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Original article

Increasing Portion Size in Britain

Christina Benson

Department of Anthropology, Durham University, UK

c.m.benson@durham.ac.uk

Abstract

British obesity levels have risen significantly in the past two decades, with over half of all British adults now overweight or obese (NEPHO 2005). Much research has been undertaken in the United States into the effect of historical changes in food portion sizes upon obesity levels, with positive correlations being found in the majority of research (Young & Nestle 1998 & 2002, Rolls et al 2002). Despite the recent interest in food portion sizes and obesity, little research has been conducted within Britain to date. This explorative study aimed to address the gap in the literature by ascertaining the extent to which food portions sizes have changed in Britain over the past century and to examine the causes of any such changes. Several qualitative and quantitative research methods were employed to conduct this research which consisted of national food survey analyses, manufacturer data analyses, recipe analyses, food portion size exercises, questionnaires, a focus group and the creation of two threads on website forums. The research showed that portion sizes have changed dramatically in Britain, with the most significant increases occurring within the past twenty years. The qualitative research highlighted that not only are increasing portion sizes affecting caloric intake, but the increasing prevalence of snacking is also an issue. There is no one explanation for these changes in dietary habits however, it appears that the main causes of the increase in British portion sizes are a combination of intensive farming methods, the effects of globalisation, in particular Britain's intensive exposure to American culture, and the notion of 'waste not want not' which appears embedded in the public's consciousness. Levels of lay comprehension of increasing portion sizes are questionable, and it appears that even those people who are aware of the negative impact that larger than standard portions can have, still struggle to refrain from over-eating. The lack of public advice on appropriate portion sizes for different individuals only adds to the confusion among the public as to appropriate amounts to consume and begs us to consider future public information into food portion sizes.

Introduction

The ever increasing rates of obesity in the UK raise salient questions as to the impact of the British eating environment upon the future of the nation's health. Many argue that obesity in Britain is now reaching epidemic levels and, with 30,000 deaths per annum being obesity-related in England alone (Davey 2004: 360), it is now imperative that this issue is addressed. Despite the human and monetary costs of obesity within the UK it has been found that, regardless of governmental interventions and national targets set in the 1980s, overweight and obesity levels have continued to surge. The Historic Health of Nation Targets (NEPHO 2005) hoped to reduce obesity in men from 7% in 1987 to 6% by 2005, and to reduce obesity in women from 12% in 1987 to 8% by 2005. Despite these aspirations, obesity rates have now trebled, meaning that over half of all British adults are now overweight or obese (NEPHO 2005).

So, how has the UK come to have such a high prevalence of overweight and obesity? What causal factors have so dramatically affected caloric intake among the public? Much work has been conducted globally into the causes of obesity, with the relatively recent transitions toward processed foods, influential commercial marketing, sedentary lifestyles, a growing literal and conceptual distance between food and consumer, and growing patterns of over-consumption, all being cited as explanations (Barnes 2005). These

determinants all contribute to an obesogenic environment (Ulijaszek & Lofink 2006), and are the pivotal themes within the discourse of obesity prevention.

Although it was evolutionarily advantageous for *Homo sapiens* to have a thrifty genotype/phenotype, in order to protect against times of scarcity, in the context of today's society, where the food supply is secure, the trait has become maladaptive (Ulijaszek and Lofink 2006). This adaptive human trait has now become disadvantageous within modern industrialised societies, where individuals consume more and expend less than ever before. This imbalance of energy intake and energy expenditure results in high levels of insulin resistance, hypertension, cardiovascular disease, type 2 diabetes and many other related non-communicable diseases characteristic of Western populations (Scrimshaw & Dietz in Garine & Pollock 1995: p148-156). Zimmet (2000) argues that the rise in disposable income affects obesity levels greatly, as the associated lifestyle changes directly correlate with vast increases in obesity-related diseases and excess weight has been shown to be the cause of more illnesses than any other medical condition (Levy 2000). Zimmet (2000) highlights the case of many South Asian countries, which are now suffering from chronic disease epidemics that have occurred concurrently with a modernisation in lifestyle, a process labelled by Arthur Koestler as 'Coca-colonisation' (Zimmet 2000). As a result of new found wealth, many South Asians are now consuming significantly greater quantities of meat

than ever before, which appears to be having a marked effect upon the health of the population (Irwin 2000). Similar changes in diet are notable within Western society also, as meat consumption has also risen dramatically, with the end of rationing in the UK heralding a new era of frequent meat consumption, synonymous with financial stability.

