

Symposium on ‘Nutrition: getting the balance right in 2010’

Session 4: Getting balanced nutrition messages across Translating complex science into life-course health promoting strategies

Judith L. Buttriss

British Nutrition Foundation, High Holborn House, 52–54 High Holborn, London WC1 V 6RQ, UK

These days, we are bombarded with nutrition information from diverse sources and of varying quality. There has been a dramatic increase in communication channels, including more television channels with airtime to fill, and the emergence of the Internet and ‘new media’ such as social networking sites. Part of this culture is to deliver ever changing and novel angles. The background ‘noise’ that this creates can make delivery of evidence-based advice about healthy eating that generally carries less novelty value, a huge challenge. This paper illustrates ways in which complex scientific information can be translated into meaningful health promoting strategies that can be applied across the life course. The examples used are nutrition in the context of healthy ageing, communicating the concept of energy density in the context of satiety, healthy hydration, health effects of probiotics and resources for use by teachers in the classroom. This selection of examples demonstrates the processes adopted at the British Nutrition Foundation to identify the evidence base for a particular topic and then to communicate this information to various target audiences. The British Nutrition Foundation’s approach typically starts with preparation of a detailed review of the evidence, often with the involvement of external expertise, followed by peer review. For much of this work conventional science communication routes are used, but use is also made of the Internet and various forms of new media.

Health promotion: Communications: General public: Health professionals: Media

Even the best science, if it remains hidden away within the peer reviewed literature, will not improve public health. So, to be of use in a public health context, nutrition science needs to be translated into simple but nevertheless robust messages to guide individuals towards a healthier diet and lifestyle. To be effective, the communication of nutrition principles should be accurate and evidence based, balanced, set in context of everyday life, consistent, provided in a form available to the target audience, timely, repeated over time to increase understanding and adoption, and in a form that will be understood by the target audience and also relevant to them.

The environment for communicating information on nutrition and health has changed, meaning that our communication skills need to be better than ever. There has been a dramatic increase in communication channels, including many more television channels with airtime to fill. Over a period of just a few years, the emergence of the Internet

and ‘new media’ (chat rooms, social networking sites, podcasts, webinars and the like) has together changed the communications environment for ever. Journalists’ hunger for ever different or novel messages about diet and health has meant there is often much less interest in conventional ‘balanced diet’ approaches, and sometimes it seems that there is only limited interest in science itself with the plethora of celebrity-endorsed approaches to eating that now adorn the high street book shelves. The diversity of sources of information and types of messengers has for several decades meant that the public is often bombarded with inconsistent and conflicting advice that sometimes seems to change from week to week. There is demand for ‘better quality’ information and personally targeted advice, yet many may not always recognise sound science or sound sources when they stumble across them.

It is well recognised that providing information in isolation does not usually motivate behaviour change.

Abbreviation: BNF, British Nutrition Foundation.

Corresponding author: Professor Judith L. Buttriss, fax +44 20 7404 6747, email j.buttriss@nutrition.org.uk

Furthermore, different audiences need different approaches and there is a need to select the best communication channels and identify approaches that will motivate people to pay attention to and use the information. It is important to consider the audience and their preferred formats, channels and contexts. Choice of approach will be different for scientists versus policy makers, or health professionals versus the public. Children, adults and older people are likely to have different needs, as will different ethnic minorities. The public is often the ultimate target and information targeted at the general public must reflect everyday lives, current eating habits, attitudes, beliefs and values, lifestyles and priorities. Minority ethnic groups may have different languages, sources of information, cultural beliefs and priorities. Other key considerations include age, stage of life, gender, education, income and physical and mental functioning. Furthermore, some groups are harder to reach than others and therefore potentially under-served. Examples from the British Nutrition Foundation's (BNF's) recent work are used in this paper to illustrate the concepts of effective communication; each of the reviews used as case studies includes a comprehensive reference list.

British Nutrition Foundation's approach to effective communication

BNF is a UK-based registered charity, established over 40 years ago, which exists to deliver authoritative, evidence-based information on food and nutrition in the context of health and lifestyle. BNF's work is conducted and communicated through a unique blend of nutrition science, education and communications activities. Core to the work of BNF is the collation and distillation of the scientific information pertaining to a particular aspect of nutrition. Typically this 'BNF approach' involves preparation of a collation of the available evidence (sometimes a systematic review but more often a quicker though in-depth narrative review), often with the involvement of external experts, followed by standard peer review. Once the manuscript is completed and reviewed, the core messages emerging are identified and a communications strategy, targeting and choice of approach and communications vehicle agreed. Expert public relations/media expertise is utilised during this decision making process.

BNF attracts funding from a variety of sources, including contracts with the European Commission, national government departments and agencies; food producers and manufacturers, retailers and food service companies; grant providing bodies, trusts and other charities. Further details about the work, governance and funding of the Foundation can be found on our websites (<http://www.nutrition.org.uk> and <http://www.foodfactoflife.org.uk>).

