Use of supermarket receipts to estimate energy and fat content of food purchased by lean and overweight families

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Abstract

The aim of this study was to compare the energy and fat content of food purchased for home consumption by households comprising mainly overweight individuals (OH), with those comprising mainly lean individuals (LH). 214 supermarket shoppers and their household were recruited from a Tesco supermarket in Leeds (UK). Households collected supermarket receipts and completed a shopping diary for 28-days, and each member of the household completed a 4-day food record. OH purchased food higher in fat (38% total energy from fat) than LH, (34.9%: $p = 0.001$) and they purchased more energy and fat per adult equivalent, per day than LH (10.05 MJ compared to 9.15 MJ: $p = 0.01$ and 103 g compared to 86 g : $p = 0.001$). Households were 15% more likely to be classified as OH for each additional MJ of energy purchased per person, per day, after adjusting for number of children, household size, age, sex and social class. It was concluded that food purchasing behaviour may be linked to the prevalence of obesity in households who shop at supermarkets.

Introduction

The UK population is continuing to gain excess body weight. Recent figures suggest that over half of the adult population is overweight and 18% men and 20% of women can be classified as obese (Comptroller and Auditor General, 2001). For children the situation is of particular concern as 20% of children can currently be classified as overweight and 10% obese (Chinn & Rona, 2001). Obesity tracks from adolescence to adulthood so overweight or obese adolescents have a greater than average chance of being overweight or obese as adults. Offspring of obese parent(s) are consistently seen to be at increased risk of fatness (Parsons, Power, Logan, & Summerbell, 1999). BMI, health and dietary behaviours are known to be associated within families (Parsons et al., 1999; Nguyen, Larson, Johnson, & Goran, 1996). Furthermore, families arrange a common, shared environment that may be conducive to overeating. Family members serve as models, and reinforce and support the acquisition and maintenance of eating behaviours (Epstein, 1996). This may be particularly relevant to the purchase, preparation and distribution of food within a family where obesity is a feature, and there is an overweight primary shopper.

The direct cost of obesity (not including overweight) to the National Health Service has recently been estimated as half a billion pounds per annum, with a further cost to the UK economy of one and a half billion pounds as a result of indirect expenses such as absence from work (Comptroller and Auditor General, 2001).

A number of cross-sectional studies have clearly demonstrated positive associations between fat intake and body fatness (Astrup et al., 2000; Bray & Popkin, 1998). Recently there has been a reduction in the proportion of energy from dietary fat in the UK, which has had no discernible impact on the increased prevalence of obesity in the UK population (Ministry of Agriculture Fisheries and Food 2000). Despite this reduction the fat intake of the UK population remains high and is in excess of recommended intakes (Department of Health, 1991). A decrease in physical activity may also be contributing to the continuing increase in the prevalence of obesity and the modest decrease in dietary fat intake is not sufficient to halt this development (Bray & Popkin, 1998).

Energy and fat enter the diet of the UK population by several routes. Approximately 85% of both the fat and energy content of the diet is derived from food purchased for consumption at home (Hughes, 1996; Ministry of Agriculture Fisheries and Food 1999). The remainder (approximately 15%) is derived from food eaten out and is supplied by institutions such as schools, workplace canteens, restaurants, fast food outlets and suppliers of snack food and confectionery.

The primary supply of food consumed in the home is from supermarkets, with an average of 85% of all household groceries being purchased from this source (Competition, 2000a). The total value of food and drink sold in the UK is approximately £90 billion per annum (Euromonitor 2000) and 84% of this is sold through six major supermarkets chains (Competition Commission, 2000b). Food from supermarkets enters the household via the primary shopper. The food that the primary shopper chooses to buy and provide for consumption at home may be an important determinant of familial dietary patterns (Kelder, Perry, Klepp, & Lytle, 1994; Maes, Neale, & Eaves, 1997; Nguyen et al., 1996; Rossow & Rise, 1994). Little is currently known about food purchasing in supermarkets and its impact on the development of obesity.

