The 'good buy' diet: what works in practice

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Disclosures: *Technical Advisor to the World Health Organization, the Pan American Health Organization, Member of C.A.S.H., W.A.S.H., UK Health Forum and Trustee of the Student Heart Health Trust – all unpaid.*

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Evolutionary diet

- Profound changes in the composition of human diet with the introduction of agriculture and animal husbandry ~10,000 years ago
- Salt: necessity for life – first international commodity of trade – great symbolic importance and economic value – first state monopoly – property of preserving foods from decay – enhancing flavors fulfilling hedonic reward
- Evolutionary diet: estimated intake for sodium ~10mmol/d and for potassium ~200mmol/d (ratio ~0.05)
- Modern diet: measured intake for sodium ~170mmol/d and for potassium ~60mmol/d (ratio ~2.5)

Eaton SB et al. Am J Med 1988; 84: 739-49
Cordain L et al. Am J Clin Nutr 2005; 81: 341-54

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No one has ‘normal’ salt consumption

- Salt was scarce for most hominid evolution
- First manufactured 6,000 years ago
- Mass produced for only a few hundred years

Yanomamo Indian

On ‘evolutionary’ diet (i.e. almost no salt [<1 g/day], very little fat, no refined carbohydrate, fruits & vegetables ↑↑, but aggressive fit, stress ↑↑↑)

No high BP, no rise in BP with age, no adverse health consequences, no vascular disease

Male adults:	BP:	96 / 61 mmHg
	Cholesterol:	3.1 mmol/L

from Cappuccio FP & Capewell S. Functional Food Rev 2015; 7: 41-61

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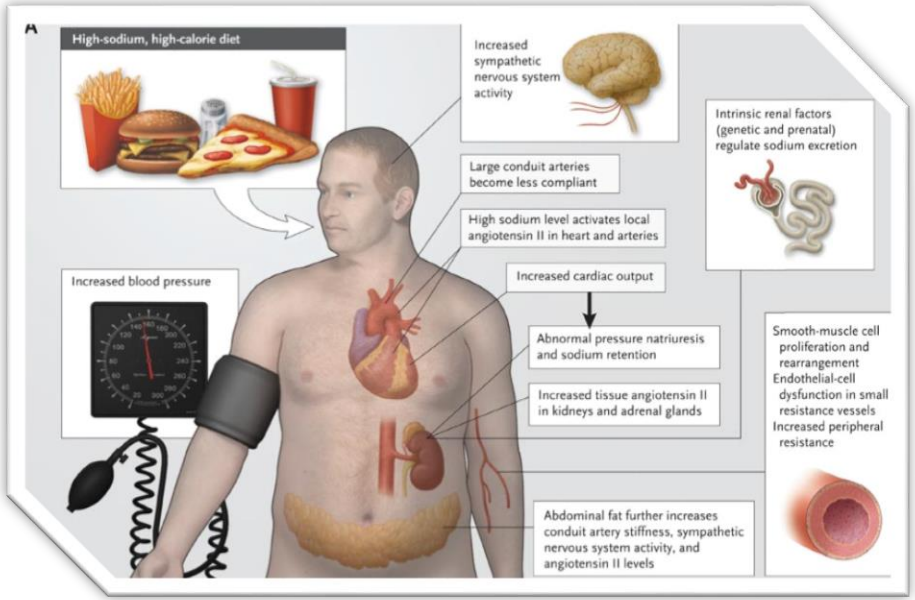
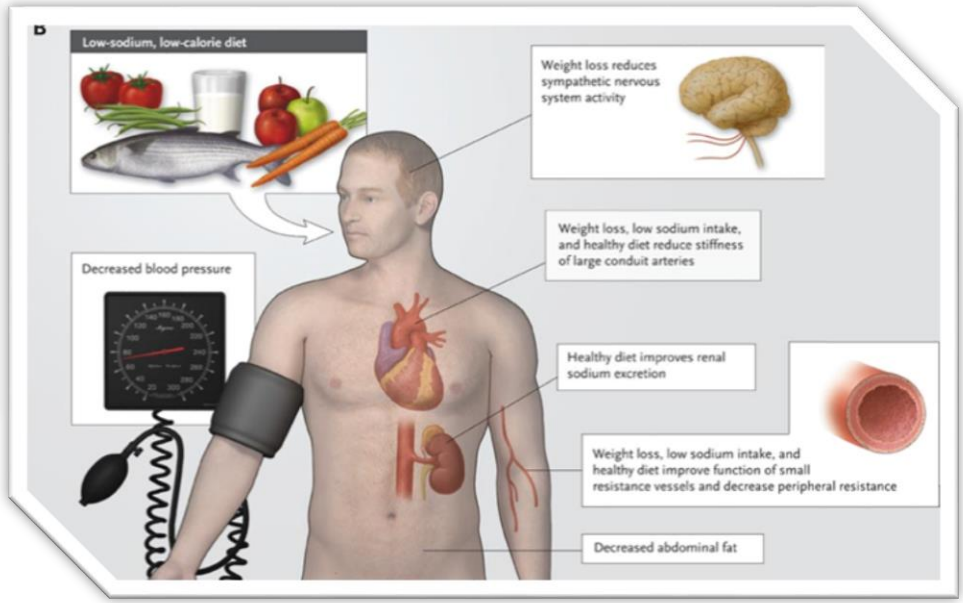
Mechanisms Linked to Increases in Blood Pressure and the Therapeutic Effects of Healthful Dietary Patterns, Sodium Reduction, and Weight Loss



