



Paper for information: The Nutritional wellbeing of the UK population – synthesis paper

Agenda Item: 3

This paper was discussed by members at the last SACN meeting on the 11th October 2006. It has since been revised, taking into account comments from Members.

The comments from members are included and can be seen at Annex 2.

- This paper is presented to the committee for agreement.

DRAFT

The nutritional wellbeing of the UK population

This analysis of British dietary surveys indicates some positive change in the diet of the UK adult population over the last fifteen years, for example a fall in fat and saturated fat intakes, a decrease in the consumption of red meat, processed meat and meat-based dishes and an increase in fruit and vegetable consumption. However, further improvements in the diet of the UK population, in respect to patterns of food consumption and several nutrients, are required to reduce the increasing risk of nutrition-related ill-health and disease (such as obesity, diabetes, coronary heart disease, stroke, cancer and alcohol related diseases) particularly for certain population subgroups at a greater risk of poor diets.

- 1) This report summarises the analysis of the results of the British National Diet and Nutrition Surveys (NDNS). The aim of these nationwide surveys, undertaken at regular intervals across a representative sample of the UK population, is to review the nutritional status of the UK population; identify specific health outcomes where the population failed to meet dietary recommendations and to identify any specific groups at risk. This report also provides practical proposals for improvement where sections of the population have been shown to consume a poor diet. Special attention is paid to health outcomes not currently the focus of governmental policy.
- 2) **This analysis is presented in two sections:**

Section 1: *The nutritional health of the UK population:*

This section brings together the findings on food, macro and micronutrient dietary intakes and biochemical status from 6 surveys of different population age groups ranging from children aged 1 ½ years to adults aged 65 years and over¹.

Section 2: *The micronutrient intake of UK adults:*

This section highlights main findings from a detailed analysis of the most recent micronutrient intake data of the adult population. It describes the lifestyle, demographic and dietary characteristics associated with low intakes and borderline intakes i.e. intakes meeting minimum recommendations.

¹ The NDNS programme does not cover children under 18 months of age, pregnant and lactating women or individuals living in institutions (except for adults aged 65+ years). The surveys are designed to be representative of the British population, so ethnic minorities and low-income groups are included, but not in large enough numbers for separate analysis.

Current dietary recommendations

- 3) The Committee on Medical Aspects of Food and Nutrition Policy (COMA) was set up in 1964 and was succeeded by the Scientific Advisory Committee on Nutrition (SACN), in 2001 to provide government with independent scientific advice on nutrition. The dietary targets and guidelines set by COMA and SACN are summarised in table 1 (the recommendation for alcohol was provided by the Royal College of Physicians). These targets and guidelines were set with the intention of promoting health and preventing nutrition related chronic disease. Examples of UK wide government initiatives to support these targets and guidelines are summarised in annex 1.

Dietary reference values:

- 4) COMA set reference intake figures for food components: for energy, estimated average requirements (EAR) values are set at levels of intake likely to meet the needs of 50% of the population. For fat and carbohydrate (including sugar and fibre), dietary reference values (DRV) are set as proposals for mean population intakes. For protein, vitamins and minerals, reference nutrient intake (RNI) values (Department of Health (DH), 1991) are set at levels of intake considered likely to be sufficient to meet the requirements of 97.5% of the population. Lower reference nutrient intake (LRNI) values are set at levels of intake considered likely to be sufficient to meet the needs of only 2.5% of the population.
- 5) Section 2 of this report, refers to “low intakes” which are defined as intakes below the LRNI for a given vitamin or mineral (DH, 1991) and “borderline intakes”, defined as intakes of a given vitamin or mineral at or above the LRNI, but less than the EAR (RNI for iodine and potassium).

Biochemical status:

- 6) The functional status of an individual for a given nutrient is largely determined by the dietary intake, but this can be modulated by factors such as genotype, smoking, and interaction with other nutrients and food components. Biochemical status describes the concentration of nutrients within the body available for use in biochemical processes and it is particularly useful in comparing changes in absorption, utilisation and excretion of nutrients over time. Also, because of the uncertainties in ascertaining the nutrient intake of individuals it is useful to have corroboration in the form of direct measures of blood nutrient status.
- 7) In both sections of this report “low biochemical status” corresponds to the concentration of specific status indices falling below a set threshold, for a given vitamin or mineral².

² The thresholds of status quoted in this report were those current at the time of each survey, full details and justification can be found in the survey reports. The biochemical status marker for vitamin D, plasma 25-OHD reflects the vitamin D absorption from the diet and from endogenous production in the body from exposure to sunlight.

Table 1: Summary of dietary recommendations and intakes reported in 2000/1 NDNS.