The objective of this investigation was to establish whether households comprising mainly overweight and obese individuals (OH) purchased food containing significantly more energy and fat per person from supermarkets and other sources than households comprising normal weight individuals (LH). In addition this study tested the feasibility of using itemised receipts to estimate the fat and energy content of food purchased as this have many potential advantages, e.g. not susceptible to under -or misreporting, automated, easy to collect, etc. The study aimed to compare the recorded energy and fat intake of individuals in these two types of household to determine if any differences observed in purchasing patterns were reflected in recorded energy and fat intakes. The data from this study could help to inform interventions and policy initiatives designed to help families to prevent and manage obesity in their households.

Method

Participants

The participants were recruited from a random sample of 837 active Tesco Clubcard members, shopping at a large Tesco supermarket in Leeds, (Roundhay Road Store), 454 (54%) registered an interest in taking part in the study and 284 met the recruitment criteria of spending >=60% household food purse at Tesco and other supermarkets and were recruited to the study. Many of those contacted were active Tesco shoppers but did not purchase their main food shop from this Tesco. 214 out of the 284 households recruited to the study returned a complete set of data. Reasons for not completing the study included the amount of work each participant was expected to undertake and unforeseen family events such as illness, death and unexpected work commitments.

Measures

Estimates of energy and fat composition of household

food purchased using till receipts

One eligible person, known as the primary shopper, was selected to collect supermarket till receipts for the 28-day period of the study. A shopping diary was completed for food purchased from independent retailers for which there was no receipt available.

Estimates of household nutrient intake

A 4-day food diary was completed for each member of the household (apart from fully breast fed babies) over three weekdays and one weekend day. Food eaten at home was weighed using digital scales (Soehnle Vita). A pocket book was used to record food eaten outside of the home.

Householder absences from meals and meals eaten by visitors

A record was made of the number and type of meals missed by household members and meals eaten by visitors.

Coding and processing data

Nutritional analysis of food diaries, pocketbooks and foods itemised on till receipts and shopping diaries, was undertaken using the Weighed Intake Software Program (WISP), for Windows V1.2 produced by Tinuviel Software, Warrington, UK.

Coding—till receipts

Databases of all food and drink sold at the Tesco in Leeds were supplied to the Public Health Nutrition Unit from the Information Technology Department at Tesco Stores Ltd at approximately three monthly intervals. These databases and other product information were used for coding receipts prior to nutritional analysis of food and drink purchased. The till receipt descriptor was used to search for further information used to identify the fat and energy content of the food product in the supermarket database. This database was derived from information supplied by food producers and manufacturers.

Wasted food

An assumption was made that 10% of all foods and hence all nutrients were either lost through wastage, spoilage or fed to domestic pets or livestock (Ministry of Agriculture Fisheries and Food, 1999).

Adjustments for children in households

To calculate the amount of energy purchased per person, per day, per household an adjustment was made for the number of children present. This was done by calculating the mean energy intake of male and female children up to the age of 18 years using UK dietary reference values for energy (Department of Health, 1991) and expressing this as a percentage of the mean adult (male, female) requirement. A figure of 0.62 was derived and used for children to calculate the number of adult equivalents per household.

Household net balance

To make a realistic comparison between food purchased and eaten by a household over the 28-days of the study, account was made for meals eaten out and by visitors. If all meals were eaten at home and there were no visitors eating from household food stores, the amount of food purchased for that period would represent 100% households requirement for food, i.e. the household net balance would be 100. Each meal eaten by a visitor to the house or eaten out was therefore given a weighting factor (WF) in proportion to its normal importance over the period surveyed. The relative weighting factors were based on breakfast = 0.75, mid-day meal = 1, and evening meal = 1.75 (Ministry of Agriculture Fisheries and Food, 2000). When each of these figures is multiplied by 28 and added together a total of 100% (98% plus a rounding error) is obtained. This represents 100% of a person's dietary intake for the 28 days of the study. In addition a weighting factor of 0.62 was used to adjust adults meals for children. The formulae for calculating the net balance for a household are as follows:

1. To adjust for meals missed by household members—(no. of meals missed by adults * WF)) (no. meals missed by children * WF (* 0.62))/no. adults) (no. children * 0.62)

