Food, health and environment: towards a more sustainable diet

Professor Susan Jebb
Department of Primary Care Health Sciences

27th November 2013
Food is a complex system

Dietary advice for consumers needs to optimise health within the constraints of a sustainable food supply

Food and drink industry is a major contributor to the UK economy

- The food and grocery industry in UK provides 1 in 7 jobs (3.5m people from farm to plate)

- Food manufacturing is UK’s largest manufacturing sector representing 16% of manufacturing output

- Over 350,000 dedicated food outlets in the UK

- Over 8,000 new products launched every year

- Food and drink exports have shown 7 years of continued growth, worth £12.2bn in 2012
Agriculture dominated by drive to produce more food – mostly energy
Changing power and influence in the food system

• 1920-70’s: Governments sought to intervene in agricultural production and markets to boost output, with consumers as passive recipients

• 1980’s: Shift towards more open markets with farmers competing in a global market with increasingly efficient systems of food manufacture and distribution

• 1990’s: Consumers in the driving seat of the modern food economy with industry competing to meet their demands

**Expectation**
That consumers would choose well and the newly flexible food supply chain would make a healthy diet available, affordable & acceptable

**Reality**
Consumers not informed or did not prioritise health; industry had incentives to mobilise demand for popular, cheap items

**Expectation**
That economies would gain through a market-oriented food sector & healthier population

**Reality**
While some consumers became healthier, inequalities increased and the cost of diet-related disease soared
Food – an unsustainable system

We face:
• Supply side pressures: resource scarcity, environmental degradation, climatic instability
• Demand side pressures: Population growth, demographic changes, changing diets

Within the context of:
• Insufficient, ineffective or perverse governance systems

Leading to increasing inequalities:
• In UK – food poverty and health disparities increasing
• Globally – poorer countries suffering the most

How can we feed 9 billion people by 2050?
Heavy reliance on supply side measures to meet growing demand

**Sustainable intensification:**
- Increasing yields
- Increasing efficiency in food chain
- Enhancing nutritional benefits per MJ

**Together with:**
- Reducing waste
Food chain contributes 18% of total UK GHG emissions

Source: Environmental Statistics (Defra)
GHG emissions by selected food groups (UK average per capita, up to RDC)

Audsley, Brander, Chatterton, Murphy-Bokern, Webster and Williams
Predicted global trends in consumer demand for meat (kg/person)

Source: FAO 2006
The global livestock challenge

- 40% grains consumed
- 12-18% GHG emissions

70% agricultural land

15% irrigation water

Main cause of deforestation, biodiversity loss & land degradation

Major source water pollution
More than a third of rice harvested in SE Asia may be lost before reaching consumers

- Harvest
- Handling
- Threshing
- Drying
- Storage
- Transport

Cabinet Office (2008)
Food Matters 2 – Trends and Challenges
The scale of food waste in UK

**Avoidable Food & Drink Waste**

- **4.2 Mt**
  - Home composting/fed to animals: 0.36 Mt
  - LA collected: 2.6 Mt

**Unavoidable Food & Drink Waste**

- **1.6 Mt**
  - Home composting/fed to animals: 0.26 Mt
  - LA collected: 1.3 Mt

**Total UK Household Food & Drink Waste**

- **7.0 Mt**

**Food Group as % of waste**

- Fresh vegetables and salads: 19%
- Drink: 17%
- Bakery: 11%
- Dairy and eggs: 10%
- Meals (home-made and pre-prepared): 10%
- Fresh fruit: 8%
- Meat and fish: 7%
- Other: 17%

**Disclaimer and footnotes**

Given the relative uncertainty around estimates the data is reported to two significant figures. As a result, the sum of certain data presented may be inconsistent with the total quoted.

Mt = Million tonnes

WRAP, 2012

Household food and drink waste in United Kingdom
Food waste

Avoidable food waste, mostly ‘not used in time’ accounts for 19% of all food and drink brought into the house, including:

• 13 billion portions of fruit/vegetables/salad
• 24 million slices of bread
• 1.2 million yogurts

Eliminating avoidable waste would lead to:

• Economic savings to consumers of £5.6 billion per year
• Carbon reduction of 17 million tonnes
• 19,000 km² land available for other uses
Consumer demand is at least as important as supply-side action.
<table>
<thead>
<tr>
<th>GHG mitigation potential by 2050 (vs. business as usual)</th>
<th>GHG reduction [Gt CO$_2$ – eq/yr]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reductions in food supply chain, losses and waste</td>
<td>0.76 – 1.5</td>
</tr>
<tr>
<td>No ruminant meat diet</td>
<td>5.8</td>
</tr>
<tr>
<td>No meat diet</td>
<td>6.4</td>
</tr>
<tr>
<td>Plant based diet</td>
<td>7.8</td>
</tr>
<tr>
<td>“Healthy” diet (Harvard eating plan)</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Smith et al, 2013, Global Change Biology
1 in 2 have high cholesterol
1 in 3 have high blood pressure
1 in 4 adults are obese
1 in 20 have diabetes
What is a healthy diet?

