

FOOD WASTE PREVENTION: LESSONS FROM THE LOVE FOOD, HATE WASTE CAMPAIGN IN THE UK

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SUMMARY: This paper identifies and critically evaluates common characteristics of Love Food Hate Waste (LFHW) campaigns' local activities through analysis of their case study reports. The paper also describes the processes required to build up this campaign in order to facilitate application of successful outcomes of the LFHW campaign in the UK to other countries. We showed through analysis of case studies that the Waste and Resources Action Programme (WRAP) examined several methods in the early stage of the LFHW campaign and chose "Local Intensive Campaign", "Roadshow", "Cookery Course" and "Cascade Training" as effective methods. These were often adopted in the later case studies. Two case studies of local intensive campaigns showed a reduction of around 15% in avoidable household food waste. In relatively large-scale campaigns, radio, local newspaper and bus adverts were often used for publicising the campaign messages. In small-scale campaigns, unique local and outdoor adverts were adopted, often in cooperation with various partners, instead of mass media and transit adverts. Almost all local intensive campaigns included roadshows as a face-to-face approach. A cost per household of about £0.3 was reported in three cases. The unit cost was reduced by conducting wide-area campaigns in collaboration with multiple local authorities. Partnership campaigns with major retailers and local authorities enable direct face-to-face communications with a large number of people.

1. INTRODUCTION

We waste astonishing quantities of food. The FAO have estimated that of the 4 billion metric tonnes of food produced for human consumption globally every year we lose or waste one-third via poor practices in harvesting, storage, transportation, and market and consumer wastage (FAO, 2011). In addition, the Institution of Mechanical Engineers (2013) has pointed out that substantial amounts of land, energy, water and fertilisers are lost in the creation of foodstuffs that end up as waste. Among countries that struggle to prevent food waste, it has been reported that the UK succeeded in preventing 21% of avoidable household food and drink waste between 2007 and 2012 (WRAP, 2013b). These savings were considered to be at least partly the result of the Love Food Hate Waste (LFHW) campaign and related activities launched by the Waste and Resources Action Programme (WRAP) in 2007.

WRAP and its members published many reports about their various LFHW campaigns. Quested et al. (2011) reported an outline of their research and the results utilised for preparing

the LFHW campaign as well as some examples of these activities and their impact. Quested et al. (2013) explained further the strategy of the LFHW campaign and its related activities with retailers and manufacturers. They added more research results related to food waste behaviours. Goodwin and Barthel (2013) described the process of building up and developing the LFHW campaign. The OECD published a case study report about food waste prevention in Japan and UK (Parry et al., 2015). This report outlined the LFHW campaign and related activities with retailers and manufacturers, their impact as well as an outline of UK policies and actual situations about food waste. The OECD report also suggested that following following four factors are important for successfully reducing food waste; 1) An evidence-based strategy, 2) An integrated approach such as integration of large scale awareness raising campaigns, local / community engagement to influence behaviours and changes of the retail environment, 3) A framework for action with collective targets of businesses and 4) Monitoring and reporting. WRAP provided a resource list of household food and drink waste that included the above reports (WRAP, 2016a). It also listed case studies evaluating local activities under this campaign. However, none of this literature reviewed the evidence across these case studies.

Some literature reviews about waste prevention have mentioned LFHW campaigns. Cox et al. (2010) reviewed the evidence about household waste prevention and introduced the LFHW campaign as an example of a way to increase self efficacy by providing tips on how to perform an activity and an example of raising the visibility of prevention by identifying specific behaviours. Sharp et al. (2010a) reviewed household waste prevention intervention campaigns at the local level and mentioned the LFHW campaign and the Love Food Champions which was one of the programmes under the LFHW campaign. Sharp et al. (2010b) examined how to measure waste prevention through literature review and also mentioned the Love Food Champions case. But there was no detailed analysis of the types of and outcomes from LFHW campaigns in these reviews.

In order to apply the successful outcomes of a LFHW campaign to other countries, it is necessary to find common characteristics of the local campaigns undertaken. This paper identifies and critically evaluates common characteristics of LFHW local activities through analysis of their case study reports. It also describes the processes required to build up campaigns of this nature.

2. METHOD & MATERIALS

2.1 Literature review and investigation of WRAP website and its archives

In order to describe the process of building up the overall LFHW campaign, we reviewed papers and reports relating to a range of LFHW campaigns. We collected information and reports from WRAP's present website and its archive sites. We utilised the UK Government Web Archive (National Archives, n.d.) and the Wayback Machine (Internet Archive, n.d.).

2.2 Comparative study of case study reports

WRAP has published a number of reports and materials about food waste. The major reports are listed in the Household Food and Drink Waste Resource Listing (WRAP, 2016a) This includes some case study reports as well as a web page of local authority communications case studies (WRAP, n.d. a). WRAP provides further reports and materials to partners through its resource library web site (WRAP, n.d. b). In this study, we chose case studies related to the LFHW local activities from the first two listings and the WRAP web site. However, we have excluded food bank activities case studies because they are characterised as reuse services and require different consumer behaviors from the food waste prevention behaviours that the

LFHW is promoting. We have also excluded case study reports that do not mention the year in which intervention started because we analysed the process of the LFHW local activities' development and the associated trends chronologically, from the year an intervention began. The case studies we examined in this paper are listed in Table 1.

WRAP has supported various local campaign activities. However not all local activities were reported and published. We examined what types of cases have been reported and what kinds of activities were adopted in the later cases on the basis of the cases WRAP reported.

We conducted categorisation and comparative analysis of the case studies to explore both common and different characteristics among them. Interventions in LFHW local campaigns were classified into two major categories. One is "Campaign" and the other is "Face-to-face approach". We define "Campaign" as activities that aim to appeal to many people with various media, and define "Face-to-face approach" as activities that aim to communicate directly with someone either individually or in a small group. We have divided interventions into these two categories because they are expected to have different functions. A main goal of a campaign is to raise people's awareness, while a main goal of the face-to-face approach is to promote behavioural changes. We categorized interventions in case studies into more groups and compared them with each other in order to characterise them.

3. PROCESS TO BUILD UP THE LOVE FOOD HATE WASTE CAMPAIGN

3.1 Outline of WRAP

WRAP is a not-for-profit company limited by guarantee, launched in 2000 (WRAP, 2001). It has been a registered charity since 2014 (WRAP, 2016b). WRAP aims for a world in which resources are used sustainably. It works with governments, businesses and communities to deliver practical solutions to improve resource efficiency (WRAP, n.d. c). Its activities range from research and collecting evidence to collaboration through voluntary agreements, campaigns, grant-making and investment, and evaluation of impact. Its activities are focused on food and drink, clothing and textiles, and electricals and electronics under its 5-year plan from 2015 to 2020 (WRAP, 2016b). The average number of full-time equivalent staff was 172 in FY2016. The total income for 2015/16 was £26.8m, of which £24.0m was from central government and devolved administrations (WRAP, 2016c).