2. To adjust for meals eaten by visitors —(no. of meals eaten by adult visitors * WF)) (no. meals eaten by child visitors * WF (* 0.62))/no. adults) (no. children *0.62)

3. Subtract the value for missed meals (1) from 100, then add the value derived for visitors (2).

For example, if 2 adults ate 6 dinners and 4 lunches out and their child ate 6 lunches out, the household net balance would be 93%. This would mean that the food they purchased met 93% of their need for food. The other 7% of their requirements was met from food eaten outside the home. The net balance was used to adjust the amount of energy and fat purchased for the household according to its family composition, the number of visitors eating from the household food stores and the number of meals eaten out.

Data analysis

Body mass index (BMI) was calculated for individuals from self-reported weights and heights (reported in the presence of a researcher). BMI was converted into a z-score as a means of comparing adults and children on the same scale and for the purpose of determining which households could be classified as overweight. An overweight household (OH) was one in which the mean BMI z-score for a household was greater than 1.3 which is the BMI z-score for an equivalent 18 year old overweight male based on the 1990 UK growth reference curves (Cole, Freeman, & Preece, 1995).

Individual adults were classified as overweight if BMI >=25 kg/m^2 and obese if BMI >=30 kg/m^2. For children (18 years) the 91st and 98th centiles BMI were used as a cut off points to determine overweight and obesity, respectively (Child Growth Foundation, 1990).

Low energy reporting households were determined by their reported energy intake (4-day food diary). The daily energy requirement of the household was calculated using data on the age, weight and sex of each person in the household (Department of Health, 1991). A cut off point of EI:BMR ,1.2 was used to determine low energy reporting households (Price, Paul, Cole & Wadsworth, 1997). This cut off point for under-reporting energy intake was used in the Dietary and Nutritional Survey of British Adults (Gregory, Foster, Tyler & Wiseman, 1990). PAL was not estimated in this study.

Independent t-tests were used to compare differences between LH and OH if variables were based on continuous data. Chi-squared tests were used to compare categorical variables. Crame´r's V provided a measure of the association (rather like that of Pearson's correlation coefficient). Multiple logistic regression was used to adjust for age, number of children in household, proportion of males and females in household, social class and household size. Data was analysed using Microsoft Access and Excel 1997, SPSS version 9.

Results

Characteristics of the sample

Table 1 shows LH contain significantly more people (2.6 people) than OH (2.1 people p = 0.001) and LH were younger (39.6 years) than OH (51.3 years p = 0.001). LH had a higher mean number of children per household, 0.7 compared with OH, 0.3 p = 0.001 which probably reflected the diminishing size of households as age increases and children leave home. It is interesting to note that mean BMI of primary shoppers is higher in OH (28 kg/m^2) than LH (23 kg/m^2 p = 0.001). Table 2 shows 71 and 94% primary shoppers were female in OH and LH, respectively, (p =

0.173). The mean number of people, per household claiming to be either slimming or on a low fat diet was not significantly different between the two types of households.

Table 2 shows there were no significant differences between the socio–economic composition of the two types of household. OH were significantly more likely to contain overweight children (64% p = 0.001) and overweight adults (63% p = 0.001) than LH. 65% of primary shoppers in OH had a mean BMI >=25 kg/m^2 compared to 35% of the primary shoppers in LH (p = 0.001). OH were more likely to under report their energy intake (estimated from 4-day weighed intakes) than LH (p = 0.02).

Table 3 shows the fat and energy content of food purchased for home consumption from supermarkets and other independent of retailers.OHpurchased food fromsupermarketswhich was significantly higher in energy derived from fat (37.9%) than LH (34.8% p = 0.002). Mean daily purchase of fat, from all retail outlets, per adult equivalent for OH (103 g) was significantly higher than LH (86 g p = 0.001). Total daily energy purchased per adult equivalent was also higher for OH (10.05 MJ) than LH (9.15 p = 0.015). Table 3 also shows significant differences between the two groups in the daily purchase of fat and energy per adult equivalent from supermarket shopping (till receipts).