Nestle and Young (2002) were some of the first researchers to investigate the effect of portion size upon obesity. Their research into changes in portion size in the USA has shown that, not only are market place food portion sizes increasing, but they are often exceeding the recommended portion size, sometimes by 480% in the case of pasta dishes. Increases in food portion sizes inevitably affect caloric intake and if this excess energy is not expended then weight gain is unavoidable. One of the areas which has shown the most notable changes in food portion size is the fast food industry (Nielsen & Popkin 2003), which offers super size and value portions of their meals (Spurlock 2005, Nestle 2003). It has been shown that as a result of these 'value adding' practices it is often cheaper to consume these value meals than it is to purchase a standard sized meal (Nielsen and Popkin 2003). These trends are particularly prominent in the United States where food is increasingly consumed away from the home, with over a third of families eating one fifth of their meals in the car, as a result of the 'time famine' with which dual income families are faced (Turner et al 2008).

Nestle and Young (1998) and Wansink et al (2005) showed that most individuals cannot accurately estimate portion sizes and are thus unable to calculate caloric intake, a phenomenon which has become known as "portion distortion" (Schwartz & Byrd-Bredbenner 2006). It is argued that "portion-distortion" has occurred as a result of frequent exposure to large portion sizes in restaurants and ready meals and these extreme portions have now become the norm. It has also been consistently demonstrated that as portion size increases so does consumption, with supersize portions directly increasing the amount of food consumed in one sitting (Rolls et al 2002, 2004; Wansink et al 2005).

Much research has been conducted into the demography of individuals more likely to consume larger portions. Rolls et al (2002) and Wansink and Ittersum (2007) looked at the responses of individuals to discreet changes in food portions, and an abundance of food and although there were significant data to illustrate that consumption increased simultaneously with food portion size, there was no evidence that any of the types of individuals highlighted in the hypotheses were either more or less likely to consume more food. That anyone is susceptible to "portion distortion" has however recently been challenged by Burger et al (2007) who found that an individual's BMI accounted for 28-51% of the variance in choice of food portion size.

Despite the wealth of research available for changes in portion size in the

United States, very little has been conducted elsewhere, except for the work of Rozin et al (2003). They found that despite the French gastronomic traditions of rich food, there was a significantly lower prevalence of obesity in France than in the United States, a phenomenon referred to as the 'French Paradox'. They found that much less food is consumed in one sitting and snacking is much less commonplace than in America, and argue that it is the different attitudes towards the ecology of eating which most significantly affect obesity levels.

As the research here looks at changes in food portion sizes in Britain over the past century it is important to put the British eating environment into context before exploring the work that has been conducted. The main factors which have affected British consumption habits are, arguably, the impact of the Second World War and rationing and the introduction of intensive farming methods.

At the outbreak of the Second World War (1940) rationing was swiftly introduced as a result of Britain's heavy reliance on imported foodstuffs and the need to direct resources toward the War effort. The rationing scheme categorized foodstuffs into three groups; rationed foods (meat, bacon, ham, fats, cheese, sugar and sugar products), quasi-rationed foods (milk and eggs) and un-rationed foods (local, seasonal fruit and vegetables) (Zweiniger-Bargielowska 2000). As a result of rationing, people subsisted on staples of potatoes, bread and vegetables, with more luxurious items such as meat and sugar products being viewed as a rare

treat. In a publication on food control during the preceding war years the Ministry of Food stated;

'Since 1940 Britain has suffered a shortage of nearly all the more appetising and popular staple foods. Meat, fish, butter, eggs and sugar have been scarce.....People have been compelled to satisfy their physical needs by filling up with larger quantities of the bulky and less attractive vegetable and cereal foodstuffs still obtainable.'

(Ministry of Food 1946)

Changes in British agricultural policies since 1950, similar to those in the USA, have resulted in intensive farming methods which provide an abundance of cheap foods. The Common Agricultural Policy was created after the establishment of the Common Market and was intended to create a single agricultural policy which would be used by a collective of different European countries and would enable countries to increase production and export which had dropped so dramatically during the war years (Fennell 1997). The deficit which was left by the war was quickly filled however, and a drive towards intensive farming has resulted in a profusion of foods which has never been experienced before.

