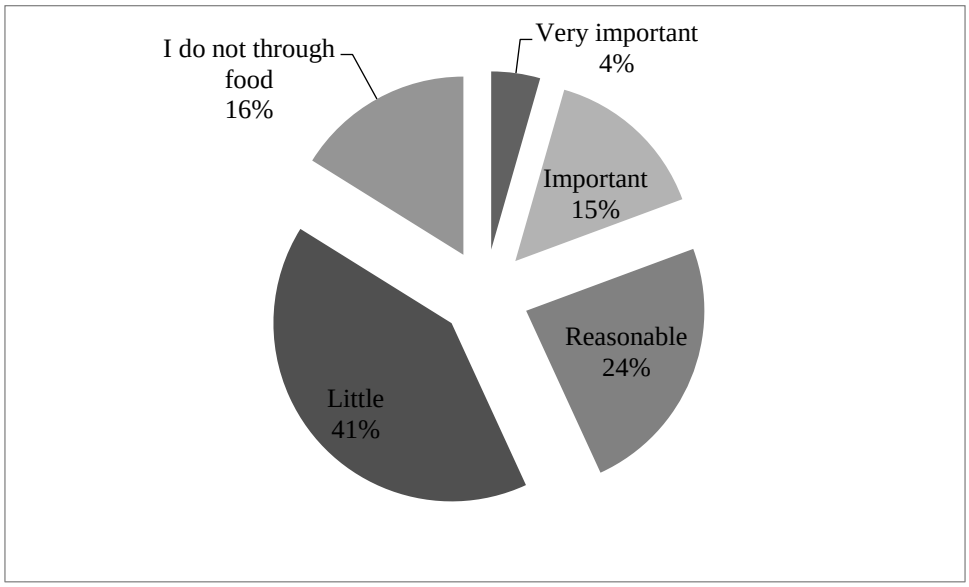


Figure 4. Self estimated food waste amounts by survey respondents (n=309)

To rather improve food waste management among young consumers, we investigated which practices according to them would reduce food waste. Results are summarized in Figure 5. As shown, respondents reported that paying attention to food date labels would be the most effective practice to reduce food waste. This is probably related to educational level of respondents as 78.7% of them were students (Table 1). Food date label plays a key role in prevention of food waste. According to a Swedish household diary study, 20 to 25% of food was wasted because of packaging factors like passing a best-before date (Aschemann-Witzel et al, 2015) which is significant. Respondents also suggested freezing food, reusing and sorting, as actions to reduce food waste. Somehow, they intuitively suggested adopting a 3Rs strategy based on Reducing, Reusing and Recycling (FAO-UNEP, 2014). Rather than avoiding food waste, changes in shopping habits were also recommended: buying goods in small quantities (9%) and using a shopping list (7%) that would be also time-saving. Jribi et al. (2020) have observed a better food shopping performance during Covid-19 lockdown.

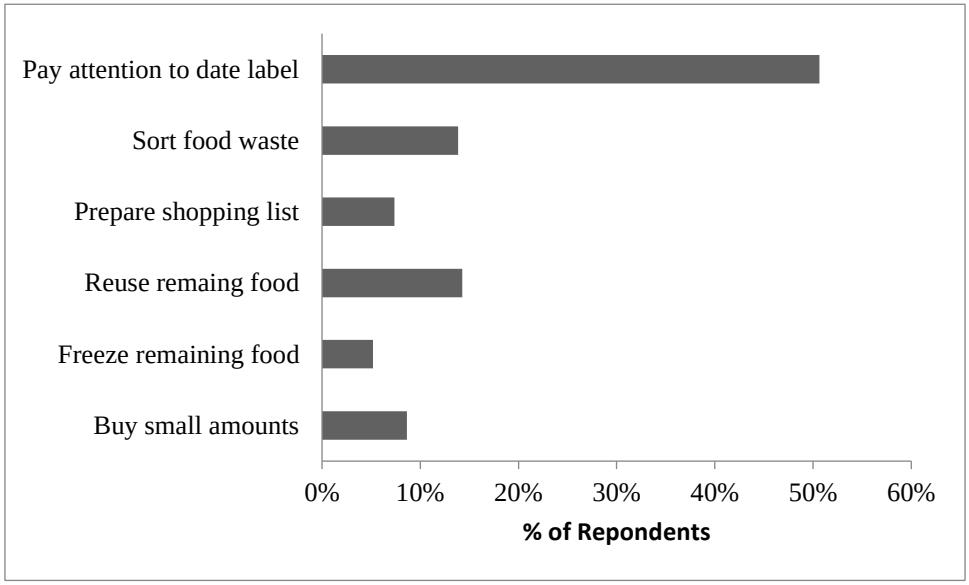


Figure 5. Practices to reduce food waste recommended by survey respondents (n=309)

CONCLUSION

Taking into consideration the growing world population, sustainable diet is becoming more and more a must, rather than an option. To achieve this goal, it is important to integrate different dimensions of the whole food system, from food production to consumption behavior. In this research, a specific focus was addressed to young consumers' perceptions and attitudes toward sustainable diet. Results showed high engagement and interest of young consumers about sustainability. However, there is a lack of a clear definition of sustainable diet. For this reason, strategies should focus on clearer and better communication on sustainability and education on the environmental and health impacts of food choices.

Targeted interventions based on information and empowerment should also favor the consumption of sustainable and healthy food products and reduce food wastage. To the best of our knowledge, this study is the first to provide data on the knowledge and attitudes of young Tunisians regarding food sustainability.

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