Public Health England

Healthier and More Sustainable Catering: Nutrition principles

The scientific principles for developing nutrient-based standards for planning nutritionally balanced menus

About Public Health England

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1. Executive summary

1.1 The nutrition principles for healthier catering underpin the development of a framework for food and nutrient standards. It deals with establishing food-based guidance and emphasises the importance of basing this on evidence-based government advice. Maintaining consistency with government dietary advice is important and hence the principles use ‘the eatwell plate’ to frame the food-based guidance.

1.2 The main population dietary recommendations are set out and the nutrients we currently eat too much of and those that we do not eat in sufficient amounts are identified. The principles cover issues to consider when planning menus and how, through establishing food and nutrient-based standards, we can help people get the nutrients they need. Along the way, the principles illustrate example nutrient standards for adults and set out some of the specific nutritional requirements for this group.

2. Introduction

2.1 Large sections of the population rely on others to buy, prepare and serve food on their behalf for a significant number of their meals. For some people this may be all the food that they eat. These individuals rely on the providers of their food to plan menus in such a way that it is possible for them to meet dietary recommendations. Using food and nutrient-based standards as a framework on which to base menus will help to ensure that people can achieve dietary recommendations.

2.2 On average, the population consumes too much saturated fat, salt, added sugars, and eats too little fibre, fruit and vegetables and oily fish than is recommended. We also know that some sections of the population have intakes of some vitamins and minerals below recommended levels.

2.3 Planning menus, based on food and nutrient standards for the specific population group being catered for, is a clear and objective way of helping to reduce intakes of saturated fat, sugar and salt. It also helps to increase the amount of foods and nutrients in the diet where intakes are lower than government recommendations.

2.4 This document sets out the principles behind establishing nutrient-based standards for specific population groups. These principles underpin a toolkit for serving food to adults.

3. Food-based healthy eating advice

3.1 The government recommends that everyone eats a diet that contains:

- plenty of starchy foods such as potatoes, rice, bread and pasta (choosing wholegrain varieties or eating potatoes with their skins on for more fibre)
- plenty of fruit and vegetables; at least five portions of a variety of fruit and vegetables a day
- some meat, fish, eggs, beans and other non-dairy sources of protein
- some milk and dairy products, choosing reduced fat versions, eating smaller amounts of full fat versions or eating them less often

and just a small amount of foods and drinks high in fat, salt and/or sugar.

3.2 It is important to avoid dehydration. It is recommended that people drink between six to eight glasses (about 1.2 litres) of water, or other fluids, every day.

3.3 The eatwell plate (see Figure 1) is a pictorial representation of government healthy eating advice and is helpful for planning healthier menus.

3.4 Diets high in salt and saturated fat but low in fish, fruit, vegetables and fibre increase the risk of high blood pressure, cardiovascular disease and some cancers. Consuming foods and drinks that are high in fat and non-milk extrinsic sugars (NMES, often referred to as added sugars but also includes sugars in fruit juice and honey) too frequently can contribute to excess energy intake and weight gain. Obesity carries with it many negative effects on health.

Figure 1: The eatwell plate

4. Nutrient-based recommendations for the population

4.1 Recommendations for nutrient intakes for the general public are based on advice from the Committee on Medical Aspects of Food and Nutrition Policy (COMA) and the Scientific Advisory Committee on Nutrition (SACN). In 1991, the Department of Health published dietary reference values (DRVs) which cover a range of intakes for most nutrients[1]. DRVs for total fat, fatty acids, starch and sugars were set as a percentage of daily energy intake for adults in addition to those for energy, protein, fibre (as non-starch polysaccharides, NSP) and some vitamins and minerals. DRVs for energy were subsequently revised in 2011[2] . Population targets for average salt intake were published in 2003[3]. Tables 1 and 2 show the current DRVs and Table 3 shows the maximum daily salt intakes for children and adults.

4.2 DRVs for children have not been set for some of these nutrients and, in particular, children below the age of five with small appetites, who need energy-dense diets, should not have their fat intake restricted. The DRV for fibre is for adults only.

