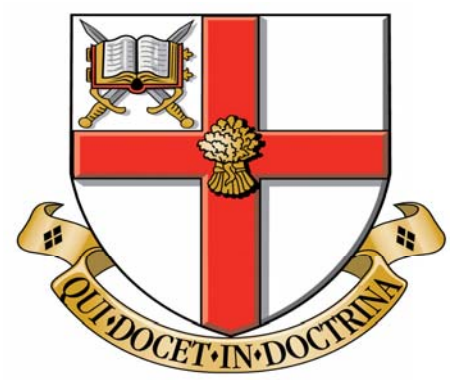

MSc Public Health Nutrition

XN7038: DISSERTATION

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An Evaluation of a 'Love Food Hate Waste' Educational Session amongst Primary School Children Aged 9-11 Years.

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Declaration of original work

I hereby declare that work contained herewith is original and is entirely my own work (unless indicated otherwise). It has not been previously submitted in support of a Degree, qualification or other course.

26/09/2014

Abstract

An Evaluation of a 'Love Food Hate Waste' Educational Session amongst Primary School Children Aged 9-11 Years.

Food waste is a major public health concern at present, with 177 million tonnes of food wasted globally each year and 7.2 million tonnes wasted within households in the United Kingdom UK[(1)]. With a lack of awareness in the general population of food waste and the associated implications for the environment and the economy Love Food Hate Waste (LFHW) is a national campaign aiming to improve knowledge and attitudes amongst individuals within the UK[(2&3)]. The campaign has successfully educated adults and households leading to a 13% reduction in food waste over 3 years, however little is known about its impact amongst children in the school setting[(4)]. The aim of the present study was to assess the potential for a LFHW session delivered in primary schools thus evaluating the impact of the session on pupils aged 9-11 years (key stage 2).

Semi-structured interviews were conducted with 4 teachers/support staff from 4 different primary schools to assess the expected current understanding of pupils with regards to food waste. Following this mixed method questionnaires were used to assess the impact of an educational LFHW session on children pre and post session (n=163), also evaluating teachers post session.

The interviews found that children had some baseline knowledge of environmental and economic concepts to be able to apply to understanding food waste. The LFHW session improved awareness of food waste (as shown in figure 1), post session 83.3% of pupils were able to recognise that a lot of food is wasted within the UK. Although the pupils understood the economic impact they generally struggled to grasp the main environmental concepts associated with LFHW, there was no statistically significant difference between environmental knowledge before (M=7.64, SD=1.292) and after (M=7.31, SD= 1.524) the session (p=0.38).

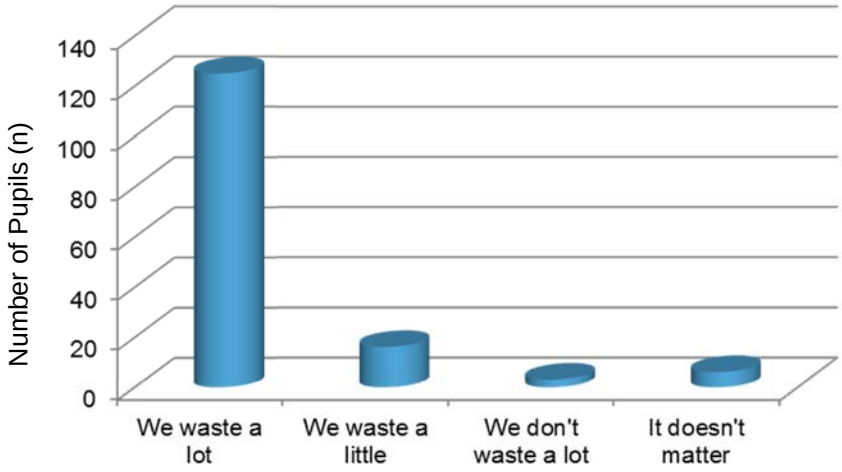

Figure 1: Pupil's thoughts on how much food is wasted after the LFHW session had been delivered. The question was based on a Likert scale with four options: (1) we waste a lot (83.3%), (2) we waste a little (10.7), (3) we don't waste a lot (2%) or (4) it doesn't matter (4%).

In conclusion, primary school children aged 9-11 are capable of recognising food waste as a problem however they appear to lack the knowledge to be able to understand the main concepts comprising the LFHW campaign. It may be more beneficial to take a different, more interactive approach to delivering future sessions as effectively demonstrated in other research.

1. Department for Environment, Food & Rural Affairs. (2014). Reducing and managing waste. Retrieved from: https://www.gov.uk/government/policies/reducing-and-managing-waste/supporting-pages/food-waste.

2. Quested, T. E., Parry, A. D., Easteal, S., Swannell, R. (2011). Food and Drink Waste from Households in the UK. Nutrition Bulletin, 36(4), 560-467.

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List of abbreviations

DEFRA	Department for Environmental and Rural Affairs
DfCSF	Department for Children, Schools and Families
DfE	Department for Education
ESS	Enhanced Sustainable Schools
LFHW	Love Food Hate Waste
RoWAN	Ross-shire Waste Action Network
SEED	Sustainability and Environmental Education
SWAC	School Waste Action Club
THAW	Taking home action on waste
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
USA	United States of America
WHO	World Health Organisation
WI	Women's Institute
WRAP	Waste and Resources Action Programme

1. Introduction

On a global scale approximately 30-40% of food produced is wasted; this is having a detrimental effect upon the environment, economic development, food availability and the sustainability of food (Gustavsson, Cederberg, Sonesson, van Otterjijk & Meyerbeck, 2011; Godfray et al., 2010). Gustavsson et al. (2011) recognise that more food is wasted in industrialised countries compared to developing countries. This food is wasted throughout the various stages of the supply chain - whether this is the initial agricultural production phase or during household consumption. There are numerous reasons for food waste including patterns of crop production, internal infrastructure and capacity, distribution and marketing stages, consumer purchasing and the use of food in practice (Gustavsson et al., 2011).

The Waste and Resources Action Programme (WRAP) (2008) have established that a third of total food produced in the UK is wasted by consumers, a high proportion of this food waste is unnecessary and avoidable. Quested, Parry, Easteal & Swannell (2011) state that a large proportion of food is wasted within the household, the primary reason for this is lack of knowledge, particularly with regards to food availability, safety and storage (Godfray et al., 2010).

In 2007 the WRAP developed 'Love Food Hate Waste (LFHW)'. This UK wide public health campaign aims to raise awareness of food waste and the associated environmental and economic implications, also promoting the use of simple everyday strategies to reduce the amount of food wasted in the home (WRAP & Women's Insitiute, 2008; LFHW, 2014).

The LFHW campaign is currently incorporated successfully into educating adults and households, achieving a significant reduction in food waste of 1.1 million tonnes (13%) between 2007 and 2010 (WRAP, 2011). This positive improvement in waste reduction suggests that public health campaigns to reduce food waste are proving successful and there may be potential for the LFHW campaign to expand and target a wider audience.

There is presently no evidence to support the promotion of the LFHW campaign amongst children or in the school setting. Previous research has demonstrated that educating children during the most influential stages of their lives allows them to develop skills and attitudes they are likely to maintain and pass on to future generations (Kwan, Peterson, Pine & Bouretta, 2005; WHO, 1996). This indicates the potential for LFHW educational sessions to have an impact on the knowledge and attitudes of school children.

Due to the limited research on the impact of delivering LFHW awareness sessions amongst school aged children, this research will utilise qualitative and quantitative methods to assess the impact of delivering such an educational session in primary schools in Cheshire.

2. Literature review

The Department for Environment, Food & Rural Affairs (DEFRA) (2014) state that the amount of food wasted each year is 177 million tonnes, 7.2 million tonnes of this is wasted within households in the UK. This costs the public £12 billion per year and the food industry £5 billion per year. The majority of this food could have been eaten, recognition of the amount of avoidable food waste (shown in figure 1) has resulted in the prioritisation of preventative measures (DEFRA, 2011).

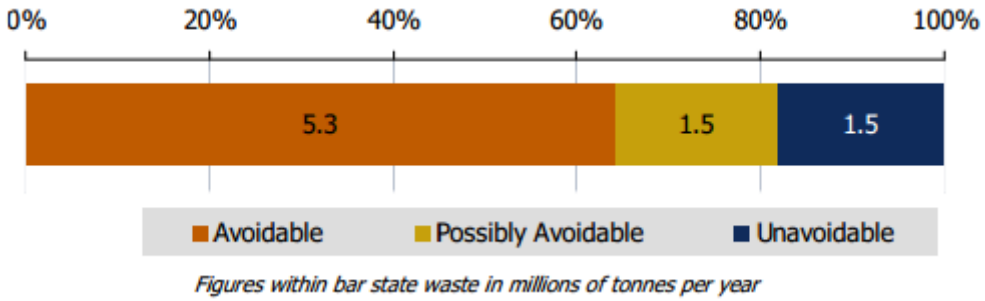

Figure 1: *A diagram representing the weight of avoidable food and drink wasted in UK in tonnes. (Taken from Household Food and Drink Waste in the UK: Final Report - WRAP, 2009).*

Within the DEFRA (2011) policy there is a pledge to cooperate with the community, local businesses and local authorities to encourage positive health behaviours and the reduction of waste. The government funds the Waste and Resources Action Programme (WRAP) to deliver resource efficient policies to stakeholders. Various incentive schemes have been developed including 'Local Green Points' - a waste and recycling rewards scheme (DEFRA, 2011). There is limited evidence evaluating the impact of this scheme to date however the substantial reduction in food waste since indicates that existing incentive schemes may be having some impact.

The DEFRA (2014) aim to move towards a 'zero waste economy' whereby environmental and financial resources are appreciated and not used wastefully. The Prevention is Better than Cure policy (HM Government, 2013) pledged to encourage a 'culture of valuing resources' in 2013, this was to be achieved by changing behaviour of central government, local authorities, businesses, civil society and individuals. It is important to target all individuals within communities to induce a positive attitude towards food waste. Children may provide a new target audience for future food waste campaigning. The research available on the effectiveness of national and local food waste intervention is generally scarce, as a consequence policy-makers cannot make evidence based recommendations (Sharp, Giorgi & Wilson, 2010).

Household waste intervention has proven successful in some experimental research studies, for example Wickens (2005) reports on the Ross-shire Waste Action Network (RoWAN). This programme involved households who participated in a volunteer support programme over 13 months. It was generally found that a provision of support, positive influence, a variety of information sources, regular monitoring and feedback encouraged improved knowledge, attitudes and a reduction in household waste (Wickens, 2005). However this project may have been influenced by participant bias, as the households included in the study were recruited via voluntary subscription, therefore this would suggest participants had an underlying interest in waste reduction.

