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**THE MERGER OF THE UK NATIONAL FOOD SURVEY
AND FAMILY EXPENDITURE SURVEY**

Invited paper submitted by the United Kingdom*

Summary: Work started in summer 1997 on the possibility of merging the data collection and validation phases of the UK's National Food Survey and Family Expenditure Survey. After passing a series of check-points (each of which could have led to the abandonment of the project), the merged survey went live on 1 April 2001. This paper discusses the problems encountered and their solutions. Given the growing interest in diet and nutrition, it is hoped that the paper will help any other countries that might wish to collect food and nutrition data in their Household Budget Surveys.

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Background to the National Food Survey

1. Sponsored by the Ministry of Agriculture Fisheries and Food (MAFF)², the National Food Survey (NFS) was the oldest continuous UK government social survey. Among many uses of the survey were identifying changes in food and drink expenditure, consumption and prices paid over time; monitoring the progression towards nutritional targets and, periodically, providing the basis of estimates of income and price elasticities of demand for various foods. For many foods NFS also provided more detailed weighting information for the Retail Prices Index than the UK's Household Budget Survey (the Family Expenditure Survey - FES).

2. In the NFS, interviews were conducted continuously, with about 6,700 households a year in the United Kingdom taking part. Unlike the FES, there was only a short paper and pencil interview (lasting about 15 minutes) for collecting background household information, including occupation and income group. One member of the household was asked to keep a diary record of the price and weight of food items brought into the home over a seven-day period, including free food, such as food grown in the garden. The food descriptions were required for nutritional analysis, and were more detailed than those required for the FES. In half the households, individual members were asked to keep a personal diary record of eating outside the home. No monetary rewards were paid to respondents.

Background to the merger

3. One of the conclusions of a review of major UK Government Statistical Surveys was that the overlap between the NFS commissioned by MAFF and the FES commissioned by the Office for National Statistics (ONS) should be investigated. A combination of the two surveys was considered in the early 1980's, but foundered on evidence suggesting that the response rate of a combined survey would fall to unacceptable levels. However, with improved IT and survey techniques and the fact that the coverage and methodology of the two surveys have become more similar in recent years, it was felt that the idea of combining the two surveys should be re-considered. A joint ONS/MAFF project was therefore set up to examine the feasibility of merging the data collection, validation, imputation and clean file production stages of the two surveys. The analysis and reporting would remain with the two separate departments.

4. A number of advantages were highlighted by the Study Team:

- (1) For NFS users, benefits were largely in terms of data quality and potential for additional analyses. A two-week diary completed by individual household members would give greater precision than the NFS and, assuming a similar respondent burden to the FES, less under-recording of food eaten out.
- (2) For FES users, the merger would provide an opportunity to review and update survey design and data processing systems, resulting in improvements in speed of delivery of quality-assured data.
- (3) Merging the two surveys would bring about some cost savings, some of which could be used to finance an increased sample size.

5. The design proposed for the merged survey was based on the current FES design, enhanced to provide additional information on food, mainly by asking respondents to record quantities and additional details of food bought as well as expenditure. The survey would consist of household and individual interviews, a diary of expenditure and food quantities to be completed by every person aged 16 or over and a simplified diary to be completed by every child aged 7 to 15 years.

Main stages of the project

6. Desk research, which examined the viability of a merger and a small-scale pilot, was carried out during August 1998. The pilot study highlighted the additional burden that would be placed on respondents and the difficulties this might cause. However, it recommended that a merged survey could work providing that the burden on respondents, including the length of interview, was reduced and steps were taken to ensure that the necessary food detail was recorded. A specification and development plan was produced.

7. The main elements of the development plan were:

- (1) A series of small methodological projects including testing of the diary and investigating the potential for utilising partial responses and weighting of results;
- (2) A small scale pilot to test the procedures;
- (3) A main pilot in which the merged survey would be run at the same time as the two existing surveys for two field-work months;
- (4) Evaluation in February/ March 2000 with a view to live running in April 2001;
- (5) Development of a new ONS processing system and some changes to the MAFF system.

