Sodium reduction and health: evidence for public policy

Experience in the UK and world-wide

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Deaths in 2000 attributable to selected leading risk factors

- Blood pressure
- Cholesterol
- Tobacco
- High Body Mass Index
- Fruit and vegetable intake
- Physical inactivity
- Alcohol
- Urban air pollution
- Lead exposure
- Occupational carcinogens
- Illicit drugs
- Unsafe sex
- Occupational particulates
- Occupational risk factors for injury

Number of deaths (000s)
Stroke and Ischemic Heart Disease (CHD) Mortality Rate in Each Decade of Age, Versus Usual Systolic BP at the Start of that Decade

Stroke

<table>
<thead>
<tr>
<th>Age at risk</th>
<th>Usual SBP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80–89 y</td>
<td>256</td>
</tr>
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<td>60–69 y</td>
<td>64</td>
</tr>
<tr>
<td>50–59 y</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>16</td>
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CHD

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<td>32</td>
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<td>40–49 y</td>
<td>16</td>
</tr>
</tbody>
</table>

Changes in diastolic blood pressure, salt intake and stroke deaths in Finland

DBP

Salt

Stroke

**W.H.O. recent positions**

To reduce the average salt consumption of the adult population to <5g/day

Policies for salt iodization and reduction of salt intake are compatible, cost-effective and of public health benefit

Reliance on salt as a vehicle for the delivery of iodine should not justify promotion of salt intake to the public

Additional vehicles to salt for micronutrient fortification should be explored
Components of a strategy to reduce population salt intake

Communication
- Public Awareness Campaigns
- Consumers
- Food industry
- Decision makers
- Media
- Health Professionals

Reformulation
- Setting Targets
- Reformulation
- Benchmarking food categories
- Labelling
- Industry Engagement
- Motivation
- Costs & Benefits
- Consumer awareness
- Wider support
- Corporate responsibility

Monitoring
- Population salt intake
- Urinary sodium
- Dietary surveys
- Reformulation progress
- Salt content of foods (databanks; self-reporting by industry; market surveys)
- Effectiveness of communication
- Measuring awareness of campaigns
- Measuring attitudes and behaviour changes

Research
- Epidemiology
- Nutrition
- Public Health
- Food technology
- Behavioural
Communication
Phases 1-3 (2004-8)
• Salt is bad for your health
• Check the labels for salt
• Eat no more than 6g per day
• 75% of salt is hidden in food
• Choose food with lower salt

Phase 4 (October 2009)
• Most of the salt we eat is already in everyday foods
• You can lower your salt intake by checking the labels to compare products, and choosing the options lower in salt
• We should aim to have no more than 6g salt per day, and children under 11 have less than this
The PR and media coverage was measured using WOTs (Weighted Opportunities To see). During October, salt campaign coverage accounted for 30% of the total FSA media coverage in terms of WOTs, and 29% in terms of number of items. The campaign reached all sections of the media and resulted in an excellent 90% positive Net Effect.
Reformulation
Priority: 12 categories of food

- Bread
- Meat products
- Cheeses
- Ready meals
- Soups
- Breakfast cereals
- Fish products
- Crisps, savoury snacks
- Catering meals
- Restaurant meals
- Sauces, condiments and spices
- Potatoes products
EU benchmarks & food categories

- Benchmarks for food categories that commonly represent major sources of salt in average diets
  - Bread 16 % in 4 years
  - Ready meals 16 % in 4 years
  - Meat products 16 % in 4 years
  Acknowledging that sub-categories of meat may have different benchmarks, including reducing variations between similar products
  - Cheeses 16 % in 4 years
  Acknowledging that sub-categories of cheese may have different benchmarks, including reducing variations between similar products

- Food producers encouraged to move towards the ‘best in class’ levels (lowest possible salt levels) for all categories of food

- Exceeding the 16% target or improving the ‘best in class’ levels is strongly encouraged
If you set a maximum target, this will move those products at the high end of the category down. However, these may not be big sellers in the market and, if this is the case, the maximum set will have little impact on reducing intakes. In addition, those companies that do not have products above this level do not have to do any work.

An average target can be set much lower and if applied to an individual company’s product category will encourage more action to be taken, and will mean that more products in the category need to be reformulated to reduce levels of salt.