Household waste schemes such as Gloucestershire Zero Waste Challenge Week profile campaign have targeted schools previously to reduce the amount of household waste sent to landfill over one week (DEFRA, 2013). The campaign proved successful as residents, schools and communities together managed to reduce this by an average of 3.8kg per household, most households achieving a 50% drop in waste sent to landfill. This indicates promising results for the potential to collaborate further with schools with more of an emphasis on food waste reduction.

Previous waste campaigns have been launched to reduce the amount of food wasted nationally. These have been targeted at individuals, households and businesses. Current national policies aimed at reducing food waste include the Courtauld commitment, this is a responsibility deal delivered by WRAP and aimed at reducing household waste of groceries (WRAP, 2013). Since the Courtauld commitment was established in 2005 more than 1.7 million tonnes of waste has been prevented, saving £3.1 billion and reducing carbon dioxide emissions by 4.8 million tonnes. These figures include supply chain product and packaging waste additional to household food and drink waste, and in fact the food and drink waste reduction target was marginally missed by 0.3%. This indicates that more focus is required to prevent food and drink becoming waste products (WRAP, 2013).

Questead et al. (2011) recognise the lack of awareness within the general population, both with regards to how much food waste is generated in the home and also the environmental impact of wasting food. The Cabinet Office (2002) also established that waste as an issue in isolation was not as well recognised as the global issues of climate change or local issues such as litter in the streets. Therefore it seems vital to associate waste with a wider issue such as climate change to promote the awareness and emphasise the seriousness of this to the public.

There are many reasons underpinning the high level of food waste within the UK. Importantly these often do not occur in isolation. The main behaviours related to preventable food wasting are associated with planning, storage, shopping, preparation and consumption (Quested et al., 2011). WRAP (2008) are aware of the specific reasons for household food waste. This may be due to

throwing away leftovers after a meal (from the plate or from cooking), food that may be passed its use by date, food that looks, smells or tastes bad or food that has gone mouldy. Therefore in response to this Love Food Hate Waste (LFHW) aims to promote simple strategies such as meal planning, using food before going shopping for more, refrigerating and freezing food, checking the dates on food, measuring portion sizes, using left over food and the correct storage of foods (WRAP, 2014).

Love Food Hate Waste operates nationally around the UK communicating with consumers via grocery retailers, local authorities, food manufacturers and community groups. Some of the techniques used include extensive media coverage, large supermarket campaigns and over 300 local authorities run LFHW initiatives amongst local residents.

More specifically a £120,000 Love Food Hate Waste campaign implemented in Leicestershire has increased the number of committed food waste reducers from 12% to 21%, reducing food waste by 1,875 tonnes and saving approximately £133,000 (DEFRA, 2013). The campaign was comprised of LFHW cooking classes, helpful tips, recipes and free giveaways such as meal planning and measuring tools (Leicestershire City Council, 2014). Additional to this, The North London Food Waste Challenge involving households in a three week challenge reduced total household food waste by 38%, saving an average of 30% on weekly food shopping bills (DEFRA, 2013). Despite the active campaigns associated with LFHW there are limited research publications on the effects of food waste intervention.

Previous research has also evaluated the impact of the LFHW campaign amongst adults and households. A Love Food Champions pilot scheme aimed to evaluate the effects of the LFHW campaign amongst 81 households over the duration of four months (WRAP, 2008). This pilot study was successful as 38 households included within the study managed to reduce their household waste by more than 50%. This sample number is relatively small, this was more than likely due to the study attrition as some households did not provide both before and after measurements of food waste. Since this pilot the WRAP have further supported 22 local LFHW campaigns working in

collaboration with the Food Standard Agency, UK government and the food and drink industry to facilitate a reduction in food waste (WRAP, 2014).

Furthermore the WRAP (2008) discovered that families with children waste more uneaten food than those families who do not have children each week. However it must be noted that some households were underrepresented e.g. those with a lower number of occupants and those living in flats and some were overrepresented e.g. Asian households (WRAP, 2008). Despite this the evidence indicates that educating children could be a successful method of incorporating the principles to prevent food waste into the home.

The World Health Organisation (WHO) (1996) recognises the importance of health promotion in the school setting, with access to over 1 billion children worldwide, school staff, families and the community as a whole. Promotion of health during childhood has been found to be significantly influential in the development and maintenance of positive attitudes and skills at this stage and also in later life (Kwan, Peterson, Pine & Borutta, 2005; WHO, 1996). There is evidence emerging to indicate a relationship between health messages learnt during childhood and the positive influence they have on adult health behaviour (Wiley, 2004; Reynolds, Temple, Ou, Robertson, Mersky, Topitzes et al., 2007). Consequently it can be suggested that educating children about food waste will ensure this knowledge is maintained into adulthood thus influencing their attitudes and behaviour towards food waste reduction.

Waste Watch are involved with local authorities in providing waste reduction related educational activities to primary and secondary schools across the UK (including Cheshire), their approach is called the Schools Waste Action Club (SWAC) (Maddox, Doran, Williams & Kus, 2011). The main aim of the SWAC is to increase awareness and enhance understanding of issues related to waste, not only amongst pupils but also amongst school staff by also promoting the three R's (reduce, reuse and recycle) through workshops and assemblies. Although Waste Watch does focus on education surrounding waste it is very general and there is no specific focus on food waste. There has been limited published research to date on the effects of the SWAC.

Since the SWAC Waste Watch have changed their approach to waste education, creating a new approach called Enhanced Sustainable Schools (ESS) which addresses the specific needs of each school allowing an individual capacity building programme to enable gradual sustained positive change (Zabala, 2012). Zabala (2012) reports on the findings from the first year of ESS stating that the pilot scheme has had a positive effect on the sustainability of 13 primary and secondary schools. Love Food Hate Waste may allow for a similar but more tailored and focused approach to be taken to the increasing of food waste awareness amongst primary school children.

The Government and the Department for Education and Skills (DfES) are also committed to supporting schools in developing a sustainable approach to the environment (DfES, 2006; Department for Children, Schools and Families [DfCSF, 2008). The DfCSF state that the government's aim is to make every school sustainable by 2020, meaning that pupils will understand the impact of environmental issues on the planet and will be able to make informed choices regarding sustainable behaviour. Integrated within the school sustainability approach will be pupil awareness of waste and its impact upon resources and the environment, waste will also be associated with the value of money and the four R's (reducing, reusing, recycling and repairing) will be promoted (DfCSF, 2008). It is important to note that the government made the decision to no longer support the sustainable schools initiative in 2010, however many charities and organisations have collaborated to continue the development of the initiative with the Department of Education (Sustainability and Environmental Education [SEED] 2014).

The United Nations Economic Commission for Europe (UNECE) (2003) recognise children as effective advocates in transferring public health messages learned in formal or informal education to the home thus influencing parental lifestyles. Families have been pressurised into recycling in the past due to children taking responsibility of inflicting positive learnt behaviours on the family members within the household (Cabinet Office, 2002).

Ballantyne et al. (2001) discuss the intergenerational influence whereby children are encouraged to share their school learning with their families at home potentially advocating messages related to food waste to adults. Liu & Kaplan (2006) further expand on this to suggest that children's acquired knowledge in school can contribute to the education of adults as co-learners. The family environment is an appropriate place to practice learning about food waste and can further increase the impact of the message on a child when they discuss this with a parent/guardian (Heimlich & Ardoin, 2008). Gronhoj & Thogersen (2009) studied 601 Danish families to examine parent-child similarities of general values, attitudes and behaviours related to three common household practices including handling waste responsibility. They found that parents had more favourable attitudes towards waste and therefore children were able to discuss waste related issues with parents to enhance their knowledge and attitudes further (Gronhoj & Thogersen, 2009). However these results cannot be generalised as parents and children do not all have the same environmental priorities. The children included in the study were 16-18 years old thus being older than the population of the present study, self-reporting measures were also used which could influence the reproducibility of the study.

Maddox et al. (2011) also support the intergenerational influence as they examined the impact of a previous school based waste education on promoting action at a household level, they considered Waste Watch's 'Taking Home Action on Waste' (THAW) project. The THAW project was undertaken in Rotherham over the duration of two and a half years, its primary purpose was to educate 6705 primary school children (from 39 different schools) to "reuse, recycle and reduce". This was with the intention that the children would take this message home to their families thus encouraging families to engage in waste reduction practice. Following the intervention not only was student knowledge enhanced but there was also a significant impact upon household waste reduction. Maddox et al. (2011) found that the intervention resulted in an average increase of 8.6% for recycling set out rates and residual waste tonnages fell by approximately 5%-10% from baseline level. Although this study had a promising impact upon household waste reduction in general, the evaluation focus favoured the monitoring of recycling rather than reusing and reducing waste thus was not a fair representation of all three R's (Maddox et al., 2011). Despite this the

study design implies that LFHW messages taught in the school environment may have an equally successful impact within the home of children.

In order for children to exercise control over the environment Chawla & Cushing (2007) suggest that they need opportunities for collaborative decision making in day to day life, the influence for these decisions may stem from the home, school including after-school activities and other care situations. Chawla & Cushing (2007) emphasise the importance of discussion amongst children in supportive environments such as the school classroom, this encourages children to consider a range of perspectives, processing the information individually enabling them to interpret their own ideas.

The key stage 2 national PSHE curriculum states that on completion pupils can demonstrate their ability to save, manage money and make informed decisions about the environment, thus understanding the potential local, national and global implications of their actions (Department for Education [DfE], 2013). This suggests that pupils aged 9-11 years will be developing a good knowledge base and have a potential to grasp the main concepts of LFHW. However the key stage 2 geography curriculum documenting that pupils should be taught about various environmental issues was discontinued in September 2013. Schools have been free to develop their own curriculum to best suit the needs of their classes during the academic year 2013/14 (DfE, 2013). This means that the exact knowledge of pupils cannot be determined thus it is important to consult teachers to gain a more accurate insight into whether the potentially adapted geography syllabus interlinks with issues related to food waste. This will then allow the expected knowledge of children and the potential for the delivery of a LFHW session to be identified.

The teacher's perspective has been found to be valuable in previous studies involving intervention amongst primary school children. Wind et al. (2008) conducted research with primary school children and teachers into the effects of a school based intervention on fruit and vegetable intake - the Pro Children Study. They found that evaluating the teachers additional to the pupils allowed for

more in-depth data to be collected thus enhancing the results of the study. This emphasises the additional usefulness of including teachers within the present study.

Childhood is becoming an increasingly important time for children to be learning how to manage their money effectively and times of financial hardship are particularly teachable opportunities (Suiter & Meszaros, 2005; McCormick, 2009). This is due to the current recessional impact upon financial stressors affecting families and thus children e.g. food prices, rising fuel costs and a decline in savings. Sherraden, Johnson, Guo & Elliot (2011) suggest that levels of financial literacy are generally low amongst primary school children although they have good potential to be able to understand financial concepts. This was demonstrated by evaluating a classroom based curricula and a voluntary "I Can Save" after school club for pupils in the USA over 4 years. The success of their research indicates that some key stage 2 pupils may have the ability to be able to understand the economic concept associated with LFHW. However the children in Sherraden, Johnson, Guo and Elliot's (2011) study started learning the financial curricula at a younger age (5 years old) therefore it cannot be assumed that pupils in the present study have the same financial literacy. It has been noted that children acquire various ideas and information related to financial information from non-school sources thus suggesting that the level of economic knowledge is likely to vary amongst all pupils across schools (McCormick, 2009).