Research conducted by Davey (2004) into obesity in Britain found that British manufacturing, marketing and consumption habits have evolved in a similar vein to those in the USA. The research also showed that, in today's Britain, portion sizes have increased, with the introduction of 'Super Size' chocolate bars and 'Big Eat' packets of crisps

encouraging over-consumption among the population (Dave 2004). Davey thus asserts that the British environment is 'toxic' in promoting over-consumption in the same fashion as argued by Rozin et al (2003) in relation to America.

Wrieden et al (2008) conducted the only comprehensive analysis to date of changes in food portion sizes in Britain over the past twenty years. They found that portion size trends were not as extreme as in the United States but, the introduction of 'giant' and 'king size' chocolate bars, crisps and confectionery has affected average portion sizes being consumed by the British public.

Despite the lack of research into food portion size changes in Britain, interest in the field is slowly increasing, with the retail sector beginning to address the issue of large portion sizes in the British market place. The Institute of Grocery Distribution (IGD) recently launched a working group in response to concerns relating to over-consumption and increases in manufacturer portion sizes (IGD 2008). Interest in food portion sizes has now also reached the British Food Standards Agency (FSA 2008) which recently held a workshop on the subject in order to analyse the current evidence in relation to portion size and obesity. They noted that while it was evident that there was a definite increase in portion sizes over the past fifteen years, particularly in the confectionery and crisp sectors, there was a vast shortage of current and historical research into changes in British portion sizes (FSA 2008).

The focus of this research is therefore to address the gap in the literature in relation to changes in portion sizes in the UK by assessing these changes from an historical perspective and also to explore public attitudes toward changes in portion size.

Materials and Methods

As this explorative research focused on historical changes in food portion sizes the primary sources employed were archival and government records. However, a number of data collection methods and sources were used in order to allow the data to be triangulated. Seven methods of data collection were used in total: national food survey analyses, manufacturer data analyses, recipe analyses, food portion size exercises, questionnaires, a focus group and the creation of two threads on website forums.

National Food Survey Analyses

A total of 6 national food surveys were selected to track changes in national consumption habits, focusing on meat, cereals/grains, potatoes, cheese, fish, fruit, vegetables, fats and sugars (Figure 1). These foods were selected because they were recorded in all of the surveys and comprise the main components of diets with which to highlight any changes in national consumption levels.

Manufacturer Data Analyses

Surveys conducted by the Ministry of Agriculture Fisheries and Food (MAFF) in 1988 and 1993 were used in

conjunction with data obtained from McDonalds to assess historic changes in portion sizes of typical market place products, including confectionery, drinks, crisps, biscuits, chips and pre-prepared meals (Figure 2). However, since the last MAFF survey was conducted over ten years ago, the data cannot be deemed representative of portion sizes in today's current market place and is only viable as historical analysis.

Recipe Analyses

Four recipe books and leaflets from the Second World War to the present day were analysed; 'How Britain was fed in the War Time' (a collection of Ministry of Food leaflets), the 1966 edition of Good Housekeeping, the 1995 edition of Good Food'. The recipes which were looked at included lamb hot-pot, fish stew, macaroni cheese, burgers, spaghetti in a Housekeeping and 'Jamie's Ministry of tomato sauce and summer pudding. Both the books and the recipes were selected

because of their popularity and accessibility, as these recipes would have been popular amongst different socio-economic backgrounds.

Food Portion Size Exercise

To address whether or not there were any characteristics which made one individual more likely to over-consume than another, 29 participants were asked to select from a set of eight standardised images (Nelson et al 1997) the portion size which they felt best represented the amount of that food they would typically consume. Fourteen different foods were selected overall; corn flakes, soup, pate, pasta, roast beef, roast chicken, stew, new potatoes, chips, broccoli, green beans, fruit salad, fruit crumble and ice cream. These images were chosen because of their perceived popularity and represent a range of both everyday and more luxurious foodstuffs. The sample for this exercise consisted of 15 males and 14 females, ranging from 16 years old

Figure 1: National Food Surveys used in this research.