Recommendation		Population group	Reason for Recommendation	Intake ³ / meets recommendations?	
Fruit & vegetables	At least 5 x 80g portions/day (400g) (portion sizes are smaller for children under 5) (DH, 2002).	Adults	Reduce risk of some cancers, cardiovascular disease and many other chronic conditions (DH, 2002).	Mean 2.8 portions/day.	No
Oily fish ⁴	At least 1 portion/wk (140g) (SACN, 2004).	Adults	Reduce the risk of cardiovascular disease (SACN, 2004).	Mean is below recommendations in all age groups of population, (0.3 portion/wk for adults),	No
Red and processed meat	Individual consumption should not rise and high consumers should consider a reduction with the aim of reducing population average (90g/day in 1998) (DH, 1998).	All red meat consumers	To minimise cancer risk (DH, 1998).	Mean intake of red and processed meat and meat based dishes has decreased since 1986/7 (138g/day, 79g/day 2000/01. and 155g/d, 96g/day in 1986/7 for men and women respectively) ⁵ .	-
Non-milk extrinsic sugars (NMES)	No more than 11% food energy ⁶ or about 60g/day (DH, 1991).	All	To reduce incidence of dental caries in the UK (DH, 1991).	Up to 19% food energy across all population groups.	No
Fat	Population average 35% food energy (maximum) (DH, 1991).	All	To reduce cardiovascular disease, and reduce energy density of diets (DH, 1991).	Mean intake 35% food energy	Yes
Saturated fat	Population average 11% food energy (maximum) (DH, 1991).	All	To reduce cardiovascular disease, and reduce energy density of diets (DH, 1991).	Mean intake 13% food energy	No
Non-starch poly-saccharides	An average intake of 18g/day (DH, 1991).	Adults	To improve gastrointestinal health (DH, 1991).	Mean intake 15.2g/day for men, 12.6g/day women	No
Alcohol	No more than 3-4 units/day ⁷ . (DH, 2006).	Men aged 18+ years	To minimise the risk of liver disease, cardiovascular disease, cancers, injury from accidents and violence (Royal College of Physicians, 2006).	60% of population exceed daily recommendation	No
	No more than 2-3 units/day. (DH, 2006).	Women aged 18+ years		44% of population exceed daily recommendation	No
Salt (sodium chloride)	Population average should be reduced to a maximum of 6g/day (2.4g sodium/day). (Proportionally lower for children according to age) (SACN, 2003).	Adults	To reduce risk of hypertension and cardiovascular disease (SACN, 2003).	Mean salt intake 9.5g/day	No
Vitamins & minerals	Dietary Reference Values. (DH, 1991).	All	To promote optimum health and prevent deficiency (DH, 1991).	Low intakes for different vitamins and minerals are seen within different age groups, see main findings for details.	Not all
Supplements	Vitamin D if consuming no meat or oily fish (DH, 1998).	Older Adults, household or living in institutions	To reduce the risk of bone ill health (DH, 1998).	Vitamin D supplement use (including prescribed) in institutional older people was lower (mean 3%) than in the free-living group (mean 16%). Older people had low intakes and status of vitamin D.	No
	Vitamins A and D unless obtain adequate A and D from diet and sunlight (DH, 1994).	Children aged 1-5 years.	To ensure adequate intake (DH, 1994).	Children aged 1½-4½ years: 1/5 reported non- prescribed supplement use, mean vitamin D intakes are 18% of the RNI.	No
Energy intake	EAR for men 2500kcal/day, for women 2000kcal/day	Adults	Reduce the risk of chronic diseases such as cardiovascular disease, some cancers, and type 2 diabetes (DH, 1991).	80-90% of EAR.	Yes ⁸
Body weight	Body mass index (BMI) between 18.5 and 25 (DH, 1991).	Adults		66% of men, 53% of women had a BMI above 25.	No

³ For adults unless stated otherwise. The NDNS programme does not cover children under 18 months of age, pregnant and lactating women or individuals living in institutions (except for people aged 65+ years). The surveys are designed to be representative of the British population, so ethnic minorities and low-income groups are included, but not in large enough numbers for separate analysis.

⁴ SACN encourage consumption of at least 2 portions (140g per portion) of fish per week (at least one of which should be oily). Men, boys and women past childbearing age can consume up to 4 portions and girls and women of child bearing age are advised to consume up to 2 portions of oily fish per week (SACN, 2004).

⁵ Consumption figures include non-meat components of meat-based dishes, so figures for consumption of red and processed meat and meat-based dishes are not directly comparable with recommendations for red and processed meat. Detailed recipe analysis of composite processed products would be required to calculate red and processed meat content alone.

⁶ Energy consumed as food and drink, excluding alcohol (DH, 1991)

⁷ One unit (8g alcohol) is approximately equivalent to half a pint of beer, lager or cider, a single measure (25ml) of spirits, a small glass (125ml) of wine or a small glass of sherry, port or other fortified wine.

Methodology

- 8) *The nutritional health of the UK population* (section 1) presents a detailed summary of findings from the four surveys in the NDNS programme carried out between 1992 and 2001. Results from the most recent NDNS of adults aged 19-64 years (NDNS 2000/01) are also compared with the 1986/87 Dietary and Nutritional Survey of British Adults aged 16-64 years (Gregory *et al*, 1990). This paper highlights specific diet and nutritional issues according to age, gender, regional and socio-economic differences. The findings from the NDNS surveys 2000/01 and 1986/67 identify changes in the diet and nutritional health of the population over the last fifteen years.
- 9) *The micronutrient intake of UK adults* (section 2) reports further analysis of data from the recent NDNS of adults (2000/01). Three analyses were carried out:
- (a)** Differences in dietary and non-dietary characteristics of those with low intakes/biochemical status compared to those with intakes/biochemical status at or above recommended thresholds. Nutrients for which there were sufficient numbers of people with low intakes/biochemical status to give meaningful results (≥ 100), were vitamins A, D and B₆, riboflavin (referred to as vitamin B₂ in main paper), potassium and magnesium.
 - (b)** This analysis considered all nutrients for which a relatively high proportion⁹ of adults had intakes below the LRNI (vitamin A, riboflavin, iron, calcium, magnesium, potassium, zinc, iodine) or low biochemical status (vitamins B₁, B₆ and B₁₂, riboflavin, vitamins C and D, folate and iron). Data were analysed by 5 equally sized groups (i.e. divided by quintiles) of the population grouped by intake/biochemical status for each nutrient. Differences in dietary and non-dietary characteristics between those with the lowest intakes/biochemical status (i.e. below quintile 1) and those with the highest (i.e. above quintile 4) were identified.
 - (c)** Principal component analysis was used to characterise different patterns of food consumption and identify groups of individuals with similar dietary characteristics. The non-dietary characteristics of these groups were also investigated.