WRAP was established in response to Waste Strategy 2000 for England and Wales (DETR, 2000), which called for a dedicated new body, the Waste and Resources Action Programme, to be set up to promote more sustainable waste management, especially to overcome market barriers to promoting reuse and recycling. The government required that WRAP have such functions as market facilitation, including consumer awareness, promoting investment in reprocessing, research management, information management, advice, guidance and technical support. WRAP was clearly expected to promote action and collaboration as well as to conduct research, from the beginning of its establishment.

3.2 Until the Beginning of Discussions about Food Waste Reduction

Characteristics of WRAP's activities at the first stage were shown by the OECD Environmental Performance Reviews in 2002 (OECD, 2002). WRAP's objectives were to create stable and efficient markets for recovered materials and products, and to remove barriers to waste

Table 1. WRAP's Love Food Hate Waste local campaign case study reports. * the year an intervention began.

No.	Year*	Case Name (Area, Partner, Campaign etc.)	Report Category	Report Title	Types	URL
1	2007	Kent	Local Authority communications case study: Kent County Council	Love Food Hate Waste Campaign	Local intensive campaign, Roadshow	https://partners.wrap.org.uk/assets/3599/
2	2008	Herefordshire and Worcestershire	Local Authority waste prevention case study: Herefordshire and Worcestershire Councils	Love Food Hate Waste campaign	Local intensive campaign, Door to door engagement, Roadshow	http://www.wrap.org.uk/sites/files/wrap/WRAP_herefordshire_worcestershire_LFWH_v31.pdf
3	2008	Cumbria	Local Authority communications case study: Cumbria	Podcasts for Love Food Hate Waste Cumbria County Council	Single method, Roadshow	https://partners.wrap.org.uk/assets/3597/
4	2008	York and North Yorkshire	Local Authority communications case study: York and North Yorkshire Waste Partnership	Reducing food waste by providing training for Local Communities	Food waste reduction challenge, Roadshow	https://partners.wrap.org.uk/assets/3603/
5	2008	Women's Institute		Love Food Champions	Cookery courses, Workshop, Cascade training	http://www.wrap.org.uk/sites/files/wrap/LFC%20draft%20FINAL%20report%20171008-FINAL.pdf
6	2009	South West	LA waste prevention case study: South West Waste & Recycling Partnership	Local authority partnership waste prevention campaign based on Love Food Hate Waste	Local intensive campaign, Roadshow	https://partners.wrap.org.uk/assets/3602/
7	2009	Greater Manchester (Launch event)	Local Authority waste prevention case study: Greater Manchester	Love Food Hate Waste campaign launch Greater Manchester Waste Partnership	Single method	http://www.wrap.org.uk/sites/files/wrap/WRAP_greatman_lfw_v4_hr1.pdf
8	2009	Greater Manchester Student Master Chef	Case study: Greater Manchester	Love Food Hate Waste Student Master Chef	Cookery courses	https://partners.wrap.org.uk/assets/3600/
9	2011	Worcestershire	Love Food Hate Waste case study: Worcestershire County Council and the University of Worcester	Reducing food waste through community focussed initiatives	Local intensive campaign, Roadshow, Cookery courses	http://www.wrap.org.uk/sites/files/wrap/2011.11.Worcestershire.CC_LFWH_2011_case_study.3e14035c.11397.pdf
10	2011	Retailers and brands activities		What retailers and brands are doing to help you reduce food waste.	Retailer's activity	https://partners.wrap.org.uk/assets/3596/
11	2011	Women's Institute		The WIs Let's Cook Local National Cookery Courses	Cookery courses, Cascade training	https://partners.wrap.org.uk/assets/4095/
12	2012	West London		West London Food Waste Prevention Campaign Evaluation Report	Local intensive campaign, Roadshow, Cookery courses, Cascade training	http://www.wrap.org.uk/sites/files/wrap/West%20London%20Food%20Waste%20Campaign%20Evaluation%20Report.1.pdf
13	2012	Derbyshire	Love Food Hate Waste case study: Derbyshire County Council	Derbyshire County Council's Love Food Hate Waste Christmas Campaign	Local intensive campaign	https://partners.wrap.org.uk/assets/4086/
14	2012	Oxfordshire	Love Food Hate Waste case study: Oxfordshire Waste Partnership/Community Action Group Project December 2013	Oxfordshire's "Dinner in" Project	Cookery courses, Cascade training	https://partners.wrap.org.uk/assets/4090/
15	2014	10 Cities campaign		Love Food Hate Waste 10 Cities: 7 retailers! July-September 2014 and beyond	Retailer's activity, Roadshow, Cascade training	http://www.wrap.org.uk/sites/files/wrap/LFWH%2010%20cities%20launches%202014%20July-Sept%20-%20Retailer%20case%20studies.pdf
16	2014	Save More activities	Love Food Hate Waste - Save More	Helping people to save money by reducing food waste in Edinburgh	Workshop, Cascade training	
17	2014	Save More activities	Love Food Hate Waste - Save More	Helping people to save money by reducing food waste in Swansea	Workshop, Cascade training	
18	2014	Save More activities	Love Food Hate Waste - Save More	Helping people to save money by reducing food waste in Derbyshire	Workshop, Cascade training	

minimisation, reuse and recycling. Behind substantial government funding (over £40m for 2001–2003), WRAP comprised seven major programmes. Four of them dealt with specific material streams, that is, paper, glass, plastic and wood, with the other being financial mechanisms, procurement, and standards and specifications. WRAP provided funding to companies and academia for research & development and capital investment projects, market research and studies, training programmes, seminars and other forms of information provision and awareness raising. Although WRAP's objectives included waste minimisation and reuse even at that time, all targets were related to recycling (WRAP, 2003). At the end of FY2001, 40 people in total were working for WRAP (WRAP, 2002). At this stage, there was no major project on food waste reduction.

In 2002, a new governmental waste strategy in England “Waste not, Want not” (Strategy Unit, 2002) was released. This strategy required that WRAP should initiate new waste awareness and waste minimisation programmes, as well as recycling programmes addressing kerbside best practise and organic market development. One waste minimisation programme WRAP was requested to develop was an initiative for retailers to reduce packaging and food waste generated by households. This was the first food waste reduction programme we found relating to WRAP.

