A REVIEW OF THE FOOD STANDARDS AGENCY'S DIETARY SURVEYS PROGRAMME

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ABSTRACT

Objective
To review the extent to which the Food Standards Agency's Dietary Surveys Programme (DSP) meets the needs of users. The DSP encompasses a series of government-funded surveys of food and nutrient intake and nutritional status on individuals including the National Diet and Nutrition Survey (NDNS). Our remit was to critically examine the Agency's requirements for dietary survey information to support nutrition and risk assessment and to provide options for meeting these requirements.

Design
A questionnaire was used to probe quantitative and qualitative opinions from users, producers and managers of the DSP. This was followed by a two day Workshop discussion of main issues and the generation of 19 possible options for consideration by the Agency.

Subjects and methods
The questionnaire was sent to 273 recipients identified as either users of the DSP or involved in the production/management of surveys. Completed responses were received from 103 recipients of whom 43 were invited to the 2-day Workshop. An Advisory Panel, representing NDNS users and producers from academia, industry and government, risk assessors/epidemiologists and ethicists, was used in designing the questionnaires, assessing findings and developing final recommendations.

Results
97% of questionnaire respondents agreed that a DSP is needed in UK. Furthermore, 94% agreed that the DSP provides essential information not available elsewhere. The NDNS was considered particularly valuable in providing nationally representative data on intake and nutritional status in individuals. Areas of concern related to timeliness, flexibility, falling response rates and misreporting of consumption. Many felt that the survey could be promoted and disseminated better to maximise the use of this valuable resource.

Conclusions
There is widespread support for the Dietary Surveys Programme from its users who would have no alternative source for such high quality data on food and nutrient consumption and physical status in the same individuals.

Nineteen options to improve effectiveness have been suggested to the Agency. These include methods to prioritise breadth and depth of coverage and possible means of improving response and compliance. Strategies to make surveys more efficient and timely such as adopting a rolling programme, disaggregating survey components, integrating with other studies and improving data access are also suggested.

Key words
Diet, Surveys, status, NDNS, Food Standards Agency, nutrition, food chemical exposure
Running title: UK Dietary Surveys Programme review.

INTRODUCTION

Background

The Food Standards Agency's Dietary Survey Programme (DSP) comprises national dietary surveys that are fully or partly funded by the Agency. Responsibility for the DSP passed from the Ministry of Agriculture, Fisheries and Food (MAFF) to the Food Standards Agency on its establishment in April 2000. The major focus of the Agency's Dietary Surveys Programme has been to gather information to monitor the food consumption, nutrient intake and nutritional status of the British population. This information is used for nutritional surveillance and food chemical exposure assessment, and to inform food and nutrition policy and healthy eating advice.

Remit of the Review

In 2002, the Food Standards Agency needed answers to two key questions:

- What are the information needs of the Agency, in relation to food consumption, nutrient intakes, nutritional status and food chemical exposure assessment?
- How can these needs best be met?

The authors' role was to act as consultants to the Agency to provide Options for consideration by the Agency. This paper is a summary of the methodology and key findings from the project (N10015; known as REVSURVE). The task diagram for the project is shown in Appendix 1.

NDNS and related surveys

The major component of the DSP is the National Diet and Nutrition Survey programme (NDNS). The NDNS provides cross-sectional information on the dietary habits and nutritional status of nationally representative samples of the British population. This programme has been jointly funded and managed by the Agency and the Department of Health

- Dietary and Nutritional Survey of British Adults (1990) [1]
- National Diet and Nutrition Survey (NDNS): children aged 1.5 to 4.5 years (1995) [2]
- NDNS: people aged 65 years and over (1998) [3] [4]
- NDNS: young people aged 4 to 18 years (2000) [5] [6]
- NDNS: adults aged 19 to 64 years (2002/2003) [7]

Each survey collects quantitative information on food consumption (using weighed records whenever possible), physical measurements (e.g. height, weight and blood pressure), a blood sample for analysis of nutritional status indices, a detailed interview to collect information on socio-economic, demographic and lifestyle (e.g. physical activity) characteristics, and in some surveys, a record of physical activity, a urine sample and an assessment of oral health.

The key benefits of the NDNS are:

- the provision of detailed and robust food consumption data for individuals;
- the provision of data on diet, nutritional status and related characteristics in the same individuals to allow analysis of the links between them.

Other surveys in the DSP

A number of other targeted dietary surveys have been, or are being, funded and managed by the Agency (previously by MAFF). These surveys have focussed on dietary habits and have generally collected little or no information on nutritional status.

- Dietary Survey of Vegetarians [8]
- Survey of intake of sweeteners by Diabetics [9]

- Dietary Survey of Afro-Caribbean people [10]
- MAFF 1992 Food and Nutrient intakes of British infants aged 6-12 months [11]
- LIDNS: Low Income Diet And Nutrition Survey (planned for 2003-2005)

Issues for consideration in the Review

Timeliness
The NDNS is divided into 4 surveys of different age groups, conducted sequentially approximately every 3 years (Table 1). Each survey aims to obtain data on dietary habits and nutritional status for around 2000 individuals. The fieldwork for the most recent NDNS of adults aged 19-64 years was completed in summer 2001. From planning to publication each survey takes about 5 years and publication is achieved, on average, about 2 years after fieldwork is completed. The most recent NDNS of adults aged 19-64 years is being published as a series of five separate reports; the first report covering food consumption data was published in December 2002, about 17 months after completion of fieldwork [7].

Flexibility
The protocol for each survey is designed to ensure that questions relevant to each group are included in the interview. Because of the long planning stage for each survey it is not usually possible to adapt their content or coverage at short notice.

Table 1. Response rate for Studies in the NDNS

Study Name	Age Range (yrs)	Survey Date	Publication date	Food Diary Period	Response rate (as % of eligible sample)		
					Inter-viewed	Completed Diary	Blood sample
Adults	16 – 64	1986 – 97	1990	7 days	84	70	61
Pre-school children	1½ - 4½	1992 – 93	1995	4 days	88	80	48
Older people	65+	1994 - 95	1998	4 days	75	59	45
Young people	4 – 18	1997	2000	7 days	80	64	45
Adults	19 – 64	2000 - 01	2003	7 days	61	47	37

Trends
The NDNS is not designed to provide data on trends. In the current format, a survey of each age group could be carried out every 12-15 years and therefore some comparison between point estimates would be possible provided methodology remains the same.

Response and compliance issues
The surveys are time-consuming and burdensome for respondents, particularly due to the use of the weighed dietary record. Response rates in the NDNS (see Table 1) have fallen in line with a general trend reflected in other surveys [12]. There is concern that the lower the response rate, the less likely it is that the data are representative of the population. A “token of appreciation” (gift voucher to the value of £10) is currently offered to NDNS respondents for completing a weighed dietary record, but UK ethics committees insist that this is not associated with a blood sample. Around 20-30% of respondents refuse to give a blood sample and this further reduces the sample size for users of data on nutritional status.