⁸ Mean energy intakes fall below the EARs in all population groups although the number of obese individuals is increasing. This apparent paradox reflects under-reporting of intake and possibly overestimation of energy requirement for physical activity.

⁹ It is not possible to give a single precise figure above which the % was considered a "high proportion", due to the variability of nutrient intake/status across the age groups and sexes. Further detail of the proportion of adults with intakes below LRNI and biochemical status below indices markers can be found in section 1 of this report.

Main findings**Children aged 1½-18 years****10) *Intakes failing to meet recommendations:****Fruit & vegetables*

- Children aged 4-18 years consumed less than the recommendation for people aged over 5 years ($\geq 400\text{g/day}$) with mean consumption between 70-190g/day¹⁰. Twenty percent of children aged 4-18 years did not consume any fruit (excluding fruit juice) during the survey week.

Oily fish

- All age groups consumed well below the recommendation (≥ 1 portion/wk) with mean consumption below 0.1 portion/wk.

Non-milk extrinsic sugar (NMES)

- On average all age groups exceeded the recommendation ($\leq 11\%$ food energy), with mean intakes up to 19% of food energy; the main source of which was soft drinks.

Non-starch polysaccharides (NSP)

- All age groups had mean intakes below the recommendation for adults (18g/day); a DRV has not been set for children. Mean intakes ranged from 6g/day for children aged under 5 years to 12g/day for children aged 15-18 years.

Alcohol

- Boys and girls aged 15-18 years reported drinking a mean alcohol consumption of 9 and 7 units of alcohol/week respectively.

Vitamins & minerals¹¹

- *Vitamin A* -A tenth of children aged 1½-18 years had intakes below the LRNI.
- *Vitamin D* -Children aged under 5 years had a mean intake from food at only 18% of the RNI.
 - 12% of children aged 11-18 years had low biochemical vitamin D status.
- *Iron* -16% of children under 5 years and 47% of girls aged 11-18 years had iron intakes below the LRNI.
 - 20% and 21% respectively had low iron stores as indicated by serum ferritin concentrations below threshold levels;
 - 8% and 6% respectively were anaemic as indicated by haemoglobin concentrations below threshold levels;

¹⁰ Not calculated using 5-a-day definition and includes fruit juice. There are currently no recommendations for weight of fruit and vegetable consumption for children under 5 years, due to smaller portion sizes.

¹¹ Thresholds of low biochemical vitamin D status :

Plasma 25-hydroxy vitamin D: <25nmol/l

Thresholds of low biochemical iron status :

Serum ferritin: 1½-4½yrs (male & female) <10µg/l, 7yrs+ male <20µg/l, 7yrs+ female <15µg/l.

Haemoglobin: 1½-6yrs (male & female) <11g/dl, 7yrs+ male <13 g/dl, 7yrs+ female <12 g/dl.

-A quarter of girls aged 11-18 years showed biochemical evidence of low iron status (transferrin saturation below 15%) (these data were not available for children under 4 years).

- *Other Minerals* -Large proportions of females aged 11-18 years had mineral intakes falling below the LRNI for magnesium (52%), potassium (28%), calcium (22%), zinc (24%) and iodine (12%).
-Smaller proportions of males in this age group had intakes below the LRNI for magnesium (24%), potassium (12%), calcium (11%), zinc (12%) and iodine (2%).

Supplements

- A fifth of children aged 1½-4½ years were reported to be taking non-prescribed supplements, mainly vitamins A, C and D and multivitamins.¹²

Young adults aged 19-24 years

11) *Intakes failing to meet recommendations:*

Fruit & vegetables

- Almost all (98%) of young adults aged 19-24 years consumed less than the recommendation (≥ 5 portions/day). Mean consumption was 1.6 portions/day.

Non-milk extrinsic sugar (NMES)

- Young adults aged 19-24 years exceeded the maximum recommendation ($\leq 11\%$ food energy) with mean intakes at 16% food energy from NMES.
- This age group, reported drinking substantially more soft drinks (8-9 cans carbonated drink/wk) than in 1986/87 (3-4 cans carbonated drink/wk).

Salt

- Men and women aged 19-24 years were least likely of all the adult age groups to have intakes at or below the recommended population average (≤ 6 g/day), with 98% and 83% respectively consuming more than 6g/day (estimated by urinary excretion).

Non-starch polysaccharides (NSP)

- Young adults aged 19-24 years had a mean intake (11g/day) below the recommended population average (18g/day).

*Vitamins & minerals*¹³

- A large proportion of males and females aged between 11 and 25 years had intakes of vitamins and minerals below the LRNI, including vitamin A (15%), riboflavin (14%), iron (25%), potassium (21%) and magnesium (35%) compared to other groups.

¹² COMA recommended supplements of vitamins A and D should be given to children between the ages of one to five years, unless adequate vitamin status can be assured from a diverse diet containing vitamins A and D rich foods and from moderate exposure to sunlight (DH, 1994).

¹³ Thresholds of low biochemical vitamin D status:

Plasma 25-hydroxy vitamin D: <25 nmol/l

Thresholds of low biochemical iron status :

Serum ferritin: 7yrs+ male <20 µg/l, 7yrs+ female <15 µg/l.

Haemoglobin: 7yrs+ male <13 g/dl, 7yrs+ female <12 g/dl.

- *Vitamin D* -28% of women and 24% of men aged 19-24 years had low biochemical status for vitamin D.
- *Iron* -42% of young women aged 19-24 years had iron intakes below the LRNI.
 - 16% had low iron stores as indicated by serum ferritin concentrations below threshold levels;
 - 7% were anaemic as indicated by haemoglobin concentrations below threshold levels;
 - 27% showed biochemical evidence of low iron status (transferrin saturation below 15%).