Communications directed at the general public

Communicating effectively with the general public can be particularly challenging. There are no hard and fast rules but pointers that we have found to be helpful are: to make information relevant and concise; to use short sentences and everyday words without being patronising; to avoid

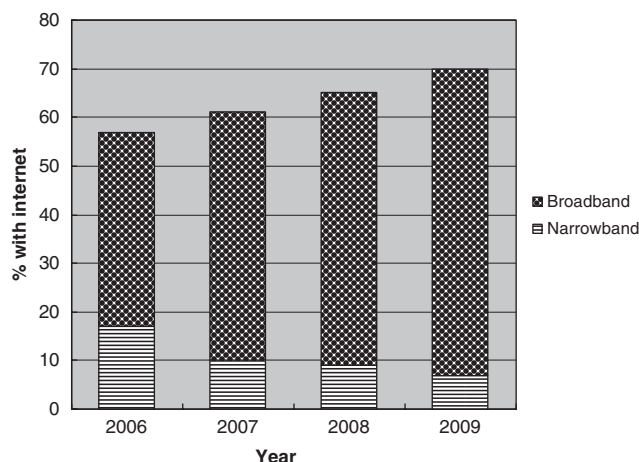


Fig. 1. Households with access to the Internet and broadband. From Office for National Statistics⁽¹⁾.

jargon, abbreviations, ambiguous phrases and acronyms; to include take home messages; to use pictures, graphics and case studies to illustrate a story; and to give practical information and advice, tips, food/meal swaps, recipe ideas and to emphasise stepwise changes. Our main communications route with the general public is our website <http://www.nutrition.org.uk>, which was established about 10 years ago and totally updated in 2009, and attracts in the region of 3 million hits a month.

The reach and impact of the Internet has become huge in recent years. As is illustrated in Fig. 1, in 2009, 18.31 million UK households had Internet access, having almost doubled since 2001⁽¹⁾. In 2009 this represented 70% of households and an increase of 1.85 million households since 2008. Global Internet usage is illustrated in Fig. 2⁽²⁾.

Figs. 3 and 4 illustrate the types of information sought and the age profile of Internet users in 2009⁽¹⁾. The most common usage concerns emails but 42% of users are seeking health information (Fig. 3). Healthy people tend to conduct episodic searches about topics such as disease prevention, pregnancy, anti-ageing and short-term acute illnesses. A total of 76% of respondents had used the Internet in the 3 months prior to the survey (80% of men and 72% of women). Seventeen per cent of men and 24% of women had never used the Internet (Fig. 4)⁽¹⁾.

Earlier this year, we incorporated some questions into a YouGov omnibus survey to establish consumers' 'views on the most reliable sources of information about food'⁽³⁾. As revealed in Fig. 5, nutritionists and dietitians were considered the most reliable, followed by the Food Standards Agency. Newspapers were poorly regarded, with television not far behind, but food labels and the Internet both scored relatively well.

Healthy ageing: a case study

Approximately 10 million people in the UK are aged over 65 years (16% of the population), making this a large and indeed expanding group. The last census (in 2001) revealed that for the first time there are more people in the

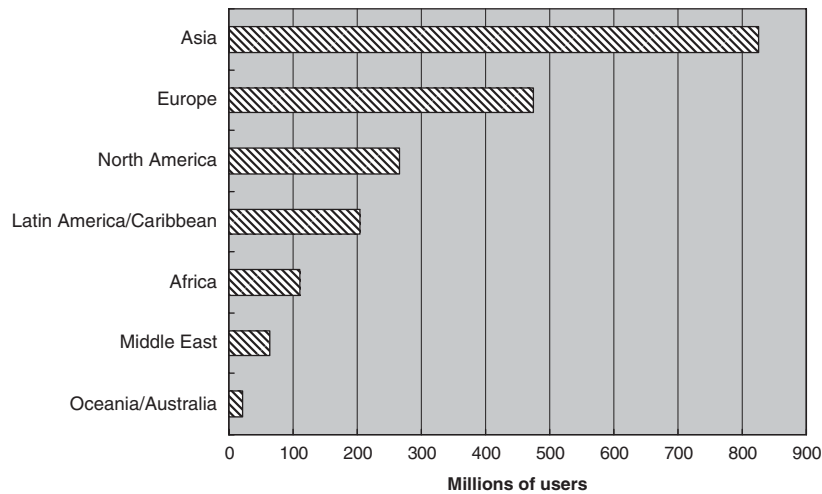


Fig. 2. Internet usage around the world. From Internet World Stats⁽²⁾.