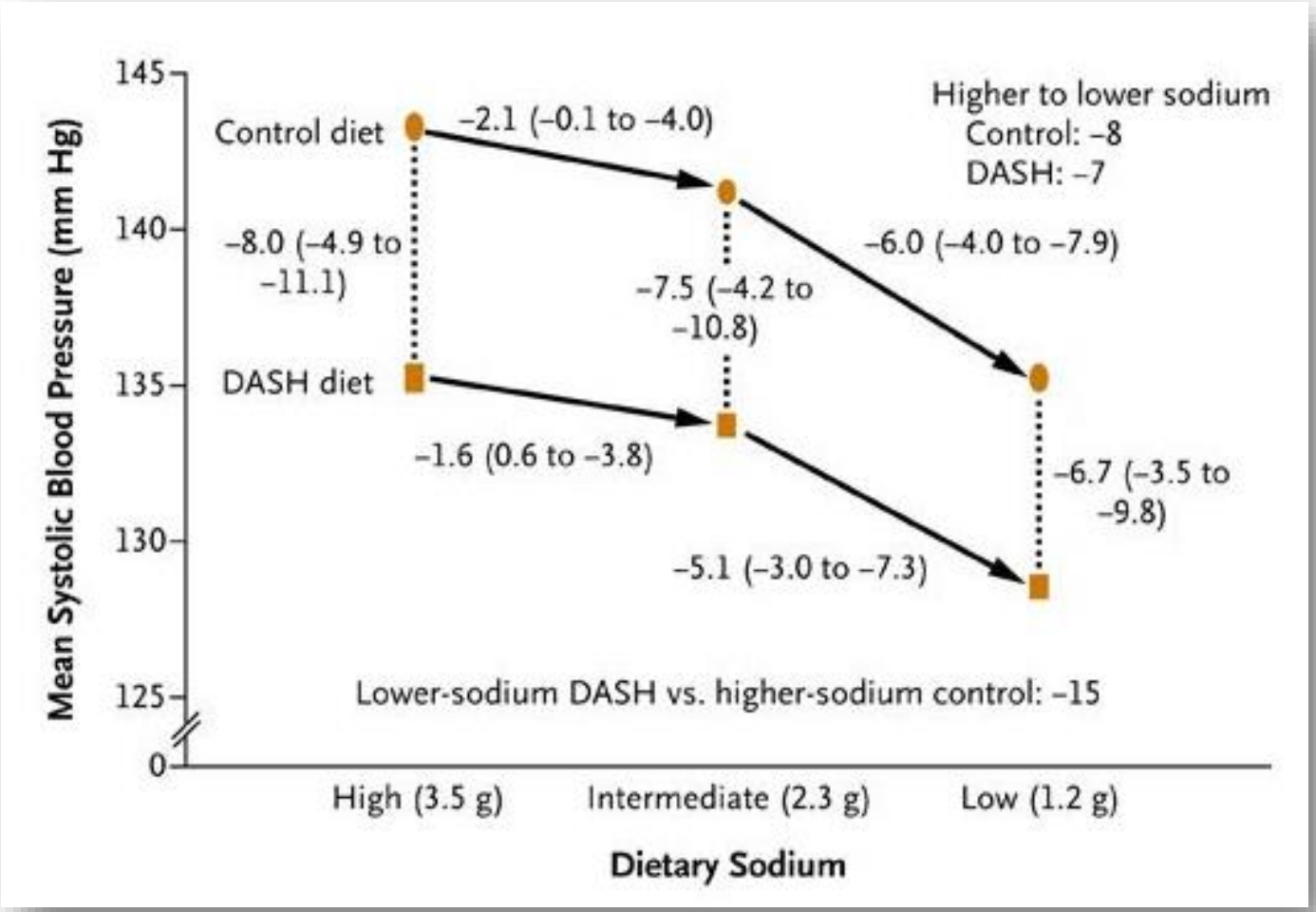


Sacks F, Campos H. N Engl J Med 2010; 362: 2102-12

‘Women sprinkling salt on their husbands to stimulate their sexual performance’