Schug & Hagedorn (2005) investigated the impact of a 'Money Savvy Kids' curriculum amongst primary school aged children in Chicago. The classroom taught curriculum contained information on saving money, investing money and family finance. They found that children could effectively learn the basic ideas of economics and personal finance when these were presented in a well organised and engaging way. The authors acknowledge some limitations to their research in the sense that they found difficulties obtaining accurate information from children of a younger age and it was uncertain whether the children would act in accordance with their newly acquired knowledge (Schug & Hagedorn, 2005). Although this research is based in the USA it does suggest potential for the pupils in the present study to have the ability to understand the financial aspect of LFHW.

Barraza, Duque-Aristizabal & Rebolledo (2003) state that public awareness of environmental issues can be raised through education to enhance skills and knowledge. Chawla & Cushing (2007) state the early stages of life e.g. childhood is largely neglected in the environmental research field. Rickson & Lundholm (2008) considered taught geography in the classroom setting and how controversial environmental issues were learned; their qualitative study involved 12 students (aged 13-15) and three teachers. Within this study Rickson & Lundholm (2008) identified that the learning process was shaped by emotional responses to the content, opinions about the teacher delivering the lesson and additionally different perspectives on the content of lessons. Although the children in this study are a slightly older sample compared with the present study, it is important to acknowledge these barriers when attempting to educate school aged children about LFHW - particularly as some barriers to learning may emerge.

Chawla & Cushing (2007) considered the evidence for environmental education in schools, they found that activities relating to nature and the environment in childhood and youth are 'entry-level variables' that predispose children to take an interest in the protection of the environment in childhood and also later in life (Meinhold & Malkus, 2005). However Rickson (2001) disputes the fact that this applies to all children and states that intention to care for the environment is associated with three factors; gender, socioeconomic status and environmental attitudes and knowledge. Chawla & Cushing's (2007) literature review also revealed that children who are from disadvantaged communities may be more likely to report environmentally protective behaviours that saved money or earned money.

Rickinson (2001) reviewed studies to report on a review of recent empirical studies of primary and secondary school environmental education. Having considered many studies he states that students environmental factual knowledge appears to vary based on gender. Some research would suggest that boys appear more knowledgeable than girls and other studies have found the opposite correlation that girls have more environmental knowledge than boys (Gambro & Switzky, 1999; Connell, Fien, Sykes & Yencken, 1998). However it must be noted that the environmental education topics contained within comparable studies are not consistent, for example some

education programmes focused more on climate change whereas others may have been more concerned with rainforest destruction.

The current research contained within this literature review identifies a clear gap in children's knowledge with regards to food waste, with other research indicating a sound knowledge base for children to be able to develop an understanding of the main concepts related to LFHW. The contribution of the present study is to enhance the research surrounding the LFHW campaign in a school setting; amongst primary school children (key stage 2) in Cheshire. Using a mixed method design this research will address four research questions: (1) Do primary school children have sufficient knowledge and awareness to be able to make a positive contribution to the reduction of food waste? (2) Would a Love Food Hate Waste session increase the knowledge and awareness of primary school pupils? (3) What impact will a Love Food Hate Waste session have on the knowledge and attitudes of children? (4) Can the main messages related to Love Food Hate Waste be conveyed effectively to children, how well are these messages retained?

3. Methods

3.1 Design

This research was conducted in two parts; the first part was qualitative interviews with teachers and support staff from each primary school. The second part was quantitative and qualitative evaluation questionnaires administered pre and post-delivery of a children's LFHW session.

3.1.1 Part One

Semi-structured qualitative face to face interviews (see appendix 8.1 for the interview schedule) were conducted with 4 female teachers and support staff to determine expected knowledge and attitudes towards food waste and the associated implications amongst key stage 2 children. Originally this would be to inform a questionnaire to assess the actual understanding of pupils. However during the recruitment stage of the research process, and after liaising with Keep Britain

Tidy, the possibility of evaluating the delivery of LFHW educational sessions within the chosen primary schools in Cheshire was discussed and decided upon. These sessions had not been evaluated prior to this research being conducted.

3.1.2 Part Two

A pre-session quantitative structured questionnaire (see appendix 8.2) was administered in the classroom setting immediately before the delivery of each LFHW session. This assessed the pupils' current knowledge and understanding of food waste and their attitudes towards the subject. Two weeks post-intervention another quantitative/qualitative questionnaire (see appendix 8.3) was administered in the classroom to measure pupils' knowledge, understanding, attitudes and how well the messages had been retained after learning about LFHW. Additional to this a teacher's qualitative semi-structured questionnaire (see appendix 8.4) was also given to evaluate teacher and support staff expectations, thoughts and feelings after the session.

This study gained ethical approval from the University of Chester, Faculty of Life Sciences Research Ethics Committee.

3.2 Questionnaire

The structured questionnaire used pre-session will utilise a Likert scale and tick box format as previous research can confirm this is the most effective way to capture and maintain the attention of children in primary schools (Edwards & Hartwell, 2002; Mumtaz, 2001). The pre-session evaluation questionnaire was designed with consideration of a previously revised questionnaire used by Wilson, Magarey & Mastersson (2008) to assess dietary patterns associated with positive energy balance and food behaviours, attitudes, knowledge and environments amongst Australian children aged 10-12. This particular questionnaire was assessed for reliability and validity to produce a modified revised version.

The semi-structured questionnaire used to evaluate the LFHW sessions was designed based on a previous questionnaire used successfully by Edwards and Hartwell (2002). Within their study they utilised a mixed method of data collection to collect quantitative and qualitative data from school children aged 8-11 years regarding opinions and knowledge regarding fruit and vegetables. Using a similar combination of open ended questions and Likert scale tick boxes allowed the children to convey their attitudes, knowledge, thoughts and feelings on food waste.

3.3 Population and subjects

Four primary schools within the Cheshire district were recruited for this study, two of the schools were in West Cheshire, one of the schools was in Chester and the other one was in East Cheshire. The selected schools were recruited via Keep Britain Tidy by convenience sample. Advertisement for the research included sending emails and letters to schools, and a snowball sampling method amongst colleagues from Healthbox and Keep Britain Tidy.

3.3.1 Part One

A member of staff from each of the 4 schools was interviewed face to face by the researcher; this totaled 4 staff - 2 female teachers and 2 female learning support staff. Informed written consent was obtained before interviewing participants.

3.3.2 Part Two

The study included a total of 163 year 5 and 6 (aged 9-11) male and female pupils from four different primary schools within the Cheshire area. All of these pupils were asked to complete a questionnaire pre and post-delivery of a LFHW session.

Table 2 shows the number of pupils from each school that completed the questionnaire prior to the delivery of the LFHW session demonstrating their specific school, gender and year. Incomplete questionnaires were excluded from data analysis.

Table 1: *A table to show pupil characteristics of those who completed the pre-session questionnaire (n=155), pupils in year 5 were aged 9-10 years and pupils in year 6 were aged 10-11.*

			Y5 (n=78)		Y6 (n=77)		
	Participants (n)	**Excluded**	**Boy (n)**	**Girl (n)**	**Boy (n)**	**Girl (n)**	
School 1	23	0	-	-	14	9	
School 2	64	3	18	19	16	8	
School 3	30	0	10	8	5	7	
School 4	46	5	14	9	5	13	
Total	**163**	**8**	**42**	**36**	**40**	**37**	**155**

Table 3 presents the number of pupils who completed the questionnaire after the LFHW session had been delivered. The number of pupils was marginally lower due to some pupils being excluded on the grounds of sickness and participation in other ongoing activities within the schools coinciding with the post session questionnaire completion.

Table 2: *A table to show pupil characteristics of those who completed the post-session questionnaire (n=150), pupils in year 5 were aged 9-10 years and pupils in year 6 were aged 10-11.*

			Y5 (n=78)		Y6 (n=72)		
	Participants (n)	**Excluded**	**Boy (n)**	**Girl (n)**	**Boy (n)**	**Girl (n)**	
School 1	23	1	-	-	14	8	
School 2	64	10	17	18	15	4	
School 3	30	0	10	8	5	7	
School 4	46	2	17	8	5	14	
Total	**163**	**13**	**44**	**34**	**39**	**33**	**150**

Informed written consent from the school and from parents (where necessary) was obtained before the research was conducted, and participants were free to withdraw from the research at any given moment.

The teachers included within the qualitative evaluation questionnaire following the delivery of the session were 6 female teachers who were present during the LFHW sessions. Each were given a questionnaire two weeks following the session, full consent was obtained and participants were free to withdraw from the research.

3.4 Procedure

3.4.1 Part One

Qualitative semi-structured face to face interviews were conducted at all four schools with 4 different teaching/learning support staff. The interviews had a specific focus on food waste and enquired about the expected knowledge and attitudes of key stage 2 pupils (see appendix 8.1). The interviews were approximately 20 minutes long, conducted at the chosen schools and were recorded using a voice recorder (with verbal and written consent).

3.4.2 Part Two

Immediately prior to the LFHW session the questionnaires were administered in the classroom, assistance was available from the researcher, LFHW volunteers and teacher present if required. The questionnaire was given to each pupil and took approximately 10 minutes to complete.

The LFHW session was delivered by Keep Britain Tidy in the classroom setting, lasting approximately 30-40 minutes. The session was delivered by different volunteers, potentially adding some bias as natural variation of session delivery was a confounder. All sessions were presented following a standard LFHW syllabus which included facts and statistics about food waste (including simple economic figures), the journey food takes from the ‘farm to the fork’ (including resources

used and damage to the environment), tips to prevent food wastage and free gifts with the LFHW logo on i.e. seeds, storage bag clips and spaghetti measurer) (see appendix 8.5 for the LFHW session outline). Year 5 and 6 pupils were split into classes with a maximum of 35 pupils in each class.

The post-session evaluation questionnaire was administered in the classroom setting two weeks after the LFHW session. Similarly, this took approximately 10 minutes to complete. The researcher and teacher were both present to offer the pupils any assistance needed.

The teacher evaluation was also administered two weeks after the LFHW session had been delivered, completed by teachers who had attended for the duration of the session.

3.5 Data management and data analysis

3.5.1 Part One

Post data collection the recordings from the interviews were transcribed into verbatim by the researcher and coded to identify reoccurring themes. The data was then integrated and summarised to reach the results. These would be used to inform the design of the second part of the research (see appendix 8.6 for example transcript).