The Urban Working Class Diet: 1940-1949	1909-1949	Ministry of Food
Household Consumption of Selected Foods from 1942 Onwards	1942-1996	DEFRA
Household Food Consumption and Expenditure	1984-1986	MAFF
The Dietary and Nutritional Survey of British Adults	1987	MAFF
The National Dietary and Nutrition Survey: adults aged 19 to 64 years	2000-2001	FSA
The Low income Diet and Nutrition Survey	2003-2005	FSA

Figure 2: Changes in Commercial Food Products between 1988 and 1993

Food	1988	1993	Difference	% Increase
1 slice fresh white bread	23g	25g	2g	8%
1 thin slice corned beef	30g	38g	8g	26%
Bolognese Sauce	220g	240g	20g	9%
Dried Raisins	10g	30g	20g	200%
French fries	100g	110g	10g	10%
Fish pie	227g	250g	23g	10%
Individual mince pie	48g	55g	7g	14%
Medium portion of boiled rice	150g	180g	30g	20%
medium slice of quiche	120g	140g	20g	16%
Plain Croissant	50g	60g	10g	20%
Ravioli canned average portion	200g	220g	20g	10%
Ribena (individual carton)	250g	263g	13g	5%
Ribena (King Sized Carton)		394g		58%
Blue Ribband	22g	29g	7g	31%
Hob Nob Bar	15g	27g	12g	80%
Ready Brek	150g	180g	30g	20%
Cadbury Buttons (bag)	33g	33g		
Cadbury Buttons (Large size)		51g	18g	54%
Nestle Fruit Gums	33g	40g	7g	21%
Nestle Golden Cup Bar	38g	37g		
Nestle Golden Cup Bar (Large Size)		60g	22g	57%
4 finger Kit Kat	43g	49g	6g	13%
McDonald's Bacon & Egg McMuffin	140g	146g	6g	4%
McDonald's Quarter Pounder with Cheese	186g	195g	9g	4%
McDonald's Reg Fries	93g	110g	17g	13%
McDonald's Large Fries	124g	155g	31g	25%

to over 76 years old. Participants were recruited from three different social groups representative of different generations: a youth club, a church group and a day centre for the retired and elderly.

Questionnaires

Surveys were conducted in order to investigate public perceptions of changes in food portion size, attitudes toward

these changes and also dietary habits. The population for the questionnaires consisted of 24 participants from the three social groups used for the food portion size exercise. Altogether 14 males and 10 females participated in this part of the research. The survey, which was self-administered, comprised a combination of open-ended questions, closed questions and Likert scale questions in order to obtain both statistical and descriptive data.

Focus Group

A focus group was conducted with women from a local Women’s Institute (WI) in Saltburn, Cleveland. Fifteen participants, aged between 58 and 75, took part in the focus group and the discussion was recorded and analysed. After the focus group the researcher was approached by a participant who wished to discuss in further detail her opinions about changes in food portion sizes and so an informal email interview was then conducted with this participant over a sustained period of time.

Website Forum Threads

Threads were also started on two internet web forums asking people likely to have an interest and knowledge of changes in British food habits for their opinions of changes in food portion sizes. The threads were placed on the Jamie Oliver website as well as the Evening Gazette website (a regional and popular

newspaper in the North East of England), in order to gauge the opinions of people within the local area. Three replies were received from each posting.

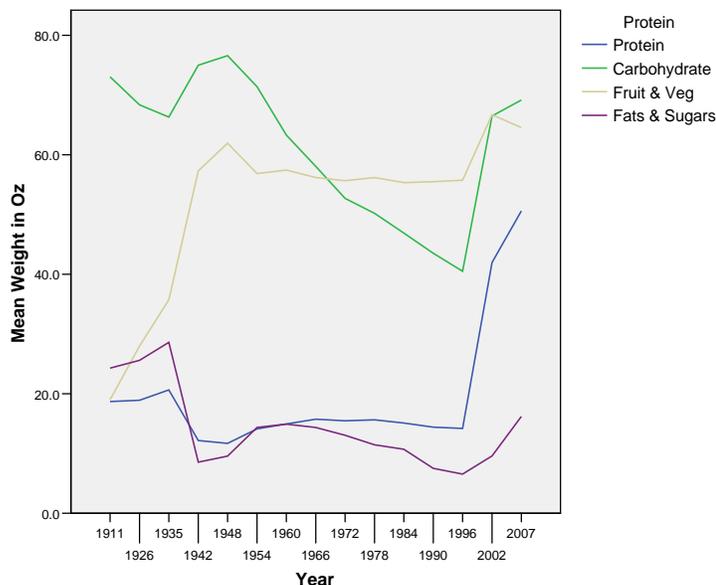
Results

Overall Changes in Portion Size

Analysis of national food surveys has shown that the most prolific increases in food portion size in Britain appear to have occurred over roughly the past twenty years (Figure 3) and the impact of rationing is clearly demonstrated, with protein, carbohydrates, fats and sugars all having reduced in consumption between the 1920s and 1950s, whilst consumption of un-rationed foods (fruit and vegetables) rose dramatically.