Misreporting
Misreporting is a feature of all dietary assessment methods and a source of bias when comparing dietary and nutritional parameters in a population [13] [14]. There is no consensus on how to avoid under (or over)-reporting, or how best to correct for it [15]. Recent NDNS surveys have attempted to identify potential under-reporters and to explore the impact of excluding them from the analysis [5]. However, this drastically reduces sample size, can also result in bias, and cannot adjust for selective under-reporting of specific foods.

Sampling (social and regional coverage)
The NDNS sample is designed to be representative of the regional and socio-economic distribution of individuals living in private households in Britain although it excludes pregnant and lactating women. People living in institutions (e.g. prison) are normally excluded, although the NDNS of people aged 65 years and over included a sample living in residential and nursing homes. The sample is based on postcode sectors in England, Wales and mainland Scotland, stratified by census-derived variables including region and a socio-economic indicator. One eligible person is sampled from each household. The survey is conducted over 12 months in 4 rounds, ensuring a similar distribution of regions in each quarter. Results in the published reports are re-weighted as necessary to account for differential sampling probabilities and for differential non-response.

Information on food consumption
The NDNS surveys record the weight and full description of each type of food/drink eaten over 4-7 days, although portions are usually estimated for food eaten outside the home. The survey fieldwork covers 12 months to take account of possible seasonal variations in eating habits. Different foods are distinguished using a coding frame, which details around 7000 different generic, branded and composite foods including homemade dishes and vitamin/ mineral supplements. These codes are aggregated into about 115 subsidiary food groups (e.g. sponge puddings, cereal-based milk puddings, etc.) and then into about 58 main food groups (e.g. puddings). Although the description of the foods eaten is very detailed, these surveys may not be a good source of information on

- trends in rapidly changing items e.g. brands, novel foods
- dietary habits of minority groups (e.g. ethnic groups, vegans)
- types of food not separately coded for nutritional purposes (e.g. liver from different animals)
- rarely-consumed foods (e.g. oysters).

Information on nutrient intakes
Currently information is included on protein, carbohydrate {starch, total and individual sugars, non milk extrinsic sugars (NMES), intrinsic and milk sugars (IMS)}, fat, fatty acids, cholesterol, vitamins A and carotenoids (total carotene, α-carotene, β-carotene, β-cryptoxanthin), C, D and E, thiamin, niacin equivalents, riboflavin, folate, vitamins B6 and B12, biotin, pantothenic acid, iron (total, haem and non-haem), calcium, phosphorus, magnesium, sodium, chloride, potassium, zinc, copper, iodine and manganese.

Information on nutritional status from blood and urine analytes
Currently information collected in the NDNS is related to haematology, vitamin status indices, lipids, markers of inflammation and enzyme activity and urinary electrolytes (a 24hr urine sample in surveys of adults).

Information on physical measurements, blood pressure, physical activity and oral health
Currently information is collected in the NDNS on height, weight and body mass index, and depending on the age group, also on mid upper-arm, waist and hip circumference, demi-span and systolic and diastolic blood pressure. Some surveys have included a physical activity diary and oral health assessment.

Dissemination

Reports of NDNS surveys and the MAFF dietary survey of infants are published by the Stationery Office. The reports comprise tables of basic analyses and some more complex analyses, with commentary and interpretation, together with background documentation as appendices.

Until recently the NDNS findings have been published as a single volume with the oral health findings as a separate volume. The new NDNS of adults 19-64 years is being published as a series of five reports over a 12 month period, each covering a different aspect of the findings (food consumption, nutrient intakes, nutritional status and physical measurements, as well as a technical report). For the first time, these reports are accessible via the Agency Website (www.food.gov.uk).

Raw data on individuals from the NDNS (and the survey of vegetarians) have been deposited at the Data Archive at the University of Essex (www.data-archive.ac.uk) and are available to researchers for a small administrative charge. Various formats and file types are available for the more recent NDNS studies, while options and documentation are more limited for earlier studies.

METHODOLOGY OF REVIEW

The Authors were given access to relevant Agency internal reports [16] [17] [12], which had evaluated some of the problems surrounding the collection and use of data, in particular those relating to the latest survey of adults. Background information on the DSP, its use within the Agency and typical enquiries received, was also provided.

To supplement information provided by the Agency and to gain an understanding of the information needs of non-Government users, opinions were sought from a large sample of users and producers (n 273) via a written questionnaire. This was followed up by a two-day workshop involving a smaller subgroup of respondents (n 43).

Design of questionnaire

The aim of the questionnaire was to collect information from users and producers of the DSP, both inside and outside the Agency. This included users of published survey reports, raw data, or the Agency's in-house intake programme. Views on problems inherent in the dietary surveys themselves, such as response rate and bias, were also sought. To provide an international perspective, users and producers of similar surveys outside of the UK were also contacted.

A series of questions was developed, in consultation with Agency staff and the advisory panel, to probe use of the various elements of the DSP and how the programme could be improved to better meet the needs of different users. Questions were revised to ensure that they were phrased neutrally. The questionnaire was clearly divided into sections relevant to users of UK dietary survey data, producers of UK dietary survey data and international users of survey data. Hyperlink text was used to guide respondents to the areas of the form that they should complete. A four-point scale was used to avoid bias towards the middle answer. The final version of the questionnaire was ready for electronic distribution at the end of August 2002.

Recipients of the questionnaire
Potential recipients of the questionnaire were drawn from the following groups

a) Members of EFCOSUM (European Food Consumption Survey Method) Project which included producers of international survey data
b) People accessing raw data from the Essex archive
c) Representatives from all relevant Food Standards Agency branches including the Consumer Exposure Team (CERT) group
d) Representatives from Food Standards Agency, Scotland, Wales and Northern Ireland.
e) Interested parties including industry groups such as the Food and Drink Federation, British Nutrition Foundation, British Retail Consortium and Institute of Grocery Distribution, consumers and other representative groups across the UK
f) Contractors involved in surveys – MRC Human Nutrition Research, Institute of Food Research, Rowett Research Institute, National Centre for Social Research (NCSR) previously known as SCPR, Office of National Statistics (ONS) previously known as OPCS.
g) External experts in dietary survey methodology
h) Archivists from the University of Essex data store
i) Additional groups/individuals identified by the Advisory Panel (see Acknowledgements).
j) Scientific Advisory Committee on Nutrition (SACN)

In addition, an invitation to participate in the survey was placed on the Agency website. Thirty requests for a questionnaire were obtained via this route.

Two hundred and seventy three questionnaires were e-mailed with receipt confirmed. Categories of recipients were summarised as follows: Academic (182 UK and 25 non UK), Food Standards Agency (31 UK) Government (30 UK and 21 non UK) and Industry (57 UK and 7 non UK).