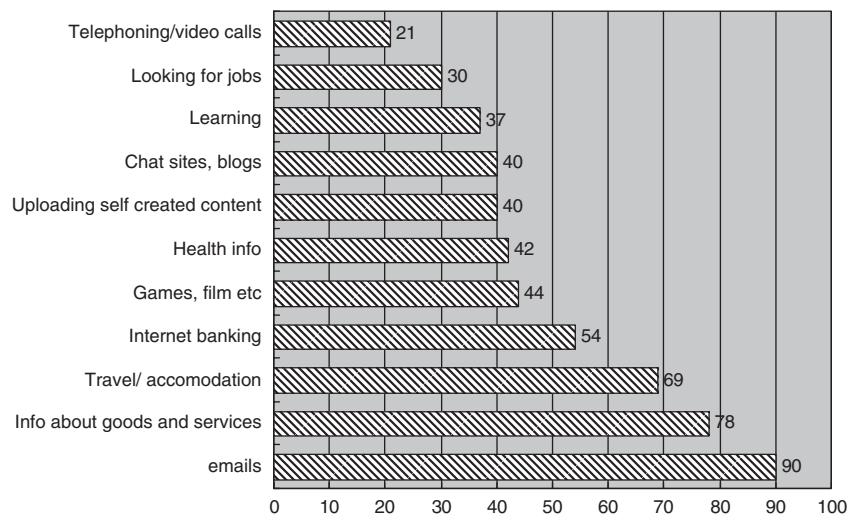


Fig. 3. Internet usage (%) by adults. From Office for National Statistics⁽¹⁾.

UK population over 60 than are under 16 years. This group is also very heterogeneous in terms of their health and their needs. Improvements in life expectancy in the UK, which has been increasing by about 2 years per decade, is being matched in many other parts of the world (Fig. 6)⁽⁴⁾ even where poverty is rife, but crucially here and elsewhere, increases in healthy life expectancy are not keeping pace. We are living longer but much of this extra time is being spent in ill health (Fig. 7)⁽⁵⁾. This demographic trend poses many challenges for society and our health care system.

To investigate the potential of diet and lifestyle to improve healthy life expectancy, in 2005 BNF established a Task Force on nutrition and healthy ageing, under the chairmanship of Professor John Mathers, the report of which was published in 2009⁽⁶⁾. The genes we inherit at conception set the trajectory and context for future health but thereafter nutrition in the womb and throughout life and overall lifestyle influence the impact of our genetic inheritance. Furthermore, time continuously pushes the

pendulum towards ill health and disability. The Task Force adopted a life course approach to the study of ageing, considering how each organ system ages over time and the evidence for nutrition and/or lifestyle having the potential to hold back the effects of time. Chapters in the report cover teeth and the oral cavity, bones, joints, skeletal muscle, skin, the brain, the cardiovascular system, the immune system, the gut and the endocrine system. The Task Force found evidence of protection against chronic disease; preservation of immune function, digestive health, cardiovascular health, functional ability, bone health, oral health and vision; benefits for cognitive function, mental health and wellbeing; ability to minimise risk of weight loss, under-nutrition, low nutrient status and deficiency diseases; and capacity to aid recovery from illness. Once the science had been established, the Task Force moved on to consider the public health implications and we drew together all the nutritional information, by organ system (see Buttriss⁽⁷⁾). This collated information was used as the basis of the consumer communications work associated with the launch

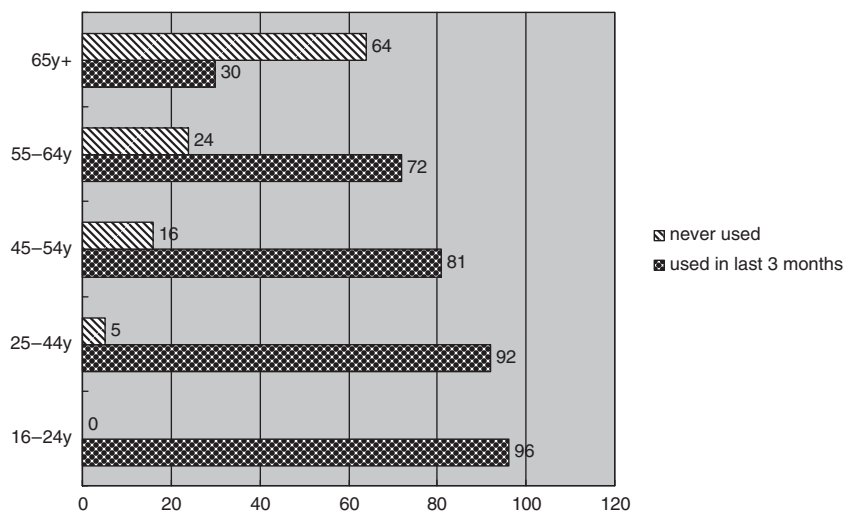


Fig. 4. Percentage of adults using the Internet, by age, in 2009. From Office for National Statistics⁽¹⁾.