WRAP published a new 2004-2006 business plan in response to “Waste not, Want not” (WRAP, 2004). In this business plan there was no specific description of household food waste reduction programs. However, internal discussions on food waste were started in early 2004 (Goodwin and Barthel, 2013). In 2005, WRAP launched the Courtauld Commitment, a voluntary agreement aimed at improving resource efficiency and reducing waste within the UK grocery sector (WRAP, n.d. d). This is the programme that WRAP was requested to develop in “Waste not, Want not”. However, at this stage, the agreement went only so far as to say that food waste was an issue worth investigating further and one on which the grocery sector could work with WRAP (Goodwin and Barthel, 2013). A WRAP report said, “Good information on the types and quantities of food waste, along with reasons why the waste is produced, is crucial in working with the food industry on reducing household food waste and for the development and targeting of the consumer-facing Love Food Hate Waste campaign which was launched in November 2007” (Exodus Market Research, 2008).

Then, in its 2006-2008 business plan (WRAP, 2006), WRAP set as its target the reduction of household food waste by 100,000 tonnes. To meet this target, WRAP needed to find out what consumers were throwing away and why. Working closely with the retail sector, WRAP wanted to address the way food was packaged and sold, and the behaviour of consumers that leads to food waste. It also said, “We need to undertake some carefully designed consumer research to identify appropriate and persuasive messages and to identify exactly what practical actions consumers should be taking to reduce food waste”.

3.3 Developing Evidence towards Food Waste Reduction

WRAP launched a major research programme in 2005 to reveal the nature, scale, origin and causes of post-consumer food waste (Exodus Market Research, 2008) and published the research summary “Understanding Food Waste” in March 2007 (Goodwin and Barthel, 2013; WRAP, 2007). This report immediately attracted a positive response from mass media and the public (Goodwin and Barthel, 2013). The response led to further investment of time and effort in the issue and it evolved into a report called “The Food We Waste” (Goodwin and Barthel, 2013; Exodus Market Research, 2008).

“Understanding Food Waste” listed some studies that were conducted to find out more about what food we waste, why we waste it and what can be done to change consumer attitudes and behaviour. As the initial research activity, 10 focus group interviews were conducted in 2006 to

investigate attitudes to food purchasing and disposal as well as storage and consumption (Ipsos MORI, 2007). Then, building on the above qualitative work, surveys were carried out in 2006 to investigate consumer attitudes and behaviours relating to food and food waste, and what might motivate consumers to throw away less food. Interviews with 1,862 GB households aged 16 and over were conducted for this survey. The results of the work fed directly into the development of the LFHW campaign (Brook Lyndhurst, 2007). In addition, consumer research was conducted to examine perceptions of self-dispensing systems. Packaging solutions with the potential to cut food waste was examined by a market survey of packaging formats and technologies. Some of IT resources in helping consumers waste less food was developed and tested (WRAP, 2007). These research results were summarised in the “Understanding Food Waste” report.

Besides these research efforts, WRAP carried out a major study between 2006 and 2008 to estimate in detail the nature, scale and origin of food waste through a compositional analysis technique combined with survey work on household attitudes, claimed behaviour and socio-demographics. For this purpose, 2,939 householders were surveyed. A food waste diary research was also conducted. A total of 284 diaries were returned and used to provisionally quantify the amounts and types being thrown away and also to link the reasons for disposal with the types of food disposed. These studies resulted in the report “The food we waste” (Exodus Market Research, 2008).

Through these research projects, WRAP developed an evidence base of food waste and launched the LFHW campaign based on the findings. Even after launching the campaign, WRAP continued to study major food waste in detail, to investigate potential reduction of food waste by improvement of packaging and sales promotion, and to carry out case studies of local campaigns and community engagement. Among these initiatives, we reviewed and examined case study reports of local campaigns and community engagements, and have described them in section 4.

3.4 Outline of Love Food Hate Waste Campaign

In June 2007, WRAP launched the LFHW campaign, with a launch event at London’s Borough Market, where a celebrity chef demonstrated food waste-saving recipes and tips (Goodwin and Barthel, 2013). The aims were to raise awareness of the need to reduce the amount of food that we throw away, and how doing this will benefit both the environment and us as consumers (WRAP, n.d. e). The campaign communicated directly with consumers and also through a wide range of partner organisations – grocery retailers, food manufacturers, local authorities and community groups.

Activities used in the campaign included extensive media coverage of food waste that highlighted the scale of the issue and provided general tips and advice, and guidance related to specific themes, for example, catering for large numbers, homemade lunches and leftovers at Christmas (Quested et al., 2013). Tools, hints, tips, recipes and ideas to help people waste less were also made available via numerous channels (e.g. websites and recipe cards in supermarkets). Partners’ activities were also a part of this campaign. For example, grocery retailers asked customers to support food waste reduction (WRAP, n.d. f), and local authorities’ LFHW initiatives helped local residents through local public relations, road shows and cookery demonstrations (Quested et al., 2011, 2013) (as shown in a later section). Opportunities to break bad habits picked up during times such as following retirement and during university studies have also been utilised in the campaign (Quested et al., 2013). WRAP reported in its FY2008 annual review that the national campaign was complemented by WRAP-supported LFHW activity to 114 local authorities in 16 partnerships (WRAP, 2009a). Quested et al. (2011) showed as an example of its activities that more than 300 local authorities run LFHW initiatives that help local residents.

Community-level engagement with face-to-face communication is an important component of the LFHW campaign. WRAP has developed partnerships with a number of organizations, such as the Women's Institute, and deliver workshops and programmes to help consumers build confidence around food, and realise the benefits of wasting less (Quested et al., 2011). Community-level engagement with face-to-face communication can be very effective. However, the challenge is influencing sufficient numbers of people to make a sizeable difference (Quested et al., 2013). To address this challenge, WRAP used "cascade training" approaches, where they (WRAP) train a group of people who each train further people.

Alongside these campaign activities, WRAP has also been working with partner companies and organizations to make technical changes to the retail environment, such as in the way food is packaged, labelled and sold and its shelf-life (Quested et al., 2013; WRAP, 2017b). This consists mainly of three areas: (1) buying the right amount (e.g. 25% off an item rather than giving volume offers such as "buy 3 for the price of 2"), (2) keeping what people buy at its best (e.g. selling a pack of cheese that can be reclosed) and (3) helping people use what they buy (e.g. improving freezing guidance such as moving away from "freeze on day of purchase" to "freeze up to the date"). One positive outcome was the revision of date-marking guidance in response to consumer confusion over date labels (WRAP, 2010). This concerted twin-track approach has meant that it is easier for people to waste less food, whilst at the same time building momentum around the issue (Quested et al., 2013).