Analysis of questionnaire

The main uses of surveys in the DSP and the utility of various types of information collected were assessed quantitatively using frequency tables and graphs (see Results and Discussion). The questionnaire also evaluated users' opinion on the scope, methodology and accessibility of the DSP and on how information gaps could be covered. International users were also asked how the NDNS compared to national surveys in their own country.

Based on the analysis of these qualitative responses, and in consultation with Food Standards Agency officials and the Advisory Panel, a list of priority issues was outlined in a working document for discussion at a Workshop.

Workshop format

A total of 43 participants attended a 2-day workshop. Participants included Agency officials, members of the Advisory Panel (see acknowledgements) and others with relevant expertise identified through their questionnaire responses. The workshop followed a creative brainstorming and problem-solving format, whereby a selection of issues was discussed to generate possible options to pursue. The main advantages (pros) and disadvantages of each option (cons) were then identified.

Options for the Agency

From the workshop discussions, 19 options were then developed and circulated to Agency officials and selected experts for comment. These options are summarised in Table 3.

RESULTS AND DISCUSSION

Results from questionnaire

Response to REVSURVE questionnaire

One hundred and three questionnaires were completed, a response rate of 38%. Food Standards Agency and other government staff comprised 16% and 13%, respectively, of the final sample, while 43% worked for academic institutions. A further 29% were affiliated to industry or were consultants.

Use of Dietary Surveys Programme

Most respondents to the questionnaire (93/103) were users of the Dietary Surveys Programme (DSP) data. Twenty-two respondents had been involved as a producer in some way in DSP surveys, half of whom (11) were currently involved in the NDNS adults 2000/01. Six had been involved in LIDNS. None had been involved in the surveys of sweetener use in Diabetics or the Dietary Survey of Afro-Caribbeans. In terms of role, most had been involved in the management, design or report-writing of surveys.

Of the eight surveys in the Dietary Surveys Programme, the four in the NDNS programme were most familiar to respondents. Virtually all (97%) had used the original Adult survey, while 72% had used the most recent survey of young people aged 4 to 18years. The MAFF infant feeding survey was used by about 40% but the remaining surveys in the Dietary Surveys Programme (Vegetarians Afro-Caribbeans and Diabetics) were very little used, and then mainly by respondents from the Agency and Department of Health (DH). The four NDNS surveys were rated highly in terms of usefulness; the others were useful to the small minority who had used them.
The *tables, text* and *summary* were the most frequently used parts of NDNS reports, but some used other sections such as the *technical appendices* and *fieldwork questionnaires*.

Approximately one third of respondents had used the raw data on NDNS surveys. The Data Archive at the University of Essex was the source for the majority of respondents, but about one third (mainly Agency respondents) had used the Agency's internal Intake Programme. Of those obtaining data from the archive, about one in four rated this as difficult although most rated it as satisfactory. The format most commonly requested was SPSS files.

Nutritional surveillance/research was the major purpose of most users of the DSP; twice as many people used the NDNS for this as for risk or exposure assessment. However the balance was more equal for the less frequent surveys (Vegetarians, Diabetic/sweeteners, Afro-Caribbeans and Infants), which were designed to fill a more specific need. Other main uses of surveys were for policy development/support and for teaching.

Data on food consumption was most frequently used from the surveys, followed by data on nutrient intakes, anthropometry and nutrient status (blood analytes). Some use had been made of the oral health data in the three most recent NDNS studies and of the physical activity data in the survey of young people aged 4-18 years. None of the REVSURVE respondents had used the data on bowel movement records.

From the published reports**,** most respondents had used average (mean or median) values for the total sample and for subgroups. Slightly fewer had used the measures of dispersion such as SD or percentiles. Of those who used the food consumption data, two thirds had used the information on subsidiary food groups, which provide slightly more disaggregated data (around 115 food groups vs. 58). Of the nutrient intake data, macronutrients and micronutrients seemed of equal interest. Around half had used the comparisons of nutrient intakes with Dietary Reference Values.

Users analysed the raw data principally for information on consumption of food groups and, in about two thirds of cases, specific foods. In many cases this involved calculating the nutrient contribution

from foods, or portion size, or the number of times the foods were consumed. Ten users had looked in more detail at meal occasions (time of consumption, foods consumed at same meal, food source etc), which requires more specialised data analysis.

Opinions about the Dietary Surveys Programme

The questionnaire respondents were asked how the current Dietary Surveys Programme provided for their information needs and what changes might be made to improve this. Agency officials tended to be more critical of the shortcomings of the DSP. Table 2 summarises the quantitative responses from all respondents to these questions.

The majority of REVSURVE respondents felt that the DSP was not timely enough and most thought the current approach was not suitable for monitoring time trends. There was little difference in the distribution of responses between subgroups (use for nutrition, risk assessment or both, or UK versus non-UK, or affiliation (academic, the Agency, government or industry/consultants)).

REVSURVE respondents had mixed views as to whether the current response rate provided data of sufficient validity. All respondent groups were concerned about misreporting, with only a small proportion (<7%) unsure/unaware whether this was an area of concern.

Most respondents to the REVSURVE questionnaire felt that the range of population groups covered was adequate although roughly half the Agency and risk assessment respondents did not agree with this. Half the respondents felt that the regional coverage was adequate although Agency respondents were less likely to agree.

The majority of all REVSURVE respondent groups felt that the information on food consumption and its context were adequate although half the Agency respondents and six out of seven risk assessment respondents did not agree with this. The majority of respondents, with the exception of industry/consultants, agreed that the range of nutrient intakes covered and the range of blood and urine analytes and the range of physical measurements were adequate.

Views were split on the ease of access to results from Dietary Surveys Programme. The majority of academic respondents agreed that access was adequate whilst other sub-groups were less satisfied.

The majority of REVSURVE respondents agreed that the format of the published report was appropriate. Risk assessors tended to be least satisfied and/or least likely to use the published reports.

The majority of respondents had not used the raw data. However, the majority of those who had used the data tended to agree that the format was acceptable.

No respondents thought that the DSP was not required and none thought that the information was available from other sources.

