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## **Food waste, consumer attitudes and behaviour. A study in the North-Eastern part of Italy**

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Reducing the amount of wasted food is a key element in developing a sustainable food system.

Large quantities of produced food are discarded and, to a large extent, the waste is avoidable. The wastage of food occurs at all stages of the food life cycle, starting from harvesting, through manufacturing and distributing and finally consumption, but the largest contribution to food waste occur at home.

In the past, several studies investigated the amount of food waste in Italy. Nevertheless there is a substantial lack in the knowledge of the reasons linked to waste food at households.

The aim of this paper is to focus on the consumption food waste for exploring the reasons of food waste on family level, which is a significant fraction of total, in order to overcome food wasting behaviour and point out options to design prevention measures.

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### **1. Introduction**

During recent years there has been increasing international interest in the amount of wasted food and its negative consequences. Reducing the amount of food that is wasted is a key element in developing a sustainable food system. In fact, firstly, food waste represents a monetary loss, secondly, has a social impact as it contributes towards increases in food prices, making food less accessible for the poorest and increasing the number of malnourished people (Graham-Rowe et al., 2014; Stuart, 2009), thirdly, contributes to decreasing the quality level of natural resources generating also greenhouse gasses (FAO, 2013 and 2014; WRAP, 2011).

Recently the question of the adverse environmental impact of food waste has shifted from being something of interest to a selected group of researches only, to a position at the centre of public and institutional attention. This is due to the diffusion of more precise information about the economic, social and environmental impacts of the increasing amounts of food wasted especially in the industrialized countries.

The aim of this study is to explore reasons for household food waste with special attention to food waste that can be related to households' behavior, purchase habits, attitudes and life style.

## 2. Background

Large quantities of produced food are discarded around the world (Gustavsson et al., 2011) –as stated by FAO (2011) 280-300 kg per capita per year in developed countries and 120-170 kg per capita per year in developing countries – and, to a large extent, this type of waste is avoidable (Refsgaard and Magnussen, 2009; Swami et al., 2011). The wastage of food occurs at all stages of the life cycle of food, starting from harvesting, through manufacturing and distributing and finally consumption, but the largest contribution to food waste is from homes (EPRS, 2014; FAO, 2011 and 2012; Thøgersen, 1996; Williams et al., 2012). According to the literature review, food losses refer to the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption. They take place at production, postharvest and processing stages in the food supply chain (FAO, 2011; WRI, 2013). Food losses occurring at the end of the food chain (retail and final consumption) are rather called “food waste” (Parfitt et al., 2010; WRI, 2013). It has been estimated (FAO, 2011) that in developing countries 40% of losses occur at post-harvest and processing levels, while in industrialized countries more than 40% of losses happen at retail and consumer levels.

Although consumers were the single biggest contributors to food waste volume, little is known about the drivers of food waste in households (Stefan et al., 2013) and more in general only a few studies to date have investigated on the consumer behavior and on food’s choice. The findings of such research have indicated that, on the one hand, people share an ethic intention not to waste food, but, on the other hand, they tend to waste food (Bolton and Alba, 2012).

The reasons of wasting food have been investigated also in Italy to some degree (Capone et al., 2014; Garrone et al., 2011; Segrè and Falasconi, 2008 and 2011; Waste Watcher, 2013), but there is only little insights about the possible drivers among Italian households. In fact, although the themes covered in these researches represent an important starting point there is still a lack of understanding of the nature of household food waste behavior in Italy. As sustainable household waste management is becoming an important concern for local and national authorities also in Italy a good understanding of factors that contribute to the amount of wasted food seems to be essential if we/they design effective interventions. For these reasons, in the current study, we aim at analyzing food waste by focusing on the consumption to explore reasons of wasting food at family level, which also in Italy is a significant fraction of total, in order to overcome food wasting behaviour and point out options to design prevention measures.

### **3. Methodology**

As food waste is the result of multiple, interacting activities (Cohen et al., 2014; Graham-Rowe et al., 2014; Quested et al., 2011, 2013), we aim at understanding this issue at household level by identifying a number of the main factors affecting food wasting.