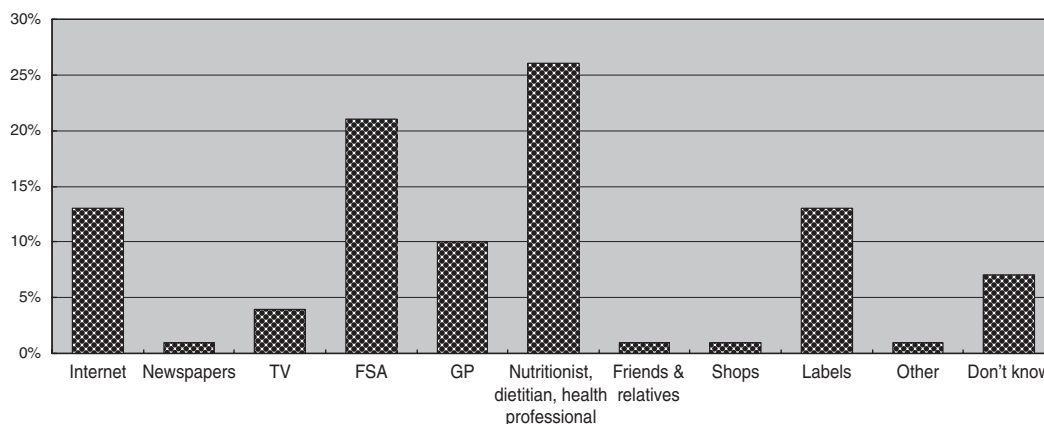


Fig. 5. Most reliable sources of information about food – according to consumers. From YouGov⁽³⁾.

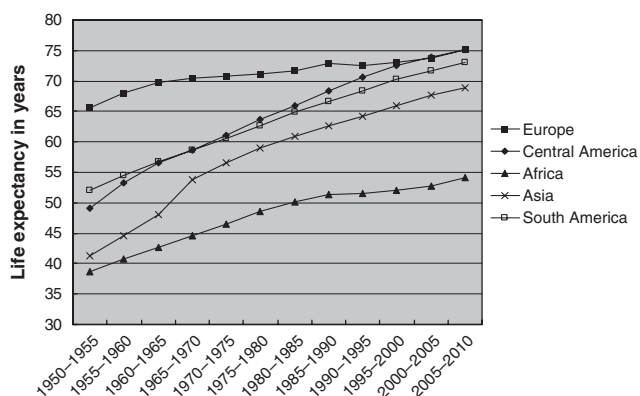


Fig. 6. Global life expectancy at birth by demographic region 1950–2010. From Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat⁽⁴⁾.

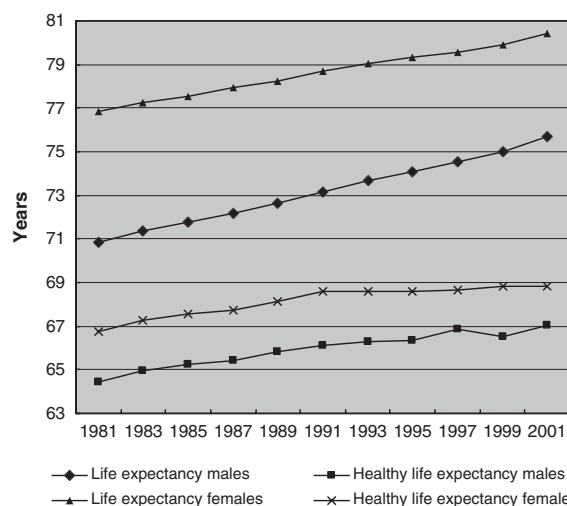


Fig. 7. Life expectancy and healthy life expectancy at birth in the UK 1981–2001. From Office for National Statistics⁽⁵⁾.

of the report. We held a conference for researchers and health professionals, the main target audiences for the report and published articles in a variety of journals targeting specific health professional groups, but wanted to reach a wider audience and we did this primarily through the

media (the findings were published on the front page of the *Daily Express* and in five other national newspapers and a number of magazines) and via our website. To encourage

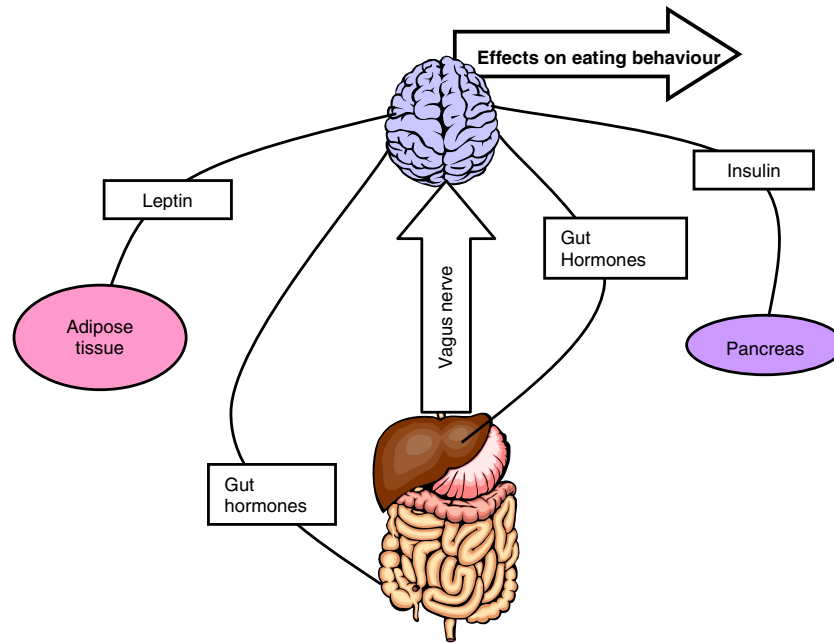


Fig. 8. Overview of the control of satiation and satiety. From Benelam⁽⁸⁾.