Adults aged 19-64 years

12) *Intakes failing to meet recommendations:*

Fruit & vegetables

- Eighty-six percent of adults consumed less than the recommendation (≥ 5 portions/day). Mean consumption had increased by 0.4 portions/day to 2.8 portions/day compared to the previous survey.

Oily fish

- Adults consumed well below the recommendation (≥ 1 portion/wk) with a mean consumption of 0.3 portion/wk. Adults aged 50-64 years reported a higher consumption (mean 0.6 portion/week) in comparison to the previous survey in 1986/87 (mean 0.4 portion/wk).

Non-milk extrinsic sugar (NMES)

- Men and women exceeded the recommendation ($\leq 11\%$ food energy) with mean intakes at 14% and 12% food energy respectively.

Salt

- Adults' mean salt intakes increased to 9.5g/day from 9g/day in 1986/87, well above the recommended population average of (≤ 6 g/day). Sodium intakes were estimated by urinary excretion in both surveys.

Non-starch polysaccharides (NSP)

- Men and women had mean intakes (15g/day and 13g/day respectively) below the recommended population average (18g/day).

Alcohol

- 60% of men and 44% of women exceeded the recommended daily maximum for sensible drinking on at least one of the seven reporting days. Alcohol provided 6.5% and 3.9% of total energy on average for males and females aged 19-64 years respectively.

*Vitamins & minerals*¹⁴

- *Iron* -41% and 27% of women aged 25-34 years and 35-49 years had iron intakes below the LRNI respectively.
 - 8% and 12% respectively had low iron stores as indicated by serum ferritin levels concentrations below threshold levels;
 - 8% and 10% respectively were anaemic as indicated by haemoglobin concentrations below threshold levels;
 - 17% and 18% respectively showed biochemical evidence of low iron status (transferrin saturation below 15%).

13) Intakes meeting recommendations*Fat*

- Adults consumed a lower proportion of food energy derived from total and saturated fat (35% and 13% respectively) compared to 1986/7 (40% and 17% respectively), accompanied by a reduction in total and LDL blood cholesterol levels.

Red meat

- Adults ate less red, processed meat and meat-based dishes (138g/day for men and 79g/day women) compared to 1986/87 (155g/day for men and 96g/day women).
- Although figures are not comparable with recommendations for consumption of red and processed meat alone (COMA 1998)¹⁵, this favourable decrease in consumption of red, processed meat and meat-based dishes since the previous survey suggests an indication of positive change.

14) Women aged 50-64

- This section of the population, compared to other population groups, was the closest to meeting current dietary recommendations. They ate the most fruits and vegetables (mean 3.8 portions/day) and oily fish (0.6 portion/week the same as men aged 50-64 yrs) compared to other population groups; had the lowest mean intake of salt (7.5g/day) among adults aged 19-64 and the highest mean intake of NSP (14g/day) amongst females.
- Meeting recommended intakes, this group also had the lowest mean intakes of NMES (11% food energy) and total fat (34.5% food energy) compared to other population groups and the lowest mean intake of alcohol (2.7units/day) among adults aged 19-64.

¹⁴ Thresholds of low biochemical iron status :
 Serum ferritin: 7yrs+ male <20µg/l, 7yrs+ female <15µg/l.
 Haemoglobin: 7yrs+ male <13 g/dl, 7yrs+ female <12 g/dl.

¹⁵ Consumption figures include non-meat components of meat-based dishes, so figures for consumption of red and processed meat and meat-based dishes are not directly comparable with recommendations for red and processed meat. Detailed recipe analysis of composite processed products would be required to calculate meat content alone.

15) Analysis of non-dietary characteristics:

- Adults with relatively low intakes of vitamin A, potassium and magnesium and adults with low biochemical riboflavin or vitamin D status were more likely to be smokers, to be living in households in receipt of benefits and to be younger in age.
- Adults with low biochemical status for vitamin D were less physically active compared with those with biochemical vitamin D status above threshold levels.

16) Analysis of dietary characteristics:

- Adults with relatively low nutrient intakes consumed less of almost all food groups except savoury snacks and soft drinks other than fruit juice.
- Low biochemical riboflavin status was associated with drinking significantly less milk and eating significantly more savoury snacks and drinking significantly more soft drinks.
- Low riboflavin and low biochemical vitamin D status were independently associated with eating fewer fish and fish dishes, and eating less total fruit and vegetables or fruit alone.

17) Analysis of dietary and non-dietary characteristics by quintile¹⁶:

- Dietary patterns were identified similar to those observed above for analysis by DRV/status cut offs.
- However, the association between low nutrient intake/status and higher consumption of soft drinks (excluding fruit juice) was not seen.
- Adults who ate more sugar, preserves and confectionery had low nutrient intake/biochemical status.
- Adults with the lowest biochemical status for riboflavin, B₁₂, vitamin C and folate ate the least breakfast cereals.

18) Analysis of consumption patterns:

- Dietary and non-dietary patterns were observed in three distinct groups, identified in a statistical model which explained around a quarter of the variability in food consumption.
- People in the group with the lowest mean intakes or biochemical status of all nutrients, except for iron, were more likely to be smokers, to live in households receiving benefits and to have had the highest consumption of soft drinks, savoury snacks and alcoholic beverages.
- People in the group with the highest mean intakes or biochemical status of most nutrients were least likely to be smokers and ate the most fish and fish dishes, fruits and vegetables and nuts and seeds.
- Adults taking non-prescribed supplements tended to be those with higher co-consumption of these micronutrients in food.

