Predicting percentage of individuals consuming foods from percentage of households purchasing foods to improve the use of household budget surveys in estimating food chemical intakes

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Submitted 12 March 1998: Accepted 20 July 1998

Abstract
Objective: To examine the hypothesis that there is sufficient agreement between percentage of households purchasing selected foods using household budget surveys and percentage of individuals consuming these foods as determined in individual-based surveys to allow the former to act as a surrogate for the latter when estimating food chemical intakes using household budget data.
Design: Database study.
Setting: Databases from Sweden, The Netherlands, Ireland and the UK.
Subjects: 319 foods (Sweden $n=60$, The Netherlands $n=80$, Ireland $n=90$, UK $n=89$).
Results: Pearson correlations demonstrated a high degree of linear association between % households purchasing and % consumers ($r=0.86$). Regression analysis defined a close positive relationship between the two datasets (slope 0.95, intercept +2.74). Across countries, using the regression equation, the % households predicted % consumers to within 5% of the true value for between 33 and 48% of foods and to within 10% for between 53 and 78% of foods.
Conclusions: Values for % households can be used as a crude surrogate for % consumers and can thus play a role in improving estimates of food additive intake.

Keywords
Household budget surveys
Food chemical intake estimation

Monitoring national food consumption is an integral part of any national food policy, providing data for the estimation of nutrient intake and food chemical intake. The demand for good food intake data for monitoring food chemical intake is ever increasing, with risk assessments now required for food additives, pesticide residues, contaminants, food packaging material migrants, natural plant toxicants and so forth. Many options are available in considering suitable methodologies for measuring food consumption data: prospective versus retrospective methods, quantitative versus qualitative, direct versus indirect and individual versus household. Household budget and household inventory surveys provide detailed information on food purchases at the level of the household which may then be used to provide an indirect estimate of food consumption using appropriate conversion factors[1]. These surveys may collect information solely on the amount of money spent on various commodities or on the amount of money spent plus the quantity purchased. Where only expenditure data are collected, a price index can be used to transform these economic data into estimates of food quantities[2]. Household surveys are attractive to many countries where resources may not be available for conducting a large individual-based food consumption survey.

Notwithstanding the fact that the data are collected at household level, several statistical models have attempted to provide reliable derivatives of food and nutrient intake for specific age and sex groups[3–5]. For the purposes of food chemical monitoring, however, mean intakes of foods among the total population or population subgroups are not sufficient. Because the aim is to determine the exposure to a food chemical, the assessment must focus on the intakes of the individuals eating the food(s) in question and particularly those with the highest intake of the food(s). At present, it is not possible with household survey data to estimate the intake of a given food among consumers only of that food because household surveys do not provide data on the food intake among individuals

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https://doi.org/10.1079/PHN19980040 Published online by Cambridge University Press

within the household. Household survey intakes, therefore, represent the intake of the total population, i.e. consumers and non-consumers.

The significance of this for food chemical intake can be seen with the following example. If a given food chemical is present in food A with a mean population intake of P ($g\,day^{-1}$) and with C % consumers, then the intake of A among consumers only CO ($g\,day^{-1}$) is $100 \times P/C$. Clearly, the nearer C is to 100%, the closer P and CO are. However, for foods consumed by, for example, 33% of the population, CO is three times P. Thus in the absence of data on C, an inevitability with the household method is that the estimate of food chemical intake will tend to underestimate true consumer intakes of the chemical in question. The present paper examines the hypothesis that there is sufficient agreement between % households purchasing given foods using household budget surveys and % individuals consuming these foods as determined in individual-based surveys to allow the former to act as a surrogate for the latter when estimating food chemical intake using household budget survey data.