Table 1: Current recommendations for fat, carbohydrates (including sugars) and fibre for the population

	Population average % of food energy
Saturated fatty acids	Not more than 11
Polyunsaturated fatty acids	6.5
Monounsaturated fatty acids	13
Trans fatty acids	Not more than 2
Total fat	Not more than 35
Non-milk extrinsic sugars	Not more than 11
Intrinsic and milk sugars, and starch	39
Total carbohydrate	50
Fibre as non-starch polysaccharide (g/day)	18

4.3 Recommendations for protein, vitamins and minerals vary by age. Where different intakes for males and females are recommended for vitamins and minerals, the higher value is identified in Table 2 to ensure that the greatest needs of the group are met.

Table 2: Current recommendations for protein, vitamins and minerals for the population

Nutrient (unit) per day	1-3 years	4-6 years	7-10 years	11-14 years	15-18 years	Adults 19-50 years	Adults 50 years and above
Protein (g)	15	20	28	42	50	50	50
Vitamin A* (µg**)	400	400	500	600	700	700	700
Thiamin (mg)	0.5	0.7	0.7	0.9	1.1	1.0	0.9
Riboflavin (mg)	0.6	0.8	1.0	1.2	1.3	1.3	1.3
Niacin equivalent*** (mg)	8	11	12	15	18	17	16
Vitamin B6 (mg)	0.7	0.9	1.0	1.2	1.5	1.4	1.4
Vitamin B12 (µg**)	0.5	0.8	1.0	1.2	1.5	1.5	1.5
Folate (µg**)	70	100	150	200	200	200	200
Vitamin C (mg)	30	30	30	35	40	40	40
Vitamin D (µg**)	7	0^{α}	0^{α}	0^{α}	0^{α}	0^{α}	10^{β}
Calcium (mg)	350	450	550	1000	1000	700	700
Magnesium (mg)	85	120	200	280	300	300	300
Potassium (mg)	800	1100	2000	3100	3500	3500	3500
Iron (mg)	6.9	6.1	8.7	14.8	14.8	14.8	8.7
Zinc (mg)	5.0	6.5	7.0	9.0	9.5	9.5	9.5
Copper (mg/d)	0.4	0.6	0.7	0.8	1.0	1.2	1.2
Selenium (µg**)	15	20	30	45	70	75	75
Iodine (µg**)	70	100	110	130	140	140	140

* Retinol equivalents = Retinol + (beta-carotene divided by 6)
** µg = micrograms. 1000 micrograms = 1 milligram (mg)
*** Niacin equivalent = niacin + (tryptophan divided by 60)
$^{\alpha}$ Certain at risk individuals or groups may require dietary vitamin D – see paragraph 6.14
$^{\beta}$ For the population aged 65 or more only

Table 3: Recommended maximum daily salt intakes for infants, children and adults

Age	Target average salt intake (g/d)[3]
0-6 months	Less than 1
7-12 months	1
1-3 years	2
4-6 years	3
7-10 years	5
11 years and over	6
Adults	6

5. How the population's intakes compare with these recommendations

5.1 We know from the National Diet and Nutrition Survey (NDNS) 2008/2009 to 2010/2011[4] that, while on average the population intake of total fat is about the right amount, those with the highest intakes of total fat are obtaining close to 50% of their energy from fat, far greater than recommended amounts (no more than 35%).

5.2 These surveys also tell us that on average the population consumes too much saturated fat, salt and non-milk extrinsic sugar (NMES, some people call this added sugars but also includes sugars in fruit juice and honey). We also know that for different sections of the population, some people have intakes of vitamins and minerals below recommended levels.

6. Nutrient standards – principles to plan menus to help people move towards recommendations

6.1 Planning menus to meet nutrient-based standards for a given population will contribute to helping reduce intakes of saturated fat, sugars and salt. This will also help to increase the amount of fibre, vitamins, minerals and foods in the diet where intakes are lower than government recommendations.