Table 2 . Quantitative results from the questionnaire about the DSP

	yes	no	DK	Base n
Timeliness Do you think the current approach is timely enough?	32%	56%	12%	*85*
Flexibility Do you think the current approach is flexible enough?	36%	20%	43%	*83*
Time Trends and monitoring Do you think the current approach is acceptable?	27%	64%	8%	*84*
Response rate Do you think the current approach gives a response rate that provides data of sufficient validity (quality, power, representativeness etc.) for your needs?	31%	35%	35%	*78*
Misreporting Are you concerned about misreporting in the surveys?	77%	18%	5%	*84*
Range of population groups covered: socio-economic, ethnic, etc. Do you think the range of groups covered is acceptable?	65%	17%	18%	*82*
Regional populations covered Do you think the current approach gives us sufficient detail on people in different regions in the UK?	49%	24%	28%	*80*
Information on food consumption Do you think the current approach provides sufficient information on food consumption and its context? (i.e. what, where and when food is consumed?)	60%	29%	11%	*80*
Information on Nutrient intakes Do you think the range of nutrient intakes covered is adequate?	62%	20%	18%	*82*
Information on Nutritional status from blood and urine analytes Do you think the range of analytes covered is adequate?	54%	14%	32%	*81*
Physical measurements (e.g. anthropometry and blood pressure) Do you think the range of physical measurements is adequate?	69%	12%	19%	*84*
Dissemination-Access to information Do you think access to the Survey results is adequate?	56%	39%	5%	*80*
Dissemination- format of DSP publications Do you think the format of published reports is appropriate?	75%	14%	11%	*79*
Dissemination- raw data from DSP Do you think the format of raw data is adequate?	29%	19%	51%	*68*
Do you think we need a UK Dietary Surveys Programme?	97%	-	3%	*86*
Do you think the UK Dietary Surveys Programme provides information not available elsewhere?	94%	-	6%	*77*

- **percentages may not sum to 100% due to rounding**

Surveys outside the UK

International users (n=19, representing 13 countries) were also asked to provide their views to a similar range of questions on their own nationally generated data. Many of the international respondents expressed similar views on their national data to UK respondents considering the UK DSP. This would suggest that there is a generic difficulty in collecting dietary information.

Delays in delivering results and difficulty in monitoring trends were seen as problems in several countries. Comparison between cross-sectional surveys is made in some countries but these are typically 10-15 years apart. The US NHANES and the Danish food consumption study use a rolling programme approach to monitor trends.

Non-UK Surveys were sometimes criticised as inconsistent, as use of different methodologies prohibited comparisons and longitudinal assessments being made (e.g. Australia). The rolling programme system (as in US NHANES) was felt to offer enhanced flexibility, and this approach was supported by other respondents even though although their national surveys did not currently operate in this way (Ireland, Australia, New Zealand).

The majority of international respondents agreed that their country's survey provided sufficient regional information but there was no clear view on whether they adequately covered population sub-groups such as children or the elderly.

Response rates in non-UK surveys were very variable and were quoted as ca. 61-80% in Australia, France 50%, Ireland 68%, New Zealand 50%, 54-86% in Sweden (60% considered the lower limit of acceptability) and US NHANES ca. 80%.

In contrast to UK respondents, who were generally more satisfied with the information provided by the DSP, half the international respondents felt that their surveys provided insufficient information on food consumption and 75% felt they did not provide adequate information on nutritional status from blood and urine analytes.

Most respondents were concerned about misreporting, but agreed that nutrition surveys were accessible and that published reports were in a suitable format.

Results from Workshop

The qualitative responses of REVSURVE questionnaire respondents were used as the basis for the background papers, which were used to inform discussion held at the Workshop.

Issues discussed at Workshop

- Issue 1 Need for Dietary Surveys Programme
- Issue 2 Breadth of surveys
- Issue 3 Depth of surveys
- Issue 4 Response Rate & Misreporting
- Issue 5 General Strategy (Timeliness, Trends etc)
- Issue 6 Dissemination

From the discussion, nineteen options were then circulated to selected Panellists and workshop attendees for further refinement.

Table 3 provides a résumé and commentary on each option.

Table 3: Commentaries on options explored

Issue one: do we need a Dietary Surveys Programme?		
A	**To maintain status quo in terms of the organisation of the current NDNS programme**	The Dietary Surveys Programme(DSP) has been running since 1986 with surveys on the same age group being planned at approximately 12 year intervals (to date, only the adult survey has been repeated). A wide range of age groups has been covered and a number of supplementary surveys have been carried out. It has been the major source of data on nutritional status, nutrient intakes and food consumption data in Britain. The Dietary Surveys Programme is highly respected both within and outside the UK and by diverse groups of users such as academics, the Agency, government and industry. However, the current approach is costly to maintain and in its current format may no longer provide all the information that is vital to policy makers, risk assessors and nutritionists. Since many changes to the *status quo* have been suggested and favourably evaluated, the Dietary Surveys Programme should evolve to bring about improvements and overcome some of the current shortcomings.
B	**To abandon the dietary surveys programme completely rather than make any changes to the status quo**	No respondents to the REVSURVE questionnaire felt that a DSP was not necessary and all acknowledged that the loss of such a programme would remove a source of data essential for a range of functions including the formulation of policy. There is overwhelming support for the view that the Dietary Surveys Programme is essential to provide data on individual consumption and status. This unique dataset, designed to be nationally representative, is used for a wide variety of purposes, but mainly for purposes relating to nutrition and risk assessment. Abandoning the Dietary Surveys Programme at this opportune time when one cycle has been completed may lead to immediate financial savings but cannot be justified as a long term cost saving measure since alternative comparable sources of data do not appear to be available (also see Options D and P). This conclusion re-iterates that reached previously by an independent consultant group (MHA, 1997).
Issue two: breadth of survey		
C	**Perform more adjunct surveys (in addition to NDNS)** **and/or use modelling techniques** **to increase breadth of coverage of the DSP**	The availability of extensive and up to date baseline data is clearly vital to the Agency and other users. Therefore additional coverage should not compromise in any way the core NDNS survey. However, there may be scope for a more proactive, planned programme of mini-surveys, as adjuncts to a core NDNS, that would provide more robust and timely data to answer the needs of risk assessors and nutrition policy makers (see also option O). The advantages of doing more adjunct surveys, rather than attempting to boost the NDNS sample, are mainly in terms of flexibility, timeliness, and response rate. Being more focussed on a specific information need, their methodologies could be more appropriate, surveys shorter and samples more representative of the target group. Data from a national survey could monitor which groups appear vulnerable and ad-hoc surveys could then provide the reduced but targeted information that is needed on these groups as frequently as required. Vulnerable groups already known, such as people on low incomes, can be prioritised in a survey timetable. However, there will also be groups whose vulnerability is acute, unpredictable or previously unrecognised, or due to a particular exposure scenario (e.g. pregnant women consuming tuna) and here timely surveys are especially pertinent. The issue of how to prioritise groups to survey is covered in option D. There are methodological issues involved in conducting more adjunct surveys. In regard to adjunct surveys, comparison with other survey data may be difficult where different techniques of dietary assessment have been used. Research may be needed to establish which method is most appropriate for the purpose/population and statistical help is needed to select the sample carefully to avoid bias. Modelling is essentially using current data to predict what is unknown. At simplest it is the application of simple formulae to calculate extreme intakes, but more complex techniques are also used by the Agency (e.g. deterministic modelling in the Intake programme). There may be scope for using probabilistic modelling techniques such as the Monte Carlo method, which produces a distribution of possible exposures and their probability, permitting inferences about