Table 4 shows that the chances of a household being classified as OH are increased by 14% for every additional 10 g of fat purchased per person per day from supermarkets (p = 0.003). This amount of fat (10 g) is less than that contained in one standard packet of potato crisps. The purchase of an additional MJ of energy per person per day also increases a household's chances of being an OH by 15% (p = 0.019). In addition for every one percent rise in energy derived from fat contained in all food purchased, a household had a 7% increased chance of being classified as OH (p = 0.003). These odds ratios have been adjusted for age, number of children in the household, proportion of males and females, social class and household size.

LH consumed significantly more fat (16 g) and energy (1.52 MJ) per person, per day out of the home than OH (10 g p = 0.001 and 0.91 MJ p = 0.003) Table 5. Interestingly, LH reported a significant overall difference in their daily intake of fat compared to OH. However there was no significant difference between the total reported energy intake of two groups (OH 8.72 MJ; LH 9.14 MJ P=0.164). Table 5 also highlights the differences between the energy and fat content of food consumed by households and food purchased by households.

Table 6 shows a significant relationship between household purchase of energy in relation to the estimated average requirement for energy of the household and the

weight status of the household. OH were more likely to exceed their household requirement for energy than LH, although it is important to note that no adjustment has been made for PAL here.

Discussion

This study shows there were significant differences in the amount of energy and fat purchased per person by OH compared to LH (Table 3) even when adjustments were made for the number of children and adults living in each household. Households were 15% more likely to be classified as OH for each additional MJ of energy purchased per person, per day, after adjusting for number of children, household size, age, sex and social class (Table 4). OH were also more likely than LH to purchase more energy than the members of the household required (Table 6).

These finding may reflect the tendency of obese individuals to prefer eating food which is high in energy and fat and the expression of this preference in their food choice and purchasing behaviour in the supermarket. There is some evidence that enhanced liking for higher fat levels in food characterises individuals predisposed to obesity (Mela, Ritson, & Kuznesof, 1999), although it is important to note that not all high fat consumers become obese (Cooling & Blundell, 2000; Macdiarmid, Cade, & Blundell, 1998). It is also important to note that in a cross sectional study such as the one reported here, it is impossible to determine whether the greater energy and fat purchased by overweight households is a cause or result of the obesity of the family members. Only a cohort study design could shed further light on this point. However, these findings may support the hypothesis that the proportion of dietary fat is positively associated with body weight (Prentice & Jebb, 1999). Macdiarmid et al. showed that fat intake was associated with BMI in adults. From their reanalysis of data from the Dietary and Nutritional Survey of British Adults they found that a positive relationship existed between BMI and dietary fat intake in both men and women when expressed as a percentage of energy (Macdiarmid, Cade, & Blundell, 1996). Macdiarmid et al.also found that BMI tended to be higher in people who consumed a high fat diet (.45% energy from fat) (Macdiarmid et al., 1996). Our study used self-reported heights and weights to determine BMI but these were recorded in the presence of a researcher who encouraged participants to remeasure/weigh themselves if they returned unrealistic values. BMI does tend to be underestimated in heavier men and women and if this were the case in our study, the data would be an underestimate of the weight status of households expressed as z-scores (Spencer, Appleby, Davey, & Key, 2002). This study has also shown that OH are more likely to buy more energy than required by the household, although the interpretation of this finding is obscured by the lack of data on PAL (Table 6).

There are many influences on dietary intake, but the role of the family is believed to be particularly important (Birch, 1999; Epstein, 1996) and may partly explain the association between the purchase of food with a high energy and fat content and the weight status of households reported here (Sallis & Nader, 1988). Several studies have shown the association between fat intake of members of the same family. Feunekes reports moderate to high associations between the fat intake of two parents and between siblings and between mothers and daughters (Feunekes, Stafleu, de Graaf, & van Staveren, 1997). Other investigators have reported similar observations (Kelder et al., 1994; Oliveria et al.,1992). The role of the primary shopper may be particularly important in this regard because their influence on the family diet is likely to be profound. In this study, 64% of the primary shoppers in OH were overweight. It is likely that patterns of eating which have been involved in the aetiology of obesity in a primary shopper may influence the diet of other members of the family, especially children and particularly with regard to their fat intake. Fisher and Birch investigated the fat preferences of young children and found that children who indicated a strong preference for high fat foods, had higher total fat intakes, higher triceps skinfold measurements and heavier parents than children who preferred low fat food (Fisher & Birch, 1995). Their findings suggest that parents may influence fat preference and adiposity in their children.