To achieve this objective we conducted a survey through the distribution of an anonymous questionnaire to households. The questionnaire was pre-tested in a preliminary pilot study. The data were obtained during a two-month period started in October 2013 using two data collection methods: online questionnaire forms (350) and face-to-face questionnaires submitted by the researchers (162) so as to reach all relevant age groups. Altogether 512 responses were collected. For the data analysis, we used 490 completed questionnaires. However, since the survey was based on a non-probability sampling frame, we might not use the results for statistical inference.

Since our hypothesis is that people's attitudes and individual behaviour may influence the quantity of food waste, in the questionnaire many different statements regarding attitudes to food waste, as well as purchase habits, were investigated and specific questions to the respondents were posed. Moreover individual socio-economic position was estimated using specific questions.

As we were interested in investigating the main explanatory factors in predicting the probability of wasting food in a family, we have elaborated a logistic model. The dependent variable was a dummy, whose value was one if the interviewed stated that usually his/her family wastes part of food they weekly buy and zero otherwise.

### **4. Results**

#### *4.1 Sample characteristics and waste attitudes*

Examination of the sample socio-demographic characteristics indicates a majority of female respondents (59%; Census data: 51%) compared to males (41%; Census data: 49%). Each relevant age group is represented (from 15 years old), 58% of the respondents had successfully completed high school and 27% held a University or postgraduate degree. More than half (59%) are employed, 26% are housewives or students and 9% pensioners ("other" 3%). A vast majority (89%) live in the North-Eastern part of Italy. Fifty per cent was the person mainly responsible for shopping.

Interviewees were also asked to identify their first and second choice of shop they use for their main grocery shopping. The majority undertakes their

main shopping from hyper- and supermarkets. We also asked them to declare if they waste food: 56% stated they do not. We noticed that the more respondents spend during the week, the more they waste. Moreover if respondent is a woman or an elder the probability to produce waste decreases. Fifty-five per cent affirmed they do not waste food. The respondents who usually waste food, throw mainly food and vegetables away. The majority of respondents (89%) stated that the problem of food waste is important, while 31% asked for more information about how to better store food in order to avoid waste.

#### *4.2 Economic analysis: backward stepwise regression*

The model was estimated using the SPSS® (14th version) program with a backward stepwise regression procedure (Tab. 1). All variables were significant at the standard level (95% confidence interval) with the exception of "once-a-week regular shopping" ( $p=0.082$ ) and "grocery shopping" ( $p=0.062$ ).

Although the model is able to correctly estimate the probability of 64.7% of cases, it provides some interesting insights about the factors affecting food wasting.

It has been detected that purchasing behaviour can influence food waste. In fact, food wastage is higher for families that purchase from supermarkets and hypermarkets, that make once-a-week shopping and spend more than 100 euros per purchase.

It seems also that packaging could play an important role in producing food waste, in particular as regard packages that contain a quantity of food larger than real needs.

Moreover, food waste can be related to respondents' and families' socio-economic and demographic characteristics. In detail, the wastage of food decreases with age, but increases with growing educational qualification and family size.

From these results, it seems to be possible to state that family composition and habits are the main factors that can explain the wastage of food. Consumers with higher educational qualification devote a lot of time to work. This characteristic is particularly common in younger families with higher number of children. These people have not enough time to devote to shopping and have to concentrate purchases during a morning or afternoon once a week, to shop from hyper- or supermarkets, where it is possible to choose among several goods in order to satisfy different family needs. By means of the model, it is possible to estimate that the probability of wasting food in such a family, with graduated components, aging less than 30 years, with two children, making once-a-week shopping and spending more than 100 euros is

**Tab. 1.** Estimated model explaining waste food probability in the home

Variable	B	E.S.	Wald	df	Sig.	Exp(B)
I think that waste is an important problem	-0,992	0,325	9,305	1,000	0,002	0,371
Too big packages	0,639	0,229	7,787	1,000	0,005	1,894
Under age 31	1,175	0,461	6,491	1,000	0,011	3,239
Age 31 - 45 years	1,219	0,467	6,813	1,000	0,009	3,383
Age 46 - 60 years	1,055	0,449	5,513	1,000	0,019	2,871
Family size	0,208	0,102	4,108	1,000	0,043	1,231
Years of education	0,097	0,035	7,774	1,000	0,005	1,102
Supermarket and hypermarket shopping	0,638	0,342	3,479	1,000	0,062	1,893
Once-a-week shopping	0,359	0,206	3,019	1,000	0,082	1,431
Food purchase: more than € 100,00	0,474	0,214	4,902	1,000	0,027	1,607
Constant	-3,586	0,757	22,428	1,000	0,000	0,028

  

Right predicted percentage	Predicted			Right percentage
	Yes waste		Right percentage	
	0,00	1,00		
Yes waste	0,00	209	64	76,6
	1,00	103	97	48,5
Global percentage			64,7	

  

-2 log likelihood	Cox and Snell R-squared	Nagelkerke R-squared
580.165	0,13	0,17

76%. On the contrary, among senior consumers with lower educational qualification (primary degree), belonging to single-family units, making shopping at several shops, the probability decreases at 11%.