Materials and methods

Four countries participated in the study where each country had both a household survey and an individual-based survey from the same time period. Table 1a and 1b summarize the structure of the parallel databases in each country. Each participating centre was asked to identify 70–80 foods or food groups for which consumption/purchase data existed in both the household and individual survey databases. Whilst there was considerable overlap between centres, certain suitable foods found on both databases in one centre may not have been present in all others and where food groupings rather than foods were the database-listed item, the exact food group definitions sometimes varied. Thus whereas the Irish database allowed comparisons to be made for 15 meat and poultry listings, the Swedish database allowed only six comparisons within the category. These variations across centres do not in any way detract from the capacity of each centre to test the hypothesis in question, rather they add to it by providing heterogeneity. In choosing suitable foods, each centre was asked to include both rarely and commonly eaten foods, foods which are consumed as the whole product (e.g. cakes) and foods which are more commonly used as ingredients in composite dishes (e.g. onions), and quite specifically defined foods (e.g. white bread) in addition to more aggregated food groups (e.g. all breads). For each food, the % households purchasing and the % individuals consuming were estimated for each centre. In The Netherlands, the analysis was run based on adults only from the individual survey and adult only households from the household survey. In both Sweden and the UK an analysis of adult only data was conducted in addition to an analysis of the total samples from the parallel databases but the results presented refer to the total sample. In Ireland, it was not possible to separate households on the basis of adults only and therefore the results refer to comparison of all individuals with all households.

The percentages of households purchasing each food were plotted against the values for % consumers of these foods. Pearson correlation coefficients were calculated as a summary measure of the strength of the association between the two datasets. The individual data were regressed on the household data to derive the best fitted line. This was done for each centre and for the four centres combined as well as for certain aggregated food groups based on the combined datasets. The degree of variation between % consumers of foods and % households purchasing the same foods was determined by estimating the prediction errors for each food[6]. This entailed regressing individual data on household data, leaving out on each occasion the food for which the prediction error was to be derived. The equation so derived was then used to estimate % individuals consuming (Ye) from the % households purchasing the food in question. This was compared with the actual % individuals consuming (Ya) and the prediction error was calculated as the difference between the actual and the estimated (Ya − Ye). Prediction errors may be positive (underestimate % consumers) or negative (overestimate % consumers). A summary measure, the root mean square error (RMSE)[6], was used to make comparisons of prediction errors between countries and regularity of purchase of foods. The RMSE was calculated for each country by squaring the prediction error for each food, calculating the mean of the squared prediction errors within each country and then calculating the square root of these values. The RMSEs were then compared between countries. To assess the influence of regularity of purchase on the accuracy of predicting % consumers, the foods from the merged dataset from all countries ($n = 319$) were classified into rarely purchased foods purchased by less than 10% of households ($n = 65$), quite commonly purchased foods purchased by 30–70% of households ($n = 115$) and very commonly purchased foods purchased by more than 80% of households ($n = 11$). The RMSEs were calculated by squaring the prediction errors for each food item classified as rarely, quite commonly or very commonly purchased, calculating the mean of the squared prediction errors within each classification and then calculating the square root of these values.

Table 1(a) Details of the household budget surveys for the four centres

	Sweden	Netherlands	UK	Ireland
Survey name	Hushallens Livsmedelsutgifter	Dutch Household Budget Survey 1992	1988 National Food Survey	1987 Household Budget Survey
Agency responsible	Statistics Sweden, Stockholm	Central Bureau of Statistics	Ministry of Agriculture, Fisheries and Food	Central Statistics Office
Sample size	2079 households	1967 households	7318 households	7705 households
Age range	All ages	All ages	All ages	All ages
Typology of data	Foods purchased, expenditure and amounts	Foods purchased, expenditure only	Foods purchased, expenditure and amounts	Foods purchased, expenditure only
Survey method	4-week purchase records	7-day purchase records	7-day purchase records	7-day purchase records
Foods eaten outside the home	Expenditure for meals eaten outside the home	Expenditure for meals eaten outside the home	Number of meals but not cost or content	Expenditure for meals eaten outside the home
Number of food items*	Approx. 400	Approx. 375	Approx. 180	Approx. 125
Published data	1992: Household expenditures 1989 with amounts (in Swedish)[9]	1992: Budget Survey (in Dutch)[10]	1988 Household Food Consumption and Expenditure[11]	1987 Household Budget Survey[12]

*Refers to the number of food items for which purchase data existed in the databases analysed.