Interestingly the energy and fat content of food recorded as consumed by OH is not significantly higher than LH (Table 5) and this may reflect the difference in mis-reporting between the two groups. A cut-off point of EI:BMR ,1.2 was used to identify 33% of the OH under reported their energy intake compared to 28% of the LH ($p = 0.02$). Under reporting of energy intake is well documented in studies of the energy intake of overweight and obese subjects and the result obtained here are in accordance with this observation (Prentice & Jebb, 1999). The fat and energy content of supermarket purchases does show a difference between the two groups but under reporting household shopping may be less common than under reporting energy intake (Tables 3 and 5). Itemised receipts are generated automatically at the point of sale and it would require a deliberate and considerable effort to obscure or change food purchases in order to under report food purchases, especially as the receipts were collected over a 28-day period. Till receipts may overcome the unintentional mis-reporting of food intake (Macdiarmid & Blundell, 1998) that may occur in obese people because the production of a record of food purchased is generated automatically.

The mean age of the OH is significantly higher than that of LH (Table 1). In the UK there is a tendency for weight gain associated with advancing age. It was not surprising to find subjects in OH with a higher mean age than LH. However, using a logistic regression model, (which adjusted for age, number of children in the household, proportion of males and females, social class and household size) OH

were more likely to purchase food containing a higher percentage of energy derived from fat, more energy and more grams of fat per person than LH (Table 4). A cohort study design would enable direct comparisons to be made between households with similar age profiles and composition.

An increased tendency of overweight people to buy more energy and fat may relate to differences in the eating behaviour of obese compared to normal weight individuals. In the 1970's, Schachter originally proposed that the eating behaviour of obese individuals was triggered by external cues, such as the smell, taste and sight of food, whereas the eating behaviour of normal weight people was controlled by internal physiological cues (Schachter, 1971; Schachter & Rodin, 1974). Schachter's externality theory of obesity attempted to create a model to explain the difference in eating patterns of normal and overweight individuals. According to this model, high external responsiveness would encourage over purchasing of energy and fat in the stimulating environment of the supermarket, where there is an abundant supply of palatable high fat food. Externality theory suggests, in this context, normal weight individuals may make food purchasing decisions which are responses to cues relating to healthy eating and more in tune with the nutritional requirements of the household.

At the time of publication, Schachter's 'externality theory' was not universally supported; with further research studies it became clear that the relationship between externality and overweight was more complex than originally proposed. It did, however, spawn a number of subsequent ideas that have continued to be at the centre of research. In particular better liked foods are consumed in higher quantities than lesser liked foods and this effect is exaggerated in obese subjects (Mela, Aaron & Gatenby, 1996; Mela et al., 1999). Little work has been undertaken on whether this type of relationship also applies to the food purchasing behaviour of obese subjects in the supermarket environment.

It is noteworthy that 65% primary shoppers in the OH are overweight or obese compared to 35% of primary shoppers in LH (Table 2). Further investigations into the behaviour of overweight or obese primary shoppers may provide useful information on how this influences the range of food available for domestic consumption and nutrient intake of the rest of the household. Clearly this observation is relevant to intervention strategies designed to lower the consumption of fat in the UK population. The data in Table 5 indicates that targeting an intervention at the food shopping behaviour of overweight primary shoppers in the supermarket environment may be a useful step forward. Current UK guidelines from the Department of Health tend to focus on modifying food choice on the plate (Health Education Authority, 1994). Perhaps the model of a healthy shopping trolley could provide a relevant vehicle for

modifying food choice in the supermarket, prior to choice on the plate? The itemised till receipt may be a valuable tool in providing feedback to customers on the fat content of their shopping trolleys. Little work has been undertaken in this area although this issue was raised over 25 years ago (Dodd, Stalling, & Bedell, 1977).