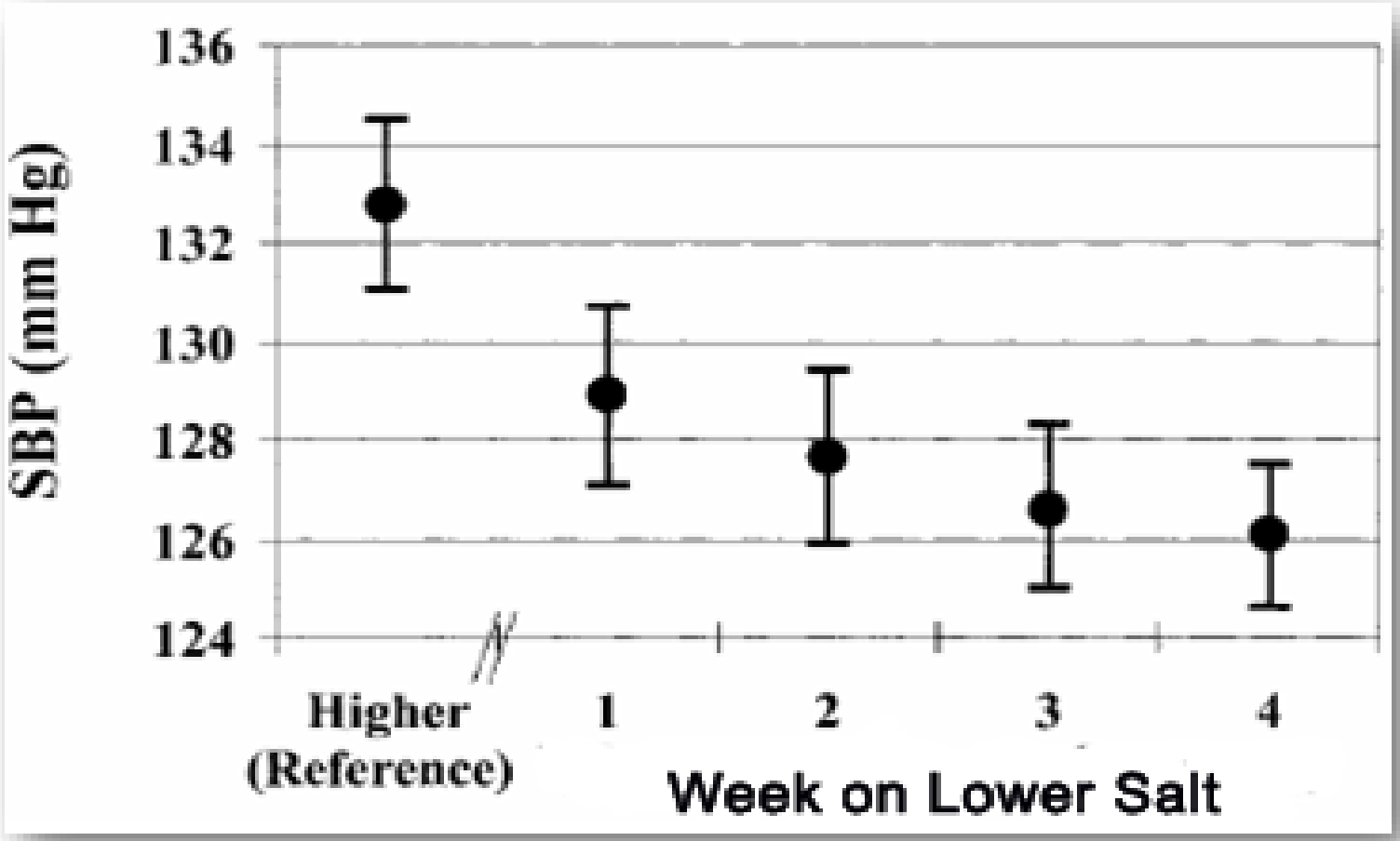
Anonymous woodcut

Sodium Reduction, the DASH Diet, and Changes in Systolic Blood Pressure



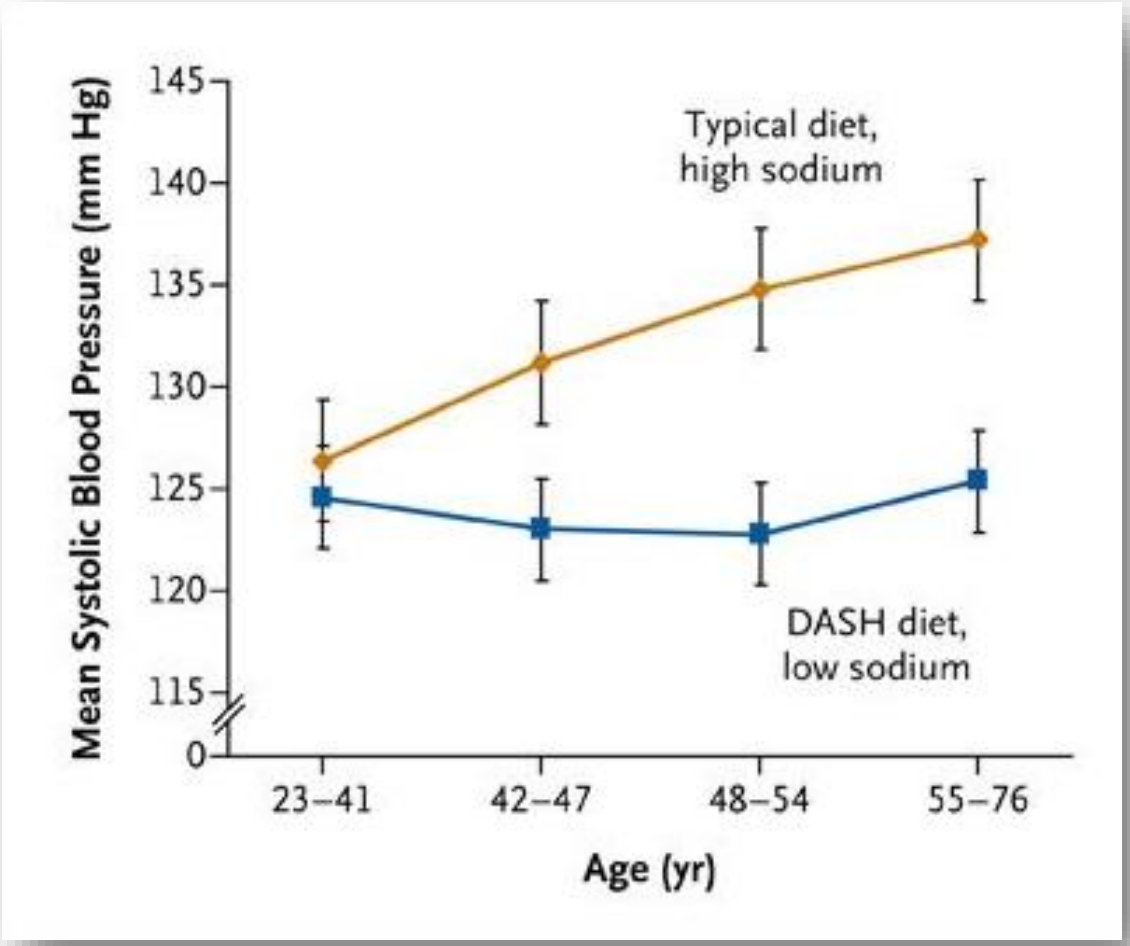
Sacks F, et al. N Engl J Med 2010; 362: 2102-12

Effects of salt reduction on blood pressure over time



Obarzanek E et al. Hypertension. 2003; 42: 459-67.