take up of the messages we produced a poster, tips, recipe ideas and fact sheets, and provided images of ‘healthy’ food baskets. These can be found at <http://www.nutrition.org.uk/nutritioninthenews/healthyageing>. By August 2010, the poster had attracted 1782 hits, the top tips for healthy ageing 3506 hits and the recipes 2705 hits. We also produced targeted articles for a range of consumer magazines with different key audiences and gave talks to specific groups such as those running care homes. These targeted activities enabled us to present the information in the most appropriate way to different groups.

Satiation and satiety: a case study

Our work on this topic also began with a review of the available evidence, this time undertaken by a member of the BNF team with input from international experts in this field of research. A BNF Briefing Paper emerged that included definitions of the terms used, and discussion of the mechanisms by which appetite is controlled, measurement techniques, the effects of foods and drinks on satiety and satiation, behavioural effects and the role of satiety in weight control⁽⁸⁾. Satiation is the condition that prompts the termination of eating and satiety is the sense of fullness that persists after eating. Both are important in controlling energy intake; satiation influences the amount consumed on a particular occasion and satiety influences the length of time until the next eating occasion. A number of organ systems and hormones are involved in these mechanisms, as summarised in Fig. 8.

The impact of macronutrients on satiety varies: protein has a greater effect than carbohydrate, and carbohydrate a greater effect than fat (see Benelam⁽⁸⁾). Studies have shown that in free-living situations, higher protein diets tend to be more satiating than those with lower protein

content. An implication of this is the need to maintain protein intakes on energy reduced slimming diets⁽⁹⁾. Some dietary fibre components, in particular viscous fibres and novel gelling fibres, influence satiety but this does not apply to all types of dietary fibre. Dose is also important; large amounts of fibre may be required for an effect to be seen. Drinks are also relevant: alcohol-containing drinks are known for their aperitif effect and support passive over consumption of energy. Furthermore, there is a lack of full compensation for the energy consumed, which seems to be a general feature for all energy-containing drinks. As a consequence, drinks have the potential to result in over-consumption of energy, although the data are inconsistent. Interestingly though, high-water foods, including soups and stews appear to be more satiating than solid foods; this is presumed to be linked with their energy density (the energy provided per unit weight of food, typically expressed as kcal/g or kJ/g) hence the volume consumed to achieve a particular energy intake. Energy density is influenced by the water content of a food, in particular, and also by the food’s fat and fibre content.

We wanted to draw out key strands of information that could be used as the basis for communications activities with health professionals, schools and the general public. We decided to focus on the concept of energy density. Studies have shown that people typically consume a relatively constant weight of food, although total energy intake may vary to a greater degree⁽⁸⁾. This raises the possibility of reducing energy intake by reducing the energy density of foods, whilst ensuring that emphasis is placed on those dietary components, in particular the protein, fibre and water content of foods that influence satiation and satiety⁽⁸⁾. This concept is illustrated in Fig. 9⁽¹⁰⁾. Both displays of food provide the same amount of energy: 6590 kJ (1575 kcal), but the energy density determines the volume of food available; the lower the energy density, the more

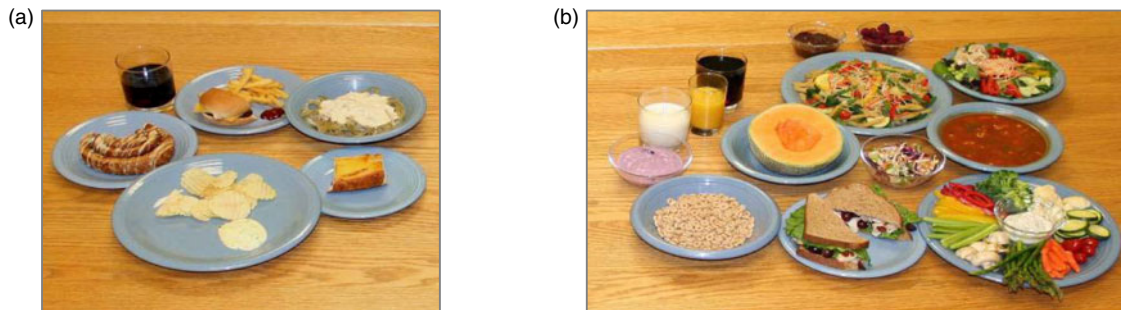


Fig. 9. Two strategies for providing a daily energy intake of 6590 kJ (1575 kcal). This illustrates two strategies for supplying 6590 kJ (1575 kcal) in a day's food: (a) food has an overall energy density of 2.3; (b) food has an overall energy density of 0.52⁽¹⁰⁾.

food can be consumed. This concept was used as the basis of our communications strategy with health professionals and the public. We produced a simple chart illustrating how energy density varies across commonly consumed foods and some recipes. We have since produced a leaflet for slimmers and those wishing to maintain a healthy weight (see <http://www.nutrition.org.uk/nutritioninthenews/fuller>). By August 2010, the chart had attracted 3675 hits, the recipes 2458 hits and the weight loss leaflet had attracted 11 233 hits. We also produced a podcast to be used in schools, explaining the concepts in more simple terms (<http://www.nutrition.org.uk/nutritioninthenews/fuller/introduction-to-satiation-and-satiety>).