6.2 When planning menus it is useful to consider how people consume food and how to apportion nutrient intake throughout the day. For the purposes of developing menus, the convention is that people usually divide their intakes across four eating occasions; breakfast, lunch, evening meal and foods consumed between meals (snacks).

6.3 Using this approach, you can estimate the proportion that each eating occasion makes to intake. Since most people usually consume a wider range of foods at lunch and evening meals, these meals account for a greater proportion of intake. As such, it is assumed that breakfast contributes 20% of daily intake, with lunch and evening meals contributing 30% each. The remaining 20% is for foods consumed between meals (snacks).

6.4 To help shift nutrient intakes towards government recommendations it is necessary to consider measures to tackle those nutrients that we know people do not consume enough of (that is, at risk of insufficiency) and those that people consume too much of (that is, in excess).

6.5 For macronutrients (fat and sugar) we have based "target recommendations" (see Table 4) on the estimated average requirement (EAR) for relevant nutrients – the EAR represents an average that many people will need more of and many will need less. For salt, we have used population targets for average salt consumption[3].

6.6 Where more than 5% of a stated population group have intakes below the Lower Reference Nutrient Intake (LRNI) there is a risk of insufficiency within that group. The LRNI is the amount of a nutrient that is only sufficient for those people who have the lowest requirements. Most people require an intake greater than the LRNI to meet their requirements. For these nutrients, you should provide increased amounts relative to the energy content of meals – this protects individuals at risk of insufficiency.

6.7 Where people consume certain nutrients in excess of recommended amounts for example saturated fat, salt and NMES; you should plan menus to provide these in lower amounts relative to the energy content of meals – this will help prevent excess consumption. To achieve dietary recommendations, where excesses are apparent, the target recommendations are set equivalent to 98% of the EAR (for fat and sugar) and 98% of the population target for average salt consumption provided from all meals and snacks.

6.8 For vitamins and minerals where insufficiencies are apparent target recommendations are set so that, in general, 100% of the average population requirement is provided from breakfast, lunch and evening meals. Any food and drink eaten outside of these eating occasions would further contribute to intakes. The target recommendations are summarised in Table 4.

Table 4. Target recommendations

Percentage of daily intake					
	Energy Protein Fibre	**Total fat, saturated fat, sugar, salt**		**Vitamins and minerals (where insufficiencies are apparent)**	
		Average population requirement	**Target#**	**Average population requirement**	**Target#**
Breakfast	20	20	No target	20	No target
Lunch	30	30	29	30	35-40
Evening meal	30	30	29	30	35-40
Snacks	20	20	No target	*	No target
Total	100	100	98 or less	100	100 or more

target for nutrients where excess or insufficiencies are apparent.
* Snacks will provide additional micronutrients to contribute to the micronutrient target of 100% or more over the day. You should take care not to encroach upon maximum safe levels of intake.

6.9 Table 5 gives an example, for adults aged 19-74 years, of the recommended targets for nutrients that this group may consume in excess or in insufficient amounts. You can use the principles to identify nutrient standards for different population groups.

6.10 In 2011, SACN reviewed energy requirements and recommended levels of energy intake required to maintain a healthy body weight in otherwise healthy people at levels of physical activity at that time. The updated SACN energy requirements for men and women are slightly higher than previously recommended. However, in light of the high levels of overweight and obesity in the UK population, the government continues to advise that, as a guide, men and women should consume 10.5MJ (2500 kcal) per day and 8.4MJ (2000 kcal) per day, respectively. These values are readily understood, are not meaningfully different to SACN's updated recommendations and are the basis of the average population energy requirement provided in Table 5 (9.4MJ/2250kcal per day).

6.11 Using these principles and standards such as those in Table 5 to plan menus would help the majority of people to meet dietary guidelines and have the opportunity to get all the nutrients they need.