8. There were a number of critical points but there were two main ones:

- (1) If the results from the 2000 pilot study appear to suggested that a merger would not be successful, there would still be time for the two surveys to be run separately in 2001. The timetable had been built around it being possible to make this decision by September 2000. There were a number of milestones before then which might also suggest that it would not be sensible to go onto the next stage. These included whether it became apparent at any stage that user needs could not be met in terms of non-response, data quality or data detail; respondent burden could not be reduced to a suitable level or the 2000 pilot work was unsuccessful.
- (2) ONS could demonstrate that they were able to redevelop the FES processing system. If this were not to be possible, ONS would still have time to amend its existing system to accommodate the merged survey.

Developing and testing the new survey

9. The name decided upon for the merged survey was the Expenditure and Food Survey (EFS) and a programme of design, testing and development was initiated. Simply combining the

two surveys would result in too heavy a burden on respondents and unacceptable response rates. The primary aim of the development work was to reduce respondent burden while still meeting the requirements of FES and NFS users. There were several elements, including:

- (1) A review of user requirements leading to cuts and amendments to the questionnaire and diary;
- (2) Redesign of survey procedures;
- (3) Redesign of the diary.

10. An important part of the development was qualitative research with respondents and interviewers. Interviewer testing and cognitive research with respondents lead to substantial improvements in the diary design.

11. Developments culminated in a large-scale field test. The purpose of this trial was to test all survey procedures and provide estimates of response rates, average expenditure and consumption. Results were assessed against a number of criteria that had been agreed with users at the outset. These related to data quality, comparability and operational issues. The precision of comparisons with the FES was increased by use of an inter-penetrating sample, carrying out the test in the areas where the FES was in the field at the same time.

12. One of the key criteria was that response rates should be at least as high as for the FES, and at least 60 per cent in actual operation. The pilot met both criteria, with a slightly higher response than the FES in the inter-linked sample and a reasonable expectation of reaching the 60 per cent minimum.

13. Comparability with expenditure estimates from the FES was also important. There was concern, based on the previous attempt at merger, that recorded expenditure would be lower, and that the balance between food and non-food expenditure might be affected. Both total expenditure and food expenditure proved to be in exact agreement, compared with results from the inter-linked FES sample. There was more variability in comparisons of detailed components, but all were within the amount of sampling variability expected.

14. An assessment of the food data from the perspective of NFS confirmed the expected rise in the level of recording, resulting from the improved survey design, and that the detail of food descriptions and the recording of food weights all met the assessment criteria.

15. The main governmental users of the FES and NFS agreed that the new EFS met all the criteria for success and the National Food Survey Committee supported the recommendation. The decision to go ahead was announced by the National Statistician in a press notice in December 2000.

Design of the new survey

16. As already noted, the EFS was to be broadly based on the FES. The main changes were:

- (1) Recording of food weights in the diary;

- (2) More detailed descriptions of food in the diary and more detailed food codes;
- (3) A new section on free food brought into the household – own grown, picked in the wild, or given to the household;
- (4) A small but worthwhile reduction in the number of FES questions;
- (5) A relaxation of the rule that interviewers had to secure the agreement of all adults in the household to all parts of the survey, including diaries, in advance. Piloting showed that this relaxation made it easier to obtain the complete information and did not lead to unacceptable increases in costs;
- (6) A much improved diary design.

17. A further change was to develop a method of imputing for missing diaries. The FES requirement that all adult diaries must be completed resulted in some bias against households with several adults. Hot decking will be used to impute for a diary from a similar person and household but not if it is the main shopper's diary that is missing. This is expected to bring in a further 2 or 3 percent of households, but the proportion of data that is imputed will be smaller. Households with imputed data will be flagged so that users can exclude them if they wish.

18. Many of the new design features tested as part of the development work, such as changes to response rules, the improved diary and reductions in the length of the interview, have been in use on the FES since April 2000.