Hydration: a case study

At the BNF we receive a lot of enquiries about fluid intake: how much should be drunk each day? Which drinks count? Are there dangers of consuming too much? To get to the facts we set about conducting a thorough review of the evidence, with the support of an advisory group including experts in physiology, sports nutrition, dental health, paediatrics and dietetics. The review covered the physiology of hydration, health effects of different dietary water sources, and current recommendations, and was published earlier this year⁽¹¹⁾. Again it formed the basis of a series of communications: a conference for health professionals and researchers and website-based resources for the public and for use in schools (see <http://www.nutrition.org.uk/nutritioninthenews/hydration>). This approach was supplemented by press releases, a day of radio interviews and a series of articles in health professional publications. The main messages emerging from the review emphasised that water is essential for life and constitutes the greater part of our body weight (on average about 60%). Body water content is closely monitored and maintained within narrow limits, through stimulating thirst or increasing urinary output. However, if losses are not sufficiently replaced, dehydration occurs and extreme dehydration can be fatal, with even mild dehydration (about 2% loss of body weight) resulting in headaches, fatigue and reduced physical and mental performance⁽¹¹⁾. Excessive water consumption, though rare, is also dangerous as it can result in hyponatraemia. Food provides about 20% of total water intake, on average, and almost all drinks contribute

positively to water balance, the exceptions being stronger alcoholic drinks such as wine, spirits and strong beers⁽¹¹⁾. Individual fluid needs vary widely depending on factors including body size and composition, the environment and physical activity levels, but current recommendations in the UK are to drink the equivalent of 6–8 glasses of fluids per day (about 1.2 litres), in addition to the water acquired through foods⁽¹¹⁾. This does not have to be water! Though water is a good choice, many other drinks count too such as milk, juices, low energy and other soft drinks, tea and coffee. Clearly some of these choices bring with them a calorific value, as a result of the sugars and sometimes fat that they contain, some are acidic and so have the potential to erode enamel, and some provide caffeine. The information on suitable choices was communicated by a poster (<http://www.nutrition.org.uk/nutritioninthenews/hydration/healthy-hydration-guide>), supported by tips and hints (<http://www.nutrition.org.uk/nutritioninthenews/hydration/getting-the-balance-right-everyday-examples>) that provided more detail and tailored the advice, for example, stressing advice about caffeine consumption during pregnancy. The aim of this poster was to correct the many misperceptions currently held on the topic of hydration through its use directly by the general public or by health professionals during consultations with clients. By August 2010, it had received 15 000 hits.

Health effects of probiotics: a case study

Another topic we have tackled is the health effects of probiotics. Because of the complexity of this subject, we chose to limit the communications activities to health professionals. A systematic review of the literature was undertaken, focusing on evidence of effects of probiotics on gut flora, acute and antibiotic-associated diarrhoea, irritable bowel disease, irritable bowel syndrome and allergies⁽¹²⁾. Again expert input was sought to inform the design of the literature search and the interpretation of the evidence, and the review underwent a rigorous peer review stage. A conference was held on the topic in late 2009 and audio podcasts of the presentations published (<http://www.nutrition.org.uk/nutritioninthenews/probiotics>). Web-based fact sheets were also developed to briefly summarise current thinking for each of the conditions, to ensure that busy health professionals could quickly access the main

findings of the complex material reviewed (by August 2010 these had attracted 4567 hits). Targeted articles have also been published in a number of health professional journals.

In summary, probiotics are live micro-organisms, mostly bacteria, which when taken in adequate amounts confer a health benefit. They have been found to work in a strain specific way, which means that their properties vary from strain to strain, although some properties may be shared between different strains⁽¹²⁾.

The best studied health outcomes in probiotic research are acute infectious diarrhoea and antibiotic associated diarrhoea⁽¹²⁾. Two strains, *Lactobacillus rhamnosus GG* and *Saccharomyces boulardii*, have been extensively studied. Both have been found to be effective in reducing the duration of acute infectious diarrhoea by, on average, one day (studies mainly in children), and to reduce the risk of developing diarrhoea during antibiotic treatment by on average two-thirds. A few large-scale studies have examined the effectiveness of probiotic strains in preventing *Clostridium difficile*-associated diarrhoea, which is typically found in hospital settings and most often in elderly people. One placebo-controlled blinded study testing the strain *Lactobacillus casei* DN-114001 (*L. casei* imunitas) found a significant effect on the occurrence of *C. difficile*-associated diarrhoea and another non-blinded study found a significant effect of *L. casei* Shirota (see Weichselbaum⁽¹²⁾).