¹⁶ The analysis by quintile identified some associations not seen in the analysis using DRV/status cut offs, due to varying sizes of the groups being compared, resulting from the different methodology used. The quintile analysis compared intakes/status of the highest quintile with the lowest quintile (each quintile is a fifth of the population sample), whereas the analysis using DRV/status cut offs compared those with intakes/status above the DRV/status threshold to those below the DRV/status threshold (the proportion of the population above and below certain thresholds was different for each variable, see main paper for details).

Adults aged 65 years and over

19) *Intakes failing to meet recommendations:*

Fruit & vegetables

- Adults aged over 65 years consumed below the recommended 5 portions/day. both in the free-living group (mean intake 3 portions/day) and especially the institutional group (mean intake 2.1 portions/day)

Oily fish

- Both the free-living and institutional groups consumed well below the recommendation (at least 1 portion/wk) with mean intakes <0.1 portion/wk.

Non-starch polysaccharides (NSP)

- Both the free-living and institutional groups had mean intakes (12g/day & 10g/day respectively) below the recommendation (18g/day)

*Vitamins & minerals*¹⁷

- *Vitamin D* -Both the free-living and institutional group had mean intakes at only 34% of the RNI.
 - 8% of the free-living group and 38% of the institutional group had low biochemical vitamin D status.
 - Plasma concentrations of 25-OH vitamin D were lower for men and women in the free-living group aged 65 years and over living in Scotland and the North compared to those living other more southern regions. This was not accompanied by a significantly lower intake of vitamin D in Scotland and the North of England and so could be attributed to the reduced exposure to sunlight at higher latitude.
- *Iron* -3% of the free-living group and 6% of the institutional group had iron intakes below the LRNI.
 - 8% and 11% respectively had low iron stores as indicated by serum ferritin levels;
 - 10% and 46% respectively were anaemic as indicated by haemoglobin concentrations below threshold levels;
 - 11% and 28% respectively showed biochemical evidence of low iron status (transferrin saturation below 15%).

Supplements

- The proportion of older people reported, by interview, to be taking non-prescribed supplements was lower in the institutional group (8%) than those living independently in the community (31%). The proportion of older people reported, by 4 day dietary record, to be taking vitamin D supplements (including prescribed supplements) was also lower in the institutional group (3%) than those living independently in the community (16%) (Bates *et al*, 1998)¹⁸.

¹⁷ Thresholds of low biochemical vitamin D status:

Plasma 25-hydroxy vitamin D: <25nmol/l

Thresholds of low biochemical iron status:

Serum ferritin: 7yrs+ male <20µg/l, 7yrs+ female <15µg/l.

Haemoglobin: 7yrs+ male <13 g/dl, 7yrs+ female <12 g/dl.

¹⁸ Coma recommended vitamin D supplements for older adults who are housebound or living in institutions who eat no meat or oily fish (DH, 1998).

Socio-economic status

20) There were marked differences in diet and nutritional status associated with socio-economic status. Fruit and vegetable consumption was lower in those living in benefit households and those from manual social class groups than those in other socio-economic groups. Both adults and children living in households in receipt of benefits were more likely to have intakes of vitamins and minerals below the LRNI compared to those living in households not receiving benefits. Low biochemical nutrient status was also seen in this group. Results of the low-income diet and nutrition survey, to be published in 2007, will help to understand and address the barriers to improving the quality and variety of diets of low-income groups.

Vitamin & mineral intake and biochemical status overview

21)

- Dietary intakes below the LRNI and low biochemical status were reported for several vitamins and minerals, especially in older children, young adults and older people particularly those living in institutions.
- Low biochemical vitamin D status was observed in most age groups, but it was most noticeable in older children, young adults (including women of childbearing age) and older people living in institutions. The proportion of individuals with low biochemical vitamin D status in these groups increased in the winter months, the only exception being institutional elderly.
- Biochemical vitamin D status was lower for free-living men and women aged 65 years and over living in Scotland and the North than in other regions of England and Wales at lower latitude, however there were no significant regional differences found for children or adults under 65 years.
- Intakes below the LRNI and RNI were more frequently reported for minerals than vitamins.
- Mean intakes of magnesium and potassium were below the RNI in all age groups except for children under 10 years.
- Iron intake below the LRNI was a particular problem in young children, adolescent girls, women aged 19-34 years and women over 65 years. Low biochemical iron status was also seen in all of these groups as well as older men.

Recommendations and Summary

22) Although there have been positive changes in the diets of the UK adults over the last fifteen years (for example a fall in fat and saturated fat intakes, a reduction in the consumption of red meat, processed meat and meat-based dishes and an increase in fruit and vegetable consumption), there is still room for improvement. Specific population groups identified as most at risk of poor dietary variety and low nutrient intake and biochemical status were:

- Children aged 18 years and under
- Young adults aged 19-24 years
- Smokers
- People in lower socio-economic groups
- Adults aged 65 years and over living in institutions

23) Several government initiatives seek to contribute to the reduction of obesity and improved diet and health of the nation (annex 1). It is important to note that data collection for the previous NDNS survey (2000/1) would not have captured dietary changes, which may have taken place following the relatively recent introduction of these initiatives (For example government reformulation work to reduce salt intakes did not begin until 2003).

24) The analyses detailed in this report confirm that improving the quality of the diets of children and young adults is an important area for investment. The rising prevalence of obesity coupled with low nutrient intakes and biochemical status in children and young adults suggests diets are too high in energy and sugar, but low in fruit and vegetable content, leading to poor vitamin and mineral status. Current policies addressing these issues include the promotion of fruit and vegetable consumption, the nutritional improvement of schools meals. The FSA is working to reduce the salt, fat, saturated fat and energy content (including sugar) of many manufactured foods.