Results

In total, 319 foods were included in the analysis – 60 foods from Sweden, 80 foods from The Netherlands, 90 foods from Ireland and 89 foods from the UK (see Appendix). The results of the Pearson correlations and regression analysis are given in Table 2. The Pearson correlations demonstrate a high degree of linear association between the two datasets. The regression analysis defined a close positive relationship, with the slopes of the lines approaching 1 and the intercepts approaching 0. The relationship between the two datasets is illustrated for all four centres combined in Fig. 1. When specific food groups were considered across countries, although several retained the features for all foods compared within a country

Table 1(b) Details of the individual surveys for the four centres

	Sweden	Netherlands	UK	Ireland
Survey name	Och Kostvanor 1989 (HULK)	Dutch National Food Consumption Survey 1992	Dietary and Nutritional Survey of British Adults 1988	Irish National Nutrition Survey 1990
Agency responsible	National Food Administration, Uppsala	Ministry of Health, Welfare and Sport; Ministry of Agriculture, Nature Management and Fisheries	Ministry of Agriculture Fisheries and Food	Irish Nutrition and Dietetic Institute
Sample size	2047 individuals	6218 individuals	2197 individuals	1218 individuals
Age range	1–74 years	1 year+	16–64 years	8 years +
Typology of data	Foods consumed	Foods consumed	Foods consumed	Foods consumed
Survey method	7-day food record	2-day food record	7-day weighed record	7-day diet history
Foods eaten outside the home	All foods consumed at home and outside the home	Main housekeeper recorded all foods eaten at home for each individual and subject recorded foods eaten outside the home	All foods consumed at home and outside the home	All foods consumed at home and outside the the home
Number of food items*	Approx. 500	Approx. 1100	Approx. 3850	Approx. 700
Published data	1994: Dietary Habits Sweden 1989 (in Swedish)[13]	Zo eet Nederland 1992[14]	Dietary and Nutritional Survey of British Adults 1988[15]	Irish National Nutrition Survey 1990[16]

*Refers to the number of food codes for which consumption data existed in the databases analysed.

https://doi.org/10.1079/PHN19980040 Published online by Cambridge University Press

Table 2 Constants and slopes for the regression equation: % individuals consuming = *b* (% households) + *a*, for all foods within a country and for nine food groups across countries, together with Pearson correlation coefficients (*r*) and significance levels (*P*)

	Slope (*b*)	Constant (*a*)	*r*	*P*
Within countries				
Sweden (*n* = 60)	0.95	+5.69	0.84	0.000
The Netherlands (*n* = 80)	0.93	+1.93	0.81	0.000
Ireland (*n* = 90)	0.89	−1.11	0.93	0.000
UK (*n* = 89)	1.16	+3.33	0.86	0.000
All four centres combined (*n* = 319)	0.95	+2.74	0.86	0.000
Within food groups				
Bread	1.03	+2.86	0.85	0.000
Cereals	1.05	+5.55	0.88	0.001
Cakes and buns	0.63	+21.71	0.49	0.150
Dairy products	0.86	+3.70	0.89	0.000
Meat	1.04	−0.89	0.87	0.000
Fish	1.01	−0.64	0.89	0.000
Fruit	0.86	+2.85	0.95	0.000
Vegetables	0.97	+2.85	0.80	0.000
Savoury snacks	0.66	+6.55	0.65	0.040

(i.e. slope almost 1 and intercept approaching 0), two in particular deviated i.e. 'cakes and buns' and 'savoury snacks' with slopes of 0.63 and 0.66, respectively, and intercepts of +21.71 and +6.55, respectively. Possible reasons why actual % consumers of these food groups were significantly higher than the predicted values are considered in the discussion section of this paper. Table 3 gives data on prediction errors. Just under half of the foods in the analysis had positive prediction errors, indicating that the values for % households purchasing underestimated % consumers, with the remainder of the foods having negative prediction errors and thus overestimating % consumers. Between 33 and 48% of the foods had very low prediction errors (±) 5%, with 53–78% of foods being predicted to within 10% of the actual value. The RMSE values