3.5.2 Part Two

The results from the pre-session questionnaire were quantitative, thus were entered into a spreadsheet using Microsoft Excel. SPSS was then be used to analyse and identify trends within the acquired data. The quantitative data generated from the questionnaires was non parametric thus Chi-squared test for association was used to determine the statistical significance (p value). The questions assessing knowledge and attitudes were tested for association with variables including school, year group (5 & 6) and gender.

The results from the post-session evaluation questionnaire were analysed both qualitatively and quantitatively. The quantitative data was non parametric and analysed using Microsoft Excel and SPSS, trends in knowledge and attitudes post LFHW session were again identified using Chi-squared test for association to calculate statistical significance (p value), also adjusted for variables such as school, year, gender. A paired sample t-test was used to compare environmental knowledge before and after the LFHW session. The qualitative data was coded into relevant themes allowing this to be summarized, Hek & Moule (2011) support this method of qualitative data analysis.

The teachers post session evaluation questionnaire was analysed by similarly coding the data into common themes to summarise the information collected.

4. Results

4.1 Part One

Interviews with four primary schools teachers were conducted. Key words noticed within the transcripts include: aware, choices, decisions, field trips, parents, council, curriculum, responsibility and recycle. The following themes emerged from a detailed analysis of the transcripts:

All teachers/support staff had heard of the LFHW campaign before either through Cheshire West and Chester council collaboration, previous school involvement e.g. all schools had environmental officers or personal involvement.

- School 4: “I have heard of LFHW, I know it’s been highlighted by Cheshire West and Chester council in conjunction with lots of other agencies”

In 3 of the schools the teachers/support staff explained that the pupils had a general knowledge of climate change and wasting water. Some topics taught were suggestive of the impact of food waste but did not demonstrate a clear link. One school had not studied man’s effect on the

environment yet but rather was concentrating on natural disaster on a wider scale; environmental geography was due to be taught later in the academic year. Various extra-curricular activities were mentioned such as cookery lessons, field trips:

- School 2: “They have done a debate about bottled water and tap water and about what happened in Wales, about them making the reservoir in the 60’s. We have done debates about endangered animals not necessarily linked to food”
- School 3: “A lot of it has been climate but we have done water as well because we have has the water board in to do some work with us”
- School 4: “We have been to Winsford to the recycling centers where they showed us what happens to food waste and glass and all the other recycling materials”

All schools mentioned that they had chosen two children to be environmental officers, responsible for the waste in schools. According to teachers elected pupils had an increased knowledge of food waste compared with other children, this was due to them being educated by teachers outside normal school hours and attending school field trips:

- School 1: “There are two girls who are environmental officers, they had an invite to learn about recycling”

In all schools the teachers thought that children were capable of understanding the link between environmental damage and the impact this has on themselves and their families, the understanding of this was found to be stronger as children progressed into key stage 2.

- School 3: “We would encourage also their own research, that could be at home worked on so yes I think they do understand”

With regards to the money messages surrounding LFHW, the teachers thought that most pupils would not understand the cost implications associated with wasting food. However, teachers did think that if this is incorporated into the curriculum more and appropriate teaching methods are used e.g. visual aids and projects then children do have the potential to understand.

- School 2: “Very often on the economics side and saving money, things like that its often a topic covered in the summer term, especially for the children going up to high school”

When expressing opinions on the most effective way to teach children public health messages, the teachers found interactive activities to be most beneficial, particularly those involved with agencies from outside the school e.g. community food workers, nurses, dentists. It was generally felt that children engaged more effectively with professionals from outside of the school.

- School 3: “We have had different professionals in talking to the children because actually they related more to a professional person coming in"

The general consensus on whether pupils take home messages they have learnt in school was mixed, teachers thought that some pupils would take their ideas home to discuss further with parents whereas some would not. It was found that pupils were more likely to take the messages home when they were given something to take away, whether this would be something they have created, a questionnaire or a ‘freebie’.

- School 1: “I think taking something home, perhaps making something to go home and it gives a starting point for conversation, something to talk about”

Teachers/support staff all thought that children would benefit from a LFHW session delivered within their primary schools thus this informed part two of the research.

4.2 Part Two

4.2.1 Pre-session evaluation

The main findings from the pre-session questionnaire were that 65% of children had not heard of the LFHW campaign before (figure 2), pupils in year 5 were 20% more likely to have heard of LFHW ($p<0.01$), with more pupils who had heard of the campaign attending school 3 and school 4 ($p<0.01$). When the pupils were asked if they would like to learn more about LFHW 36.8% responded by answering “yes”, 12.3% said “no” and 51% said they did not mind. Although not

statistically significant the results were indicating a trend towards year 5 pupils across all schools being keener to learn about LFHW compared with year 6 pupils.

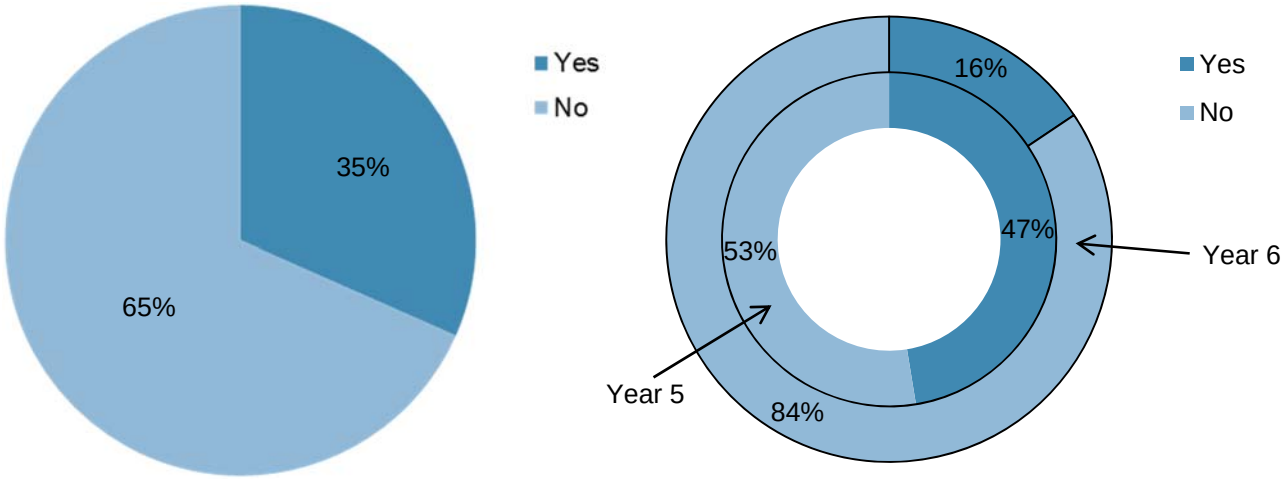

Figure 2: *Pie charts demonstrating the number of pupils (n=155) across all schools who had heard of LFHW prior to the session, split into number of pupils in each year group (year 5 or year 6)*

4.2.1.1 Knowledge

19.4% of the pupils across the schools were able to correctly identify the amount of food wasted each year in the UK before the session with 54% of the pupils over estimating this value ($p<0.01$). When the pupils were asked about the resources used in the production of food 'from farm to fork', across all four schools 21.3% of pupils had excellent knowledge, 36.1% had good knowledge, 34.8% had average knowledge and 7.7% had poor knowledge (as shown in figure 3). No significant associations for school gender or year group were observed here.

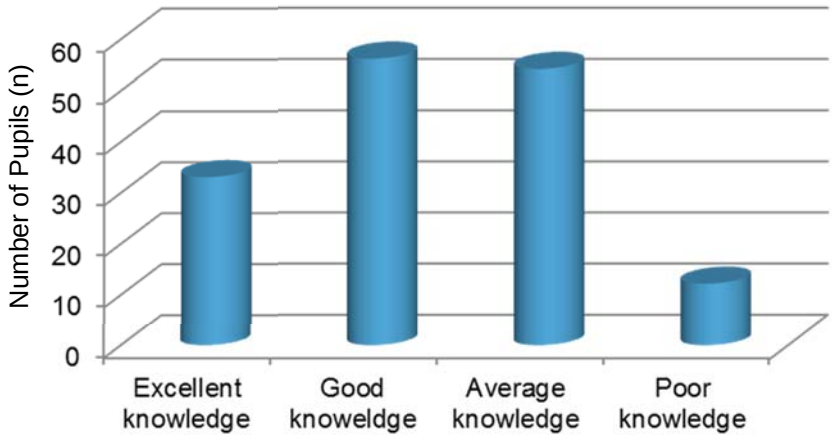

Figure 3: *A graph demonstrating pupils' level of knowledge related to the resources used to produce food (n=155). Pupils were asked to identify the resources used during the food production process, the answers were given a score of 1=excellent knowledge, 2=good knowledge, 3=average knowledge, 4=poor knowledge based on the number of correct answers given.*

The pupils were told that using the earth's resources emitted greenhouse gases and were asked what impact they thought using too many of the earth's resources had on the environment. The results in table 3 show that year 6 pupils were more aware of the environmental impact, further analysis demonstrates that this trend of year 6 being more knowledgeable is significant particularly in school 2 and school 3 (p=0.003). When results were analysed according to gender and year group the findings indicated that boys scored higher on environmental awareness, particularly boys in year 6 (p=0.025). The data for girls indicated a trend that they were less likely to score as high as boys however the data did not prove statistically significant (p=0.116).

***Table 3**: A table to show year 5 and year 6 male and female pupils who were asked what impact they thought using too many of the earth's resources had upon the environment. They were given 5 options to choose from (1) It helps a lot (4.5%), (2) It helps a little (23.2%), (3) No effect (12.3%), (4) It is a little bad (25.2%), (5) It is very bad (34.8%).*

			It helps a lot	It helps a little	No effect	It is a little bad	It is very bad	Total
Year 5	**Boy**	**School 2**	1	5	5	4	3	**18**
		School 3	0	4	1	3	2	**10**
		School 4	1	3	2	3	5	**14**
		Total	**2**	**12**	**8**	**10**	**10**	**42**
	Girl	**School 2**	1	11	1	2	4	**19**
		School 3	0	1	0	1	6	**8**
		School 4	2	1	0	2	4	**9**
		Total	**3**	**13**	**1**	**5**	**14**	**36**
Year 6	**Boy**	**School 1**	0	1	1	8	4	**14**
		School 2	0	2	1	5	8	**16**
		School 3	0	0	0	1	4	**5**
		School 4	1	0	1	2	1	**5**
		Total	**1**	**3**	**3**	**16**	**17**	**40**
	Girl	**School 1**	1	1	2	4	1	**9**
		School 2	0	1	2	3	2	**8**
		School 3	0	0	0	0	7	**7**
		School 4	0	6	3	1	3	**13**
		Total	**1**	**8**	**7**	**8**	**13**	**37**

The pupils were questioned on their knowledge of the most effective ways to prevent food waste, similarly the answers were given a score (as above). 11.6% of pupils had excellent knowledge, 32.9% had good knowledge, 32.9% had average knowledge and 22.6% had poor knowledge. No significant associations for school gender or year group were observed.