The UK has done some modelling work which shows that to achieve a similar overall reduction in intakes from a food sector an average target (in the majority of cases) needs to be reduced by far less than a maximum.
Monitoring & Surveillance

Population salt intake
Salt content of food
Salt consumption in Britain

<table>
<thead>
<tr>
<th></th>
<th>1990's</th>
<th>2000-1</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (n=199)</td>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Women (n=202)</td>
<td>7.7</td>
<td>8.1</td>
<td>9.5</td>
</tr>
<tr>
<td>All (n=401)</td>
<td>9.5</td>
<td>8.6</td>
<td></td>
</tr>
</tbody>
</table>
Monitoring of salt content of foods

• Databanks
  – Salt content of foods that contribute the most sodium in the diet
    • Sampling plan
    • Market share
    • Data from nutrition label data. Company websites, industry, trade associations, analysis of foods (costly!)

• Self-reporting by industry
  – Trade associations
  – Individual companies
  – Individual products by industry
Research
Risk of incident stroke associated with higher compared with lower salt intake in 14 population cohorts from 10 published prospective studies including 154,282 participants and 5,346 events

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample size</th>
<th>Events</th>
<th>Follow-up (years)</th>
<th>Relative risk (95% CI)</th>
<th>Sodium difference (mmol/day)</th>
<th>Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kagan 1985(^{10})</td>
<td>7895</td>
<td>238</td>
<td>10</td>
<td></td>
<td>100</td>
<td>0.92 (0.60 to 1.42)</td>
</tr>
<tr>
<td>Hu 1992(^{11})</td>
<td>8562</td>
<td>104</td>
<td>4</td>
<td></td>
<td>1.79 (1.18 to 2.70)</td>
<td></td>
</tr>
<tr>
<td>Alderman 1995(^{6})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1900</td>
<td>17</td>
<td>3.5</td>
<td></td>
<td>150</td>
<td>0.59 (0.10 to 3.43)</td>
</tr>
<tr>
<td>Women</td>
<td>1037</td>
<td>6</td>
<td></td>
<td></td>
<td>120</td>
<td>2.10 (1.01 to 4.33)</td>
</tr>
<tr>
<td>He 1999(^{9})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weight</td>
<td>6797</td>
<td>430</td>
<td>19</td>
<td></td>
<td>100</td>
<td>0.99 (0.81 to 1.20)</td>
</tr>
<tr>
<td>Overweight</td>
<td>2688</td>
<td>250</td>
<td></td>
<td></td>
<td>100</td>
<td>1.39 (1.10 to 1.76)</td>
</tr>
<tr>
<td>Tuomilheto 2001(^{13})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1173</td>
<td>43</td>
<td></td>
<td></td>
<td>100</td>
<td>1.00 (0.68 to 1.48)</td>
</tr>
<tr>
<td>Women</td>
<td>1263</td>
<td>41</td>
<td></td>
<td></td>
<td>100</td>
<td>1.34 (0.87 to 2.06)</td>
</tr>
<tr>
<td>Nagata 2004(^{14})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>13355</td>
<td>137</td>
<td>7</td>
<td></td>
<td>110</td>
<td>2.34 (1.23 to 4.47)</td>
</tr>
<tr>
<td>Women</td>
<td>15724</td>
<td>132</td>
<td></td>
<td></td>
<td>92</td>
<td>1.70 (0.96 to 3.00)</td>
</tr>
<tr>
<td>Cohen 2006(^{15})</td>
<td>7154</td>
<td>79</td>
<td>13.7</td>
<td></td>
<td>92</td>
<td>0.56 (0.28 to 1.11)</td>
</tr>
<tr>
<td>Geleijnse 2007(^{16})</td>
<td>1448</td>
<td>181</td>
<td>5</td>
<td></td>
<td>69</td>
<td>1.08 (0.81 to 1.45)</td>
</tr>
<tr>
<td>Larsson 2008(^{18})</td>
<td>26556</td>
<td>2702</td>
<td>13.6</td>
<td></td>
<td>84</td>
<td>1.04 (0.93 to 1.17)</td>
</tr>
<tr>
<td>Umesawa 2008(^{19})</td>
<td>58730</td>
<td>986</td>
<td>12.7</td>
<td></td>
<td>85</td>
<td>1.55 (1.20 to 2.00)</td>
</tr>
</tbody>
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Combined effect: P=0.007