19. Like the FES and the NFS, the EFS continues to cover Great Britain with a Northern Ireland boost carried out by the Northern Ireland Statistics and Research Agency. The target sample size for Great Britain is 6,850 households, compared with 6,500 for the FES and 6,100 for the NFS. As for the FES, 56 primary sampling units (postcode sectors) are selected each month, 25 more than the NFS, resulting in a less clustered design for NFS users.

A new expenditure coding frame – COICOP

20. As well as the launch of the new survey, April 2001 saw the adoption of a new coding frame based on the European standard Classification of Individual Consumption by Purpose, COICOP. A further level of subdivision has been added to improve the mapping to the previous FES and NFS codes.

Changes for NFS Users (mainly benefits)

21. An important main benefit of the merger to both MAFF and the ONS would be cost savings from replacing two separate surveys by a single survey. Much of the cost of any survey comes from making contact with the household and there is a substantial common element that would no longer have to be duplicated. Some of the cost savings could be used to finance an increased sample size.

22. The effect of merger for FES users would be indirect because the proposed survey design was based on the current FES design. Nevertheless the project provided an opportunity to review

and update survey design and data processing systems, resulting in improvements in speed of delivery of quality-assured data.

23. For the NFS it was perceived that there would be a greater range of benefits including improvements in the quality of food data by the adoption of FES design features and practices. In fact the review and update of the survey design and data led to other improvements. These are included in a statement of the following benefits that will be derived by NFS users of the EFS food data.

24. Overall the changes represent an improvement in data quality. This arises mainly from the replacement of a single one-week shopping diary for each household in the sample with a two-week diary for each individual over 7 years of age and the use of till receipts. The National Food Survey Committee supported the merger of the NFS with the FES to form the EFS subject to some refinements on eating out, on-going assessment of data quality and the development of a methodology to maintain the best possible consistency between EFS and NFS series.

25. The EFS is essentially based on FES methodology. However this itself has been improved considerably as a result the development work undertaken for the EFS. Relative to the NFS, the EFS has brought the following changes (mainly improvements):

Sampling

- (1) A larger target sample (6,850 GB households, compared with 6,100 in the NFS) ;
- (2) A less clustered sample consisting of 58 primary sampling units (post code sectors) per month, compared with 31 for NFS;
- (3) Standard errors of average weekly per capita expenditure and consumption around 8-9% lower;
- (4) Collection of eating out data from all individuals within the sample not just from about half of them, thus reducing standard errors by at least 30 per cent.

Diary

- (5) A much improved diary design covering two-weeks and allowing the use of till receipts in place of a one-week diary without till receipts;
- (6) A diary for each member of the household rather than one for the household kept by the main diary keeper on behalf of the household. Even so, EFS results will still be for the household, not for individuals, because the main food shopper buys and hence records the bulk of the food eaten by others.

Coverage

- (7) Eating out consumption data for Northern Ireland and hence the UK for the first time;

- (8) Theoretically less information on free food and drink eaten out by children under 7 years (except certain counts from which consumption may be estimated - see under 'Detail' below). In theory, this free food was captured in the NFS but only if the Main Diary Keeper remembered to record it.

Metric

- (9) A more focussed metric for eating out. The NFS collected information on the amount of all food eaten out by food code (i.e. consumption) and on expenditure by food codes (or groups of food codes where, as frequently was the case, expenditure details were not known). To satisfy this requirement for recording of both consumption and expenditure, meant that each respondent had to include food consumed by them but bought by others and to include their spending on food eaten by others. This came to be seen as a major cause of under-recording in the NFS as respondents became overwhelmed with the complexities of this mix of requirements.
- (10) To avoid these complexities and hence to reduce under-recording of food eaten out, the EFS is only recording food that the respondent bought (but irrespective of who ate it). Thus food eaten out by members of the responding household but paid for by non-members of the household is not recorded (except on non-members own diary in the very unlikely event that s(he) was in the survey at the same time). Conversely, food eaten out which is paid for by members of the responding household but eaten by non-members is included. These effects tend to cancel out over the whole sample due to the effect of random sampling. However, there may be imbalances for some sub-groups and the need for any adjustment factors for these sub-groups is being investigated.