		likely exposure in various groups and which variables have most influence on the results. However, the data used to develop the model would need to be highly accurate and reliable in order for uncertainty to be kept manageable. The views of users were that whilst modelling may be used to answer "worst-case" scenarios in the absence of appropriate survey data, it is not a surrogate for the information required on various groups, and on individual consumers. Given appropriate validation, modelled solutions could be useful for estimation and prediction of group intakes. However, policy makers and risk managers would prefer to have actual data collection if at all possible. To pursue the option of adjunct surveys further, a cost:benefit analysis would be needed to establish whether obtaining data on vulnerable groups and regions could be best achieved via separate ad-hoc surveys, by periodic oversampling within the NDNS, or via a rolling programme (see option M).
D	**Methodology to prioritise needs to ensure adequate breadth of coverage**	The Agency needs to be able to prioritise the target groups on whom dietary and status information is required and to anticipate future risk issues as far as possible. This option considered two strategies to help prioritise information needs. 1) To use an expert advisory panel to consider emergent issues and advise on priorities for the DSP and, 2) To use current (and future) databases to identify vulnerable groups. Currently all dietary surveys in the DSP have aims and objectives set before commissioning and have been subject to external appraisal. However, the process for determining priority needs of the Agency could be more openly and clearly defined. It was suggested that an expert advisory panel (such as SACN, or a reconstituted Working Party on Dietary Surveys) be used to prioritise surveillance, identify where information is lacking or out of date, and provide a strategic framework for longer term planning. This group should be proactive, keeping a watching brief on emerging dietary trends in the UK and experience in other countries, liaising closely with other research groups and relevant organisations. In line with the Agency policy of openness and transparency, there should be consultation and a mechanism whereby evidence can be submitted to the panel. External sources of information could help identify priority groups and possible means of access. Results from food surveys, market research and health studies could be used more systematically if these sources were better known and more accessible; health and genetic databases in particular could provide a valuable resource for identifying target groups. It is suggested that use could be made of the new UK BioBank initiative (www.ukbiobank.ac.uk), which will be collecting DNA, blood samples, physical measurements and diet and lifestyle information from approximately half a million middle-aged people from 2004 onwards.

Issue three: depth of survey

E	**Extract further/additional information from existing surveys by additional data analysis using 'bolt-on' studies to extend the information collected**	In order to extend the depth of the current DSP, two options were considered. Extracting further/additional information from existing surveys by additional data analysis and using 'bolt-on' studies to extend the information collected. A fundamental review of the requirements at the start of each phase of the NDNS is needed to ensure that the most appropriate information is sought and should continue to be an integral part of the DSP programme. It is easier to request additional information than to suggest items no longer required, and it should be recognised that needs differ among users. However, some suggestions have been made, such as the removal of the bowel movement record from future studies. This could lead to a decrease in respondent burden and hence improve response rates. It may also leave more time/money for improving other existing or possibly additional parts of the survey. Policy and research priorities are always difficult to predict and this could benefit from the support of expert groups. 'Bolt-on' studies could be used to address urgent emergent issues. A limited number of practical steps such as storing samples for later analysis or including more detail in reports (e.g. on food subgroups, or intake of individual sugars) could be particularly useful to certain users in the Agency, industry and research. The availability of additional information on recipes could enhance the usefulness of data for contaminant exposure assessments but it was acknowledged that confidentiality might be an issue.
F	**Use opportunistic screening to gather information on nutrition status and then to link this with diet information on same people**	Since many blood samples are taken for routine screening purposes throughout life (e.g. infancy, pregnancy, adult health checks), a possible option is to use such occasions to obtain blood in the first instance and then obtain diet information in the same individuals afterwards. This would require co-operation from other health care professionals. Whilst this option potentially gives access to a high number of blood samples, it would be a radical departure from the current strategy and there are a large number of disadvantages in routine use (such as ethical problems, storage inconsistencies, biased samples, etc). However, it may be a workable option where information is required on a particular population group especially if they are normally subject to regular screening occasions e.g. pregnant women. The question of whether giving a blood sample is the major reason for declining responses rates should be researched.
G	**To prioritise the Agency's and others' needs to ensure adequate depth of information in any future programme**	Survey respondents who use the data for nutrition purposes considered that the depth of information available in Dietary Surveys Programme was considerable and largely met their needs. The level of detail was acknowledged to be greater than that generally available in surveys from other countries. For some aspects, the NDNS provided a unique data set (e.g. sodium and blood pressure, oral health). In fact, the rich dataset tends to be insufficiently exploited in published reports, leaving just a few academic and industry researchers to analyse the raw data further. It was recognised, however, that the depth of information gained in the surveys, desirable though it might be, has a bearing on respondent burden and response rates. The primary need for both nutritionists and risk assessors was for detailed and accurate food consumption data, so that the former group could assess nutrient intakes and the latter non-nutrient intakes. The level of detail required for these differing tasks (e.g. on food coding) differs between these two groups and leads to the discrepancy in level of satisfaction between them. For risk assessment needs, priority lists have been generated for the details needed about foods for accurate assessment of risk from additives, pesticides and chemical contaminants. These are additions that should be considered to the 'status quo' to satisfy the core needs of all respondents. This Review has therefore generated a list of 'core needs' e.g. detailed food coding data, nutrient intakes, weight and height, better functional markers for nutritional status. It has also generated a list of 'other needs' of lower priority, such as more information on the context of meals eaten and more information on food components of emerging interest such as phytochemicals and different types of fibre. With the exception of bowel records, no clear areas emerged that could be dropped without significant loss to some survey users. Once the Agency has decided upon its 'core needs', then perhaps the 'other needs' list could be considered and, if funding was available, these could be added onto the core survey or separately funded via research or adjunct surveys **(see Options C and E).** An advantage of focusing surveys on core data could be a reduction in respondent burden **(see Option H).**