Areas already the focus of governmental policy:

25) *Low fruit & vegetable consumption*

- Despite an encouraging increase in fruit and vegetable consumption it still remains below the recommendations in all age groups and is associated with low biochemical micronutrient status.

26) *High total/saturated fat intakes*

- The proportion of dietary energy derived from fat and saturated fat has decreased since the 1986/87 NDNS survey.
- Mean intakes of total fat are close to recommendations in all population groups, though intakes of saturated fat exceed recommendations in all groups.

27) *High salt intakes.*

- Mean adult salt intake has increased since 1986/87.

28) *Obesity*

- It would appear that mean energy intakes fell below the EARs in all population groups although the number of obese individuals is increasing. This apparent paradox reflects under-reporting of intake and possibly

overestimation of energy requirements for physical activity. Under-reporting would also affect intakes for other nutrients. Further research to characterise the diets of the obese and overweight groups would assist work to reduce of the prevalence of obesity.

Key areas not currently addressed by specific governmental policies are as follows:

29) *Specific “at risk” groups*

- Young adults, older adults living in institutions and people in lower socio-economic groups were identified as having a high prevalence of low nutrient intake and low biochemical status.

RECOMMENDATION

Improved monitoring of specific groups, particularly young adults, at risk of low nutritional status is required. Currently no national data are available to describe the nutritional status of pregnant women, black and ethnic minority groups or children aged under 18 months. These population groups along with older adults living in institutions and people (especially adults with children) in lower socio-economic groups could benefit from focused health initiatives.

30) *Poor dietary patterns*

- The group with the lowest mean intakes and biochemical status of all nutrients (except iron) consumed more soft drinks, savoury snacks and alcoholic beverages.
- A higher consumption of sugar, preserves and confectionery was associated with low nutrient intake and biochemical status.

RECOMMENDATION

Improvements to the quality and variety of the diet would help to address the imbalance in macronutrients and improve dietary fibre intake, as well as improving overall nutrient status. Sugar and saturated fat intake should be reduced, whilst increasing the intake of fats from oily fish, nuts and seeds etc. This is particularly important in institutions, where catering often tends to focus on the energy density of the diet rather than the quality.

31) *High sugar rich food consumption.*

- The proportion of energy intake derived from NMES exceeds the recommendation in most age groups, particularly amongst children and young adults, as well as older adults.
- Groups with the lowest mean intakes and biochemical status of almost all nutrients had the highest consumption of soft drinks.

RECOMMENDATION

Encouraging children to drink low fat milk¹⁹ rather than soft drinks, would help to reduce sugar intakes and improve riboflavin and calcium intake.

¹⁹ Semi-skimmed cow's milk is not suitable as a drink before the age of two years, but thereafter it may be introduced gradually if the child's energy and nutrient intake is otherwise adequate and growth remains satisfactory. Fully skimmed cow's milk should not be introduced before the age of five years (Department of Health 1994)

32) *Low intake of non-starch polysaccharides*

- Intake of non-starch polysaccharides was low. No groups met the recommendation for adults.

RECOMMENDATION

Further promotion of diets rich in non-starch polysaccharides is needed to reduce the risk of bowel diseases.

33) *Low fish (especially oily fish) consumption.*

- Mean consumption of oily fish was below the recommendation in all age groups even though it has increased in certain groups over the past 15 years.
- The group with the highest consumption of fish and fish dishes had the highest mean intakes/biochemical status of most nutrients.

RECOMMENDATION

Encouraging people to eat more fish, particularly oily fish, would help to reduce the risk of cardiovascular disease.

34) *Excessive alcohol consumption*

- A high proportion of men and women exceeded the recommended daily maximum intakes for alcohol consumption on at least one of the seven reporting days.
- The group with the lowest mean intakes/biochemical status of almost all nutrients out of the three groups had the highest consumption of alcoholic beverages.
- Alcohol provided 6.5% and 3.9% of total energy on average for males and females aged 19-64 years respectively.

RECOMMENDATION

Further action to discourage excessive alcohol consumption could help to improve the overall quality of the diet and would reduce the risk of liver disease and other alcohol-related illness. As alcohol contributes to total energy intake, a reduction in alcohol consumption would also help to reduce total calorie intake.

35) *Biochemical Vitamin D status*

- Low biochemical vitamin D status was found in most population age groups, notably older children, young adults and older people living in institutions.

RECOMMENDATION

COMA recommended vitamin D supplements for older adults who are either housebound or living in institutions and eating no meat or oily fish (DH 1998), so in theory this is already being addressed; however this report identifies that supplement use was only reported by 7% of institutionalised older people. Further promotion of vitamin D rich foods (such as oily fish and eggs) and outdoor activity, as well as supplements for specific high risk groups, i.e. those with poor sunlight exposure (which includes dark skinned ethnic minorities, people who cover their skin, young children and pregnant breastfeeding women) especially during winter months, would increase vitamin D status and reduce the risk of poor bone health.

Summary

36) Dietary recommendations are made on a basis of sound scientifically proven associations between food or nutrient intake, status and various health outcomes. Results from the NDNS suggest that many UK health campaigns are effective as the quality of the diets in certain groups of the population is improving. However there are certain aspects of the UK diet which require specific attention in the context of current policy of disease prevention through dietary prevention (annex 1). In general terms, the promotion of a balanced nutrient dense diet²⁰ and improvement in the quality and variety of the diet would contribute to better health and reduce the risk of nutrition-related ill-health and disease (such as obesity, diabetes, coronary heart disease, stroke, cancer and alcohol dependence). These initiatives should be set in the context of a healthy lifestyle, and reinforce existing measures to stop smoking, to maintain a healthy body weight and to take part in regular physical activity. Strategies to achieve behavioural change should be targeted particularly at young adults, older adults living in institutions and people in lower socio-economic groups.