Studies on the use of probiotics for treatment of inflammatory bowel disease show promising results for the use of certain probiotic strains in patients with ulcerative colitis, but not in patients with Crohn's disease⁽¹²⁾. The strain *Escherichia coli* Nissle has been shown to be as effective as the gold standard drug treatment mesalazine in maintaining remission in ulcerative colitis patients. Early findings showed that other probiotics, including *L. rhamnosus GG*, VSL#3 (a combination of eight different probiotic strains) and a mix of the strain *Bifidobacterium breve* Yakult, *Bifidobacterium bifidum* Yakult and *Lactobacillus acidophilus* YIT 0168, also seem to have the potential to be effective in maintaining remission in patients with ulcerative colitis, but more research is needed. Although current evidence shows promising results for the use of selected probiotic strains in patients with irritable bowel syndrome, a strong placebo effect has been found in some of the studies and evidence to make firm conclusions about the effects of specific probiotic strains is lacking so far⁽¹²⁾.

Determining content and language for schools resources

The final example concerns resources for schools and the importance we attach to determining the content and also the language used. The nutrition information conveyed has of course to be accurate and up to date but it also needs to be written and presented in a way that is appropriate and understood by the target age group. It is very important that it is relevant to the school curriculum and essential that it engages young people's interest and enthusiasm. To ensure curriculum relevance, the BNF has four regional

Education Working Groups in England, Northern Ireland, Scotland and Wales; the groups critically appraise the schools work we are doing, discuss regional educational issues (e.g. the need to translate resources into Welsh) and help define future priorities.

The BNF has developed a dedicated website <http://www.foodafactoflife.org.uk> for our schools resources, all of which are free to download. In the past year the site has attracted 950 553 visitors, an increase of 46% compared to the previous 12 months, who collectively have downloaded 1 920 000 resources, an increase of 28% compared with the previous year. The *Food – a fact of life* website provides a progressive approach to teaching young people aged 3–16 years about healthy eating, cooking, food and farming. The site provides a wealth of free resources to stimulate learning, ensuring that consistent and up-to-date messages are delivered. The website is a unique resource in the UK: offering free, up-to-date, accurate information to schools.

Prior to launch, the *Food – a fact of life* programme was piloted with users. This involved gathering teacher feedback on pedagogy and student comment on the design, layout and content of the resources. BNF education staff also visited schools to observe pupils using the resources in the classroom.

During the past year new additions to the site include twelve teaching sessions for use in pre-schools on healthy eating, cooking and where food comes from. These are based on feedback following piloting of resources in twenty-five pre-school settings. The sessions include notes for pre-school teachers and practitioners, card activities, PowerPoint presentations, recipes and online interactive activities. For secondary schools, four new modules are underway on Energy and Nutrients, Diet and Health, Ingredients and Food Science and Production and Processing.

We aspire to use new technologies to support effective teaching and learning. In response to demand from teachers for continuing professional development and acknowledging the difficulties teachers encounter in being released from school, we recently piloted three eSeminars, which are live seminars provided over the Internet with the opportunity for teachers to ask questions in real time. Following positive feedback, we plan to release a series of live broadcasts for teachers from September 2010 onwards. There will also be an opportunity for GCSE/Standard Grade and A-level/Advanced Higher students to participate. We also have a video podcast series that is proving popular in schools: during the period May 2009–June 2010 there were 21 639 views and just over 4000 downloads of these resources.

In April, we launched an online survey about our *Food – a fact of life* programme to which about 900 teachers responded. Preliminary results reveal that the programme is well positioned to support good quality food and nutrition teaching and learning in schools. We plan to make the results available in the autumn term, outlining any modifications made to the programme in light of comments received.

As well as continuing to develop our own resources under the *Food – a fact of life* banner, we also support the work in schools undertaken by a range of other organisations, including the government. For example, we

have worked with the Food Standards Agency to develop its Food Competencies for Young People. These set out a framework of core skills and knowledge on: diet and health, shopping (consumer awareness), food safety and cooking. They are for use by teachers and have been designed to be applicable in schools across the UK, despite differences in school curricula. There was a consultation phase during which teacher input was collated and utilised. Building on this work, we have recently completed a series of Food Route resources for the Food Standards Agency, which interpret the Food Competencies for use by children themselves. Pupils were directly involved in the development of the resources, which use different formats depending on the intended age group: cartoons, tick boxes and minimum words for younger children and a self-complete diary style for older children. A series of focus groups (for children in the age groups 5–16 years) were arranged throughout the UK. This exercise provided powerful insight into reading abilities and concept understanding at different ages. The voice of young people helped to shape the design and content of the final resource. We are now working on a European framework, which continues to build on this theme and which will embrace physical activity and energy balance as well as diet and nutrition. Again we are gathering the opinions of experts working in the fields of education, nutrition and lifestyle to help shape the framework through a series of project advisory groups and wider consultation. An on-line survey for young people (translated into a number of languages) will be used to gather the opinions of young people across Europe.