Effects of a Low-Sodium DASH Diet on Systolic Blood Pressure with Increasing Age

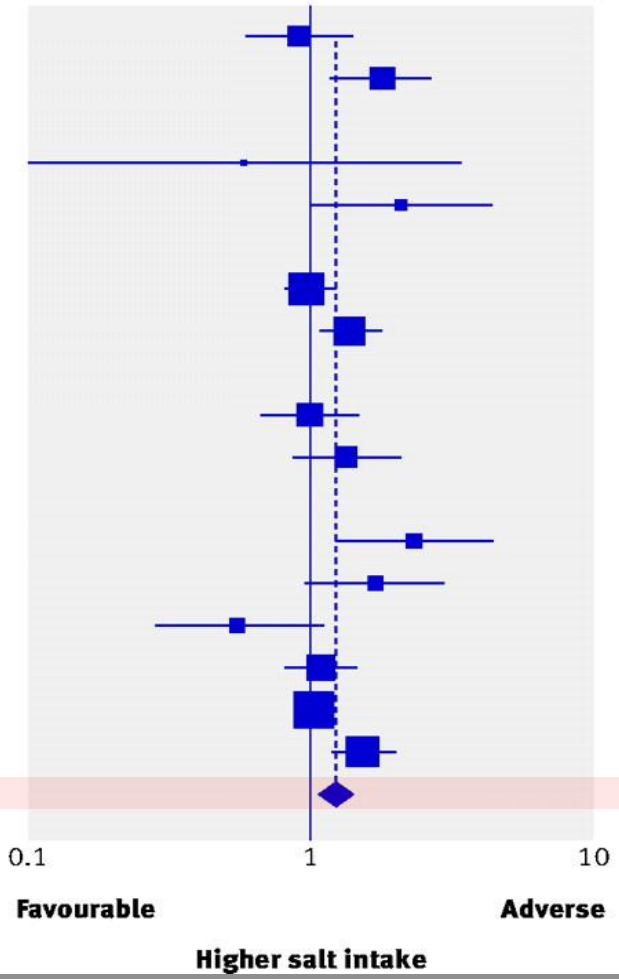


Sacks F et al. N Engl J Med 2010; 362: 2102-12

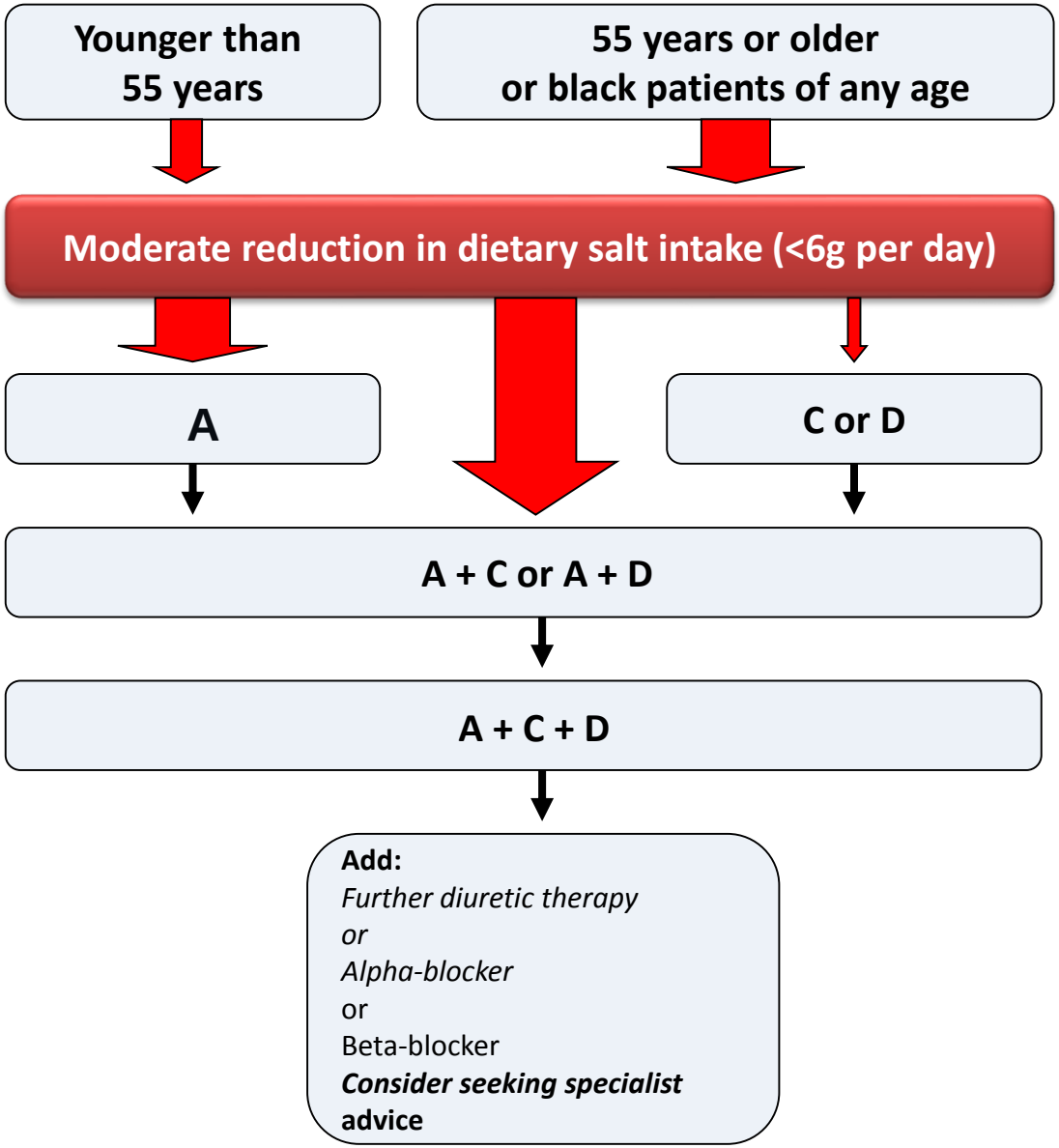
Salt intake, stroke and CVD: meta-analysis of prospective studies