6.12 Data from the National Diet and Nutrition Survey 2008/2009 to 2010/2011[4] is used in Table 5 to set the recommended targets for areas of excess or insufficiency to ensure the needs of this group are met. However, it is important to bear in mind that low intake of a nutrient does not necessarily indicate deficiency. Low intake is only considered a problem if it is sustained over a long period of time. The survey data used may not represent nutrient intakes over the longer

term (and may provide an underestimation of intakes for those nutrients not widely distributed in foods such as vitamin A). In addition, the reference values used to assess sufficient intake for some nutrients (such as magnesium, potassium, selenium and zinc) are based on very limited data. Measurements of nutrient status (that is, levels in body tissue or stores) used to assess deficiency are not available for all nutrients. Where status measurements are possible, a value indicating low status does necessarily indicate clinical deficiency, rather an individual is at risk of becoming deficient. For these reasons the recommended targets for areas of insufficiency set out in Table 5 are based on a precautionary principle.

6.13 You should take care not to encroach upon maximum safe levels of intake for vitamins and minerals (for example guidance suggests that an average or 1500 micrograms (µg) per day or less of vitamin A from food and supplements combined is unlikely to cause harm).

Table 5. Nutrient-based standards for adults aged 19-74 years

Nutrient	Average population requirement (provided as daily averages over seven days)	Recommended target for areas of excess or insufficiency (provided as daily averages over seven days)
Energy* (MJ/kcal)	9.4/2250	
Total fat (g)	87.5	Less than 85.8
Saturated fat (g)	Max 27.5	Less than 27.0
Carbohydrate (g)	Min 300	
NMES (g)	Max 66.0	Less than 64.7
Fibre (as NSP) (g)	18	
Protein (g)	Min 50	
Sodium (mg)	Max 2400	Less than 2352
Salt (equivalent g)	Max 6.0	Less than 5.9
Calcium (mg)	700	More than 700
Iodine (µg)**	140	More than 140
Iron (mg)	14.8	More than 14.8
Magnesium (mg)	300	More than 300
Potassium (mg)	3500	More than 3500
Selenium (µg)**	75	More than 75
Zinc (mg)	9.5	More than 9.5
Riboflavin (mg)	1.3	More than 1.3
Folate (µg)**	Min 200	More than 200
Vitamin A* (µg**)**	700	More than 700
Vitamin D (µg)**	Min 10****	

* If only considering adults aged 60-74 years average energy requirement is lower
** µg = micrograms. 1000 micrograms = 1 milligram (mg)
*** Retinol equivalents = Retinol + (beta-carotene divided by 6)
**** Some population groups will need supplementary vitamin D, see paragraph 6.14

6.14 Certain groups within the population may have particular dietary requirements that are not easily met within a planned menu. In some settings, targeted advice to these groups may be possible or appropriate. You do need to ensure that you cater for people with specific medical needs as they may have different requirements – these should be met on an individual basis. Some groups may also need to take supplements:

- women who could become pregnant or who are planning a pregnancy are advised to take an additional 400 micrograms (µg) of folic acid per day as a supplement from before conception until the 12th week of pregnancy. In addition to this, they should also eat folate rich foods such as, green vegetables, some fruits (oranges for example) and fortified breakfast cereals (making a total of 600µg of folate per day from both folate rich foods and a supplement)

- some adult groups of the population at risk of not getting enough vitamin D and the Department of Health recommends they take a daily supplement. These groups are:

    - all pregnant and breastfeeding women (10µg/day)
    - people aged 65 and over (10µg/day)
    - people who are not exposed to much sun, such as people who cover up their skin when outdoors, or those who are housebound or confined indoors for long periods (10µg/day for adults)

- people who have darker skin, for example people of African, African-Caribbean and South Asian origin are also at risk of vitamin D deficiency because their bodies are not able to make as much vitamin D

- infants and young children aged between six months and five years should also be given a supplement containing vitamin D (7-8.5µg/day depending on age), as well vitamins A and C. Babies under six months of age should not need supplements as their body stores of nutrients (obtained from the mother during pregnancy) and breast milk or infant formula intake should be adequate to meet their needs. Formula fed infants should not need vitamin supplements until they are having less than 500ml of formula a day, as formula is fortified with vitamins and minerals. Breastfed infants may need to receive drops containing vitamin D earlier (from one month of age) if their mother has not taken vitamin D supplements throughout pregnancy. Children who have a good appetite and eat a wide variety of foods, including fruit and vegetables, might not need vitamin supplements. Parents who are concerned about their child’s diet should talk to their GP or health visitor for further advice.