In our schools work and indeed in our work in general, we are mindful of the challenges faced in the identification of a 'diet fit for the future', a healthy, sustainable, affordable yet environmentally low-impact way of feeding the population now and in the future. As emphasised in *Food 2030*⁽¹³⁾, the world's population is projected to rise from the current 6 billion to about 9 billion by 2050. Land and water resources are already under pressure, so there is an urgent need to produce more food, whilst minimising the impact on the environment by using sustainable approaches. Food is a basic need and discussions about sustainability of the food supply need to consider the relationship between food and health, as well as other relevant factors such as climate change, greenhouse gas emissions, economic issues and the impact on the environment. Considerations also need to take account of the recognised limitations of current diets. For example, in the UK the population overall is consuming too much of some nutrients, such as SFA and Na, but at the same time substantial numbers have low intakes of important micronutrients⁽¹⁴⁾. For a more detailed discussion of this theme, see Buttriss^(15,16).

Conclusions

The examples chosen illustrate the process we adopt at the BNF to identify the evidence base for a particular topic and then to communicate this information to various target audiences. As shown, the approach adopted varies considerably depending on the type and complexity of message we are trying to communicate and the target audience.

For much of this work we use conventional science communication routes: publication in peer-reviewed journals, articles in health-professional magazines and journals and reports of conference proceedings. We also make extensive use of the Internet and various forms of new media. To reach children and their teachers we use a dedicated website (<http://www.foodfactoflife.org.uk>), supported by teacher events. Our main website (<http://www.nutrition.org.uk>), which was completely reformatted and revised last year, is our main channel for reaching the general public and we are in the process of upgrading the site to carry more podcasts and the like. We also use media communication channels. This approach can sometimes be very rewarding as evidenced by the first illustration I gave concerning healthy ageing, but it can also be very challenging and sometimes very frustrating as 'science' communication appears not always to be top of the agenda. However, to quote the philosophy of the Science Media Centre based in London: 'the media will start 'doing' science better when scientists start 'doing' the media better'.

Acknowledgements

The author declares no conflict of interest.

References

1. Office for National Statistics (2009) Internet Access Statistical Bulletin. <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=5672>
2. Internet World Stats (2010) Internet Usage Statistics. <http://www.internetworldstats.com/>
3. YouGov (2010) Survey of consumer attitudes to low calorie sweeteners. Total sample size was 2017 adults. Fieldwork was undertaken between 23rd–25th March 2010. Results available at <http://today.yougov.co.uk/pdfarchives/sweeteners>
4. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2010) *World Population Prospects: The 2008 Revision - Life expectancy at birth*. <http://esa.un.org/unpp/>
5. Office for National Statistics (2002) Health expectancies in the United Kingdom. <http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=12964>
6. Stanner S, Thompson R & Buttriss JL (editors) (2009) *Healthy Ageing: The Role of Nutrition and Lifestyle. The Report of a British Nutrition Foundation Task Force*. Oxford: Wiley-Blackwell.
7. Buttriss JL (2009) Taking the science forward: public health implications. In *Healthy Ageing: The Role of Nutrition and Lifestyle. The Report of a British Nutrition Foundation Task Force*, pp. 246–294 [S Stanner, R Thompson and JL Buttriss, editors]. Oxford: Wiley-Blackwell.
8. Benelam B (2009) Satiety, satiety and their effects on eating behaviour. *Nutrition Bulletin* **34**, 126–173.
9. Stubbs J, Whybrow S & Lavin J (2010) Dietary and lifestyle measures to enhance satiety and weight control. *Nutrition Bulletin* **35**, 113–125.
10. Rolls B (2009). The Effect of Dietary Energy Density on Satiety and Satiation. Presented at British Nutrition Foundation conference 'Satiety, satiety and their effects on eating behaviour', 19 June 2009; available at: <http://www.nutrition.org.uk/bnfevents/pastevents/satiety>
11. Benelam B & Wyness L (2010) Hydration and health: a review. *Nutrition Bulletin* **35**, 3–25.

12. Weichselbaum E (2009) Probiotics and health: a review of the evidence. *Nutrition Bulletin* **34**, 340–373.
13. Defra (Department of Environment, Food and Rural Affairs) (2010) Food 2030. <http://www.defra.gov.uk/foodfarm/food/pdf/food2030strategy.pdf>
14. SACN (Scientific Advisory Committee on Nutrition) (2008) *The Nutritional Wellbeing of the British Population*. London: The Stationery Office.
15. Buttriss JL (2010a) Nine billion mouths to feed: the challenge of establishing a sustainable food supply. *Nutrition Bulletin* **35**, 219–225.
16. Buttriss JL (2010b) What is a healthy diet for the UK? In *Feeding Britain: What Consumers Want. The Report of 'The Smith Institute'*, pp. 26–40 [N Johnson, editor]. Available at <http://www.smith-institute.org.uk/file/Feeding%20Britain%20What%20Consumers%20Want.pdf>