

**FOOD WASTE WITHIN HOUSEHOLDS: A REVIEW ON THE GENERATED QUANTITIES
AND POTENTIAL FOR PREVENTION**

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Abstract

Food waste is among the priority streams for waste prevention worldwide because it is generated at large quantities at all levels of the food production and consumption chain, in both developed and developing countries, throughout the year. Previous research indicates that food waste produced by households is one of the most significant parts of the overall food waste stream, at least in developed countries. This paper overviews the generation of food waste within households and investigates the potential for prevention.

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1. INTRODUCTION

Recently, Food and Agricultural Organization estimated that approximately one third of food produced for human consumption is either lost or wasted through the food supply chain, from agricultural production and post-harvest handling and storage to processing, transportation, distribution and consumption (Gustavsson et al. 2011 for FAO). According to a (preparatory) study for food waste in the EU-27, the retail-wholesale sector produces approximately 5% of the total amount of food waste, the manufacturing sector 39%, households 42%, while food service - catering 14% (EC, 2011). However, from a worldwide point of view, the contribution of each sector differs substantially due to a range of reasons dependent on the socio-economic conditions of each country. Parfitt et al. (2010) stated that in developing countries food losses are higher at the immediate post-harvest stages, while in industrialised and developing economies they are higher for perishable foods after they have been prepared for market, or, in fact, sold to the consumer; *“for affluent economies, post-consumer food waste accounts for the greatest overall losses”*. A recent analysis of the food supply sectors by region, showed that wastage occurring at consumption level is much more variable, with wastage in middle- and high-income regions, but much lower in low-income regions (FAO 2013). Back in 2009 WRAP (2009) estimated that consumers in the UK throw away 31% of the food they purchase for consumption. Since then, food waste at the consumption and household level is becoming an increasingly significant global issue. There is growing evidence that the contribution of the households to the food waste problem is particularly significant (Sharp et al. 2010, EC 2011). In EU-27, households are responsible for 42% of the total amount of food waste generated (EC 2011).

In order to tackle food waste generation in households, a number of socio-demographic, behavioural and attitudinal factors that could have an impact on food waste reduction have been studied (Evans 2012a, Koivupuro et al. 2012, Stefan et al. 2013). Koivupuro et al. (2012) showed that the amount of food waste

generated in Finnish households is statistically correlated with the size and the type of household, the gender of the person who has the main responsibility for shopping, people's view on the waste prevention potential, the provision of food products in low prices, and the household's view on the impact of purchasing different package sizes. Understanding such behaviours is crucial for planning effective campaigns for food waste reduction: groups of people to focus on, channels of engagement and design of campaign material (WRAP 2009). From a sociological point of view, Evans (2011, 2012b) argued that *"household food waste cannot be conceptualised as a problem of individual consumer behaviour"*, rather than a matter of social and material (e.g. *"material infrastructure of provision"*) conditions in which food is provisioned.

Among the different waste prevention initiatives that can be implemented by waste-stream at the household level, food waste ranks the top stream with the highest prevention potential (Cox et al. 2010). Besides the obvious environmental impacts of food waste, they are also associated with economic impacts, such as business and consumers' savings (Nahman et al. 2012), social and ethical issues, such as global food and water security (Koivupuro et al. 2012), expanding dimensions of malnutrition, in both hunger / undernourishment (Nahman et al. 2012) and obesity terms (Parfitt et al. 2010). This paper reviews the evidence on the amounts of food waste in the households and their causes.

2. AN OVERVIEW OF FOOD WASTE

2.1 Seeking a definition

By definition, food waste is *"composed of raw or cooked food materials and includes food loss, before, during or after meal preparation in the household, as well as food discarded in the process of manufacturing, distribution, retail and food service activities"* (EC, 2011), while food loss *"refers to a decrease in mass (dry matter) or nutritional value (quality) of food that was originally intended"* but is no

more suitable “*for human consumption*” (FAO, 2013). Food wastage comprises both food waste and loss. However, Scheider (2013) indicated that there is no fully agreement on a definition of food waste as regards prevention. In order to pass this obstacle, food waste in literature is quite often split into two categories, regarding their prevention potential: avoidable and non-avoidable food waste. Waste prevention measurements aim at the reduction of the former (Schneider, 2013).

2.2 Qualification and quantification

In order to quantify the food wastage from households, two main options are available: the first one is to ask the consumers to self-weigh the food items that they discard and fill a diary during a certain period of time. The second is to search in the final depository of household food waste, i.e. the municipal garbage bins, and conduct a waste composition analysis. Both approaches have their advantages and disadvantages (Zorpas and Lasaridi, 2013). The composition analysis usually lack information about the criteria for the definition of food waste categories and the classification of food items (Lebersorger and Scheider, 2011). Therefore, most of the relevant studies are not reproducible (Lebersorger and Scheider, 2011).