Further investigations into the long-term effect of the nutritional composition of food purchased from supermarkets and its effect on health could be explored via a cohort study design. This would help to establish any causal relationship between the energy and macronutrient composition of food purchased from supermarkets and the body weight of families living in the same house and sharing a communal food supply.

Obese individuals have been shown to mis-report their intake of energy compared to lean individuals and this study confirms this observation (Heitmann & Lissner, 1995; Macdiarmid & Blundell, 1997, 1998). The study did not provide an estimate of PAL and therefore the extent to which individuals mis-reported their intake in relation to their requirements could not be fully appreciated. It would be important for further investigations to take PAL into account to determine appropriate cut off points for individuals mis-reporting energy intake (Black, 2000). A comparison of the food purchases of OH and LH reveals more differences between the energy and fat content of their food shopping than their recorded total intakes of energy and fat. Overweight and obese individuals are less likely to under report their food purchases than their food intake. After all it is more difficult to edit a pre-printed supermarket receipt than omit recording an item of food or drink. Food purchasing data may provide a better record of the dietary behaviour of households than recorded food intake.

Conclusion

This study of a random sample of supermarket shoppers and their households in Leeds shows a significant difference in the fat content of the food purchased at supermarkets by OH compared to LH. The study also showed that the fat purchased by households in each group is greater than recorded household intake which indicates that calculating intakes from till receipts may not be so prone to under reporting as food records. Supermarket receipts could be examined further to identify the differences in food choice behaviour of lean and overweight consumers. As more receipts are issued at the point of sale they could become an increasingly useful resource for informing behavioural changes required to help prevent and treat illnesses associated with obesity such as the metabolic syndrome (hyperlipidaemia, noninsulin diabetes, cardiovascular disease). In addition itemised receipts may provide data which could be used as markers of particular lifestyles and provide

additional insights into obesogenic behaviour that cannot be identified by simply recording food intake manually.

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Table 1
Sample characteristics

	LH n = 139	OH n = 75	Difference	95% CI	p-value
Mean number of people per household (SD)	2.6 (1.15)	2.09 (0.82)	0.53	0.14 to -0.26	0.001
Mean number of adults per household (SD)	1.9 (0.62)	1.8 (0.53)	0.07	-0.10 to 0.23	0.441
Mean number of children per household (SD)	0.7 (0.99)	0.3 (0.6)	0.47	0.25 to -0.68	0.001
Mean age (years) of households (SD)	39.6 (17.7)	51.3 (17.0)	-11.69	-16.58 to -6.81	0.001
Mean BMI of primary shopper-kg/m^2	22.9 (2.8)	28.3 (4.5)	-5.47	-6.61 to -4.33	0.001
Mean number of people per household who claim to be slimming	0.06 (0.25)	0.12 (0.37)	-0.05	-0.15 to 0.05	0.244
Mean number of people per household who claim to be on a low fat diet	0.52 (0.85)	0.57 (0.81)	-0.48	-0.28 to 0.19	0.684

Table 2

Sample characteristics (continued)

	LH n = 129	OH n = 85	Cramer's V	p-value
Households in social classes 1 and 2 (%)[a]	101 (68)	48 (32)	0.09	0.19
Households in social classes 3–5 (%)[a]	38 (59)	27 (41)	0.09	0.19
Normal weight children (%)[b]	94 (94)	6 (6)	0.6	0.001
Overweight/obese children (%)[b]	8 (36)	14 (64)	0.6	0.001
Normal weight adults (%)	177 (84)	35 (16)	0.48	0.001
Overweight/obese adults (%)	59 (37)	102 (63)	0.48	0.001
Overweight or obese primary shoppers (%)	34 (35)	63 (65)	0.57	0.001
Female primary shoppers (% all shoppers)	121 (94)	60 (71)	0.09	0.173
Households under reporting energy intake—based on data from 4-day weighed intakes. EI:BMR,1.2 (%)	36 (28)	28 (33)	0.12	0.02

a Social class: 1 and 2 refers to professional and managerial occupations; 3–5 refers to skilled and unskilled occupations.

b Defined by BMI Growth Charts (Child Growth Foundation 1990).