- **Achieve energy balance** and a healthy weight
- **Limit energy intake from total fats** and shift fat consumption away from **saturated fats to unsaturated fats** and towards the **elimination of trans-fatty acids**
- **Increase** consumption of **fruits and vegetables**, and legumes, whole grains and nuts
- **Limit** the intake of **free sugars**
- **Limit salt** (sodium) consumption

WHO Global Strategy on Diet, Physical Activity and Health
Obesity – the BIG problem

- 26% adults are obese and further 38% overweight
- 16% young people (2-15y) are obese and a further 14% overweight
- Direct costs to NHS estimated at £5.1 billion/y
- Indirect costs to wider economy approx. £16 billion/y
Improvements in diet quality may avoid 70,000 premature deaths in the UK

Modelling suggests that a shift to the recommended balanced diet could yield significant health and economic benefits. Avoided premature mortality and quality adjusted life years gained, UK¹

<table>
<thead>
<tr>
<th>Change in Diet</th>
<th>Premature mortality avoided</th>
<th>Quality adjusted life years gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase fruit and vegetable intake by 136g/day</td>
<td>42,000</td>
<td>411,000</td>
</tr>
<tr>
<td>Reduce daily salt intake from average 9g to 6g</td>
<td>20,000</td>
<td>170,000</td>
</tr>
<tr>
<td>Cut sat fat intake by 2.5% of energy</td>
<td>3,500</td>
<td>33,000</td>
</tr>
<tr>
<td>Cut added sugar intake by 1.75% of energy</td>
<td>3,500</td>
<td>49,000</td>
</tr>
</tbody>
</table>

Cabinet Office (2008)
Dietary change reduces cardiovascular risk factors

Indirect comparisons from:
Lifestyle intervention reduces the incidence of type 2 diabetes

End of active intervention at 4 y (reduce energy intake, decrease fat and SFA, increase fibre, increase activity)

Intervention:
Diabetes Incidence = 4.3/100 person y

Control:
Diabetes Incidence = 7.4/100 person y

Livewell: a balance of healthy and sustainable food choices

The EatWell Plate

- 11% Fruit & vegetables
- 7% Other misc. foods (e.g., hot drinks, alcohol, sauces)
- 6% Bread, rice, potato, pasta & other starchy foods
- 57% Meat, fish, eggs, beans and other non-dairy sources of protein
- 5% Food & drinks high in fat & sugar
- 14% Milk & dairy

Total 101%
Modelling changes in dietary patterns to achieve reductions in GHGE from food of 25% by 2020

*The data from the NDNS (UK diet) for the meat content of the diet included meat dishes."
Diet composition and greenhouse gas emissions

Means, 95% CIs adjusted for ages, sex, total dietary energy intake; n=24,293
Adapted from Monsivais, Scarborough, Lloyd et al., in preparation
How to make dietary change happen?
Dietary change is slow

<table>
<thead>
<tr>
<th></th>
<th>NDNS 2000-2001</th>
<th>NDNS 2009/10</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>2308</td>
<td>1635</td>
<td>2200</td>
</tr>
<tr>
<td>¯Fat</td>
<td>35.5</td>
<td>34.7</td>
<td>35.2</td>
</tr>
<tr>
<td>%SFA</td>
<td>13.3</td>
<td>13.1</td>
<td>12.9</td>
</tr>
<tr>
<td>%NMES</td>
<td>13.5</td>
<td>12</td>
<td>12.9</td>
</tr>
<tr>
<td>Portions of F&amp;V</td>
<td>2.7</td>
<td>2.9</td>
<td>3</td>
</tr>
</tbody>
</table>
Traditional health promotion efforts have relied heavily on education.
Focusing on behaviour ...

Reflective behaviour

- Driven by decision-making
- Values the future
- Slow
- Requires high cognitive capacity (‘willpower’)
... leads to new approaches

Reflective behaviour

• Driven by decision-making
• Values the future
• Slow
• Requires high cognitive capacity

Automatic behaviour

• Immediate perceptual benefit
• Future not represented
• Fast
• Minimal cognitive processing

Marteau et al
Judging nudging: can nudging improve population health? BMJ 2011;342:d228
A public health approach to changing dietary behaviours

Creating a healthier environment
e.g. controls on marketing, access and availability

Making healthier choices easier
e.g. campaigns, labelling

Providing healthier options
e.g. reformulation, portion control
Signposting healthier choices through labelling

Pepperoni pizza 1 (per ½ pizza)
- Energy: 1601kJ (383 kcal)
- Fat: 22g (31%)
- Saturates: 8.7g (43%)
- Sugars: 2.7g (3%)
- Salt: 2.6g (43%)

of an adult’s Reference Intake. Typical values (as sold) per 100g: Energy 1322kJ/316kcal

Pepperoni pizza 2 (per ½ pizza)
- Energy: 2174kJ (519 kcal)
- Fat: 30g (43%)
- Saturates: 11g (55%)
- Sugars: 4.4g (5%)
- Salt: 1.9g (32%)

of an adult’s Reference Intake. Typical values (as sold) per 100g: Energy 1229kJ/294kcal
Reformulation is an important strategy to reduce fat, saturated fat, sugar and salt.