Issue four (i): improving response rate

H	**Provide better incentives and reduce respondent burden in order to increase response rates**	**Low response rates not only reduce final sample size but adversely affect any claim to be representative.** It was widely recognised by questionnaire respondents and workshop participants that achievement of higher response rates may be at the expense of detail, accuracy and completeness of data, but the decline in response rates to their present levels must be addressed. A balance needs to be struck between good compliance and comprehensiveness of the data on individuals. Increasing the token of appreciation and reducing respondent burden were seen as the two main ways to achieve improvements in response rates. Some users considered that power issues (larger numbers) were more critical, even if not all participants completed every aspect of the survey. Inclusion of both financial and non-financial personal incentives was suggested, not forgetting opportunities for better setting of the scene at the recruitment stage (e.g. cognisance of age, cultural and language context at initial approach, using trusted community health workers, better trained or dedicated fieldworkers, emphasising the value of the survey. Motivating people to respond initially may be the key, as once signed up they tend to complete. Personal incentives could include individual feedback and interpretation of the participants' survey results, offering dietary advice, and the possibility of a wider health check. Feedback could be done cost-effectively by developing an automated report facility, and nutritional analysis software packages already have this type of facility for nutrient intakes. Monetary incentives or rewards that adequately recognise the time and effort involved provide motivation. Ideally, a choice of incentives should be offered (money or gifts tailored to the recipient group). The key is that the incentive is only effective to the extent that it appeals to the respondent and outweighs any disincentives to participation. Studies suggest that enjoyment is vital to participation in surveys. Given the falling response rates, many respondents felt that basic data are now needed on non-responders to establish the extent of bias so that appropriate adjustments may be incorporated during data analysis. Follow up of non-responders to ascertain reasons and behavioural attributes and in the assessment of bias which may be of benefit for the design of later surveys, although ethical constraints may make this difficult. There is uncertainty over whether the main burden or disincentive for participants is the weighed food diary and interview, or the blood sample. This requires further research to determine whether any one component, the overall burden or just taking part in the survey contributes to the falling response rate. Various suggestions of less burdensome ways to collect intake data were proposed, including 'automation' of weighing eg. direct recording from weighing devices, shorter 3-day diaries, collection of data on non-consecutive days, food frequency questionnaires and repeat 24h recalls (recommended by the EFCOSUM project) (see **Option J**). Interviews/home visits could be reduced in number and length and more flexible times offered. Some data could be collected by telephone. The pros and cons of these might need to be explored further by relevant experts and/or pilot research. The use of novel technology to reduce misreporting and respondent burden is discussed under **Option K**. Other suggestions for reducing respondent burden included disaggregating the main elements of the survey, dropping biological sampling from the main survey, or only collecting biological samples from a sub-group. The adoption of a modular approach is discussed under **Option P**. There were reservations from nutritionists about complete disaggregation of survey elements, since the ability to combine intake and status data is one of the main strengths of the present NDNS, vital for some nutritional research questions and useful in setting Dietary Reference Values. However, where correlations between intake and status variables are poor, intake-status relationships need to be studied in other ways, e.g. controlled interventions. More research may need to be done to identify the reasons for non-participation and non-compliance and to find ways of overcoming these. Given the importance of government survey data and public concerns about consent and privacy, a public consultation exercise may be warranted.
I	**Improve the process for ethical approval to overcome present problems**	Both REVSURVE respondents and workshop participants identified ethical constraints as one of the aspects that have an unnecessary negative impact on recruitment. For example, the introductory letter sent to participants for the adult survey in 2000/01 was not permitted to say that this was an "important" survey. The easiest solution might be to separate the collection of biological samples for nutritional status from the main survey, so that ethical approval for the main survey is less demanding or no longer needed (see **Option P**). Biological samples for nutritional status and any other purposes could be collected via another route. The price to pay would be the loss of ability to link intake data with status data at the level of the individual. Some concerns from Ethics Committees have also focussed on the overall burden on

		participants in the NDNS. The ideal solution might be a new streamlined system of approval at national level for dietary surveillance conducted nation-wide. There is a core policy need for information from dietary surveys that should be recognised and balanced against legitimate considerations of the possible need for local decision-making Failing such reform, there are a number of steps that could be taken to remedy the currently perceived problems of working with and within Research Ethics Committees. Fundamental to any change is the need to make a clear distinction between the approach currently taken on medical research and the approach that is appropriate for dietary surveillance work. The risk-benefit equation for individual participants in these two contexts is clearly very different (e.g. participation in a clinical trial could be characterised as potentially high risk-high benefit for the participant, whereas for participation in a dietary survey could be characterised as low risk-low benefit for the participant (but high benefit for society as a whole)). It is recognised that other reforms elsewhere in the Dietary Surveys Programme, for example to increase potential benefits to participants by giving increased feedback on their own results, could synergise with reform of the ethical approval process to increase response rates.
J	**Use a retrospective method to assess diet instead of weighed dietary record**	The large evidence base concerning alternative methods will need to be reviewed and evaluated if this option is to be pursued. Currently, methods that attempt to assess past or usual intake are increasingly being seen as viable alternatives to the more onerous weighed procedures that are at least partially compromised by problems of low response rate and misreporting. The EFCOSUM project has recently selected the 24 hr recall, to be conducted at least twice, as the method of choice to achieve comparability across European food consumption surveys. This, it is claimed, should provide data on population means and distributions of intake, with modelling also providing some estimates of usual intake among groups [18]. The major problem for risk assessors of such a method (24 hr recall) is that it does not permit the ranking of individuals or the identification of those who may habitually have extreme intakes. For nutritionists, it is too imprecise to correlate with biological indices and therefore has limited value in multivariate analysis of intake and status. However, if used in conjunction with a longer-term retrospective method such as diet history or food frequency questionnaire, it may be possible to satisfy the need for information about extreme consumers and infrequently-consumed foods. Evaluation of the validity, impact on response rates and costs of any such combination of methods would need to be made if this option is to be pursued further.
Issue four (ii): reducing misreporting		
K	**Use new technology To reduce mis-reporting**	A videotape approach (eg using a video recording to check food consumption and activity records etc) has novel appeal and the potential to record food consumption objectively with less misreporting bias. It may have particular value for hard-to-reach groups such as younger respondents, non-English speakers and others currently difficult to recruit. However, the improved compliance that might be achieved would be at considerable cost in terms of equipment and in the additional burden of analysis (post-hoc assessment of tapes etc) that would fall on the investigators. Alternatives that still require some respondent input but facilitate recording may have more potential in reducing misreporting (and also increasing response rate). Technology is changing how dietary assessment methods can be delivered and many people are now (or soon will be) computer literate. Web-based data entry, perhaps in combination with digitally formatted data from special scales, could prove attractive to respondents, who may only need to upload their data weekly. Reduced burden could also increase the chance of being able to extend or repeat the recording process to provide an estimate of consumption patterns over a longer period. Costs of digital /photographic scales could be high but these would be offset by lower fieldwork costs. Data processing costs would not necessarily decrease given the assumptions to be made (e.g. for portion sizes and leftovers). All such novel technological methods would require piloting and validation against the current weighed method and preferably against suitable biomarkers (**Option L).** The effects on consumer behaviour also need to be better understood. Other potential replacements for the weighed dietary record (e.g. 24hr recall and food frequency questionnaire) are discussed in **Option J**: “retrospective diet method”. Methods of post-hoc correction for under-recording are also included in **Option L.**