When told what the average family could be wasting on food each year (£720), the pupils were asked what they could purchase for this value. 76.7% of pupils opted for a computer or a holiday, other options included a castle (1.3%), a day out (14.3%) and sweets (0.6%). No significant associations for school gender or year group were observed.

4.2.1.2 Attitude

The pupils were asked if they thought too much food was wasted in the household. Table 4 demonstrates the pupils' answers within the different schools amongst each gender. The following assumptions can be deduced from table 4; a large proportion of pupils strongly agree or agree (62.6%) that a lot of food is wasted in the household, almost a third of pupils don't know (27.7%) and a small number of pupils disagree or strongly disagree (9.7%). There was a non-significant trend emerging whereby boys were more likely to agree that too much food is wasted in the household however this cannot be confirmed in this sample ($p=0.091$). Another notable trend was that boys, compared with girls, were also more likely to tick the option 'disagree' when asked if they thought too much food is wasted in the household. But again this cannot be deemed accurate due to the inadequate statistical significance of the data. No significant associations were identified for the schools.

Table 4: *A table to show the attitudes of pupils towards the amount of food wasted. The answer was multiple choice offering a Likert scale whereby 1=strongly agree, 2=agree, 3=I don't know, 4=disagree, 5=strongly disagree.*

	Strongly Agree		Agree		I don't know		Disagree		Strongly disagree		
	Boy	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Total**
School 1	6	0	5	1	2	7	1	1	0	0	**23**
School 2	3	6	12	13	13	6	3	2	3	0	**61**
School 3	1	5	8	7	5	2	0	0	1	1	**30**
School 4	5	7	11	7	1	7	1	1	1	0	**41**
Total	**15**	**18**	**36**	**28**	**21**	**22**	**5**	**4**	**5**	**1**	**155**

To detect pupils' current priorities with regards to food they do not eat the questionnaire asked what the best practice for left-over food is. Their answers were graded in terms of their attitude whereby 1=positive attitude (46.5%), 2=unsure (29.7%) and 3=negative attitude (23.9%). On further analysis the results indicated a non-significant trend towards a higher proportion of boys (56%) than girls (37%) who had a more positive attitude towards food waste stating that they would either use food later or recycle it (p=0.20 for boys & p=0.598 for girls). School 1 also showed a potential trend as they had the most children with a positive attitude (65%), while school 4 had the most percentage of children with a negative attitude (32%) (p=0.116). Again this cannot be deemed for certain as the test was statistically insignificant.

4.2.2 Post-session evaluation

Two weeks post-session the pupils were administered a second questionnaire. This questionnaire contained questions to assess the knowledge and attitudes of pupils following the LFHW intervention, and also determined whether the main messages had been retained.

4.2.2.1 Knowledge

The same question was asked to pupils on both questionnaires regarding environmental damage and to what extent they thought using resources impacted upon the environment. A paired sample t-test was used to calculate the mean and determine whether knowledge of environmental damage

had improved post-session. There was no significant difference between knowledge before (M=7.64, SD=1.292) and after (M=7.31, SD= 1.524) which suggested the session did not enhance environmental knowledge to a great degree (t=-2.096, p=0.38). Even though there was an increase in pupils who thought using resources was bad (27.7%) for the environment, the number of pupils who thought it helped the environment a lot (16.1%) increased. Additional to this the number of pupils who thought it was very bad (27.1%) also decreased. No significant associations were found for school, gender or year group.

After coding of the qualitative data retrieved from the questionnaire the following themes emerged:

Table 5: *A table demonstrating the main themes emerging from the post-session evaluation when children were asked about the impact of greenhouse gases on the environment and the most effective ways to prevent food waste.*

Theme	School
Pupils were mainly worried about food waste using up landfill sites	2 & 3
Pupils were concerned about food waste increasing the release of dangerous gases into the environment	4
Pupils were concerned about wasting resources such as petrol, water and energy	2&4
Pupils were concerned about food waste causing pollution	2
Pupils were aware of refrigerating/freezing food to prolong its use	1,2,3 & 4
Pupils were aware of the correct storage of foods	1,2 & 3
Pupils were aware than measuring out food stops excess food from being wasted	4
Pupils thought that cutting mould off food was a good way to reduce food waste	2

When asked about the damage to the environment caused by food waste a large proportion of pupils appeared to be uncertain of this question answering “wasting food” or “I don’t know”, however answers from other pupils are listed above in table 5.

4.2.2.2 Attitude

Pupils were reminded of the amount of food wasted in the household in the UK each year and were asked for their opinion on this; the results to this question are shown in figure 4. The majority of pupils (83.3%) thought that a lot of food was wasted from households, with only 16.7% of pupils

thinking otherwise. There were no statistically significant results when schools were compared however it can be noted that a larger proportion of pupils from school 3 were not able to recognise that a lot of food is wasted (p=0.552). It can also be suggested that a non-significant gender correlation was seen for the amount of food wasted, girls found that a lot of food was wasted more commonly than boys when answering this question (p=0.146). The results also show that the difference between the number of pupils who reported a lot of food was wasted did not differ significantly between year 5 and year 6 in all schools (p=0.189).

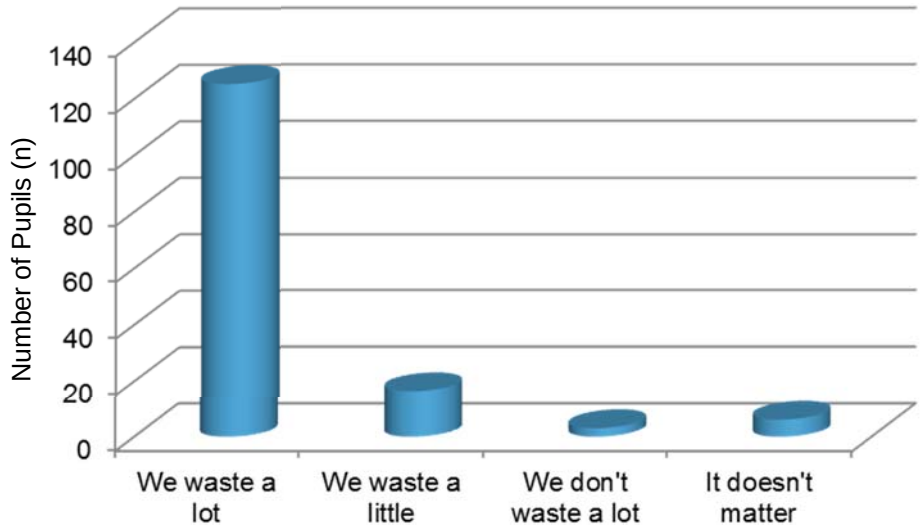

Figure 4: *Pupil's thoughts on how much food is wasted after the LFHW session had been delivered. The question was based on a Likert scale with four options: (1) we waste a lot (83.3%), (2) we waste a little (10.7), (3) we don't waste a lot (2%) or (4) it doesn't matter (4%).*

The pupils were prompted with facts involving the money implications associated with wasting food and asked for their opinions on this after the session. They were give similar options (as above) to the earlier question. It was found that 74% of pupils thought a lot of money was wasted, 17.3% thought a little, 6.7% didn't think a lot was wasted and 2% said it did not matter. In school 4 29 out of 30 pupils (97%) recognised that food waste costs a lot of money whereas in school 4 32 out of 44 pupils (67%) were able to recognise this (p=0.036). No significant associations for gender or year group were observed here.

The pupils generally enjoyed learning about LFHW. When asked about their favourite aspects of the session the pupils said that they enjoyed the LFHW games relating to food waste and thought more games should be incorporated into the session in future. Many pupils thought the LFHW

session was adequate however some pupils commented expressing that the session could have been longer, more interactive and recommended more games. School 1 were excluded from answering the question regarding what they did not enjoy about the session on the post session evaluation form due to an isolated incident (see appendix 8.7 for more details). This may have caused the findings related to this question to be unrepresentative of all schools. When asked if there was anything else the pupils wanted to learn about LFHW some wanted to learn more about food waste whereas many pupils did not want to acquire further knowledge on the subject.

4.2.2.3 Teacher Evaluation

Evaluation of teachers present at the delivery of the LFHW session revealed some common themes. The teachers found that the children enjoyed the games within the session, although the session was long, slow paced and not very interactive at times. The session generally did not meet the expectations of teachers; this was reported via an open question with teachers reporting “no” followed by a comment. With regards to pupils understanding the concepts of LFHW, teachers thought that some pupils did understand the amount of food wasted however a small proportion did not understand due to lack of concentration, or lack of comprehension particularly concerning environmental impact and the cost of food waste. The following quotes were derived from the teacher evaluation forms:

- School 1: “There was too much sitting - nothing for them to do”
- School 2: “They prefer to be interactive”
- School 3: “Delivery was less pacey than the children are used to which meant some were not engaged at times
- School 4: They enjoyed the game part of the session however I don’t think they understood the main concept or the amount of waste”

5. Discussion

The results of the present study confirm that the use of a suitable educational intervention can be effective to raise awareness of food waste as a public health issue amongst primary school (key stage 2) children. Although it is doubtful that children are able to fully understand some of the concepts evolving from the main messages comprising the LFHW campaign.

5.1 Food waste

Although all had heard of the LFHW campaign before, the teacher and support staff interviews established that children had little direct knowledge of food waste learnt from the school environment. The pupils who were environmental officers were found to have a greater knowledge, this knowledge was acquired mainly through extra-curricular activities such as outside organization's input or field trips. The results of the pre-session questionnaire confirmed this finding that the children's knowledge of food waste was fairly poor, with only 19.4% of pupils able to identify the correct amount of food wasted each year, pupils across all schools were more likely to overestimate this figure.

Despite some lack of knowledge and the finding that 65% of pupils had not heard of the LFHW campaign before, the session managed to raise awareness of the amount of food wasted. An improvement was seen in the awareness of children with 83.3% recognising the large amount of food wasted after the LFHW educational session had been delivered. This positive effect is consistent with other intervention based studies which have previously managed to improve awareness of household waste levels (DEFRA, 2013; Wickens, 2005; Maddox et al., 2011). A larger sample size in the present study may have encouraged the finding of more significant associations between school, gender and year group. Amongst this majority of pupils who were able to recognise food waste as a major concern, pupils were also able to retain some of the reasons why post session (shown in table 5). With the most prevalent reasoning being the overuse of limited space in landfill sites and the utilisation of resources. Furthermore the teachers present

at the LFHW session also thought that most of the children understood the amount of food wasted each year, this was likely due to a game during the session which focused on the amount of certain foods wasted each year.