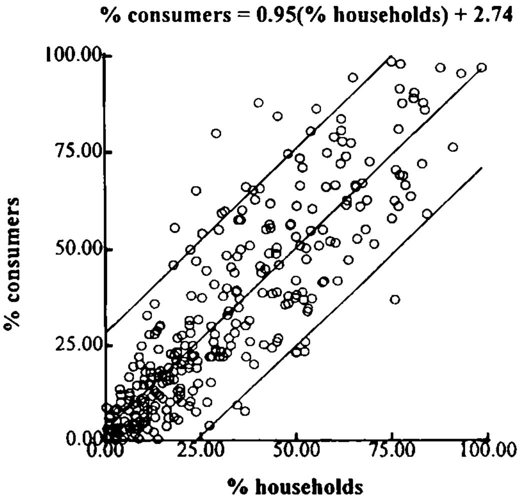

Fig. 1 Regression line with 95% prediction intervals for % households regressed on % individuals for all foods (*n* = 319) for Sweden, The Netherlands, Ireland and the UK combined

ranged from 10 to 15% between countries. This indicates that in Ireland, the estimated value for % consumers based on % households was, on average, ±10% of the actual value. In Sweden, the RMSE value was ±15(%), reflecting larger differences between the actual and estimated values. Table 4 considers prediction errors for foods which were rarely purchased (i.e. purchased by >10% of households), quite commonly purchased (30–70% of households) and very commonly purchased (>80% of households). The majority of foods were within the (±) 10% range. Some 75% of rarely purchased foods were predicted to within 5% of the true value, while none of these foods exceeded a 15% prediction error. In the other two food categories about a quarter of foods were at the higher end of the prediction error range. The influence of regularity of purchase of foods is summarized in the RMSE values, with the rarely purchased foods showing a smaller average difference between the actual values when compared with more commonly purchased foods (Table 4).

Discussion

The results of the present study form a considered and logical basis whereby those confined to using household survey data can confidently predict, with the use of the regression equation, that % households purchasing a given food will give a meaningful crude estimate of % individuals eating that food, which in turn provides them with the ability to determine the mean intake of the food among consumers only. A multiple of 3 times the mean intake among consumers is accepted as a crude indicator of intake at the 95th percentile[7] and thus can provide information about intakes at the upper extremes of consumption which are of most relevance for risk assessment. Clearly

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Table 3 Percentage of foods with positive or negative prediction errors in comparing predicted % consumers based on households purchasing with actual % consumers, the distribution of prediction errors and root mean square errors for each centre

	Sweden	Netherlands	Ireland	UK
% Foods with				
+ ve prediction error	52	38	46	43
− ve prediction error	48	62	54	57
% Foods with prediction errors in the range				
(±) 5%	33	40	42	48
(±) 5–10%	20	30	36	25
(±) 10–15%	13	15	12	11
(±) >15%	34	15	10	16
Root mean square error	15	12	10	13

therefore, the ability to predict % consumers greatly enhances the use of household data in risk assessment exercises, particularly for estimating food additive intake or the intake of novel food ingredients. To illustrate this improvement we use Swedish food consumption data and a hypothetical example of an additive permitted in ice cream (Table 5). The *consumers only* intake refers to the intake among consumers of ice cream calculated using the Swedish individual-based food consumption survey and thus is a suitable value on which to base a risk assessment. Scenarios 1, 2 and 3 consider estimates of intake where no individual-based survey is available and household data are used. In scenario 1, the mean total population intake (total purchase of ice cream/total sample) provided by the household budget survey is used. As it stands, however, it underestimates the additive intake by 50% (7 mg day^{-1} vs. 14 mg day^{-1}). In scenario 2, a 'consumers only' estimate is derived from the household budget survey mean total population intake. This is done by dividing the mean total population intake by the '% consumers' value estimated by inserting the value for % households purchasing ice cream (54.3%) into the regression equation. This refines the estimate of intake of additive X to 13 mg day^{-1}, a value almost identical to that given by the individual-based survey. Because of the very close relationship which was observed when % individuals were regressed on % households (slope approaching 1 and intercept approaching 0), a third scenario was considered which used the value of % households as a direct substitute for % individuals, i.e. do not use a regression equation. This method also gives an estimate of 13 mg day^{-1}. Therefore, in this example, the degree of underestimation which arises with the use of mean total population intakes from household surveys has been dramatically reduced by using % households, either directly or through the regression equation, to substitute for % consumers. The significance of being able to estimate % consumers and consumer only intakes rather than just mean total population intakes is evident from the fact that in the present study 34% of foods were consumed by < 10% of individuals. Thus the household estimate of intakes of foods would contain about 1 in 3 foods, the intakes of which are an order of magnitude greater among consumers of these foods.