Coding and publication detail

- (11) The EFS food classifications to be used and published by DEFRA are similar to the existing 242 NFS food codes, though there are 19 extra codes (mainly on takeaways) and some changes of code numbers (the data is coded by ONS using a different framework – see under Harmonisation - but they are also mapped to NFS codes for DEFRA purposes).
- (12) The concept of a Main Diary Keeper (MDK) disappeared with the advent of individual diaries. It is hoped to be able to identify a Main Food Shopper and that this will be a satisfactory proxy for the MDK.
- (13) As under NFS, no weights of food are collected in the eating out section of the diary. Instead consumption has to be estimated by application of a portion size to the number of occurrences of each food code. This process is simplified under EFS by a reduction in the number of codes, from 1,586 to 250, for which occurrences have to be coded and portion sizes estimated (externally, by the Food Standards Agency). As with the NFS, in order to reflect the accuracy of the estimation method, results are likely to be grouped into something like the current number of 66 food groups used for presenting eating out consumption results.

- (14) Expenditure on individual components of meals often does not exist e.g. consider roast beef and two vegetables. The recorded breakdown is therefore limited to expenditure on ice cream, soft drinks, alcoholic drinks and (other) food with a possible condensation for publication to a dichotomy of total food and drink with and without alcoholic drinks as with NFS in recent years.
- (15) In both NFS and EFS, nutrient intakes from eating out are estimated by the application of a set of externally estimated nutrient composition factors (supplied by the FSA) to the consumption estimate for each of the eating out consumption food codes. To reflect the nature of the estimation method, nutrient intakes for eating out are likely to be published in less detail than under the NFS, or not at all, by region and demographic breakdowns (the NFS estimates were probably presented in more detail than they should have been). National result for eating out will need to be tagged with a footnote about lower reliability or be shown in less detail. These issues will be discussed by the NFS Committee before a final decision is made.
- (16) As mentioned under Diary above, as with NFS, EFS results for food eaten at home relate to households (expressed as averages across household members per person per week). Unlike with the NFS, this also applies to eating out (thus food eaten at home and out are treated the same). It is not therefore possible to produce tables by age and gender.
- (17) There is no collection of the number of meals (i.e. breakfasts, mid-day meals and evening meals) taken or missed, nor of whether these were eaten at home, eaten out but from home-supplies e.g. packed lunches or both purchased out and eaten out. Under the NFS, this information was mainly used to derive an estimate of the proportion of food energy coming from meals out against the total in order to make an allowance for eating out when comparing nutrient intakes with recommended intakes. Under EFS, the food and drink involved in all of these meals continue to be covered in terms of expenditure and consumption, though they are not separately identifiable.
- (18) Strictly the meals data was not necessary once the NFS began to record detailed data on eating out in 1994. However, there was concern about under-recording of eating out, and the older method described above (known as the net balance method) was retained when comparison of actual and recommended intakes were made. With better recording under EFS, the intention is to use the eating out data directly, though checks will be made using net balance estimates (net balances for 2000, will be used given that they change only slowly over time).
- (19) In order to complete the nutrition picture, information on free food is collected, mainly as counts to be recorded in the questionnaire.
 - On welfare milk and free school milk, recorded directly under the NFS, is collected in terms of the number of bottles or pints respectively received by household members in the last seven days. These are converted to millilitres for inclusion in the consumption tables.

- A count is also taken of the number of free meals provided by employers and the number of employees receiving free tea, coffee or soft drinks from employers. The corresponding consumption data will be imputed from other diary information or from standard compositions of canteen meals and average numbers of free drinks per employee.
- The number of school meals or meals on wheels received by members of the household in the last seven days and whether they were free or paid for are also collected. In the cases of free meals, and where school dinners are paid for weekly or less frequently, the actual food eaten is (or may) not be recorded but will be imputed from other diary information when estimating consumption or from standard compositions of free school dinners.
- The number of households in which any child received free fruit at school or nursery is collected to monitor the expected growth in this in the coming years.