Before the session only 11.6% of pupils from schools were fully aware of the best practice to reduce food waste. Post-session the pupils were able to remember some of the ways to prevent this e.g. by refrigerating/freezing food, correct storage and measuring food (table 5). These findings are similar to the findings of Maddox et al. (2011) who also established that there was a signifiant improvement in knowledge of waste management after a THAW intervention amongst primary school children.

5.2 Environmental Concept

It was found that key stage 2 pupils have tailored knowledge with regards to environmental damage and the environmental factors concerned with food waste. According to the interviews with teachers and support staff the geography syllabus is variable across schools, with all schools more likely to learn about climate change and water waste specifically. Teachers/support staff reported that the two children appointed from each school as environmental officers were more informed about waste in general including food waste. Despite this teachers did think that pupils were able to understand the general link between environmental damage and the impact this has upon pupils and their families. The pre-session questionnaire confirmed that children's knowledge of environmental damage caused by food waste was poor with 62 out of 150 pupils unable to recognise that greenhouse gases created by using resources were bad for the environment. Furthermore 43 of 150 pupils believed that greenhouse gases help the environment. This suggests that school children aged 9-11 appear to lack knowledge of environmental factors, especially those related to food waste. It may be a possibility that some children did not understand the terminology including ‘resources’ and ‘greenhouse gases’ thus creating a barrier to answering questions related to environmental damage.

Following the LFHW session the results did not yield a statistically significant difference between environmental knowledge pre and post session. Although there was an increase in the number of pupils who thought greenhouse gas emissions were bad for the environment, there was also an increase of pupils who thought it helped the environment a lot. These findings may indicate that pupils did not retain environmental messages and were potentially confused or unclear about the impact of food waste upon the environment. On the basis of this information it could either be suggested that pupils do not have sufficient environmental knowledge to be able to enhance this and grasp the concept associated with LFHW. Or it may be inferred that the session did not address environmental damage to sufficiently meet the learning needs of the pupils. The post session evaluation with teachers also revealed that the impact of food waste upon the environment was not comprehended sufficiently by most pupils. This also contradicts the teacher and support staff's original claim that children understand the impact of environmental damage on themselves and their families, as these findings would suggest otherwise.

In a survey by Ofsted in 2008 41 primary and secondary schools were assessed to determine the extent to which these schools taught their pupils about sustainability. It was found that knowledge of environmental sustainability was limited across all schools visited. Ofsted (2008) found that work on sustainability in schools did not provide pupils with sufficient opportunities to understand the impact, was uncoordinated and unorganised with much of the learning being part of extracurricular activities rather than being incorporated into the curriculum. In schools whereby sustainability based lessons were imaginative, creative and involved solving and discussing practical problems with peers the pupils were able to engage more effectively (Ofsted, 2008). If all schools are to become more sustainable by 2020 it could be assumed that schools will incorporate more about this topic into their curriculum thus potentially providing a greater emphasis on environmental issues. This would provide pupils with improved baseline knowledge for them to be able to build on and apply the environmental concept of LFHW to. However it must also be acknowledged that if children will have a greater knowledge of sustainability in future the curriculum could include food waste thus potentially reducing the need for LFHW educational sessions, unless they would be required to add depth to existing knowledge.

Pupils were asked why they thought the creation of greenhouse gases via the use of resources from food production was bad for the environment however this question was misunderstood and some children struggled to answer. This suggests some lack of confusion around the effect of environmental damage in relation to food waste. When the data was themed it was found that many of the pupils were most concerned about the release of dangerous gases and pollution, the using up of landfill sites, and the wasting of resources. Hicks & Holden (2007) also studied 217 7-11 year old primary school children to explore their hopes and fears for the future of the UK. There was a similar finding that in terms of the environment pupils were concerned about increasing pollution, and the loss of land including parks as this results in less space for children to play (Hicks & Holden, 2007).

Many researchers promote the positive influence of a different approach to teaching school children about the environment involving outdoor explorative play and experimental learning activities within the school grounds, community setting and other outdoor environments (Malone, 2008; Bell and Dyment, 2008; Blair, 2009). Malone (2008) found an improvement in young people's attitudes and an enhancement of their environmental responsibility when they became involved in outdoor environmentally related activities. It may be suggested that if outdoor learning was incorporated into the LFHW sessions in future, this could enhance the children's understanding of this associated theme.

5.3 Economic Concept

Teachers and support staff did not support pupils' understanding of the concept of money and its worth in general, stating that only some children may understand if explained simply and clearly. However when tested on their knowledge before the LFHW intervention was delivered the majority of pupils (76.7%) were able to correctly identify what they could purchase for the value of £720 suggesting positive existing awareness of the value of money. Post-intervention a large proportion of the pupils (91.3%) were able to identify that wasting food is the equivalent of wasting money,

with 74% realising that we are wasting ‘a lot’ of money. The findings suggest that pupils have a good understanding and ability to grasp the economic concept related to LFHW. These results are similar to the findings of Schug & Hagedorn (2005) who agree that if information is presented to school children in a basic, organised format they are able to understand simple economic concepts.

Although the results do suggest that the children understood the economic theme within LFHW and retained money associated messages well the teacher evaluation was not consistent with this. Teachers still did not agree that the children understood the cost implications associated with food waste after the session had been delivered, the reason for this was not stated in the evaluation forms.

5.4 School Associations

Some similarities were found across all schools including pupils’ enjoyment of the LFHW session, particularly the facts and games. However there were also some distinctions, children from schools 2 and 3 appeared to have more knowledge of the environmental factors associated with wasting food. In Ofsted’s (2008) report on the sustainability of primary schools and secondary schools it was established that primary schools were more supportive of learning about sustainability of the environment. Primary schools were found to apply more effective use of their grounds to encourage growing food and reducing water and energy usage (Ofsted, 2008). It may be apparent that this is more prevalent in some schools e.g. schools 2 and 3, and that this has surfaced within the analysis of the pre and post session questionnaire results. However this cannot be confirmed due to limited availability of research and other publications on the specific sustainability of individual primary schools.

Furthermore pupils’ ability to understand the economic concept associated with LFHW significantly differed between pupils from different schools, following the delivery of the LFHW session 97% of pupils from school 1 were able to identify food waste costs a lot of money whereas in school 4 67%

of pupils could recognise this. This may indicate that pupils in school 1 have retained the concept of food waste costing money more effectively, however it is important to note that school 1 consisted of year 6 pupils only therefore these results may contain bias due to an older age of pupils in this school.

There were also other potential trends seen amongst children from school 1 who had a positive attitude towards food waste practice whereas children from school 4 had a more negative outlook. However this would need to be tested amongst wider sample of pupils and schools to be a reliable conclusion. Pupils from school 2 seemed to be able to remember more of the correct food waste prevention strategies as they could recall more options on the post-session questionnaire as shown in table 5.

5.5 Year Associations

Prior to the session it was found that year 5 pupils were 20% more likely to have heard of LFHW before, however the knowledge questions associated with food waste did not establish this correlation when the results were analysed. Thus this may suggest that although year 5 pupils were more likely to have heard to the campaign their knowledge of the key concepts was not great. Although it was not a statistically significant finding the results also started to indicate a trend towards year 5 showing more interest in learning more about LFHW. This trend may have become more apparent in a larger sample of schools and pupils.

Some aspects of the LFHW session were effective in educating all key stage 2 pupils about food waste however in other areas there was a divide between year 5 and year 6 pupils. Prior to the delivery of the session the results indicated a trend in that year 6 were more knowledge of environmental issues, even though the results were not significant for girls. This may have made year 6 pupils more susceptible to understanding the impact of food waste upon the environment, however there were no significant results that can confirm this.

No significant associations were observed between year 5 and year 6 pupils during the pre and post session questionnaire analysis. It could be assumed that it would be of no benefit to focus on one age group (year 5 9-10 year olds or year 6 10-11 year olds) or a younger age group in future research. Although having studied a broader range of children from reception to year 6 Maddox et al. (2011) would disagree as they found that the waste management intervention implemented within their research had a greater impact upon younger aged school children.

5.6 Gender Associations

There were some significant differences between the knowledge of boys and girls within the schools, particularly environmental knowledge. The pre-session questionnaire found that boys were significantly more likely to score higher on the knowledge questions associated with the environmental impact of food waste. Despite this the post-session questionnaire did not find any significant associations between boys and girls scored on the question regarding environmental damage. The pre-session results are consistent with Gambro & Switzky (1999) who found that boys had a greater environmental awareness than girls within the school setting, although the pupils in this study were older high school pupils compared with the younger present subjects. The previous research on gender trends in environmental knowledge (Gambro & Switzky, 1999; Connell et al., 1998) is dated thus it cannot be accurately compared with the present data as school curriculum surrounding environmental knowledge will have varied since becoming more relevant to current public health priorities.

The findings revealed that boys did have a slightly more positive attitude towards food waste and the prevention. Although boys were found to be more likely to agree that too much food is wasted in the household the results did not have enough statistical significance to confirm that girls were more likely to agree with this than boys. A larger sample of pupils and schools may have strengthened the significance of this result. These results do not confirm significant gender differences and therefore reject Rickson's (2001) claim that intention to care for the environment is associated with gender.

5.7 The session

The teachers agreed that the most effective way of teaching the children was interactively, with the children being able to engage effectively with professionals from outside the school setting. Despite only 36.8% of pupils being interested in learning more about LFHW before the session it was observed that most of the pupils were well engaged during the LFHW session reporting post session that they enjoyed learning and playing food waste related games. Some of the pupils stated that they did not wish to learn further about food waste however other pupils would have liked to learn more recommending a longer, more interactive session with the incorporation of more games. This may assist with the improvement of any future LFHW sessions that are delivered in primary schools.

Unfortunately the present study did not monitor the intergenerational effect of the LFHW campaign, nor did it measure the impact of the intervention on children in terms of them taking the messages home to share with parents, although the children were given 'freebies' to encourage this. The impact on the household stemming from educating children specifically about food waste in the school environment could be an area to recommend for future research.

It may be important for future LFHW intervention involving children to focus more on indoor and outdoor school-community collaboration with parents and teachers additional to the volunteers from Keep Britain Tidy. Tal (2007) conducted a case study of school-community collaboration in Israel aiming to improve environmental education by involving parents and other members of the community. He found that involving parents was successful as they were very enthusiastic, particularly about the field trips. There was a greater sense of community and the parents felt more involved with the schools agenda, with more efficient management of resources also (Tal, 2007). A potential flaw in this research being generalisable is that the parents were already quite involved with school on-goings therefore it may have been more difficult to engage parents had this not been the case.

Furthermore Zabala (2012) states that the ESS intervention programme also effectively facilitated waste reduction related team work within the school environment thus encouraging a school culture of responsibility for waste and recycling post intervention. The participating schools and participants within this pilot scheme stated that they would continue to minimise waste and recycling in school for the future, it can be hoped that the schools in the present study will also further embrace a food waste minimisation culture following the delivery of the LFHW sessions.