Study	Sample size	Events	Follow-up (years)	Relative risk (95% CI)	Sodium difference (mmol/day)	Relative risk (95% CI)
Kagan 1985[10]	7895	238	10		100	0.92 (0.60 to 1.42)
Hu 1992[11]	8562	104	4			1.79 (1.18 to 2.70)
Alderman 1995[6]						
Men	1900	17	3.5		150	0.59 (0.10 to 3.43)
Women	1037	6			120	2.10 (1.01 to 4.33)
He 1999[9]						
Normal weight	6797	430	19		100	0.99 (0.81 to 1.20)
Overweight	2688	250			100	1.39 (1.10 to 1.76)
Tuomilheto 2001[13]						
Men	1173	43	13		100	1.00 (0.68 to 1.48)
Women	1263	41			100	1.34 (0.87 to 2.06)
Nagata 2004[14]						
Men	13 355	137	7		110	2.34 (1.23 to 4.47)
Women	15 724	132			92	1.70 (0.96 to 3.00)
Cohen 2006[15]	7154	79	13.7		92	0.56 (0.28 to 1.11)
Geleijnse 2007[16]	1448	181	5		69	1.08 (0.81 to 1.45)
Larsson 2008[18]	26 556	2702	13.6		84	1.04 (0.93 to 1.17)
Umesawa 2008[19]	58 730	986	12.7		85	1.55 (1.20 to 2.00)
Combined effect: P=0.007	154 282	5346				1.23 (1.06 to 1.43)

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



Strazzullo P et al. Br Med J 2009; 339: b4567



Cappuccio FP. Chapter 50. Dietary salt reduction.
In: *Therapy in Nephrology & Hypertension: a companion to Brenner & Rector's The Kidney. Third Edition*.
CS Wilcox ed., Saunders, Elsevier Inc. 2008; 583-90

Population salt reduction for the prevention of cardiovascular disease

- A reduction in salt intake reduces BP
- A reduction of 5g per day may reduce strokes by as much as 23% (i.e. 1.25M deaths worldwide)
- Evidence of benefits as low as 3g salt per day
- Effective in both genders, any age, ethnic group, high, medium and low-income countries
- Population salt reduction programs are both feasible and effective (preventive imperative)
- Salt reduction programs are cost-saving (*US:* $6-12 saved for every $ spent; *UK:* £40m a year saved for 3g/d population salt reduction) (economic imperative)
- Policies are powerful, rapid, equitable, cost-saving

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Components of a strategy to reduce population salt intake

Communication

- **<u>Public Awareness Campaigns</u>**
- Consumers
- Food industry
- Decision makers
- Media
- Health Professionals

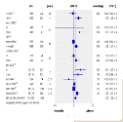
Reformulation

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

- **Voluntary vs Regulatory**

Monitoring

- **<u>Population salt intake</u>**
- 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
- Evaluation
- Policy