²⁰ A balanced diet includes consuming plenty of fruit and vegetables, foods rich in starch and fibre such as bread, cereals and potatoes; consuming moderate amounts of meat, fish, eggs, nuts, beans, pulses, milk and dairy products (choosing reduced fat versions where possible); consuming food and drink high in saturated fat and sugar occasionally and if alcohol is consumed it is consumed sensibly (Balance of Good Health FSA, 2001).

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ANNEX 1**Government policies and initiatives on nutrition****UK**

Saving Lives: Our Healthier Nation the Department of Health White Paper (1999) set out an initial action plan to tackle poor health by improvement in the life of each member of the UK population by reduction of dietary-related diseases (such as cancer, coronary heart disease and stroke). The Food Standards Agency's (FSA) *Strategic Plan 2005-10* sets detailed objectives related to diet and nutrition in the UK to make it easier for consumers to choose a healthier diet.

England

Choosing Health (DH, 2004) set out government priorities and strategies to improve the diet and health of the English population.

Scotland

The Scottish Diet Action Plan (Scottish Office Department of Health, 1996) provides a framework of action to improve diet and make progress towards achieving dietary targets. The plan has been the central focus for diet and nutrition policy in Scotland since 1996. FSA Scotland's strategic targets were aligned with the objectives of *The Scottish Diet Action Plan* and *Eating for Health-Meeting the Challenge* (Scottish Executive, 2004)²¹.

Wales

Food and Wellbeing (FSA Wales, 2003) is the nutrition strategy for Wales and was developed by FSA Wales, the Welsh Assembly Government and other key stakeholders. This focuses on measures to reduce food poverty and on the promotion of food equality with emphasis on the low income group, ethnic minority groups, infants, children, young adults and adults aged 65 years and over.

Northern Ireland

Nutrition is a priority area in the Northern Ireland Executive Public Health Programme *Investing for Health* (2002). The Childhood Obesity Task Force Report, *Fit Futures* was published in March (2006) and provides policy context for much of FSA Northern Ireland's current commitments.

²¹ Which highlights actions for improving health of the Scottish public and was part of the Scottish Executive Health Department's *Improving Health in Scotland: The Challenge* (Scottish Executive, 2003).

Main government initiatives

Fruit and Vegetables.

The 5 A DAY logo on food packaging is used to encourage the population of England to increase fruit and vegetable consumption. (DH, 2002) and is supported by *The School Fruit and Vegetable Scheme*. All four to six year old children in Local Education Authority (LEA)-maintained infant, primary and special schools in England are entitled to a free piece of fruit or vegetable on each school-day (DH, 2004). Similar schemes have been established in Scotland, Wales and Northern Ireland.

Salt.

The FSA promotional *Salt Campaign* (FSA, 2004) is supported by work to establish targets for industry to reduce salt in processed foods, using a model of sources of salt in the diet based on National Diet and Nutrition Survey (NDNS) data (FSA, 2003).

Vitamins and Minerals.

FSA *Strategic Plan 2005-10* set out aims to seek expert advice on the health implications of low vitamin and mineral (nutrient) intakes in some population groups, the results of which are detailed in the two papers summarised in this report.

Labelling.

FSA is committed to help consumers make healthier choices by improving information and understanding and by encouraging them to take action themselves (FSA *Strategic Plan, 2005-10*). As part of this commitment the Agency has recommended a voluntary “front of pack” traffic light signposting scheme to increase consumer awareness of the nutritional quality of manufactured foods (FSA, 2006).

Food Promotion.

The Office of Communications (Ofcom) proposes to restrict television food advertising aimed at children. (Ofcom, 2006).

Recognition of Local Community Initiatives

Food Standards Agency Wales set up the *Annual Awards for Food Action Locally* (AFAL) scheme to recognise individual or team contributions to local nutrition initiatives, which have had a positive impact on the diet or eating habits of residents in the communities where they work (FSA Wales, 2003). FSA Wales also published details of funding for initiatives on Nutrition and Diet as a resource for groups working on community projects and initiatives to improve diet and health and to reduce inequalities in Wales.

Women and Children.

Healthy Start is an NHS initiative, set up initially in Devon and Cornwall, and was launched nationally in November 2006. The scheme offers free vouchers every week to pregnant women or mothers with young children in population groups considered as nutritionally vulnerable, which can be exchanged for milk, fresh fruit, fresh vegetables and infant formula milk. The scheme supports breastfeeding and encourages earlier and closer contact between health professionals and families from disadvantaged groups, creating opportunities for nutritional education.

Sure Start is a government program, which has been set up in England to achieve better outcomes for children, parents and communities by increasing the availability

of childcare for all children; improving health and emotional development for young children and supporting parents in their aspirations towards employment.

Schools.

National Assembly for Wales launched the Welsh network of *Healthy Schools Schemes* (1999), which has encouraged schools to consider action on food and nutrition, such as fruit tuck shops and breakfast clubs. *The National Healthy Schools* programme encompasses minimum nutrition standards for food in schools in England set by the Department for Education and Skills (DfES), which are to be compulsory from September 2006 (DfES, 2006). This scheme is supported by the UK wide Target Nutrient Specifications (TNS) for manufactured foods (FSA, 2006), which replaced and were based on the TNS developed to meet the nutrient standards launched as part of The Scottish Executive's *Hungry for Success* initiative (FSA Scotland, 2003).

Young Adults.