In the present study we also sought to investigate factors which may influence how well % households purchasing different foods predicted % consumers of these foods. One consideration was comparability of the sample characteristics between the parallel databases within each country. Household surveys record food purchase data for the entire household whereas some individual surveys may only record the food intakes for a selected age range in the

Table 4 The distribution of prediction errors across centres for foods 'rarely', 'quite commonly' and 'very commonly' purchased together with their root mean square error*

	Rarely purchased (n = 65)	Quite commonly purchased (n = 115)	Very commonly purchased (n = 11)
% Foods with prediction errors in the range			
(±) 5%	75	26	45
(±) 5–10%	20	30	18
(±) 10–15%	5	17	10
(±) >15%	0	26	27
Root mean square error	4.7	14.8	10.2

*Rarely purchased, quite commonly purchased and very commonly purchased were defined as foods purchased by < 10%, 30–70% and > 80% of households, respectively.

Table 5 Example of improving the usefulness of household budget data for estimating food chemical intakes, based on Swedish data. Additive X permitted in ice cream at 0.5 g kg^{-1}

	Ice cream consumption (g day^{-1})	Assumed additive concentration (mg g^{-1})	Estimated additive intake (mg day^{-1})
Actual intake			
Consumers only	28	0.5	14
Scenario 1			
Mean total population	14	0.5	7
Scenario 2			
Mean total population corrected for % HH purchasing calculated using regression equation	26	0.5	13
$\left[\frac{\text{mean total population} \times 100}{0.95(54.3) + 2.74}\right]$			
Scenario 3			
Mean total population corrected for % HH purchasing (54.3%)	26	0.5	13

population, e.g. adults only. As highlighted in Tables 1a and 1b, the individual surveys in both Sweden and The Netherlands cover approximately the same age ranges as the household surveys. In Ireland, the individual survey has data for subjects aged 8 years and upwards and in the UK the individual survey is based on adults only, aged 16–64 years. Neither the Irish nor the British individual surveys could therefore be said to be directly comparable to their respective household surveys in terms of subject characteristics. A sub-analysis of adults only % consumers versus adult only households in the UK, however, showed that making the samples more comparable yielded very little change to either the regression equations or correlation coefficients defining the relationship of % consumers and % households purchasing (adults only: % consumers = 1.23 (% households) + 3.43, $r = 0.86$). Comparisons were made between rarely and commonly purchased foods. The vast majority (75%) of rarely purchased foods (34% of all foods) are very accurately predicted, i.e. to within 5%. In the case of food additives, this is encouraging since it is the more rarely purchased foods, rather than the commonly purchased foods (e.g. milk and potatoes), which contain additives.