3.5 Outcomes and their Evaluation

WRAP has been evaluating the impact of these activities in various ways. According to WRAP's research (WRAP, 2013b), there was a 15% reduction of 1.3 million tonnes of household food and drink waste between 2007 and 2012, from 8.3 million tonnes to 7.0 million tonnes, despite an increase of 4% in the number of households in the UK. Avoidable waste, that is, food and drink that could have been eaten but was not, there was a 21% reduction of 1.1 million tonnes, from 5.3 million tonnes in 2007 to 4.2 million tonnes in 2012. When expressed per household, the amount of avoidable food and drink waste decreased by nearly a quarter (24%), from 210 kg to 160 kg per year. This equates to a reduction of 1 kg per week for the average household. This large reduction in avoidable food and drink waste was concentrated in five categories, each with reductions of more than 100,000 tonnes: homemade and pre-prepared meals, bakery, drink, fresh fruit, and dairy and eggs (WRAP, 2013b).

A major research project was conducted for this evaluation. They used estimates in a report published in 2009 (WRAP, 2009c) as figures in 2007. Figures in 2012 were estimated with similar methods (WRAP, 2013c). An outline of the research used for the estimation is outlined below. For food and drink waste collected by local authorities, data from waste composition studies carried out by local authorities were collated and analysed alongside the most recent available weight data of waste statistics (WRAP, 2013c; Resource Futures and WRAP, 2013). The detailed information by food type came from major detailed waste compositional analysis, with quantifying the weight and types of food and drink waste from 2,138 households in 2007 (Exodus Market Research, 2008; WRAP 2017b) and from approximately 1,800 households in 2012 (WRAP, 2013c). The estimates of food and drink disposed of down the kitchen sink were both based on the report "Down the Drain" (WRAP, 2009b, 2013c). This research consisted of diaries being kept for a week by household occupants to record disposal of any food and drink via the sink, toilet or any other household inlet of the sewer system. In total, 355 respondents were recruited across England, Scotland and Wales in 2008, and 319 diaries were kept for the full research period. The amount of food waste fed to animals and composted at home was estimated based on the results of one-week diary-based research, recording food and drink waste disposed of by all routes (WRAP, 2009c, 2013c). Estimates in 2007 were based on the

diaries of 286 households (WRAP, 2009c). Figures in 2012 were estimated from the results of 948 households (WRAP, 2013c).

In 2017, WRAP published a report that estimated the total amount of food waste and its reduction in 2015 (WRAP, 2017a). The estimated amount of household food waste in the UK for 2015 was 7.3 million tonnes, compared to 7.0 million tonnes in 2012, an apparent increase of 4.4%. On a per person basis, the apparent increase was 2.2%. Neither of these increases was statistically significant. WRAP considered that the scale, targeting and effectiveness of interventions between 2012 and 2015 were not sufficient to deliver a significant reduction in household food waste against a backdrop of easing economic pressures and an increasing population, although some of these interventions have undoubtedly helped groups of people to reduce their food waste. The method to estimate the amount of household food waste collected by local authorities and the amount of sewer waste was the same as for the 2012 estimates. The amount of home composting and food fed to animals were estimated under the assumption that the amount of these per person per year in 2015 was the same as in 2012. As for avoidable food waste, there was no recent data on the proportion of avoidable household food waste. Therefore we do not describe it in this paper although WRAP estimated it in an approximate fashion.

4. INTERVENTIONS IN THE LOCAL CAMPAIGN CASE STUDIES

4.1 Categorisation and Characterisation of Local Activities

Table 2 shows the results of the categorisation chronologically. Campaigns were divided into three groups and face-to-face approaches were categorised into six groups, based on the characteristics of cases and interventions.

Campaigns contain both local authority campaigns and business campaigns. Among them, we categorised business campaigns into "Retailer's Activities" since these were mainly retailer campaigns. We divided local authority campaigns into "Single Method" and "Local Intensive Campaign". Reports of a "Single Method" campaign focused on an evaluation of one measure used in the campaign such as podcast and a launch event. A "Local Intensive Campaign" uses many types of media and activities simultaneously. Reports of a "Local Intensive Campaign" tend to evaluate the overall effects of a cross-media approach with intensive media use.

The face-to-face approach includes "Door-to-Door Engagement", "Food Waste Reduction Challenge", "Roadshow", "Cookery Course", "Workshop" and "Cascade Training". In "Door-to-Door Engagement" activities, Food Champions speak to residents on their doorsteps about the issues of food waste and offer them hints and tips to help them waste less food, tailored to each conversation (WRAP, n.d. g). "Food Waste Reduction Challenge" consists of three fortnightly challenges to reduce and compost food waste, supported with information packs and equipment (WRAP, n.d. h). "Roadshow" refers to small events taking place in different places to talk to people about issues of food waste and give information in the form of leaflets, banners, etc. (WRAP, n.d. g, n.d. i). Staff at a "Roadshow" sometimes ask people to fill in a questionnaire or to participate in a case study. "Cookery Course" is lessons in cooking to provide practical cookery skills and information that enable people to make the most of the food that they buy (e.g. how to prepare tasty meals from leftovers) (WRAP and Women's Institute, 2008; WRAP, n.d. j). A "Workshop" includes group work training sessions or group discussions to experience practical food waste prevention skills, to discuss issues related to food waste prevention, or to share experiences and tips about food waste and its prevention (except such activities as

Table 2 Types and effects of interventions in Love Food Hate Waste local campaign's case studies