Reponses from the questionnaires (n = 24) showed that 62% of participants felt that food portion sizes had increased over their lifetime and 46% of participants felt

Figure 3: Changes in mean portion size consumed per person, per week, for four major food groups



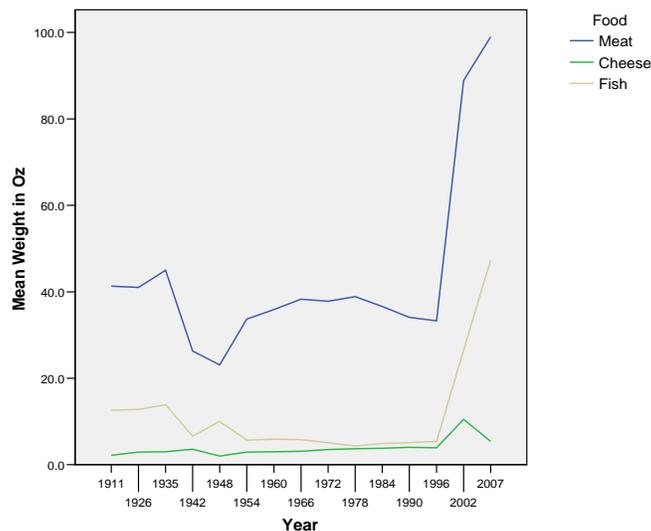
that the availability of larger portion sizes was a negative thing. When attitudes towards larger portion sizes were assessed in relation to gender it was found that 60% of women felt that large portion sizes were negative, while only 29% of men held the same view. This difference was statistically significant ($p = 0.029$, $\chi^2 = 7.073(a)$). Many of the participants felt that large portion sizes encourage over-consumption as they produce a distorted image of what is normal and if larger sized options were not as abundant in the market place people would not have the opportunity to over-indulge.

Changes in Portion Sizes of Protein

As can be seen from Figure 4, apart from declines in protein consumption during the period of meat rationing (1940 – 1954), amounts of protein eaten per person per week have remained relatively

stable up until the past decade, when consumption levels appear to have rocketed. The amount of meat and fish consumed per person per week in Britain is rising exponentially and is consistently exceeding recommended daily allowances (as Britain has no recommendations for daily allowances of different foods, the US Food Pyramid has had to be adopted). The recommended allowance of protein (which includes meat, fish, beans, peas, eggs and nuts) is 10-15oz (283-425g) a day for women and 14-21oz (397-595g) a day for men (Shaw et al). The average consumption levels of meat and fish per person, per week (Figure 3), as of 2007, total 146oz (4139g) giving an average consumption of 21oz (593g) per day, already pushing the upper boundaries of males' recommended daily allowances, without taking into account consumption of beans, peas, eggs and nuts.

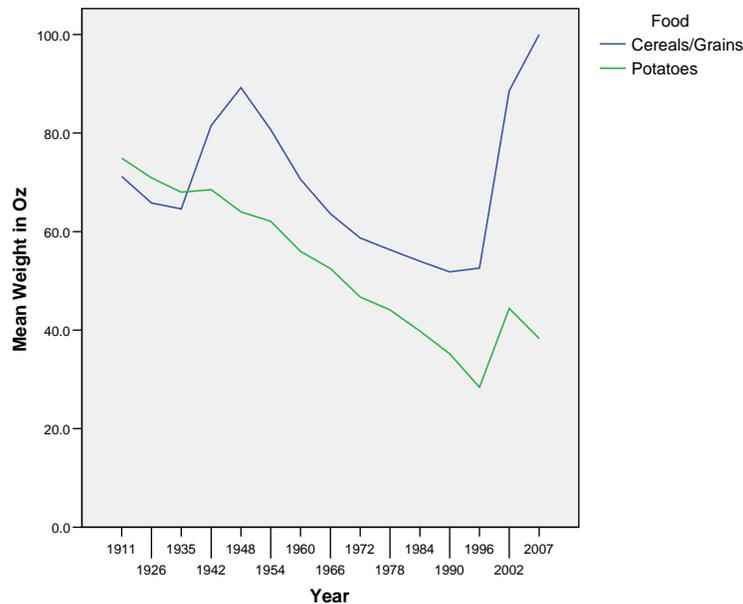
Figure 4: Changes in quantities of proteins consumed per person, per week in Britain