FSA Wales has launched *Get Cooking* (FSA Wales, 2005), a toolkit for teaching basic cooking skills in a community setting to young people aged 14-25. FSA Wales has also published *Healthy Nosh for Less Dosh* (FSA Wales, 2005) to provide healthy eating advice for those on a budget, especially suitable for students. Similarly, Scotland has published *1st Time Self-Caterers* as an aid to students and others in a new situation of having to cook for themselves (FSA Scotland, 2005). FSA have joined forces with the popular teen magazine *Sugar* to promote the importance of healthy eating to young adults, including work with *Eatwell* (FSA, 2006).

Older Adults.

FSA Wales are committed to providing support to older adults and have published *Eat Well- a guide to healthier eating in over-60s and. Stock up your store cupboard*, which was published as part of *Keep well this winter* campaign (FSA Wales, 2005).

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ANNEX 2

**Comments from SACN on NDNS summary report
Submitted December 2006**

Member	Comment	Amended	Comment
Annie Anderson	Red Meat: State that we cannot compare to recommendations if that is the case.	Yes	“Plateau reached” has been removed, table, text and footnotes amended to state that mean intake of red and processed meat and meat-based dishes has decreased since 1986/7, however comparisons to recommendations cannot be made.
	Para 10: Highlight the pattern of drinking likely to be binge drinking	No	As the data was recorded over a 7 day period we do not know how many drinking occasions there were.
	Para 10: Alcohol contributor to total energy	Yes	Includes % total energy from alcohol for adults and a sentence in the recommendations section.
	Para 21: Highlight any association between vitamin D status and latitude.	Yes	Para 19 & 21: Inserted significant difference in vitamin D status in Scotland and North England for adults 65yrs +. No significant difference for other age groups.
	Main Findings: Highlight poor NSP intakes.	Yes	NSP intake inserted for each population group.
	Preference for “eat/drink” rather than “consume”.		Changed to eat/ate when in direct reference to actual food (not including when fruit juice is mentioned) and changed to drink where appropriate.
Paul Haggarty	Para 6 & 7: Biochemical status confusing	Yes	Suggested alternative text used
	Main Findings: Include recommendations, to avoid continual reference to table 1.	Yes	
	Main Findings: Vitamin and mineral intakes/status text could be clearer.	Yes	Improved format
	Main Findings: Include % not meeting target intake for fruit and veg and oily fish	Yes	Only for fruit and veg for adults as data not available for oily fish or for children or elderly.
	Main Findings: Remove reference to mean intakes in LRNI/RNI comparison.	Yes	Except for reference to Vitamin D as no values for % below LRNI
	Para 17: State why findings are different for group data compared to ungrouped		Footnote 15 inserted as explanation
	Text edits	Yes	
	Slight preference for “consume” rather than “eat/drink”.		Changed to eat/ate when in direct reference to actual food (not including when fruit juice is mentioned) and changed to drink where appropriate.
No need to specify “biochemical” in main paper in reference to status.		Main report “biochemical status” used in first reference then continued as “status”.	

Anne Prentice	Biochemical Status: Add a footnote to indicate that thresholds used were those current at the time of each survey.	Yes	
	Table 1: Add ethnic minorities to list of populations not included in NDNS.	No	It is already mentioned in the footnote that they are included, but not in large enough numbers for separate analysis.
	Para 9b: Quintiles	Yes	
	Para 10: Check figures for % below LRNI for calcium as values differ to folate report.	Checked	The sets of data come from different sources. COMA Bone Report quotes data for 10-11 & 14-15 yr olds taken from COMA Report on Diets of British School Children (1983) and 16-24 yr olds from the 1986/7 NDNS adults report. The most recent NDNS data for 11-18 yr olds is likely to be different.
	Thresholds: Add footnote to include status thresholds.	Yes	Footnotes inserted for relevant age groups for iron and vitamin D moved to footnote.
	Text edits	Yes	
	No preference for "eating/drinking" or "consume".		
Anita Thomas	Summary: Amendment to text including population sample were noted to be eating less fat etc.	No	As the summary has been amended by members over a few drafts, I feel it has reached a stage where most are happy with its content.
	Table 1: Include recommendations for sodium chloride.	Yes	Included recommendations for sodium.
	Para 9b: Define "relatively high"	Yes	Footnote added. Due to the variation in intake across age/sex groups within the adult population it is not possible to give a figure above which a "high proportion" of adults was considered to be below LRNI or with low biochemical status.
	Main Findings: Change focus to reflect audience.	Yes	
	Main Findings: % replaced with estimated fractions.	Yes	In places where simple fractions 10% is replaced with a tenth, 25% a quarter etc.
	Final Summary: Include a sentence to state the link between intake, status and health outcomes and the effects on recommendations made.	Yes	
	General: Change "consume" to "eat and drink".	Yes/No	Changed to eat/ate when in direct reference to actual food (not including when fruit juice is mentioned) and changed to drink where appropriate.
	Preference for changing main report from "status" to "biochemical status"		Main report "biochemical status" used in first reference then continued as "status".
Tony Williams	Summary: Population wide message	Yes	Inserted "particularly for certain population subgroups..."
	Main Findings: Change "iron saturation" to "transferrin saturation".	Yes	
	Main Findings: Salt measured by urinary excretion in both surveys	Yes	
	Para 35: Describe at risk group in Vitamin D section.	Yes	
	Content with use of "consume" rather than change to "eat/drink"		Changed to eat/ate when in direct reference to actual food (not including when fruit juice is mentioned) and changed to drink where appropriate.
	Preference for changing main report from "status" to "biochemical status"		Main report "biochemical status" used in first reference then continued as "status".

06/06/07

SACN/07/15