Year Started	Campaign (large number)			Face-to-face approach (small number)					
	Local Intensive Campaign	Single Method	Retailer's Activity	Door-to-Door Engagement	Food Waste Reduction Challenge	Roadshow	Cookery Courses	Workshop	Cascade Training
2007	◆ Kent *CFWR: 10% → 20% *Those who have seen campaign: 0 ver 1/3 by 5 months						◆ Kent (see Local intensive campaign)		
2008	◆ Herefordshire and Worcestershire *CFWR: 13% → 23% *Recognition of the LFHW brand 10% → 21% by 5 months By pre-post quest.	◆ Cumbría (pod cast) *Approximately 100 entries for the competition.		◆ Herefordshire and Worcestershire *8% decreased after visited *The proportion of CFWR: similar By post quest 26% of respondents visited	◆ York and North Yorkshire *food waste 78% reduction (might be including composting) by 6 weeks By pre-post waste audit 7 households	◆ Herefordshire and Worcestershire (see Local intensive campaign) ◆ Cumbría (see Single method) ◆ York and North Yorkshire	◆ Women's Institute (see Workshop)	◆ Women's Institute *avoidable food waste 53% reduction 4.7 kg/hh/w → 2.2 kg/hh/w by 4 months By pre-post estimation using self-reported volume *CFWR 5% → 29% By pre-post quest 81 households	◆ Women's Institute (see Workshop)
2009	◆ South West (35 LAs) *food waste Estimated 7,900 tonnes for the lifetime impact of the campaign By food waste reduction metric by WRAP	◆ Greater Manchester (Launch event)				◆ South West (see Local intensive campaign) ◆ Greater Manchester (Student MasterChef) *46 requests were received			
2010									
2011	◆ Worcestershire *avoidable food waste 14.7% reduction 3.33 kg/hh/2w → 2.84 kg/hh/2w by 3 months By pre/post composition analysis		◆ Retailers and Blands activities			◆ Worcestershire (see Local intensive campaign) ◆ Women's Institute	◆ Worcestershire (see Local intensive campaign) ◆ Women's Institute		◆ Women's Institute
2012	◆ West London *food waste 15% reduction (stat sig.) 2.60 kg/hh/w → 2.20 kg/hh/w *avoidable food waste 14% reduction 1.24 kg/hh/w → 1.07 kg/hh/w by 6 months By pre/post composition analysis ◆ Derbyshire					◆ West London (see Local intensive campaign) ◆ Oxfordshire *0 ver 300kg in 1 year By the Community Impact Modelling Tool	◆ West London (see Local intensive campaign) ◆ Oxfordshire *0 ver 300kg in 1 year By the Community Impact Modelling Tool		◆ West London (see Local intensive campaign) ◆ Oxfordshire (see Cookery courses)
2013									
2014			◆ 10 Cities campaign *engaged more than 12,000 people in 10 cities *gained over 2,500 pledges by 3 months			◆ 10 Cities campaign (see Retailer's activities)		◆ Save More activities (as a whole) *97%: would use some of the information at home *62%: would help them to waste less food	◆ 10 Cities campaign (see Retailer's activities) ◆ Save More activities (see Workshop)

cf. CFWR: Committed Food Waste Reducer: CFWR is an indicator of household food waste prevention proposed by WRAP and it indicates the percentage of those who commit themselves to reducing food waste.

categorised above) (WRAP and Women's Institute, 2008). "Cascade Training" is not a type of intervention itself but a kind of approach to increase instructors or facilitators of face-to-face activities. WRAP collaborates with partner organisations and trains a group of people who then pass on messages about food waste and train further people (Quested et al., 2013).

4.2 Outcomes and their evaluation of face-to-face approaches

4.2.1 "Door-to-Door Engagement" and "Roadshow"

Just after launching the LFHW campaign, WRAP conducted several case studies about various types of face-to-face interventions in 2008. Among these interventions, roadshows and cookery courses were used in local campaigns after 2008. We examined case study reports in 2008 and how each intervention was evaluated in these reports.

Herefordshire and Worcestershire County Councils led a local intensive LFHW campaign in 2008 that included "Door-to-Door Engagement" and "Roadshow". This campaign succeeded in raising the percentage of committed food waste reducers (CFWRs) 10% from 13% to 23% in 5 months (WRAP, n.d. g). CFWRs are an indicator of household food waste prevention, proposed by WRAP at an early stage, which was made up of three questions relating to a self-reported estimate of food waste generated, how bothered by food waste the respondent is, and how much effort the respondent puts into minimising food waste.

This report concluded that "Door-to-Door Engagement" is inefficient, matching the findings of previous studies (e.g. Timlett & Williams, 2008). Eight food waste advisers spoke to a representative sample of residents on their doorsteps. 26% of the respondents to the post-campaign survey stated that they had been visited by an adviser. Of those, only 6% felt they threw away slightly less food waste and a further 2% said they threw away much less since the adviser's visit. The proportion of CFWRs in the post-campaign survey sample was very similar for those visited and not visited by an adviser. These numbers are low and probably within natural variation; they show that behaviour change campaigns tend to have little real impact without associated changes to infrastructure and services (Timlett & Williams, 2011). The report quoted a Herefordshire and Worcestershire food waste adviser's comment that "Many people we spoke to claimed not to waste food, perhaps because it is felt to be socially unacceptable, whereas the WRAP research found that almost everyone throws some food away. Although people were often happy to discuss food waste in general, they were reluctant to talk about their own barriers to reducing food waste at the doorstep." This comment coincided with an early WRAP research result that many people thought they didn't waste significant amounts of food (Brook Lyndhurst, 2007). This Herefordshire and Worcestershire report suggested that door-to-door engagement was not a key to the increase in CFWRs, although this method has been used successfully in many areas to explain recycling services to residents. One of the reasons could be the fact that people tend not to recognise how much food they waste. It is thought to be necessary that people recognise the amount of food waste they actually throw away before accepting some advice of skills and tips for food waste prevention. Therefore we thought that this scheme could not work effectively at least for promoting food waste reducing behaviours. Looking at other case studies reports, later case studies did not adopt "Door-to-Door Engagement".

The campaign also included over 30 roadshows with pull-up banners and leaflets as a face-to-face approach. Residents were asked to fill in a food waste questionnaire, and in return they could take away a free prize such as a branded jute bag or recipe cards. In this case study report (WRAP, n.d. g), "Roadshow" was positively described as "residents referred frequently to supermarket roadshows held by council staff as being positive and informative".

As a result, this report concluded that a door-to-door engagement approach was less effective than other engagement methods such as roadshows and the Women's Institute Love Food Champions project, which is described later in this paper.

4.2.2 "Food Waste Reduction Challenge"

The York and North Yorkshire Waste Partnership conducted a waste minimisation capacity building project by focusing on preventing and composting food waste (WRAP, n.d. h). They utilised WRAP's LFHW campaign for the prevention, and commissioned Waste Watch to run the project. This project included a "Food Waste Reduction Challenge" named "What Not to Waste". Waste Watch had earlier conducted a "What Not to Waste" project on general waste, including food waste, at least (Waste Watch, 2007). Eight households were recruited through various means and set a series of three fortnightly challenges consisting of (1) using compost bin / food waste digester, (2) reducing your food waste, (3) shopping smarter and cooking creative. Each household was given information packs and equipment such as a compost bin, spaghetti measures, recipe ideas, fridge thermometers etc. After the launch event, they started their challenges for six weeks. The effects of this challenge project were monitored by two audits of household waste which were carried out at the beginning and end of the challenge weeks.