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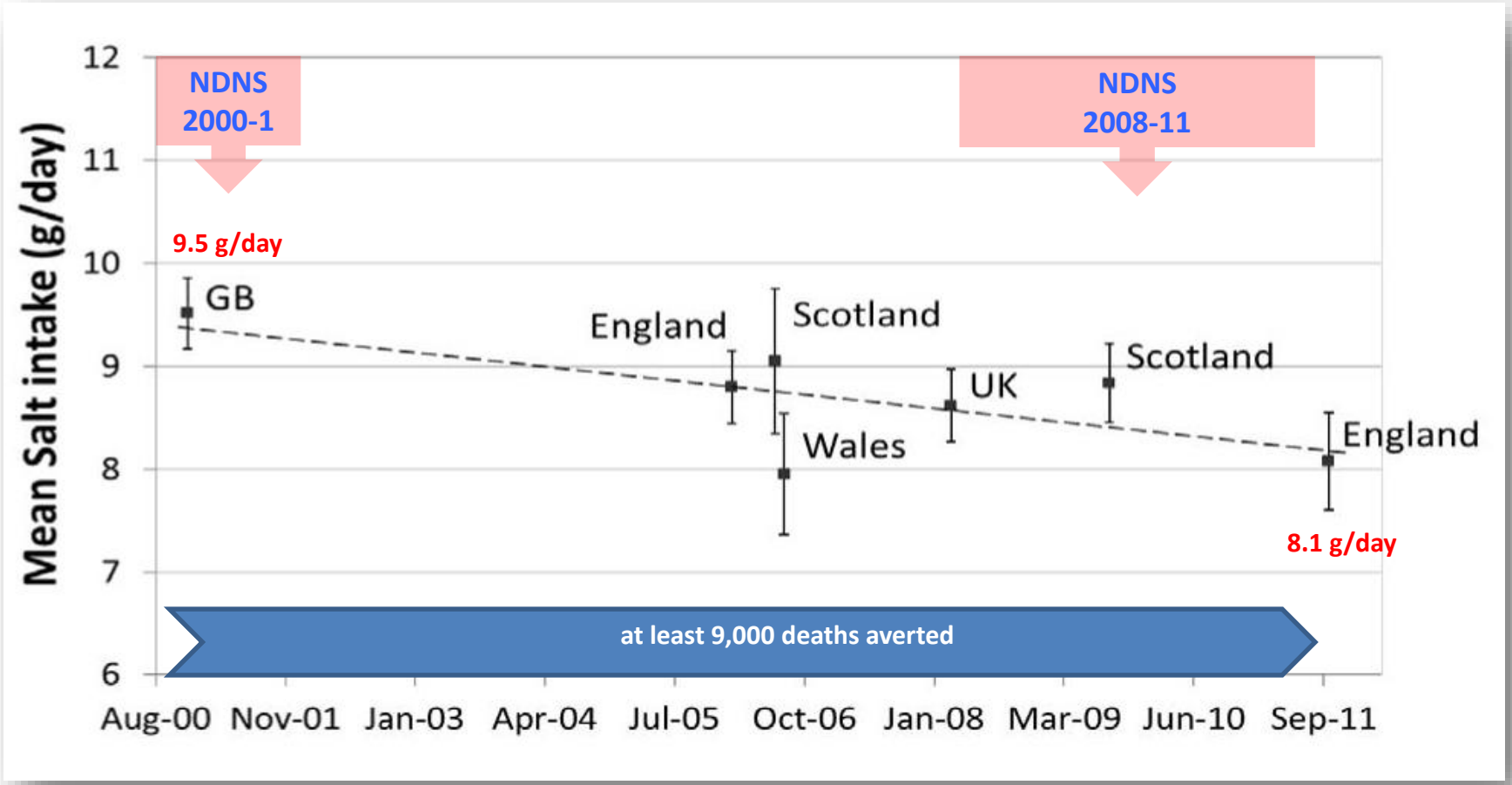
Cappuccio FP et al. Br Med J 2010;343:402-5

Salt intake reduced by 1.4 g/day in the UK between 2000 and 2011



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ANALYSIS

Food and the responsibility deal: how the salt reduction strategy was derailed by Andrew Lansley and the coalition government

The food we eat is now the biggest cause of death and ill health in the UK, owing to the large amounts of salt, saturated fat, and sugars added by the food industry. **Graham MacGregor**, **Feng He**, and **Sonia Pombo-Rodrigues** discuss the Food Standards Agency's successful salt reduction strategy and how the responsibility deal has stalled its progress. They call for urgent action to protect and improve our nation's health