If all schools within the UK are working towards integration into a sustainable approach by 2020 this may mean a potentially greater understanding of environmental issues and more substantial knowledge base for pupils to be able to understand LFHW in the future (DfCSF, 2008). Furthermore Ofsted (2008) recognise that if pupils are provided with opportunities to draw on knowledge and skills related to sustainability they respond well to this. The ability for pupils to understand local issues more than global issues also demonstrates potential for food waste as a local concern to be understood. Gayford (2009) states that using a collaborative learning approach which incorporates pupil participation, similar to the preset LFHW sessions, enables young people to achieve, enjoy and transfer the skills and knowledge they learn to everyday life.

5.8 Limitations

It is important to acknowledge some limitations to the research process used in this study. Due to LFHW sessions being organised by volunteers from Keep Britain Tidy there were different presenters delivering each session in the schools. This is a potential confounding factor due to the disturbed consistency of session delivery thus potentially adding bias to the results of this study.

The study was limited to including schools in the Cheshire district therefore the results cannot be generalisable to all schools within the UK and beyond. It may be useful to expand the sample locality in further research projects related to primary school children and LFHW. Furthermore the schools were selected by convenience schools introducing some recruitment bias as the study may have attracted schools/teachers with an underlying interest in food waste.

It could be suggested that knowledge about food waste was not exclusive to the school learning environment and some pupils will have had prior knowledge they have learnt from parents or outside of school. Hicks & Holden (2007) found that many children in their study had prior knowledge of environmental issues from hearing the news or witnessing events in the local community. This study did not consider what was learnt by pupils outside of the school setting, this must be acknowledged as a confounding factor and may be recommended as an area of investigation for future research.

As shown in the participant characteristics (table 1 & 2) there were slightly more boys than girls and more year 5 pupils than year 6 pupils across all four of the schools, this may have biased the results and consequently underrepresented girls and year 6 pupils within the study. It is also important to acknowledge that in school 1 the study included year 6 pupils only due to arrangements within that school. As some of the data was statically insignificant a larger sample size across more schools can be recommended for further research on the effect of LFHW amongst children.

As Rickson (2001) states it is important to recognise the potential barriers to learning about environmental education and thus apply it to the concept of food waste. These may be emotional responses to the content of the session, pupil's opinions about the volunteers delivering the session or differing pupils interpretations and perspectives on the session content. It may be possible that these barriers have affected some pupils and their ability to retain the messages related to LFHW. Alternatively it may be that the session was not informative and interactive enough as stated by teachers in their post session evaluation.

6. Conclusion

In conclusion it is apparent that primary school children (aged 9-11 years) have been able to gain an insight into the seriousness of food waste as a public health concern, they are able to

understand how much food is wasted and the fact that it is expensive. The findings suggest that the delivery of a LFHW educational session has improved key stage 2 pupils attitudes toward food waste and some of the main messages were retained well. However this study shows that children lack the baseline geographical education to be able to apply environmental knowledge to the environmental nature of the LFHW campaign. Due to lack of understanding of some concepts of LFHW it cannot be assumed that children are equipped with all the knowledge and skills to be able to make a positive contribution to developing a ‘zero waste economy’.

With consideration of the limited natural resources available and the unnecessary expense of wasting food, it is important that food waste prevention remains a priority within public health. The expansion of research in the food waste field can be highly recommended as evidence of effective intervention is generally limited and is not sufficient enough to inform future food waste policy. It may be useful to consider older children with a broader more informed environmental knowledge base, or perhaps consider a different more interactive approach to delivering LFHW sessions with a greater emphasis on children’s understanding of the environmental link to food waste. Furthermore it may also be valuable to extend the research to consider the intergenerational effect of messages associated with LFHW and whether these are carried effectively back in to the household.

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8. Appendices

Appendix 8.1 - Interview Schedule

Title: Expected Knowledge and Current Understanding of Food Waste amongst Children Aged 10-11 years: A Teachers' Perspective.

My research project involves assessing the potential for a 'Love Food Hate Waste (LFHW)' intervention to be delivered to primary school children. I would like to ask some questions to get the teacher's perspective on pupils' expected knowledge and to obtain an idea of the most effective way to convey food waste messages to children.

Question 1: Have you heard of the campaign 'Love Food Hate Waste'?

If not explain… Around the world 30-40% of food is wasted, costing the public approximately £34 million a day. The main messages related to the LFHW campaign are if we all made a conscious effort to reduce food waste £60 a month could be saved off the average family food bill. If we stopped throwing away so much food this could save the equivalent of at least 17 million tonnes of carbon dioxide, the same as taking 1 car off the road for every 5 cars. In order to encourage less food waste LFHW promote simple strategies including meal planning, promotion of correct portion sizes and storage of foods.

Question 2: I understand that the geography curriculum (key stage 2) has been discontinued for this academic year and primary school teachers have been free to design their own geography curriculum to best meet the needs of the pupils. Do you teach pupils about general environmental damage, climate change, wasting water, danger to animals? Breifly what do the children learn? If so does this specifically link to food waste? Do pupils seem to understand and link this with the impact it has on themselves and their families?

Question 3: Do any of the curricula for other subjects' link in with food waste, for example the PSHE curriculum for key stage 2 states that pupils should be taught that 'resources can be allocated in different ways and that these economic choices affect individuals, communities and the sustainability of the environment'. Does this refer to food?

Does the school run any extracurricular activities to promote awareness of food waste?

Question 4: Within the 'Love Food Hate Waste' campaign there is quite a large focus on the expense of food waste. The key stage 2 PSHE curriculum states that children are taught to 'look after their money and realise that future wants and needs may be met through saving'. Do you believe that children of this age group would fully understand the cost implications associated with food waste?

Question 5: The key stage 2 PSHE curriculum also states that pupils should be taught about ‘what makes a healthy lifestyle, including the benefits of exercise and healthy eating, what affects mental health, and how to make informed choices’. In your experience what do you believe is the most effective way to teach health messages to children?
Do you feel that interactive activities and workshops engage the pupils?

Question 6: How likely is it that the children take these health messages home to their parents?

Question 7: Finally, having discussed LFHW during this interview, do you feel that key stage 2 primary school children would benefit from a LFHW awareness session?

Appendix 8.2 – Pre session evaluation questionnaire

Questionnaire for year 5 & 6 students

This questionnaire asks about food waste. It starts with some general questions about you and your school and then some questions about wasting food.

The Love Food Hate Waste helpers will help you fill out this questionnaire.

The information will be used to describe all of the children in years 5 & 6 as a group. Your individual information will be kept private and confidential.

Please tick the correct box or write a short answer

1. **What is the name of your school?**

.....

2. **Which year are you in at school?**

Year 5	Year 6
☐	☐

3. **Are you:**

Boy	Girl
☐	☐

4. **Have you heard of 'Love Food Hate Waste' before?**

Yes	No
☐	☐

5. **Do you know how many million tonnes of food we waste from our homes in a year? Hint: One million tonnes of food waste weighs the same as 500,000 elephants!** 

15 million	9 million	7 million	4 million	1 million
☐	☐	☐	☐	☐

6. **This food thrown away from our own homes makes up 50% of overall total food waste. Do you think that we waste too much food at home?**

Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

7. **here are many different stages your food has to go through before it reaches your plate such as growing, harvesting, storing, transporting and cooking. All of these stages use the earth's resources. Do you know which resources are used?**

	Used	Not Used
a. Sand	☐	☐
b. Energy	☐	☐
c. Flowers	☐	☐
d. Water	☐	☐
e. Sunlight	☐	☐
f. Fuel	☐	☐

8. **Using too many of the earth's resources emits lots of greenhouse gases, what do you think this does to the environment?**

It helps a lot	It helps a little	No effect	It is a little bad	It is very bad
☐	☐	☐	☐	☐

9. **What do you agree is the best thing to do with food we don't eat?**

Tick one box in each row

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
a. The best thing to do with food we do not eat is to throw it away	☐	☐	☐	☐	☐
b. The best thing to do with food we do not eat is to recycle it	☐	☐	☐	☐	☐
c. The best thing to do with food we do not eat is use it later	☐	☐	☐	☐	☐

10. All of this food waste means that a family could be wasting £60 a month. Over a year this saves up to £720. What could your family buy for the value of £720?

Some sweets	A Holiday	A Day Out	A computer	A castle
☐	☐	☐	☐	☐

11. What do you agree are the best ways for us to stop wasting food?

Tick one box in each row

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
a. Cooking plenty of food saves food waste	☐	☐	☐	☐	☐
b. Planning meals saves food waste	☐	☐	☐	☐	☐
c. Keeping food by the window in the sun saves food waste	☐	☐	☐	☐	☐
d. Writing a shopping list saves food waste	☐	☐	☐	☐	☐
e. Storing food in the correct place saves food waste	☐	☐	☐	☐	☐
f. Cooking the correct amount of food saves food waste	☐	☐	☐	☐	☐
g. Eating food you have before buying other foods saves food waste	☐	☐	☐	☐	☐
h. Buying more food saves food waste	☐	☐	☐	☐	☐

12. Are you interested in learning more about food waste?

Yes	I don't mind	No
☐	☐	☐

☺ Fantastic, you've finished THANK YOU!

Appendix 8.3 – Post session evaluation questionnaire

Evaluation questionnaire for year 5 & 6 students

This questionnaire asks about food waste. It starts with some general questions about you and your school and then some questions about wasting food.

The information will be used to describe all of the children in years 5 & 6 as a group. Your individual information will be kept private and confidential.

Please tick the correct box or write a short answer

1. **What is the name of your school?**

   ……

2. **Which year are you in at school?**

   Year 5 ☐ Year 6 ☐

3. **Are you:**

   Boy ☐ Girl ☐

4. **What did you enjoy about the Love Food Hate Waste session?**

   ……
   ……
   ……
   ……

5. **Is there anything you did not enjoy about the Love Food Hate Waste session?**

   ……
   ……
   ……
   ……

6. **Now that you have learnt that we waste 7 million tonnes of food from our homes each year, weighing the same as 3 ½ million elephants! What do you think about the amount of food we waste?**

   We waste a lot ☐ We waste a little ☐ We don't waste a lot ☐ It doesn't matter ☐

7. **Your food has to go through lots of different stages before it reaches your plate such as growing, harvesting, storing, transporting and cooking. These stages use the earth's resources for example fuel, water and energy. What do you think this does to the environment?**

It helps a lot	It helps a little	No effect	It is a little bad	It is very bad
☐	☐	☐	☐	☐

8. **Why is wasting food so bad for the environment?**

.....
.....
.....

9. **Did you remember that all of this food waste means a family could be wasting £60 a month? Over a year this saves up to £720. What do you think about how much money we waste?**

We waste a lot	We waste a little	We don't waste a lot	It doesn't matter
☐	☐	☐	☐

10. **Do you know of any ways we could stop food from being wasted? For example putting milk in the fridge to keep it fresh for longer**

.....
.....
.....
.....