Analysis of market place foods also shows a significant increase in portion sizes of proteins, with the average portion size of corned beef having increased by 26%, the average minced beef pie by 14%, the average fish pie by 10% and the average chicken kiev by 6% between 1988 and 1993. It can be predicted that there will have been further increases in portion sizes of protein over the past 13 years, as we can see from figure 3 that it was during the mid 90's when consumption levels began to rise most dramatically. Recipe analysis also highlighted an increase in protein portion sizes, with the typical fish stew requiring 35% more fish in 1995 than during the war years, burgers requiring 40% more meat in 2008 than during the war years and a lamb hot pot requiring 70% more meat in 1995 than during the war years.

The most significant findings in relation to changes in protein portion size were those obtained from the qualitative analysis: 36% of participants stated that they consumed meat as part of their main meal of the day seven times per week, and 25% of participants independently said that they felt portion sizes of protein had increased over their lifetime. The majority of participants argued that larger sizes of protein were consumed because these products had become less expensive and the increased availability encouraged them to purchase and consume more. Participants in the focus group stated that after experiencing the harsh diet during rationing, once the price of meat and fish fell, everybody felt as though they deserved to consume greater quantities of these products in response to their imposed dietary restrictions.

Figure 5: Changes in quantities of carbohydrates consumer per person, per week in Britain



Changes in Portion Sizes of Carbohydrate

Increases in carbohydrate consumption have also occurred. As is illustrated in Figure 5, consumption levels of cereal and grain peaked during rationing, began slowly to drop in the resulting years and have swiftly risen again within the last twenty years. Throughout the past century, levels of potato consumption have steadily declined, probably as a result of increased popularity of other carbohydrate staples, such as pasta and rice, but there has also been a sharp increase in consumption levels over the past twenty years. However, this does appear to have been curtailed within the past eight years.

As of 2007, weekly consumption levels of grains and cereals totaled 100oz (2835g), giving an average daily consumption level of 14oz (405g) of grains and cereals per person, per day, which exceeds the recommended daily allowance of 6-11oz (170-312g) per person per day.

Analyses of market place products also highlight the increases in carbohydrate portion size. The average slice of white bread increased by 8% between 1988 and 1993, the average portion of french fries by 10% and the average portion of boiled rice by 20%. In 2009, McDonalds offered fries in either 80g, 114g or 160g options, with the largest portion providing almost all of the recommended daily allowance for carbohydrates. Similar trends were noted in domestic recipes, where the amount of pasta in a dish of macaroni cheese was 350% larger in the 2008 recipe than in the 1966 and the recommended portion size of spaghetti rose by 90% - from 2oz (57g) per person in 1966 to 3.8oz (108g) per person in 2008. Survey participants and focus group participants felt that portion sizes of carbohydrates had increased over their lifetime.

Self Selected Portion Sizes

Males consistently chose significantly larger portion sizes of carbohydrate (unpaired t-test, $t = 2.511$, $p = 0.018$) and protein ($t = 2.582$, $p = 0.016$) than women. When asked how likely they would be to buy a 'super-size' portion at a fast food outlet, 80% of women said that they *never* would, while 29% of men stated that they *always* would choose a super-size portion. A chi-squared test showed that the relationship between gender and the likelihood of purchasing and consuming a super-size meal was significant ($\chi^2 = 9.538$, $p = 0.049$).

There was little difference between self selected portion size and age across most food groups; however, older participants did tend to select larger portions of fruit and vegetables than younger ones.

Snacking

Snacking arose as a topic without prompting during the focus group and among those participating in the website forum threads. Many participants said that snacking has become commonplace, and that this was the main cause of rising obesity levels.