The research results of 7 households showed that households reduced their food waste by 78.7%. Other positive results included a 93.5% decrease of bread waste. Although these reductions appeared to be successful results, "Food Waste Reduction Challenge" was not found in later case studies. One of the possible reasons is the difficulty of finding a large enough pool of participants. There were eight participants in this project and only 16 in "What Not to Waste" in 2006. These numbers seem to be insufficient for an effort to disseminate food waste prevention behaviours. There is also the possibility that the effects of prevention were not significant, compared with the effects of composting, although no detailed data were available in this report. Note that the study involved a small and possibly a self-selecting sample of households who may have been more willing to make changes to their lifestyle to reduce food waste than "typical" households.

4.2.3 "Cookery Course", "Workshop" and "Cascade Training"

WRAP and the National Federation of Women's Institutes (NFWI) collaborated to conduct the "Love Food Champions" pilot project in 2008 (WRAP and Women's Institute, 2008). This project contained "Workshop", "Cookery Course" and "Cascade Training". The objectives of this Love Food Champions pilot project were to provide feedback and insights for the LFHW campaign, and to test whether there was the potential for a broader roll-out of this method of passing on knowledge and practical skills. This project had three steps: training volunteers – the "Champions", Love Food Group recruitment and meetings. A Love Food Group is a group that each Love Food Champion was required to form and consisted of a Love Food Champion and six to eight non-WI individuals in their community. At the third stage, the group members discussed a range of topics to do with reducing food waste.

In the first stage, the project team held training days for the Love Food Champions to gain the knowledge and skills necessary to recruit and facilitate Love Food Groups in their communities. The training covered what was expected of the Love Food Champions in detail, ideas for activities to use while running a Love Food Group meeting and how to recruit individuals to their Love Food Group. Topics included the cost and environmental impact of food waste, tips on where to find recruits and which existing community groups might be receptive to this type of initiative, ideas about ice breakers, public speaking exercises and an action planning sheet to help Champions prepare for recruiting and running the groups.

Then in the second stage, each Love Food Champion tried to form a Love Food Group. The

Love Food Champions targeted in particular women and men from households with school age children and young working people, as these were two groups identified by WRAP to be high food wasters. To help the recruitment of interested individuals, the NFWI and WRAP produced press releases for each individual Champion that was sent to local and regional media as well as a generic press release that was sent to national media at the launch of the project.

At the third stage, each Love Food Champion held a Love Food Group meeting once a month for four months. The topics of each meeting were as follows: 1) introduction and food shopping, 2) portion sizes and meal planning, 3) food storage and preparation and 4) leftovers or “rechauffé” meals. A Workbook was developed and provided by NFWI to the Love Food Champions. The book contained material to be covered at each meeting and offered hints and tips, plus useful information such as an explanation of the date labels on packaging and a selection of recipes to accompany the meetings. Groups were also invited to complete an activity at each meeting, related to the topic being discussed. In the case of the fourth meeting, a recipe for pizza with the addition of leftover cheese and cooked vegetables gave the groups something to cook and enjoy eating. The meetings were very informal and that seems to have been something that participants particularly enjoyed about them. For instance, a group had participants bring leftovers and extras from their cupboards and fridges to each meeting and worked as a group to figure out what meals they could create from them. They then made a meal and discussed the topic of the meeting while enjoying the meal they had prepared together.

The pilot project set out to recruit 20 Love Food Champions from the Women’s Institutes (WI) membership. Although there was interest from 25 WI members initially, 10 members completed reports until its final stage. The total number of participants appeared to be 81 households according to the report.

The weight of avoidable food waste produced in participants’ households was estimated by using data of its volume that participants recorded for the first seven days and the last seven days of the project. The results revealed that the reduction was more than 50%: from 4.7 kg per household per week to 2.2 kg per household per week on average. Compared to a UK average of 2.8 kg per household per week at that time, 4.7 kg was rather high. This was because they recruited people from two socioeconomic groups identified as high food wasters. Participants were also asked what they had enjoyed best about the meetings. The responses which came across most strongly were recipe ideas. The level of satisfaction about leftovers or „rechauffé” meals was the highest among the four topics.

As seen above, the “Love Food Champions” project gained a significant reduction of avoidable food waste from those who originally produced above average food waste on average. Recipe ideas for leftover meals and sharing them with others were highly evaluated by participants. The project intervened in 81 non-WI households, in spite of difficulties with recruiting. It is thought that those results encouraged WRAP to utilise workshops, especially cookery courses as face-to-face approach interventions and to adopt cascade training in cooperation with partners to spread food waste prevention skills.

4.3 Outcomes and their evaluation of Campaigns

4.3.1 Single Method

There were two reports which were categorized into “Single Method”. One is a case study report from Cumbria which used podcasts (WRAP, n.d. k). The project was based around a two-week radio campaign featuring four live cooking MP3/podcasts recorded on location by chefs at a local restaurant. The podcasts were made available for download in their entirety from the LFHW website. As well as being encouraged to download the podcasts, residents were invited to volunteer their own “Love Food Hate Waste” tips. Each one was entered into a prize draw to

win a £100 meal voucher at the restaurant where the podcasts were recorded. As a result, there were approximately 100 entries for this competition. There were no data about accessing the podcasts in this report. The council found that the podcasts suffered from poor production values as chefs instead of actors were used and recordings were made in a working kitchen. Podcast was not used in most of the later cases.

The other single method was Greater Manchester's launch event report (WRAP, n.d. l). A close partnership was developed with the Manchester Food and Drink Festival (MFDF), an annual event in the region and many local media members and key local ambassadors for food and drink were invited to the launch event by the MFDF using their established local contacts. The launch event comprised key speeches and a live cookery demonstration of typical domestic leftovers by a local chef, using the Food Lovers campaign artwork from WRAP. The event was also used to launch the "food diary challenge" to the press. As a result, three radio interviews, including BBC Radio Manchester, were broadcast and at least 13 articles appeared in the local press. This report concluded that the launch event achieved a PR success, reaching the core target audience through a variety of media, at very low cost. It was also used as a networking opportunity for influential individuals and organisations. However, the launch event was not written about in most of the later case study reports.