Heterogeneity: P=0.04, Egger’s test: P=0.26


<table>
<thead>
<tr>
<th>Intervention</th>
<th>U.S. Population</th>
<th>Medicare Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost of Intervention (billions of dollars)</td>
<td>Reduction in Health Care Costs (billions of dollars) †</td>
</tr>
<tr>
<td><strong>Reduction in dietary salt</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 g/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low estimate</td>
<td>0.3§</td>
<td>4.1±0.8</td>
</tr>
<tr>
<td>High estimate</td>
<td>0.3§</td>
<td>7.0±1.4</td>
</tr>
<tr>
<td>3 g/day</td>
<td></td>
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<td>12.1±2.4</td>
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<tr>
<td>High estimate</td>
<td>0.3§</td>
<td>20.4±4.1</td>
</tr>
<tr>
<td>Hypertension treatment¶</td>
<td>19.5±0.1</td>
<td>14.2±2.7</td>
</tr>
<tr>
<td><strong>Gradual reduction in dietary salt, 2010–2019†</strong></td>
<td></td>
<td></td>
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<tr>
<td>1 g/day</td>
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<td>18.9±3.8</td>
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<tr>
<td>High estimate</td>
<td>2.7§</td>
<td>31.6±6.5</td>
</tr>
<tr>
<td>3 g/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low estimate</td>
<td>2.7§</td>
<td>56.9±11.5</td>
</tr>
<tr>
<td>High estimate</td>
<td>2.7§</td>
<td>95.6±19.6</td>
</tr>
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</table>

* Plus–minus values are means ±SE from the Monte Carlo simulations. QALY denotes quality-adjusted life years.

† The reduction in health care costs is for the U.S. population of persons 35 years of age or older. Costs were discounted at 3% over the course of the decade.

‡ These values represent the ratio of the cost of the intervention in dollars to the number of QALYs gained as a result of the intervention. In some cases this calculation results in a negative number because the savings in health care costs as a result of the intervention are greater than the total cost of the intervention itself. In these cases, the intervention is described as cost saving. The column “Cost saved per dollar spent on the intervention” provides an estimate of the magnitude of these savings.

§ The cost of a population-wide regulatory approach to salt reduction is estimated at $1 per person per year, discounted at 3% over the course of the decade, according to the World Health Organization, and the total U.S. population was 306,913,687 persons as of July 2009, according to the U.S. Census.

¶ Hypertension treatment was defined on the basis of treatment of all persons with hypertension to the degree described in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial; the cost-effectiveness analysis was also based on the results of this trial.

† The gradual reduction from 2010 to 2019 represents a cumulative effect, with one third of the total reduction achieved in 2012, another third in 2015, and the final third in 2019.
The more salt we eat, the more salt we demand!

Gradual reduction in salt content of food is not detected by consumers!

Randomised Controlled Trial

% of sodium content in bread
100%
95%
90%
85%
80%
75%
Control group (N = 55)

Intervention group (N = 55)

Follow-up visit (wk)
Baselne 1 2 3 4

Taste

% of participants reporting bread diff to wk before
80%
60%
40%
20%

Baseline 1 2 3 4 5 6
Follow-up visit (wks)

Intervention group
Control group

Other World Actions to reduce population salt intake

- **Canada**: 2004 Health Survey – 2006 Hypertension Prevention & Control Programme – 2008 MoH WG (Health Canada) to reduce salt intake
- **USA**: 2010 IOM Report – Strategies to reduce sodium intake in the US
- **Barbados**: 2009 ‘Battling the hidden enemy’
- **PAHO/WHO**: 2009 Consensus Statement – actions in Mexico, Argentina, Brazil, Chile, Uruguay, Barbados, Jamaica, Costa Rica ....
- **Finland**: 1970s salt reduction campaign – 1979-82 North Karelia, then national – 1993 salt-labelling legislation
- **France**: 2001 MoH 4% lower salt over 5 yrs – 2002 AFSSA recommendations of 20% reduction over 5 yrs
- **Ireland**: 2003 FSAI Salt Reduction Programme – 2005 target of 6g/d
- **United Kingdom**: 2003 SACN sets targets to 6g/d and plan: cooperation with food industry, public awareness campaigns, voluntary nutrition labelling
Key messages

- Dietary salt is an important contributor to high blood pressure.
- Reducing salt lowers blood pressure and prevents cardiovascular disease.
- Salt intake in the Western world is higher than the levels recommended for health.
- Policies to reduce population-wide salt intake are most effective, can have a high impact and can be cost-saving.
Reducing salt intake

Most dramatic impact will be to reduce hidden salt in manufactured foods

Reduction can be achieved by

- gradual reduction of salt by food manufacturers and restaurateurs
- a public campaign on health benefits of salt reduction
- raising consumer attention to salt levels on food labels
- monitoring salt consumption and salt in foods
Anticipated outcomes

- Increased consumer *awareness* of the health dangers of high dietary salt
- Increased consumer *demand* for lower salt foods
- Increased *development* of lower salt foods by the food sector
- Increased *government monitoring* of dietary salt as a health parameter
- *Gradual reduction* in dietary salt such that most people are below the upper limit