L	**More research on suitable biomarkers and/or post-hoc modelling** **to correct for misreporting and thus improve validity of intake data**	Misreporting undermines the validity of the data collected and may lead to errors in policy recommendations. A system for correcting for misreporting in Dietary Surveys is urgently required. There was broad agreement among Workshop participants that there should be further research into both modelling and biomarkers, including existing biomarkers that may not have been adequately tested. Well-validated biomarkers have the potential to help quantify the uncertainties in consumption estimates that are caused by misreporting, or measurement error (e.g. estimation of infrequently-consumed foods). They could be used to gain confidence for some aspects of diet intake and extrapolate this to other foods/nutrients. Statistical modelling techniques can be used for modelling errors (see option C) and both biomarkers and studies of food-specific and nutrient-specific misreporting (e.g. alcohol, chocolate) could be used to inform such models. According to a recent Agency-funded study [15], group-derived EI/BMR cut off values may not be appropriate because of the personal and continuous nature of misreporting. However, there may be scope for using actual or predicted energy expenditure in individuals. Measures of energy expenditure, and urinary electrolytes and nitrogen can be compared with intake estimates and used broadly to assess confidence in the dietary data. Biomarkers for micronutrients (e.g. potassium) could potentially be extrapolated to other nutrients/foods (e.g. fruit and vegetables). There is a wealth of survey data that could be used to explore this. However, it is recognised that many biomarkers are only likely to be able to correct for gross degrees of misreporting, not minor misreporting, and tend to operate either at the group or the individual level. Whilst the optimal solution for misreporting would be prevention rather than cure (see suggestions in **Option K**), some misreporting will always occur. It is important that this source of error and uncertainty is recognised by users and producers and that attempts are made to quantify it in estimates used for surveillance and risk assessment. Modelling represents a means to achieve this, but biomarkers could inform such models by assessing bias for some dietary components. While the search for the ideal biomarker will continue, maximal use may not be being made of existing candidate biomarkers whose validity and scope is under-researched.
Issue five: general strategy		
M	**To use a rolling programme to improve timeliness and flexibility**	The NDNS has just completed its first cycle of approximately 12 years with the new adult survey, but was not primarily designed to provide data on trends. The current EFS (Expenditure and Food Survey) which runs as a continuous programme with annual reporting, cannot provide all the information required by nutritionists and risk assessors as it focuses on the collection of household food purchases only. In the US, the NHANES programme is successfully managed as a rolling programme. There was a positive response to the option of a rolling programme, both by REVSURVE questionnaire respondents, a number of whom raised it as an alternative to the present NDNS, and by the participants in the workshop discussions. After an initial 'lag' phase, which would need to be managed carefully, a rolling programme with recruitment of, say, 1000 individuals a year across all ages, might provide a worthwhile database for extensive analysis within about 5 years of commencement eventually including subgroups. It was not within the remit of this review to explore the statistical feasibility of this suggestion and a statistical design would need to be developed that meets sampling requirements. A full expectation management exercise defining targets would also need to be done. Decisions on what to include in the core programme would need to take account of the key needs of nutritionists and risk assessors, which are mainly for timely information on food consumption and nutrient intakes. Inclusion of other data, such as nutrient status, anthropometry and other health parameters could be less frequent or collected in other ways (**see Option G** for this Review's suggestions). Flexibility within the rolling programme together with the use of 'bolt on' surveys could provide added breadth and depth of information, more detailed data on subgroups, including vulnerable groups for risk assessment, assessment of responses to policy initiatives, etc. It would allow more rapid dissemination of core results. It would allow cohorts to be followed and time trends to be better analysed. It has the potential to offer a higher public and political profile for dietary surveys, keeping issues in the public eye. The difficulties in switching to a rolling programme, including staff restructuring and initial planning, use of outside contractors, and managing external expectations about early results, should not be underestimated. While some cost savings are possible, the additional start-up and overall costs of making such a switch would need to be evaluated.

N	**Using market research methods (panel of consumers) to collect dietary intake data**	Market research data (panels) could potentially be employed to answer some policy questions in the realm of nutrition and risk assessment. Market research panel studies have a large sample, are able to control representation of target groups and have high response rate. The purchasing panels set up by market research companies such as TNS partially imitate the EFS but on a much larger sample, studying 10,000 households simultaneously, compared with about 140 (different) households each week in the EFS. Completeness is one concern with this option and any gaps such as data on food wastage and eating out would need to be filled either by supplementary studies or modelling. However, data collected for such purposes may provide even better detail on foods than methods that rely on a written description. Barcode data should allow for more accurate conversion of food consumption to nutrient intakes, provided that nutrient composition databases are adequate to the task. A major limitation of using household purchase panels is that they do not provide information on food consumption at the personal level. However, other panels collect such data (e.g. Family Food Panel Complete) and these could be considered. A large number of respondents (~11,000) and a 2-week recording period give these data high power. The present limitations include the fact that the data are not weighed and no nutritional status data is sought. However, adaptations to the protocol could be investigated, perhaps by follow-up of some panel respondents. Body weight is recorded in many panels and weight change could be useful for panel members remaining in the study for several weeks. Adapted market research methods involving the use of automated techniques have appeal in terms of increased sample, lower cost and better response rates, but protocols would need to be adapted significantly if the data needs of the NDNS were to be answered. This could require significant investment prior to study conduct.
O	**To carry out separate surveys to address the differing requirements/needs of nutritionists and risk assessors**	Whilst the primary focus of the NDNS and other surveys within the DSP has been to provide information on nutrient intakes and status, the perception that risk assessors have to 'make do' with using nutrition focused data does not seem to be real. The food consumption data in the current Dietary Surveys Programme is sufficient to meet most of the needs of risk assessors, as shown by responses during the REVSURVE workshop and the REVSURVE questionnaire. Risk assessors can easily and effectively use the NDNS data and difficulties lie in areas such as coding of recipes etc. rather than in the actual data collected. As analytical capabilities improve, it is likely that risk assessment may also move to towards the use of biomarkers as currently used by nutritionists (refer to **option N**). The main benefit from splitting the surveys would be to achieve improved focus on 'at risk' groups from a risk assessment and nutrition viewpoint. However, currently collected data on foods appear to meet both the needs of nutritionists and risk assessors and there do not appear to be major benefits to be obtained in collecting separate datasets for these groups of users.
P	**Use a modular approach to measure intake and status in different individuals and use a small overlap group for validation**	The current DSP is run, to some extent, as a modular programme in that while the aim is to collect diet and status information from the same individuals this has not always been achieved. Some participant 'drop out' occurs between collection of dietary information and status collection although this has not increased markedly. There are clear advantages to separating the two main parts of the surveys i.e. the diet diary from the blood sample, in terms of reducing respondent burden and targeting 'at risk' groups. However, the main dataset then loses the advantage of being able to link intake and status, except in what would be a smaller, validation 'overlap' sample. Although this would provide both food data and blood, it would not be nationally representative. The major disadvantage to this proposal is that it may not provide sufficient information to address nutritional policy issues which require linked data on a nationally representative sample. Modifications to this proposal to include a combination of a two tier and a modular system should also be investigated. Other options in this Review (**see Options E and G**) suggest different components of tiers that could be considered (e.g. 'core' and 'other'). Different levels of diet information, such as 24 hr recall compared with 7 day weighed intake, (**see Option J**) could also be undertaken by participants in the different tiers.