4.3.2 Evaluation of Local Intensive Campaigns

Most of the reported campaigns were "Local Intensive Campaigns" and they were reported almost every year up to 2012. These campaigns utilised various media and most of them evaluated their total effects. Between the Kent case study in 2007 and the South West region case study in 2009, effects were measured by CFWRs. Both Kent (WRAP, n.d. i) and Herefordshire and Worcestershire Councils (WRAP, n.d. g) reported a 10% increase in CFWRs, estimated by pre- and post-campaign questionnaire surveys. South West Waste and Recycling Forum (WRAP, n.d. m) reported that it was possible to estimate that the lifetime benefit of the campaign would be a reduction in food waste of 7,900 tonnes. There was no description of the method used to estimate the lifetime benefit in this report. However, it was supposed that this figure was estimated for an assumed year-on-year CFWRs drop-off rate of 20% of the original level, since Herefordshire and Worcestershire Councils case study report estimated the net disposal saving over three years under this assumption (WRAP, n.d. g).

Concerning the CFWRs, WRAP pointed out that this metric started to show an anomalous relation with levels of behaviours that reduce the amount of food waste in late 2009, and proposed to use compositional analysis for its measurement (WRAP, n.d. n). Therefore in the case studies of Worcestershire in 2011 and of West London in 2012, campaign effects were evaluated using waste compositional analysis before and after the campaign activities. Worcestershire reported that avoidable food waste per household per fortnight fell around 15% from 3.33 kg to 2.84 kg through the intervention (WRAP, n.d. j). As for the West London case study (WRAP, 2013a, n.d. o), the results showed a statistically significant reduction of 0.4 kg per household per week, a 15% reduction in food waste, between the pre- and post-campaign analyses. It also reported that avoidable food waste decreased by 14% during this time. Another local intensive campaign conducted by Derbyshire County Council in 2012 was reported, but no data about food waste reduction was available in this report (WRAP, n.d. p).

As shown above, measurement was different from one case to another. This means it is difficult to analyse the relation between intervention and its effect quantitatively. Therefore we analysed these campaigns qualitatively by comparing the media and interventions used among the campaigns, examining common characteristics and differences and also examining the chronological changes.

4.3.3 Media used in local intensive campaigns

Table 3 shows what kind of media and interventions each local intensive campaign used. Table 3 Details of selected WRAP local intensive campaigns

	Organization	Kent Waste Partnership	Herefordshire and Worcestershire	South West Waste and Recycling Forum	Worcestershire	West London	Derbyshire	
Basic Features	Year started	2007	2008	2009	2011	2012	2012	
	Periods	5 months	5 months	4 weeks	3 months	6 months	2 months	
	Households	566,000	309,000	2,350,000	8,774	601,000	-	
	Cost	£ 162,152	£ 90,000			£ 168,472		
	Cost/Household	£ 0.30	£ 0.29			£ 0.28		
Media	TV					news		
	Radio		ads	ads	interview	ads	ads	
	Newspaper	ads	ads&articles	ads		ads	ads	
	Magazine	editorial	articles		ads	ads		
	Internet ads.					○		
	Website			○		○	○	
	Social media					○	○	
	Video on Net						○	
	Transit ads	Bus back ads Bus stop ads Magnetic Vehicle Signs with the LFHW logo	Bus back/sides ads				Bus-back ads Poster on underground sites	Bus ads
	Other outdoor media	Sign boards Billboards Giant Love Food Hate Waste inflatable's	Billboards		Adsheets at supermarkets Billboard Big vinyl LFHW banners		Refuse LFHW vehicle livery Sheet-ads	Billboard
	Other paper materials	Leaflets			Door-drop of leaflets Leaflets			
	Events	Photo opportunity			○		○	
	Other methods	Posters in community sites, greengrocers, council buildings etc.	Posters in community locations Door to door engagement trial appeared in the national media	Extensive engagement with the public, (No detail info) PR in local and regional media (No detail info)	Posters in various partners Life Channel Adverts in the two Doctor's surgeries with leaflets		Local zero waste challenge	
Face-to-face approach	Cookery course				○	○		
	Roadshow	○	○	○	○	○		
	Door stepping		○					
	Cascade training					○		
Others	Organization's internal communication	○				○	○	
	Retailers etc.	○			○	○		

Among the mass media, utilisation of TV was very limited. The West London case was broadcast on TV news (WRAP, 2013a), but no TV adverts were reported in the case studies. It is thought that TV adverts tended to cover an area wider than the campaign area and was so expensive that it resulted in reduced cost-effectiveness.

On the other hand, radio adverts were frequently used, in four out of six cases. As most of the reported local intensive campaigns covered a relatively wide area, radio adverts were considered to be reasonable in terms of cost-efficiency. If the target of the campaign is listening to the radio frequently, radio adverts will be an important medium for local intensive campaign. Newspaper adverts were also often used, in five out of six cases. Use of magazines was varied.

West London used adverts in borough magazines (WRAP, 2013a) and Worcestershire used adverts on Parish/ City Council/ community magazines (WRAP, n.d. j). Herefordshire and Worcestershire used articles in district magazines and staff newsletters (WRAP, n.d. g). Kent also reported using editorial (WRAP, n.d. i).

The use of the Internet was hardly reported before 2012 in the local intensive campaign. West London in 2012 reported the use of internet ads and social media (WRAP, 2013a). Derbyshire in 2012 also included social media and Video on Net as campaign media (WRAP, n.d. p). It is considered that social media were added as PR measures around 2012 as their importance as communication channels increased. There were three reports that mentioned a local authority's own website and WRAP's website.

Regarding transit adverts, bus adverts were often used, in four out of six cases. Three of them reported using bus back adverts. It is difficult for pedestrians to see bus back adverts, but those who are riding in a car running behind the bus cannot avoid seeing these adverts for a relatively long time. Therefore this type of advert will be effective when those who typically use a car are important campaign targets. Besides bus adverts, bus stop advertising (WRAP, n.d. i), Magnetic Vehicle Signs with the LFHW logo placed on any internal minibuses/vehicles (WRAP, n.d. i) and poster sites across the London underground networks (WRAP, 2013a) were also reported.

Billboards were also often used as outdoor adverts, at least in four out of six cases. A billboard is a very large board on which adverts are shown, especially at the roadside, and is prominent. Other unique outdoor adverts were also reported, including giant LFHW inflatables (WRAP, n.d. i) and big vinyl LFHW banners on the railings of a local school (WRAP, n.d. j).

Distribution of leaflets, displaying posters and events for appealing the campaign were reported in a few case studies. As another unique form of advert, life channel adverts in two doctor's surgeries were reported in the Worcestershire case study (WRAP, n.d. j). Anywhere we have to wait for a while, such as a bank, a post office, an elevator lobby, or an intersection, could also be a good place for adverts.