11. **Is there anything you have learnt to do differently at home or in school to stop food from being wasted?**

.....
.....
.....
.....

12. **Was there anything else about Love Food Hate Waste you would like to learn more about?**

.....
.....
.....

13. **How could we have made the Love Food Hate Waste session more fun for you and your friends?**

.....
.....
.....

☺ Fantastic, you've finished THANK YOU!

Appendix 8.4 – Teacher post session evaluation

Questionnaire for teachers

This questionnaire asks about the food waste session held for year 5&6 students. It starts with some general questions about you and your school and then some questions about the session.

The information will be used to describe all of the children in years 5 & 6 as a group. Your individual information will be kept private and confidential.

Please tick the correct box or write a short answer

1. **What is the name of your school?**

……

2. **What do you think the pupils enjoyed about the 'Love Food Hate Waste' session?**

……
……
……
……

3. **Is there anything you think the pupils did not enjoy about the 'Love Food Hate Waste' session?**

……
……
……
……

4. **Did the session meet your expectations?**

……
……
……
……

5. **Do you think the children managed to grasp the main concepts well? For example the environmental impact and expense of food waste.**

……
……
……
……

☺ Fantastic, you've finished THANK YOU!

Appendix 8.5 – Love Food Hate Waste Session Outline

Chester Uni Research
June 2014
LFHW Session Plan

KS2 Session Plan (between ages 7-11; year 3,4,5 and 6).

Love Food Hate Waste: 30-45 minutes (depending on class size and questions).

What you will need:

- Love Food Hate Waste Table top Game or A4 Play Your Cards Right game from lesson pack (this might be better for a larger group so they can all see – let me know if you need this).
- Food Lovers Hate Waste Leaflets (one each)
- Home Composting leaflets (one each)
- Freebies (e.g. one bag clip each)
- Each pupil will need a pen and some scrap paper *(when you arrive and are setting up, please ask that the class teacher provides this)*

Brief Classroom Session Outline:

Introduction (5 minutes)

Welcome the children to the session and give them your names. Tell them that you have to come to visit them to help them learn about a problem, where much of the lovely food we have to eat, and the money we spend on it goes in goes to waste… Ask the pupils if they would ever throw money away? They will undoubtedly say no. Explain that over the course of a year, the money wasted on food for an average family of four is £680 - a lot of money!

Explain that in the UK, everyday people throw out food and drink – both good food/drink that could be eaten, but also food /drink that we have bought but forgotten about, which then isn't safe to eat anymore and must be thrown away.

Ask the pupils to guess how much food we waste in the UK in tonnes… let a few of them have a few guesses.

Tell them that 7 million tonnes of food is wasted every year in the UK. Almost 9 Wembley Stadiums full (you can ask them to guess how many Wembley stadiums they think)!

Explain briefly the three categories: *avoidable, possibly avoidable and unavoidable*.
7.0 million tonnes; of which 4.2 million tonnes is avoidable, 1.4 million tonnes possibly avoidable and 1.4 million tonnes unavoidable.

Explain that in the rest of the session they are going to learn a bit more about this problem and also some of the things we can do to help reduce food waste so we can stop good food going in the bin.

Why is it a problem to waste food? (10-15 minutes)
Task

Ask the group to spend five minutes to write down what they think the journey is of food from farm to fork. Ask them to think of all the different stages that food has to grow through before it gets to our plate. They can work in pairs if they wish.

When they are finished, ask them to put their hands up and tell you one thing they have written - i.e. start at the first stage until you get to the end - the answers you're looking for are: things such as:

- The farmer ploughing the field
- Using his tractor which needs petrol/diesel (how did this get into the tractor; by lorries taking it from the oil plant to the petrol station which used roads etc)
- Water that is sprayed onto the field
- Manual labour or machinery to harvest food (again using machinery)
- Packing the food in a lorry to take it to the manufacturing factory (lorries need petrol and to use the road that will have been laid by workers and machinery)
- People driving to the factory using their cars to get there for work using the roads and petrol.
- Workers spending hours sorting the produce
- Machines and workers cleaning and packing the produce –
- The bags it goes into will be made of plastic which will have ink on it that will have been made in another factory
- Then another lorry to pick up the packaged goods to take them to the supermarket
- Refrigerators in the supermarket need electricity to keep them powered
- Supermarket workers going to work in their car and then spending time putting things onto the shelves
- Us travelling to the supermarket in our cars
- Our electricity to keep the food in our fridge or for us to cook it in our oven
- ETC

So this task points out that it's not just the food we are wasting but it's the resources, the machinery, the man power, the water etc. Food isn't just food that magically appears on your plate – there is a lot of work that goes into producing the food! A loaf of bread isn't just a loaf of bread; it is time and energy and resources!!

Ask children to put their hands up and say why they think it is a problem to waste water or electricity. (2-3 minutes) *Prompt around what they know about the availability of water across the world, or how electricity is generated (using non-renewables!) and the impact it has on the planet. Explain that resources like water are precious and we need to try to save them and that because creating electricity using fossil fuels is harmful, we need to use as little as possible!*

Explain the other reasons that wasting food is bad (ask them if they can think of any first) (2-3 minutes):
E.g: Money, bad for the environment (talk about landfill, methane gas, climate change), wrong to waste food when there are so many people in the world who don't have access to food.

Play the LFHW Higher and Lower Game (*2 versions to choose from)* (5-10 minutes)
(The a4 cards – in the schools lesson pack - are <u>avoidable food waste</u> and the table top game is <u>total food wasted</u>)

An alternative method to playing this game(in the usual "higher/lower" way would be to give each pupil one of the A5 cards off the game or one of the A4 cards each. Tell them not to look at the

number on the back, only on the food on the front. And ask them to order the cards in a line on the table/floor in the order of food they think is wasted the most, to the food they think is wasted the least. They can work together as a group on this and help each other to decide. Then reveal the cards to see if they are right, ask them to explain for each card why they think this food is wasted; for example, we waste fruit because it goes soft too quickly when its stored in the fruit bowl, or chicken because we only eat certain parts of it on a Sunday roast and throw the rest away when we could still use it.

What can we do to waste less food?
Ask the group to put their hands up and make a suggestion (2-3 minutes)
Add if it isn't mentioned already: Better planning, writing shopping lists, cooking less food, using the freezer to store food, eating what you have before you buy other things.

- So we need to use the THREE R's (ask them if they know what the THREE R's are) "REDUCE, REUSE and RECYCLE"

Explain that reducing and reusing means things like only buying what you need, and reusing means things like using leftovers to create a new meal the day after. You can give examples if you like. Recycling would be home composting, you can touch on this for a few minutes at the end to see if they know what it is.

Summarising Task (2-3 minutes)
Thank the group for joining in and ask them to put their hands up and say something new they have learned today.

Hand out the leaflets and freebies and let them know that the LFHW website is really useful so they could have a look on it or give it to their parents to have a look for recipe ideas etc.

Appendix 8.6 – Sample teacher transcript

Love Food Hate Waste Interview with [redacted] Thursday 27th March 2014 14.05pm

Interviewer: My research project involves finding out about children's knowledge and their current understanding of food waste from their teachers' perspective.

Interviewee: Yes

Interviewer: I would like to ask you some questions about this and also ask you about the best ways to convey messages about food waste to children aged 10-11.

Interviewee: Nod

Interviewer: Have you heard of the campaign LFHW?

Interviewee: Yes.

Interviewer: Do you know much about it?

Interviewee: Yes, I do know quite a bit we were actually with Lucinda the other day who was actually doing the Love Food Hate Waste that's their campaign isn't it so our, and they were year 6's that were with us so yes you know that's our sort of knowledge of it and we have had a few Love Food Hate Waste sessions in the school with Lucinda.

Interviewer: Would you like some more background information?

Interviewee: No that's fine I think I know enough.

Interviewer: I understand that the geography curriculum for key stage 2 has been discontinued for this academic year and teachers have been advised to develop the curriculum to best meet the needs of the pupils.

Interviewee: Right, yes.

Interviewer: So I would like to know what do you teach in geography in terms of environmental damage for example climate change, damage to animals, wasting water?

Interviewee: Yes we do.

Interviewer: What sort of things do they learn about?

Interviewee: A lot of it has been climate but we have done water as well because we have has the water board in to do some work with us.

Interviewer: So you have done wasting water and climate change, have you done anything on damage to animals?

Interviewee: I don't think they have done animals, I'm sure they haven't done it to animals.

Interviewer: Ok, so if the children have studied climate change and wasting water has this been directly linked to food waste?

Interviewee: We have teed off slightly, we have included food waste because we do do in all year groups we do do food waste so we try to get the message across yes.

Interviewer: Ok, do the year 6 children tend to understand the link between the environmental damage and the link that this may have on themselves and their families?

Interviewee: Yes because we would encourage also their own research, that could be at home worked on so yes I think they do understand.

Appendix 8.7 – Incident Report for School 1

Whilst delivering the Love Food Hate Waste session in school one, the volunteers who were delivering the session were found inappropriate by the staff and students due to some comments made singling out children, inappropriate personal stories and inappropriate examples related to food waste. These volunteers did not deliver any of the other food waste sessions in other schools. The volunteers have been reported and a formal apology from Keep Britain Tidy and the University of Chester has been made to the school in question. This incident may have biased the results very slightly however pupils from this school still answered the majority of questions on the evaluation questionnaire with the exception of question 5 which was excluded from data analysis. The teacher evaluation for school 1 also excluded question 3.

Appendix 8.8 – Supervisor contact record

Researcher: Alexandra Carver Supervisor: Aly Woodall

Date	Time	Issues discussed	Signed: Researcher	Signed: Supervisor
9/12/13	14:00 – poster presentation with Rob Skinner	Initial ideas, target group – further research required to decide on appropriate age. Discussed justification for use of research methods – more research required.		
7/1/14	13:00	Discussion of ideas and research methods (questionnaire), questionnaire design uncertain, talked about splitting the project into two parts – interviews with teachers to add more structure followed by questionnaires with children, Aly will enquire further about the possibility of two separate ethics applications		
7/1/14	On-going email feedback	Proof reading and feedback for FREC application form – submitted on 15/1/14		
25/2/14	14:00	Discussion about recruitment of schools – Alex is working with Healthbox CIC to recruit teachers.		
20/3/14	15:30	Schools have been recruited, preparation for interviews next week, Aly read through interview schedule, discussed the questionnaire – possibility of doing a more interactive activity with children		
7/4/14	14:00	Discussed interview data, questionnaire draft, second part of ethics application		
22/4/14	14:00	Discussed part two research idea, evaluation of LFHW session instead of scoping exercise		
30/4/14	10:00	Ethics deadline – final check over ethics form		
9/6/14	14:00	Discussed research methods for next part of project – administering questionnaires to children		
30/7/14	14:00	Progress update, write up discussed		
12/09/14	14:00	Results section discussed		