7. Menus that meet nutrient-based standards

7.1 Once you have established nutrient-based standards for the specific population group, such as those for adults in Table 5, then you can develop and analyse menus to assess how they meet those standards. You will have to use or have access to appropriate nutrient analysis software[5] with up-to-date information (as a minimum the most recent edition of McCance and Widdowson[6]) and take into account cooking losses and waste.

7.2 You can then develop menus that meet nutrient and certain food-based standards for example including at least five portions of a variety of fruit and vegetables a day and two portions of fish a week, including one portion of oily fish. If you are responsible for commissioning food provision then it is important to request this information and to check that actual provision meets the menus and standards. This will help ensure that you meet the needs of your customers.

7.3 If planning menus to nutrient standards in-house then the support of a registered nutritionist or dietitian is advisable. Their experience and training will assist in choosing or establishing appropriate nutrient-based standards. Some catering service providers can offer menu planning to meet nutrient standards as part of their service and have registered nutritionists or dietitians employed.

7.4 Using nutrient-based standards to develop menus can be particularly useful when catering for vulnerable groups and those in a residential setting where some of those provided for are unable to obtain food from alternative sources. It also allows a means of demonstrating the nutrient content of food provided and this is useful for people, relatives of cared for individuals in residential care and governing/inspection bodies.

8. Healthier and more sustainable catering

8.1 The principles in this document have been used to develop a toolkit for serving food to adults. This toolkit illustrates setting nutrient-based standards for this population group, includes example menus and enables the dietary targets described in this document to be met. The targets will differ according to the specific section of the population provided for and can be adapted by those providing food for individual eating occasions or for the whole day. The toolkit for adults can be found at https://www.gov.uk/government/publications?departments%5B%5D=public-health-england.

8.2 Information on specific standards for children is not included as there is guidance available in relation to the provision of food for children and in schools/nurseries. Useful references and links include:

- www.legislation.gov.uk/uksi/2008/1800/made links to the statutory instrument for implementing nutrient-based standards for school lunches
- Healthy and sustainable diets in the early years. Implications of current thinking on healthy, sustainable diets for the food and nutrient intakes of children under the age of 5 in the UK. (2012) First Steps Nutrition Trust www.firststepsnutrition.org/pdfs/sustainability.pdf
- Voluntary Food and Drink Guidelines for Early Years Settings in England – A Practical Guide. www.childrensfoodtrust.org.uk/assets/eat-better-start-better/CFT%20Early%20Years%20Guide_Interactive_Sept%2012.pdf

9. References

[1] Department of Health. Report on health and social subjects 41 dietary reference values for food energy and nutrients for the United Kingdom. Report of the panel on dietary reference values of the Committee on Medical Aspects of Food Policy. London:HMSO; 1991.

[2] Scientific Advisory Committee on Nutrition. Dietary reference values for energy. London: TSO; 2011.

[3] Scientific Advisory Committee on Nutrition. Salt and health. London: TSO; 2003.

[4] Bates B, Lennox A, Prentice A, Bates C, Swan G. National Diet and Nutrition Survey: Headline results from years 1, 2 and 3 (combined) of the rolling programme (2008/2009 – 2010/2011). Available from: http://webarchive.nationalarchives.gov.uk/20130402145952/http://transparency.dh.gov.uk/2012/07/25/ndns-3-years-report/

[5] For an account of some of the different nutrient analysis software available please see the Children's Food Trust website at http://www.childrensfoodtrust.org.uk/the-standards/nutrient-based/guides-and-reports/nasp (accessed 17/10/13). PHE does not endorse or recommend any particular nutritional analysis software package.

[6] Food Standards Agency. McCance and Widdowson's the composition of foods. 6th ed. Cambridge: RSC; 2002.