Along with the notion of too much snacking, the typical types of snacks consumed were criticized by the female participants as being unhealthy and inappropriate to eat between meals. Findings from both the focus group participants and results of the survey showed great correlations in the types of foods typical consumed as a snack, with crisps, chocolate bars and biscuits all proving to be the most popular types of snack, while nuts, yoghurts, cereal bars were the least popular. It is frequently the most popular types of snacks which are sold in larger portion sizes, with chocolate bars, biscuits and crisps all frequently come with a 'big eat', 'king size' or 'super size' option.

Some quantitative data was gathered later on in the research process, in light of the regularity with which the issue of snacking arose, but the sample size was not large enough with which to conduct a statistical analysis. What the preliminary data showed was that males tended to consume more snacks per day than females and that younger people consumed more snacks than middle aged and elderly people on average.

Discussion

From the results presented in the preceding section, it is evident that there has been a definite increase in food portion sizes over the past century, with the largest increases having occurred during the past twenty years. These findings support the initial hypothesis that British food portion sizes have increased throughout the past century, but it was expected that these changes would be steady increases and the significance of the last twenty years was not predicted. This trend is likely to be a result of changes to British Agricultural Policy, with the introduction of the Common Agricultural Policy (CAP introduced in the 1950s) becoming evident in national consumption levels. The CAP encouraged intensive farming methods which allowed food to be produced more cost effectively for the consumer (Fennel 1997). These changes in farming policy, along with subsidies, have resulted in an abundance of cheap, readily available food (Davey 2004). This was also noted by participants, with particular reference to the relatively recent affordability of meat and the temptation to consume more than ever before. The effect of rationing upon British food portion sizes appears to have altered the way in which food portion sizes are regarded today. The slogan 'waste not, want not', introduced during the period of rationing in Britain appears to have become firmly embedded in a portion of the public's consciousness, as many participants stated that they felt guilty if they left food on their plates, as they had been encouraged from an early age never to leave anything. This sentiment was predominantly expressed by older participants, but also to a lesser extent by subsequent generations. One explanation for the continual existence of this attitude amongst subsequent generations is that this notion has been passed down in families and has become instilled in the minds of individuals who are now food secure, despite being detrimental to their health.

The ways in which these notions have disseminated through generations would be an interesting area of research, especially in relation to individuals of different Socio-Economic Statuses, as it may be the case that the notion of 'waste not, want not' has been retained amongst the working classes in order to ensure that their children did not waste food, which for them may not have been as disposable.

One other reason cited for the pattern of increased portion sizes is that of exposure to America and increased globalisation, or more specifically 'grobalisation'. Ritzer & Ryan (2004) define 'grobalisation' as the ways in which dominant powers, be it countries, companies or organisations, impose their presence upon other nations with the intention of increasing their power, influence and profits. Americanisation and grobalisation go hand in hand in this context, as American commodities, such as coca-cola, McDonald's, Starbucks, Hollywood movies, Sit-Coms, American Basketball etc, have all been willingly adopted by the British public and are now integrated into British culture. The increases in means of consumption have resulted in a myriad of consumer options and the drive to consume, which were mainly founded in the US (Ritzer & Ryan 2004). The amalgamation of the consumer culture of the US, with British culture has changed the ways in which we eat with the role of the fast-food outlet, and it's myriad of portion size choices, becoming ever more salient. British attitudes towards the ecology of eating arguably mirror that of Americans, with the family often fragmented at meal time, and solitary eating and 'eating on the hoof' becoming relatively commonplace.

It was hypothesized that the majority of participants would view large portion sizes negatively. This is supported here: 46% of participants viewed large portion sizes as negative while 33% viewed them as positive. It was also hypothesized that women would be significantly more likely than men to view large food portion sizes as negative: 60% of women felt that large food portion sizes were negative, compared to only 28.6% of men. These gender differences are undoubtedly significant and have an implication for nutrition counseling when dealing with over-consumption. While these differences are influenced by the fact that men have larger appetites than women it is also probable that these differences are a result of gender-ascribed notions of gluttony and self-control as it is far more culturally acceptable for a man to consume large quantities of food than a woman.