Table 3

Fat and energy content of food purchased for home consumption

	LH n = 139	OH n = 75	Difference	95% CI	p-value
Mean daily purchase of energy (MJ) per person from:[a]					
Supermarkets (SD)	8.34 (2.41)	9.07 (2.43)	-0.72	-1.40 to -0.03	0.038
All outlets (SD)	9.15 (2.52)	10.05 (2.66)	-0.91	-1.63 to -0.18	0.015
Mean daily purchase of fat (g) per person from:[a]					
Supermarkets (SD)	78 (31.8)	92.5 (32.0)	-14.2	-23.4 to -5.2	0.002
All outlets (SD)	86 (33.2)	103 (37.0)	-16.92	-27.05 to -6.8	0.001
Percentage energy from fat in food purchased from:					
Supermarkets (SD)	34.8 (7.0)	37.9 (6.6)	-3.11	-5.05 to -1.2	0.002
all outlets	34.9 (6.6)	38.0 (6.2)	-3.05	-4.49 to -1.21	0.001

[a] Adjusted for numbers of children per household.

Table 4

Predictors of households being classified as overweight. Adjusted odds ratios devised from multiple logistic regression model represent the increase in odds of classification associated with one unit increase in the predictor variable

Predictor variable	Odds ratio	(95% CI)	P-value
Mean daily purchase of energy (MJ) per person from all outlets	1.15	1.02–1.30	0.019
Mean daily purchase of (unit = 10 g) fat per person from all outlets	1.14	1.05–1.24	0.003
Percentage energy from fat in food purchased from (%) all outlets	1.07	1.02–1.13	0.003

Adjusted for age, number of children in household, proportion of males and females in household, social class and household size.

Table 5

Comparison of recorded mean daily intake of fat and energy (4-day weighed record) with supermarket food purchases (itemised till receipts)

	LH n = 139	OH n = 75	Difference	95% CI	p-value
Percentage energy from fat (SD):					
Food consumed at home	33.0 (6.07)	33.9 (6.18)	-0.96	-2.68 to 0.76	0.274
Food consumed out[a]	30.7 (16.1)	26.7 (18.1)	4.0	-0.92 to 8.93	0.110
Total intake	33.9 (5.8)	34.3 (5.6)	-0.7	-2.07 to 1.16	0.577
Percentage energy from fat from supermarkets (SD)	*34.8 (7.0)*	*37.9 (6.6)*	*-3.11*	*-5.05 to -1.2*	*0.002*
Fat (g) consumed daily per person (SD):					
At home	67 (25)	70 (23)	-2.7	-9.7 to 4.3	0.443
Out of the home[a]	16 (16)	10 (10)	5.9	2.3 to 9.4	0.001
Total intake	83 (27)	80 (25)	-3.0	-4.2 to 10.5	0.040
Daily purchases of fat per person from supermarkets (SD)	*78 (31.8)*	*92.5 (32.0)*	*-14.2*	*-23.4 to -5.2*	*0.002*
Energy (MJ) consumed daily per person (SD):					
At home	7.62 (2.27)	7.71 (1.85)	-0.09	-1.37 to 0.37	0.779
Out of the home[a]	1.52 (1.43)	0.91 (0.94)	0.51	0.23 to 0.85	0.003
Total intake	9.14 (2.21)	8.72 (1.99)	-0.16	-0.83 to -0.16	0.164
Daily purchased of energy (MJ) per person from supermarkets	8.34 (2.41)	9.07 (2.43)	-0.72	-1.40 to -0.03	0.038

These figures have been adjusted for the number of children in each household. [a] Food not derived from household stores.

Table 6

Household weight status and ability to purchase the estimated average requirement for energy (EAR) of the household members

	LH n = 129	OH n = 85	Cramer's V	p-value
No households meeting their EAR for energy (MJ) from all shopping (%)	107 (83)	45 (53)	0.37	0.001
No households exceeding their EAR for energy (MJ) from all shopping (%)	32 (17)	30 (47)	0.37	0.001