Nevertheless, it seems worthwhile noting that the opinion about the importance of eliminating wasting could drastically cut wastage probability. For example, referring to younger households, the probability decreases from 76% to 54%.

The estimated model points out that family structure and purchase habits created by the modern socio-economic model gradually widespread in Italy affect food wasting. On the one hand, waste attitudes seem to be an aspect

dominating food waste, as consumers who consider food wastage as being a big problem tend towards decreasing their waste, on the other hand, food waste problem is mainly due to structural characteristics of households. Although young respondents perceived food waste as a problem in urgent need of solution and seem to have high self-consciousness, their consumption style produces waste.

Actually, activities undertaken for increasing consciousness among consumers about the impact of their lifestyle in order to decrease household food waste seem to have only partially determined a certain effectiveness. Nevertheless, areas for future research and engagement to reduce the quantity and impact of food waste are wide, in particular as regards the opportunities linked to the increase of awareness enabling consumption style change.

## **5. Conclusions**

The generation of food waste at home is a complex issue, relating to consumer personality and individual differences (Swami et al., 2011). It could be influenced also by shopping habits and kitchen practices (Stefan et al., 2013). Furthermore, the types of food consumed, their packaging and how they are bought can affect the quantity of wastage (Capone et al., 2014).

As a large quantity of avoidable food waste has been generated also in Italy, the paper developed an analysis of consumers' attitudes and behaviour in order to increase research knowledge about drivers of food waste in Italian households, to support institutional intervention aimed at improving consumers' awareness about the importance of reducing household food waste.

Although the households that participated did not represent the average population, this study has provided useful information about drivers that influence households' behavior with respect to food waste. In detail, it has highlighted specific factors that may motivate household food waste. In fact, results showed that attitudes, age, and income affect waste behavior significantly. Moreover, the findings identify the relationship between household waste production and consumption styles pointing out some structural drivers linked to modern lifestyle that seem to be able to influence consumers' food waste. As expected based on previous research (Stefan et al., 2013), planning and shopping routines are important predictors of food waste behavior. In addition, socio-economic and demographic household characteristics make a significant contribution toward food wastage explanation. This finding seems to imply that activities undertaken to raise consumers' awareness could have only partially effectiveness. However, as we still lack knowledge as regards for example what kind of attitudinal and control beliefs are the most impor-

tant in relation to food wastage (Stefan et al., 2013), it seems that highlighting the benefits of reducing household food waste by providing more information could support people to reduce food waste (European Commission, 2014; Segrè, 2012; Williams et al., 2012). A number of studies stated that consumer engagement and working with retailers and food manufacturers to help consumers to buy the right amount could improve food wasting (Graham-Rowe et al., 2014; Quested et al., 2011). Moreover, it seems that institutional intervention could affect consumers' stated attitudes (Cohen et al., 2014): in particular, if dialogue can stimulate new thoughts and encourage people to act more altruistically (Refsgaard and Magnussen, 2009) it could be useful to increase co-operation between food value-chain actors. Consequently, findings provide insight about the elements of consumer behavior and practices that can be discussed and influenced to reduce household food waste and its environmental and economic impacts, also if structural lifestyle characteristics may be barriers not easy to be overcome. The elements that the study has identified could be seen as potential aspects to be targeted in household food waste minimization institutional initiatives, remembering also the importance of facilitating the donation of wholesome surplus food to reduce waste and to support sustainable consumption (Segrè, 2012).

Considerable amount of research remains to be done to explain better the phenomenon of food waste, which, in any case, represents a relatively new research field (Katajajuuri et al., 2014). Future research is required to better understand consumer behavior, in order to provide people with practical tools to improve their habits. In particular, it seems that multidisciplinary research would increase the opportunities of identifying best practices and effective ways to implement waste reduction.

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