Increases in protein consumption levels appear to be some of the greatest for all food groups as hypothesized, and the changes in meat consumption have been central to this research. Meat and fish consumption levels have risen most dramatically, and the recent relative affordability of these products also appears to be the main driving force. The survey showed that 38% of participants consumed meat 7 days a week and many participants felt that they did so because of low prices. As meat has historically been an expensive product in Britain, it inevitably is adopted as a status symbol, as

previously only the wealthy could consume vast quantities, and so meat and fish begin to carry notions of grandeur, success and status. Zweiniger-Bargielowska (2000) argues that during the period of rationing the shortage of meat particularly impacted the working-class as meat was not only a status symbol and but also a marker of male privilege. When meat availability increased it was the natural response of individuals to then consume significantly more meat products, as this represented both a freedom from the restraints of rationing and a show of status not only within the household, but also within the immediate community. The effect of meat and fish prices plummeting in today's market encourages over-consumption among all members of the public, with an unconscious drive to aspire to eat meat and fish daily and in quantities previously inconceivable to many families. The investigation into self-selected portion sizes of meat shows that the average daily consumption of meat is large and, thus, it must be inferred that portion sizes of meat are getting larger. This point is supported by the research into changes in market place products whereby individual portions of both meat and fish dishes increased between the years of 1988 and 1993 and, therefore, the probability of further increases since this period are high.

Levels of cereal and grain consumption have increased at a much faster rate than other food groups. However, despite an initial surge in potato consumption during the 1990s, rates are once again beginning to decline in line with the overall trend throughout the century. Increased grain and cereal consumption can be attributed to the CAP, with intensive crop farming methods making these foods much more affordable, but it is also likely to be due to changes in food habits. Within the past thirty years, British consumers have begun to diversify in the types of foods they eat, with the introduction of more international cuisines heralding a new culinary era in Britain and increased travel and immigration have raised interest and consumption of 'ethnic' and 'foreign' foods such as rice, pasta, polenta, couscous and different types of breads. These changes in culinary habits not only affect consumption levels of cereal and grain products, but can also explain decreases in potato consumption, as other carbohydrate options are being selected as substitutes. This is supported by the qualitative research, with many participants saying that they felt they had become more adventurous in the types of foods they consumed and cooked, and that their eating habits now adopted a 'more international outlook'.

This research also attempted to ascertain whether or not there were particular characteristics which would deem an individual more or less likely to consume large portion sizes similar to work done in America on this subject (Rolls et al 2002; Wansink & Ittersum 2007; Burger et al 2007). In concurrence with the US findings, the results showed that neither gender nor age had a direct effect upon consumption of large portion sizes overall. However, when analyzing self-selected portion size in relation to particular food groups, there were some significant differences whereby women chose

significantly smaller portions of protein and carbohydrates than men. One would expect this perhaps as a result of the gender differences in caloric requirements and also the higher prevalence of women on diets.

One unexpected theme that emerged from this research was the effect of snacking on obesity, and the public concern about this habit. Snacking has become much more commonplace within the past twenty years with many people citing this as a cause of rising obesity levels. Snacking does have an impact on caloric intake which is exacerbated by the fact that the most popular 'snack foods' (chocolate, crisps, biscuits etc) are very fattening and include products in an array of different sizes, right up to 'king size'. It has already been demonstrated that our appetite control mechanisms appear to be over-ridden when faced with large portions of food (Rolls et al 2002, 2004) and so the introduction of over-sized portions by the snack industry is aggravating obesity by encouraging over-consumption and promoting larger portions as a viable alternative to standard sizes.

Conclusion

This research has demonstrated that, within Britain, portion sizes have increased, particularly within the last twenty years, and that the population is aware of these changes. However, the majority struggle to resist over-consumption. The main driving forces in increasing portion sizes appear to be the effect of intensive farming, the impact of globalisation and Americanisation and also the impact of rationing during the Second World War, with its accompanying slogans such as 'waste not, want not'. Unfortunately, with the lack of research currently being conducted within Britain as to the effect of increased portion sizes, the impact of snacking upon obesity levels, along with the slow progress in the standardisation or control of increasing portion sizes, it may be a while before any actual changes are seen within this sector. This explorative study has highlighted the changes in portion sizes which are occurring in Britain and prompts further in-depth research to be conducted into the effect of portion size upon obesity levels in Britain, as well as looking at British attitudes towards snacking and the meal as a formal occasion. It can be concluded that, should portion sizes remain over-sized or more worryingly increase, the impact of governmental legislation and advertisement in the future to prevent these trends may have much less impact, as the phenomenon of 'portion distortion' may be too embedded to change.

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