Q	**Integrate the NDNS with UK health surveys e.g. health survey for England (HSE)**	The HSE is recognised to provide useful supplementary information to the NDNS and in some cases comparative information (e.g. anthropometry and blood pressure). Approximately half of all respondents to our REVSURVE questionnaire had used the HSE and 90% of these had found it useful (in providing non-dietary data). The frequency and sample size of the HSE means that it could provide timely data on trends if the relevant questions were consistent from year to year. The view to emerge from the workshop was that any adaptation of the HSE methods (to enhance the quality of dietary information) was likely to be unacceptable to the DH, given the likelihood of an adverse effect on the current response rate. However, even if the dietary aspects of HSE were unalterable, there might be scope for integrating some elements of fieldwork and delegating to the HSE the blood sampling and anthropometry (ethical approval being already obtained). The NDNS sample could be envisaged as an additional sample of 2000 to the existing 17,000 in the HSE. The NDNS respondents would only be required to complete a basic version of the HSE interview (i.e. excluding food habits and medical details) but would have physical measurements and a blood sample taken by HSE nurses. Their dietary assessment could be conducted concurrently, (or at a later time), by NDNS fieldworkers. Such partial integration could reduce costs of management and of blood sampling and analysis, although the dietary assessment costs would remain the same unless a simpler method was adopted. The NDNS could be combined with the HSE every 3 years (as envisaged by MHA, 1997) or, given the annual nature of the HSE, could form a rolling programme. The advantages and limitations of this option are discussed elsewhere (see option M: Rolling programme). A further advantage of integration is that the sampling frame of the HSE would enable vulnerable groups to be identified (either from interview or status data) and these could be nutritionally surveyed, either concurrently with NDNS (rolling programme option) or in the years between periodic NDNS studies. It should be noted that the HSE is England-only, so additional data would need to be obtained for the devolved administrations. At present DH is reluctant to consider any change to the current HSE methodology that would increase respondent burden. However, the partial integration approach would retain the integrity of the HSE and share some of its costs, while enhancing the ability of the NDNS to sample vulnerable groups and (potentially) improving its response rate. If this option is to be pursued further, the logistics of sampling, interview, blood collection and analysis require further elaboration and discussion, as do management issues of cost and control.
Issue six: dissemination		
R	**Increase promotion of dietary surveys programme to general public to help improve response rates**	Promotion of the DSP has always occurred although the most recent survey on adults has probably received more publicity than other surveys due to the existence of the FSA website and e-mail alerts. There was general agreement from questionnaire respondents and workshop participants that the Agency should consider ways of promoting the Dietary Surveys Programme on an ongoing basis, starting with pre-publicity about new surveys through to publicity related to the widespread publication of results using internet facilities. Promotional opportunities will increase the numbers aware of the programme and this has the potential to increase response rate and numbers completing all parts of the survey. The US NHANES programme has already shown this strategy to be successful. This option is particularly timely in view of the new initiatives already in place with the most recent report. Several suggestions for special marketing to the subgroup that is hardest to recruit are all based on making people proud to participate. The ethical issues should be discussed with representatives of ethical committees. Public engagement in the debate is also highly desirable. Targeting Health Professionals or regional media could form part of the communication strategy.
S	**Improve accessibility and use of raw data by making it available in a user friendly, consistent format**	The dissemination of the 2000/2001 Adult NDNS with website access to reports is welcomed, but more could be done to facilitate the wider use of DSP data and raise the profile of the FSA programme. This could, for example, involve the FSA commissioning/developing suitable software for managing data access, registration and analysis via the FSA website. Data analysis could be provided at various levels, from simple pivot tables to detailed microdata such as individual food consumption occasions. This option has resource implications (set-up costs and expertise, and possibly support and

		maintenance costs). Consideration could be given to providing data at no cost since charging may not be cost-effective and could discourage use. The option of providing better access to raw data and group level data is feasible and essentially represents extending the current data provision so as to add value and increase accessibility. This could be piloted with a subset of data to assess take up and value.

CONCLUSIONS

There is a very high level of support for the Dietary Surveys Programme from a wide range of users, who would have no alternative source for such high quality nationally representative data on food and nutrient intakes, nor data on nutritional and physical status in the same individuals.

Nineteen options, or possible methods, to improve the Dietary Surveys Programme, are suggested to the Agency. Abandonment of the DSP (Option B) should be rejected, as the Agency has no other source of the information needed to support food policy and protect the consumer. Option A (maintaining the status quo) has the support of many users but would fail to seize the opportunity to maximise the effectiveness of this important programme.

The breadth (i.e. population coverage) and depth (i.e. detail) of the surveys were generally considered adequate, although suggestions were made for improvements and possible methods for prioritising needs (Options C, D, E, F, G). There was general agreement that respondent burden was high, leading to poor response rates and this was probed by discussing some of the underlying issues such as incentives (Option H), ethics (Option I) and survey methodology (Option J). Misreporting of food intake was acknowledged to be a widespread problem in the DSP (as in other surveys) and threatens the reliability of the data and estimates derived from it. It is essential that research be conducted into both prevention (i.e. ways of minimising it) (Option K) and cure (i.e. post-hoc treatments such as modelling and the use of biomarkers) (Option L). Whilst it is unlikely that any method be found to eliminate misreporting entirely, this could at least allow some quantification of the errors and hence uncertainty surrounding estimates of nutrition and exposure.

Other strategic options identified include: shifting the timescale of data collection to a rolling programme (Option M), as used in the United States (NHANES), or using other methods to acquire food intake data (consumer panels, novel technologies) (Option N). Reducing the volume of data collected by disaggregating the elements (Option O) and adopting a modular survey methodology, requiring different levels of information from different people (Option P), were also explored. These would have the advantage of reducing respondent burden and hence non-response bias, but would lose what some nutritionists regard as a key strength; namely the linkage of diet and nutritional status data in a high proportion of individuals. Other options explored include partial integration with the Health Survey for England (Option Q), although this might require the (NDNS-type) dietary survey to be conducted as a separate (post-hoc) element. Finally, suggestions were made in Option R and S for greater promotion and dissemination of the DSP and its results. This is likely to be fundamental to the future of the DSP, essential to encourage greater public awareness and respondent participation and to maximise the fruitful exploitation of the data.

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APPENDIX 1

A Consensus Review of the Food Standards Agency Dietary Survey Programme (REVSURVE)