- **50% reduction in SFA**
- **25% reduction in salt**
- **30% less sugar**
- **40% reduction in fat**
- **50% decrease in salt**
- **35% decrease in salt**
Reformulation has helped reduce salt intake in UK by 15% in a decade.

The mean and 95% confidence limits for each point are as calculated according to the protocol in place at the time. Different methods of assessment of completeness of 24 hour urine collections may contribute slightly (1-3%) to the decrease from 2006 to 2011. These differences fall within the 95% confidence limits for each point. The slope of the trend is not substantially affected by these differences.
Reductions in portion sizes to cut calories
Need to build public acceptability for some interventions

Household brands slash size of goods in 'hidden price hikes'

Household brands are slashing the size of their everyday goods while at the same time increasing their prices, a Which? report has found.

Twix chocolate bars have shrunk by almost 14 per cent from 58 grams to 50 grams Photo: ALAMY

By Richard Alleyne
6:00AM GMT 21 Mar 2013

Why the food police want to shrink your custard creams

MINISTERS were warned to keep their hands off our custard creams last night after plans to make biscuits and cakes smaller were leaked.
Can taxes help change dietary habits?

Taxing unhealthy food and drinks to improve health
An increasing number of countries are introducing taxes on unhealthy food and drinks, but will they improve health? Oliver Mytton, Dushy Clarke, and Mike Rayner examine the evidence

Oliver T Mytton academic clinical fellow, Dushy Clarke researcher, Mike Rayner director
British Heart Foundation Health Promotion Research Group, Department of Public Health, University of Oxford, Oxford OX3 7LF, UK

The potential impact on obesity of a 10% tax on sugar-sweetened beverages in Ireland, an effect assessment modelling study

Adam DM Briggs, Oliver T Mytton, David Madden, Donal O'Shea, Mike Rayner and Peter Scarborough

Overall and income specific effect on prevalence of overweight and obesity of 20% sugar sweetened drink tax in UK: econometric and comparative risk assessment modelling study

Adam D M Briggs academic clinical fellow, Oliver T Mytton academic clinical fellow, Ariane Kehlbacher lecturer, Richard Tiffin director, Mike Rayner director, Peter Scarborough senior researcher
Impact on alcohol purchasing of a ban on multi-buy promotions: a quasi-experimental evaluation comparing Scotland with England and Wales
# Uplift in sales with end of aisle promotions

<table>
<thead>
<tr>
<th></th>
<th>Beer</th>
<th></th>
<th>Wine</th>
<th></th>
<th>Carbonates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aisle end</td>
<td>Within aisle</td>
<td>Aisle end</td>
<td>Within aisle</td>
<td>Aisle end</td>
<td>Within aisle</td>
</tr>
<tr>
<td>Proportion of trolleys passing the display</td>
<td>33.8</td>
<td>22.5</td>
<td>27.6</td>
<td>21.1</td>
<td>51.1</td>
<td>30.2</td>
</tr>
<tr>
<td>No. of produce in each display location</td>
<td>2.85</td>
<td>12.91</td>
<td>7.62</td>
<td>10.89</td>
<td>2.09</td>
<td>7.38</td>
</tr>
<tr>
<td>No. of locations</td>
<td>8.38</td>
<td>20.92</td>
<td>10.08</td>
<td>29.31</td>
<td>8.34</td>
<td>20.77</td>
</tr>
<tr>
<td>Increase in sales (%)*</td>
<td>23.2</td>
<td></td>
<td>33.6</td>
<td></td>
<td>51.7</td>
<td></td>
</tr>
<tr>
<td>Price promotion equivalent (%)</td>
<td>-4</td>
<td></td>
<td>-7</td>
<td></td>
<td>-22</td>
<td></td>
</tr>
</tbody>
</table>

*Adj for no. of locations, price, proportion of week on promotion

Nakamura, Pechey, Suhrcke, Jebb, Marteau (SSM, under renew)
Food marketing to children increases energy intake, especially among the obese

- Exposure to food advertisements increased subsequent energy intake in all children.
- The increase was greater in obese children (155%) and the overweight children (101%) than the NW children (89%).

Developing a strategy to reduce meat consumption: 5 Rs

- **Reduce**: decrease portion sizes of carcass meat or meat content of ready meals
- **Replace**: more vegetarian meals including meat substitutes
- **Reformulate**: increase the veg:meat ratio in composite meals
- **Rebrand**: promote or refresh products that are already vegetarian or where meat is a flavouring/garnish
- **Respect**: focus on the role of meat as a ‘Sunday-special’ or celebration food; promoting ‘nose to tail’ eating