As a whole, we can point out that most local intensive campaigns utilised not only press releases but also adverts on local media, buses and billboards. Worcestershire did not use either radio ads or newspaper adverts, perhaps because the campaign scale was limited (around 10,000 households, far less than other campaigns). However, Worcestershire succeeded in using press releases to publicise the campaign and also utilised more outdoor ads such as billboards and big vinyl LFHW banners as well as posters displayed by various partners and unique local adverts like life channel adverts in the two doctor's surgeries.

4.3.4 Other activities of local intensive campaigns

Local intensive campaigns often feature activities with a face-to-face approach, in addition to public relations activities by the above media. Roadshows were reported in five out of six case studies. The remaining case also used a roadshow, but it was used for internal communication (WRAP, n.d. p). In some cases, visitors at roadshows were asked to participate by keeping a food waste diary (WRAP, n.d. i) or filling in a food waste questionnaire (WRAP, n.d. g). Cookery courses were used in two cases.

In addition, there were three cases using organization's internal communications. Kent approached the media/press department of a company that had the most employers in the area and collaborated with this company (WRAP, n.d. i). Posters and giant fruit inflatables were displayed and leaflets were placed around the building and in the canteen. The canteen team cooked all of the dishes in the campaign template leaflet and those dishes were freely available for everyone during their lunch break. Other internal communication was directed at employees of LAs and related organisations and appealed to them by internal newsletters, intranet, posters

and roadshows (WRAP, 2013a, n.d. p).

4.3.5 Cost effectiveness of local intensive campaigns

Intensive media use tends to be expensive, but the cost per household was reported about £0.3 (about US\$0.4 as converted using the average exchange rate in 2016) in three cases. The unit cost was reduced by conducting wide area campaigns in collaboration with multiple local authorities containing 300,000 to 600,000 households.

4.3.6 Retailer Activities

Table 2 contains two case study reports about retailer activities. The report in 2011 (WRAP, n.d. f) introduced each companies' initiatives for food waste reduction such as smart use of packaging, information provision about food storage at home and less waste recipes. Information provision is categorised into campaign activities. The report in 2014 (WRAP, n.d. q) introduced early activities and outputs of the 10 Cities campaign. WRAP collaborated with 7 leading retailers and 10 local authorities and delivered this campaign until 2016 (WRAP, n.d. r). From July to September 2014, they held a launch event in each city and encouraged people to make a pledge to adopt one of the key LFHW behaviours to reduce food waste at home. Contents of the events depended on each retailer and city. Examples of the contents included handing out smoothies, LFHW videos playing, minimizing food waste competition, etc. (WRAP, n.d. q, n.d. s). These launch events resulted in direct face-to-face engagement with more than 12,000 people and gained over 2,500 pledges to adopt one of the key food waste prevention behaviours. This campaign was also a part of Courtauld Commitment 3. The final report of Courtauld Commitment 3 (WRAP, n.d. r) described major activities and outputs of the 10 Cities campaign. This included LFHW's cascade and awareness training sessions to over 5,000 attendees, involving 760 different businesses and organisations; the "Big Freeze" events, where speaking to over 8,000 people about how to save food by freezing; and over 100 cookery classes to help attendees learn LFHW's five key behaviours. As such, partnership campaigns with major retailers and local authorities enable direct face-to-face communication with a very large number of people. However, it is thought to be necessary to foster a strong trusting relationship with a number of partners in order to realise a strong large-scale campaign like the 10 Cities campaign.

5. CONCLUSIONS

This paper has identified and critically evaluated the common characteristics of LFHW campaigns' local activities through analysis of case study reports. The key outcomes from our analysis are listed below:

1. England's waste strategy in 2002, "Waste not, Want not", requested WRAP to take the lead in promoting a retailers initiative to reduce packaging and food waste generated by households. This move encouraged WRAP to struggle for household food waste prevention, and it resulted in the LFHW campaign as well as the Courtauld Commitment. The LFHW approach has been generally recognized as very successful in terms of raising awareness about food waste within the UK and internationally.
2. The LFHW campaign has consisted of national campaigns and community engagements together with the activities of such partners as local authorities, grocery retailers, and community groups. Community-level engagement with face-to-face communication has been expanded through cascade training programmes. These activities have been supported with technical changes of the retail environment such as the way food is packaged, labelled and

sold and its shelf life.

3. WRAP's case studies of the LFHW local campaign could be divided into three types: "Single Method", "Local Intensive Campaign" and "Retailer's Activities". Six types of face-to-face approach activities and related activities were extracted from case study reports: "Door-to-door engagement", "Food Waste Reduction Challenge", "Roadshow", "Cookery Course", "Workshop" and "Cascade Training".
4. WRAP examined several methods for the second year of the LFHW campaign in 2008 and chose the most effective methods. As a result, "Local Intensive Campaign", "Roadshow", "Cookery Course" and "Cascade Training" were often adopted in later case studies.
5. Two case studies with pre- and post- compositional analysis showed around a 15% reduction in avoidable household food waste by the LFHW's "Local Intensive Campaign".
6. In relatively large-scale campaigns (i.e. more than 300,000 households), radio, local newspaper and bus adverts were often used to spread the campaign messages. In small-scale campaigns (i.e. 10,000 households), local ads, often in cooperation with various partners, as well as outdoor ads (e.g. billboards) were adopted instead of mass media ads and transit ads.
7. Almost all local intensive campaigns included roadshows as a face-to-face approach. Two out of six cases also included cookery courses.
8. A cost per household of about £0.3 was reported in three cases. The unit cost was reduced by conducting wide-area campaigns in collaboration with multiple local authorities containing 300,000 to 600,000 households.
9. Partnership campaigns with major retailers and local authorities have the possibility to enable direct face-to-face communication with a large number of people.

Through examining case study reports about LFHW campaigns' local activities, we could conclude that well-designed local intensive campaign with some face-to-face activities such as roadshows or cookery courses could achieve around a 15% reduction in avoidable household food waste. However, some reports assumed that campaign effects might decrease 20% a year. This means we should consider how we could make the effects longer. Timlett and Williams (2011) indicated that a behaviour-centric approach has limited effectiveness and policy makers must change infrastructure and service in order to meet challenging recycling targets. If we can apply this idea to food waste prevention, we should consider the change of retail environment, food waste separate collection, food bank service or other infrastructure and service related to food waste prevention as well as behavioural change campaigns. These are challenges for the future.

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