Other potential contributory factors to the larger prediction errors which are proposed by the authors include home-baking, bulk purchase of foods and foods eaten outside the home. For example, in Sweden while only 45% of households surveyed recorded purchases of cakes and buns, almost 85% of individuals in the food consumption survey recorded eating these foods. The discrepancy may be attributed to the widespread practice of home baking in Sweden. Conversely, one might expect to see higher values for % households purchasing ingredient-type foods than % consumers of those foods. Difficulties for resolving the issue of ingredient-type foods do exist, however, not least because recipe data are not available for all individual survey databases and purchased foods such as flour or cornflour may be used in a wide range of home-cooked composite dishes. Also, ingredient-type foods will vary from one country to another due to different cooking and purchasing practices. Certain commonly eaten foods, while purchased by the majority of households, may be purchased in bulk on an irregular basis. A 7-day purchase record may not 'catch' purchasers of foods which are only purchased once every 2 or 3 weeks, even if these foods are commonly eaten. For example, potatoes, which are outliers in each of the four countries, are also commonly eaten in the home in each of the countries. The reason why the % purchasers is less than expected is probably simply a reflection of the fact that potatoes may not be purchased on a weekly basis because they are usually purchased in bulk. The same may be true of tea, coffee and certain alcoholic drinks.

In household surveys, account is not usually taken of the expenditure outside the home and therefore a true picture of purchase/intake cannot be obtained for foods which are predominantly purchased outside of the home. For example, this methodological issue may account for the weaker relationship between household and individual data for the food group of 'savoury snacks' as shown in Table 2. Similar considerations were proposed by Nelson *et al.*[8], to account for the differences which they found between nutrient intakes estimated from household and individual-based surveys. It was, however, evident from the present study (data not presented) that whilst these influences appeared partly to explain a tendency towards higher prediction errors, there was no consistency across countries. When foods with a prediction error > 15% were considered, only one food (potatoes) was found to be common to all four countries. Spreadable fats plus oils had a prediction error greater than 15% in three countries. Thus it is necessary that, for each occasion the approach outlined in this paper to derive an estimate for % consumers is used, local expert knowledge be applied in reaching a judgement in risk assessment.

Further research would be necessary before specific guidelines for judging the accuracy of prediction of % consumers could be developed. The remit of this study, however, was to examine the possibility of using household data to act as a crude surrogate for individual data, where individual surveys do not exist. In the absence of such a surrogate, the only information provided by household surveys will be mean total population intakes which will inevitably underestimate consumer only intakes. In any analysis, consideration should also be given to the aspects of recording in the household survey which may overestimate the mean total population intake[4], the value to which the estimate of % consumers would be applied to obtain an estimate of intake among consumers only. Nonetheless, the approach outlined in this paper greatly improves the use of household data in estimating food chemical intake. Its value in nutrition policy areas should also be considered. Household data are frequently the only source of data for nutrition policy planning. If successive household survey data show a static level of population intake of a food (consumers and non-consumers combined), this could be due to changes in opposite directions between % consumers and intakes among consumers only, i.e. more people eating slightly less or less people eating slightly more. Thus by using % households purchasing as a surrogate for % individuals consuming given foods, more data of nutritional significance can be extracted from household surveys.