3. BEHAVIOURS AND ATTITUDES OF HOUSEHOLDS TOWARDS FOOD WASTE

At the household level, food waste generation is strongly associated with socio-economic parameters (age, income, marital status) as well as with certain attitudes and behaviours, such as meal planning, cupboard checking and list making before going for shopping, proper storage of food items, use of food leftovers, cooking the right amount of food and good understanding of expiration date labels (WRAP 2009; Abeliotis et al. 2012a, 2012b, 2014; Koivupuro et al. 2012; Stefan et al. 2013; Quedsted et al. 2013). However, studies also indicate that parameters of food provision such as packaging also affects the

generation of food waste (Langley et al. 2011, Evans 2012b, Williams et al., 2012).

The study of the behavioural aspects of waste prevention has only recently appeared in the literature and is still very limited. Findings so far indicate that waste prevention behaviour has different dimensions from recycling behaviour and therefore requires different approaches to increase people's engagement to relevant policies (Bortoleto et al. 2012). These authors developed and tested a structural equation model, as a variant of the Theory of Planned Behaviour (TPB) for the prediction of household waste prevention. Focusing on food waste, Stefan et al. (2013) applied the TPB to the study of food waste prevention behaviour of consumers in Romania. According to their findings, for the Romanian consumers, food waste generation is mainly driven by routines related to food provisioning rather than by a conscious intention not to waste food. In spite of the indisputable value of these pioneering studies on waste prevention behaviour, as well as the studies of WRAP (2009), Koivupuro et al. (2012) and Schneider and Lebersorger (2009) on the patterns and causal factors of food waste generation, more research is needed, in order to guide efficient campaigns to promote households engagement in food waste prevention initiatives.

4. BEST PRACTICES ON FOOD WASTE PREVENTION

The Paradigm shift in the waste and resources management sectors, that will actually achieve significant and measurable prevention and ultimately contribute to sustainability, has as prerequisite the implementation of effective strategies. A range of waste prevention strategies, targeting households, with varying degrees of success, have been applied in several EU countries. The strategies applied fall into three categories with different levels of engagement of central or local authorities: i) diffusion of information; ii) promotional campaigns; and iii) setting regulations. According to the European Commission (EC, 2012), "these strategies are complementary and can be integrated into other relevant

existing policy areas or can compose a stand-alone national waste prevention programme”. A range of best practices for food waste prevention is presented and briefly analysed below, to feature good examples and stimulate waste prevention.

4.1 “Love Food Hate Waste” campaign, WRAP, UK

This has proved to be one of the most successful food waste related awareness campaigns. Over the first two years of its application (from its launch in 2007 to 2009) in the UK, it contributed to the prevention of approximately 137,000 tonnes of food waste. The campaign aims at raising awareness, personalising the issue of food waste prevention, and developing “encourage and enable” actions. Consumers are its target group and are approached in both direct and indirect ways (via strategic partners, i.e. local authorities, institutes and retailers). The focus point of the campaign is to provide simple, easily adoptable solutions, which will cause small changes in consumers’ daily routine and lead to waste prevention (<http://lovefoodhatewaste.com>).

4.2 Réduisons nos Déchets, National Authority 2005, France

The awareness campaign “Réduisons nos Déchets” (Reducing our Waste) was developed by the ADEME, the French Environmental and Energy Management Agency, in order to provide information to households about waste generation and prevention. This campaign also participates and promotes the European Week for Waste Reduction (EWWR) initiative (<http://www.reduisonsnosdechets.fr>).

4.3 The WASP-Tool project, Greece

The co-funded by the LIFE financial instrument “WASP Tool” project (full title: “Development and Demonstration of a Waste Prevention Tool for Local Authorities” – LIFE10 ENV/GR/622”) has been elaborated, in order to investigate, demonstrate and optimise the waste prevention potential at the Local Authorities (LA) level, in the Mediterranean area, in the different geographic and waste policy context of

Greece and Cyprus. More specifically, it facilitates the implementation of the WFD with respect to waste prevention, through the development of a web-based Decision Support Tool, the WASP Tool (acronym of the words Waste Prevention) that enables LAs to select and implement the optimum waste prevention programme for their local circumstances and prepare their Waste Prevention Plans. Within this framework, a food waste prevention intervention is being conducted in three municipalities - Municipality of Chania and Municipality of Heraklio in Crete, Greece and Municipality of Paralimni, Cyprus. Prior to the intervention, approximately 100 kg of food waste per person were generated annually. The research is ongoing and therefore, data for the potential food waste reduction after the will be included in the database in the near future.

5. CONCLUSIONS

Food waste is a stream with multiple social, economical and environmental implications generated throughout the life cycle stages of food. Among those stages, in developed countries, such as Greece, the role of the households in the generation of food waste is very important. Therefore, in order to demonstrate its prevention potential, quantification of the household food waste is required, so that the key sources of its generation are identified.

Effective actions are underway by international organisations, central and local authorities in various countries, as well as the private sector, setting precedents for worldwide adaptation and replication. Among them, some initiatives focus on restraining unsustainable consumption patterns. Yet, much more work needs to be done, engaging the main principles of sustainable production, supply, consumption and discard patterns and waste management. Moreover, there are still several barriers and challenges, such as methodological limitations, conflicts of interest and established human attitudes and behaviours that need to be resolved. An effort to approach waste prevention targets, considering social and market patterns,

might hold a key to the design of effective waste prevention measures and the move to the - so needed - resource efficient societies.

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