Accuracy

- (20) The 2000 Pilot Study successfully met the success criteria for response rates and thereby demonstrated that NFS response rates could be achieved or bettered (the EFS has a target of 60 per cent or more, inclusive of eating out data). It is recognised however that constant attention needs to be given to maintaining them.
- (21) Compared to the NFS, response rates under the EFS are enhanced by the payment of £10 to each adult and £5 to each child in the fully responding households (no payment under NFS); by re-issuing a household for interview and by the limited use of imputation of diaries in cases where data for the rest of the household would otherwise be unusable.
- (22) Central coding of questionnaires and diaries, rather than the interviewer coding used for NFS since 1996.
- (23) Reduced under-recording particularly for snack food such as cakes, biscuits, crisps, ice cream and confectionery. These are items not always bought by the main shopper and more likely to be picked up with diaries for individuals.
- (24) Greater use of standard food weights where weight has not been recorded and of usually purchased products where the necessary food detail has not been recorded.
- (25) Less under-recording of eating out and hence its direct use as the favoured method in assessing total nutrient intakes for the first time (to be run in parallel with the long-established net balance method for a time).
- (26) Use of statistical weighting to correct for differential non-response.
- (27) More comprehensive and reliable data on income.

- (28) Accuracy improvements from a change of metric and the need for less food detail about food eaten out (see under details above).

Utility

- (29) Linking of food consumption and nutrient intakes with non-food expenditure from the same data source.
- (30) Availability of additional information for cross-classifying food and nutrient intakes e.g. outlet code for household food; educational attainment, ethnic origin of the Household Reference Person (which has replaced the Head of Household in all National Statistics).

Harmonisation

- (31) As implied in the last paragraph, food eaten out is now effectively compiled on a household basis, rather than on an individual basis. This has always been the case in the NFS for food brought home. Therefore, under the EFS, all food is compiled and reported on the same basis i.e. household data averaged on a per person per week basis.
- (32) Closer adherence to Government Statistical Service classifications including the definition of the household, the replacement of the Head of Household by the Household Reference Person and the adoption of National Statistics Socio-Economic Classification in place of the classifications used by NFS.
- (33) The main change in the household definition is that no account is taken, as it is in the NFS, of the number of visitors staying in, or being away from, the household for more than half the diary-keeping week.
- (34) The availability of the food code classification being used for UK and EU Household Budget Surveys and National Accounts (Classification of Individual Consumption by Purpose – COICOP) (though DEFRA will continue to use its own ‘NFS’ food codes to retain as much comparability with existing NFS data as possible (see under ‘Discontinuities’ below).

Timing

26. Data delivery to DEFRA will be eight weeks after the end of the month. Quarterly publication is likely to be two weeks later than now, at least during the bedding in period. Initial publication may be of slightly incomplete and un-weighted data.

Discontinuities in the NFS

27. It is proposed to produce an alternative NFS database and selected results in which the data will have been adjusted to be as comparable as possible with data from the EFS. Work is under-way to produce 'scaling factors' which represent differential under-recording as between NFS and FES to apply to the existing NFS data (as expected, FES results were shown to be close to EFS results in the 2000 Pilot Study and hence can be used for the scaling exercise). Scaling factors are being considered in a multivariate analysis in which the independent variables are food category, region, income, household composition and age of main Diary Keeper.

28. The production of the first annual report based on the food element of the EFS will require the combining of data from the NFS for the first quarter of 2001 with EFS data for the other three quarters.

NOTES

¹ The author acknowledges the work and help of staff in the Office for National Statistics who took the lead in this project. Thanks are also due to the Food Standards Agency, the NFS Committee and staff in the NFS Branch of MAFF all of whom contributed much time and effort in ensuring the new survey will live up to the reputation of its forerunner.

² Now DEFRA.