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Appendix

Ireland	Netherlands	Sweden	UK
White bread	Bread	Cookies, biscuits	White bread
Soda bread	Rusk, crispbread	Cakes and buns	Brown bread
Brown bread	Crisps	Crisp bread	Crisp bread
Other bread	Savoury snacks (−nuts)	Dark bread	Other bread
Biscuits	Savoury snacks (+nuts)	Light bread	Biscuits
Cakes and buns	Flour	White bread	Cakes and buns
Breakfast cereals	Rice	Pasta	Oats
Oatmeal	Pasta	Rice	Cereal
Sago/tapioca, semolina	Other cereal products	Butter	Whole milk
Rice	Potatoes	Mayonnaise	Skimmed milk
Fresh milk	Potato products	Table margarine	Semi-skimmed milk
Condensed milk	Salad	Cheese	Dried milk
Cheese	Spinach	Processed cheese	Condensed milk
Ice cream	Cauliflower	Cultured milk	Cream
Other milk products	Brussels sprouts	Milk 0.5% fat	Ice cream
Butter	Cabbage	Milk 1.5% fat	Milk pudding
Margarine	Tomatoes	Milk 3% fat	Natural cheese
Other fats and oils	Mushrooms	Cream	Processed cheese
Sirloin steak	Cucumber	Eggs	Yogurt and fromage frais
Other beef and veal	Legumes	Beef and dishes	Carrots
Mutton	Apples	Chicken and dishes	Cauliflower
Lamb	Pears	Liver paté	Leafy salads
Pork	Berries	Minced meat dishes	Cabbage
Rashers	Grapes	Pork and dishes	Brussel sprouts
Bacon (uncooked)	Oranges	Sausage and dishes	Miscellaneous veg
Sausages	Lemons and limes	Fish and dishes	Mushrooms
Pudding (black and white)	Grapefruit	Shellfish	Onions, shallots, leeks
Ham (cooked)	Bananas	Caviar, roe	Canned veg
Other cooked meat	Tinned fruit	Carrots	Fresh green veg
Minced meat	Almonds, nuts	Cucumber	Root veg
Chicken	Jam and marmalade	Mushrooms	Tomatoes
Other poultry	Treacle	Salad	Canned peaches, pears
Liver	Honey	Tomatoes	Other canned fruit
Tea	Mineral water	Chips	Oranges
Coffee	Orange juice	Potatoes	Other citrus fruit
Cocoa, drinking choc	Nectar, fruit drinks	Apples	Apples
Sugar	Other juice	Bananas	Bananas
Jam and marmalade	Orange drinks	Berries	Pears
Treacle and honey	Soft drinks	Citrus fruits	Rhubarb
Jellies	Beer	Raisins	Grapes
Sweets and chocolate	Wine	Fruit juice	Stone fruit
Potato crisps	Spirits	Nectar	Other fresh fruit
Cod	Margarines	Candy	Frozen fruit
Haddock	Low-fat margarine	Honey	Dried fruit
Plaice and sole	Other fats and oils	Ice cream	Nuts
Whiting	Butter	Jam, marmalade	Lamb and mutton
Other fresh fish	Beef	Sugar	Bacon and ham
Frozen fish and products	Pork	Sweet desserts	Beef and veal
Smoked cod	Minced meat	Cocoa, choc powder	Pork
Smoked haddock	Meat snacks	Coffee	Chicken
Other dried and cured fish	Sliced meat	Mineral water	Other poultry
Tinned salmon	Paté, liver sausage	Soft drinks	Corned meat
Tinned sardines	Other sausage	Tea	Liver
Other tinned fish	Chicken	Beer	Other offal
Eggs	Shellfish	Spirits	Meat pies
Potatoes	Herring	Wine	Rabbit
Cabbage	Smoked fish	Crisps	Sausage
Tomatoes	Tinned fish	Almonds, nuts	Eggs
Cauliflower	Other fish	Ketchup	Butter
Brussel sprouts	Milk, normal fat	Savoury snacks	Margarine
Lettuce	Milk, low-fat		Herring
Carrots	Milk, skimmed		Oily fish
Turnips	Buttermilk		White fish
Parsnips	Yoghurt, quark		Canned salmon
Other fresh veg	Milk-based dessert		Other canned fish
Tinned peas	Cream		Shellfish
Tinned beans	Cheese, Dutch		Fresh peas and beans
Other tinned veg	Processed cheese		Frozen peas and beans
Frozen peas	Other cheese		Instant potato

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Ireland	Netherlands	Sweden	UK
Frozen potatoes	Ice cream		Canned potato
Apples, eating	Ready to eat meals		Potatoes
Apples, cooking	Eggs		Chips
Oranges	Sugar		Crisps
Bananas	Chocolate flakes, spreads		Canned tomatoes
Grapefruit	Other sweet fillings		Turnip
Plums	Confectionery		Cucumber
Grapes	Chocolate bars		Cocoa
Strawberries	Cocoa, chocolate powder		Coffee
Other fresh fruit	Tomato ketchup		Tea
Tinned peaches	Mayonnaise, dressings		Fruit juice
Tinned pears			Vegetable juice
Tinned strawberries			Pickles and sauces
Other tinned fruit			Soups
Other dried fruit and nuts			Sugar
Fruit and vegetable juice			Syrup and treacle
Tinned soup			Honey
Packet soup			Jam
Sauces and creams			Marmalade
Custard and blancmange			Canned peas and beans
Fresh cream			