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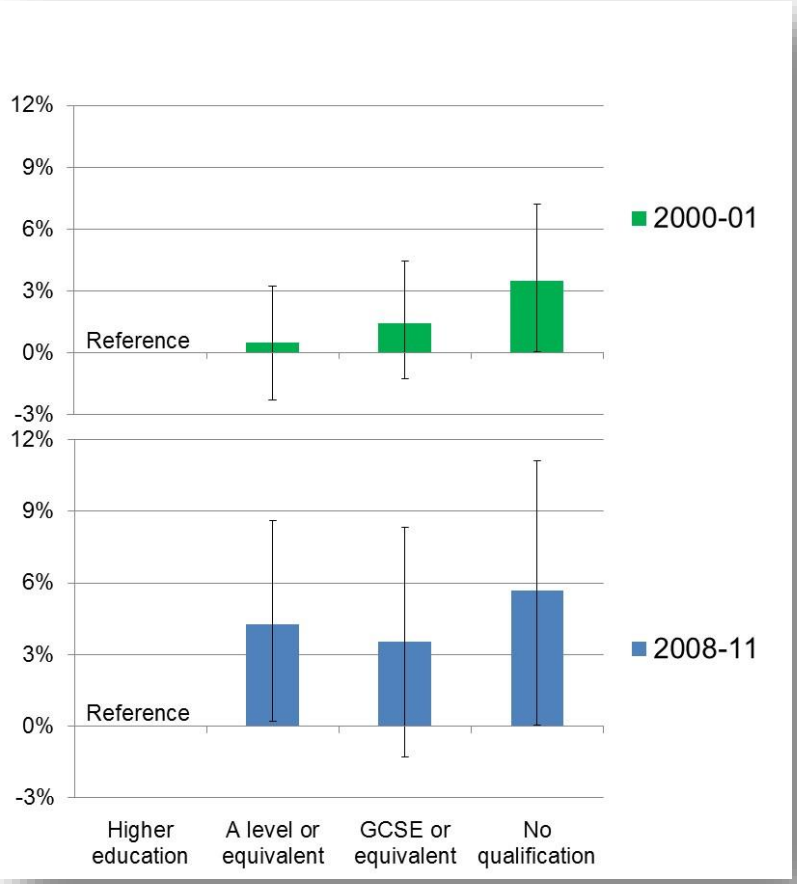
MacGregor GA et al. Br Med J 2015; 350: h1936

Social inequalities in salt intake in Britain before and after a national salt reduction programme



NDNS 2000-1 (n=2,105)

All whites

Dietary Na: 7-day food records

Urinary Na: 24h urine collections

Ji C et al. BMJ Open 2013; 3: e002246

NDNS 2008-11 (n=1,027)

All whites

Dietary Na: 4-day food diary

Na reduction: 366mg (0.9g salt) from food sources (non-discretionary)

Ji C & Cappuccio FP. BMJ Open 2014; 4: e005683

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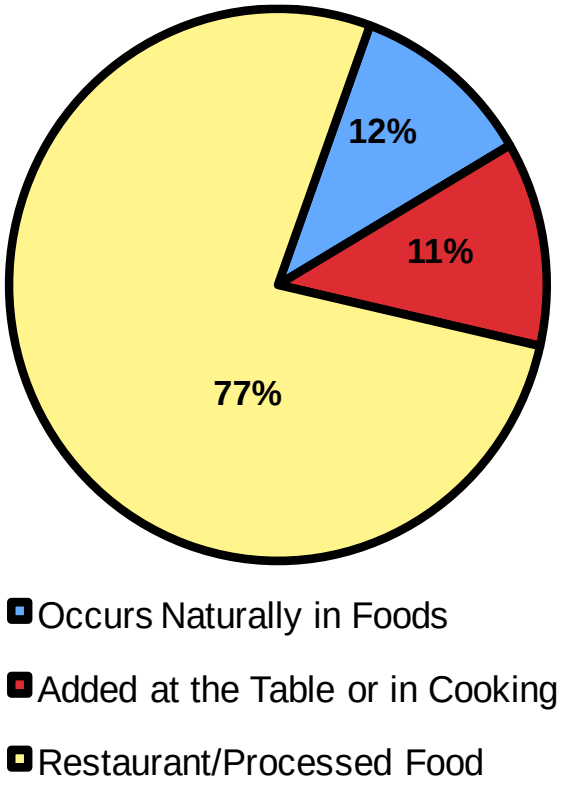
Where in our diet does salt come from?

In regions where most food is processed or eaten in restaurants



- 12% natural content of foods
- "hidden" salt: 77% from processed food – manufactured and restaurants
- "conscious" salt: 11% added at the table (5%) and in cooking (6%)

J Am College of Nutrition 1991; 10: 383-93

Industry vs Public Health Priorities

- Salt contributes to food safety
- Salt increases shelf-life
- Salt makes unpalatable food edible at virtually no cost
- Habituation to high salt foods increases demand – Profit on these foods tends to be greater
- Increasing salt concentration in meat products increases water binding capacity by up to 20%
- Salt intake is the main drive to thirst and thereby increases soft drink, beer and mineral water consumption

- High salt intake increases preventable ill-health (CV and non-CV)
- High salt intake increases the consumption of sugar-containing drinks, alcohol, hence calories.
- High salt intake is economically costly to society (healthcare costs)
- High salt intake creates addiction
- Moderate population reduction in salt intake is feasible, efficacious, cost-effective.

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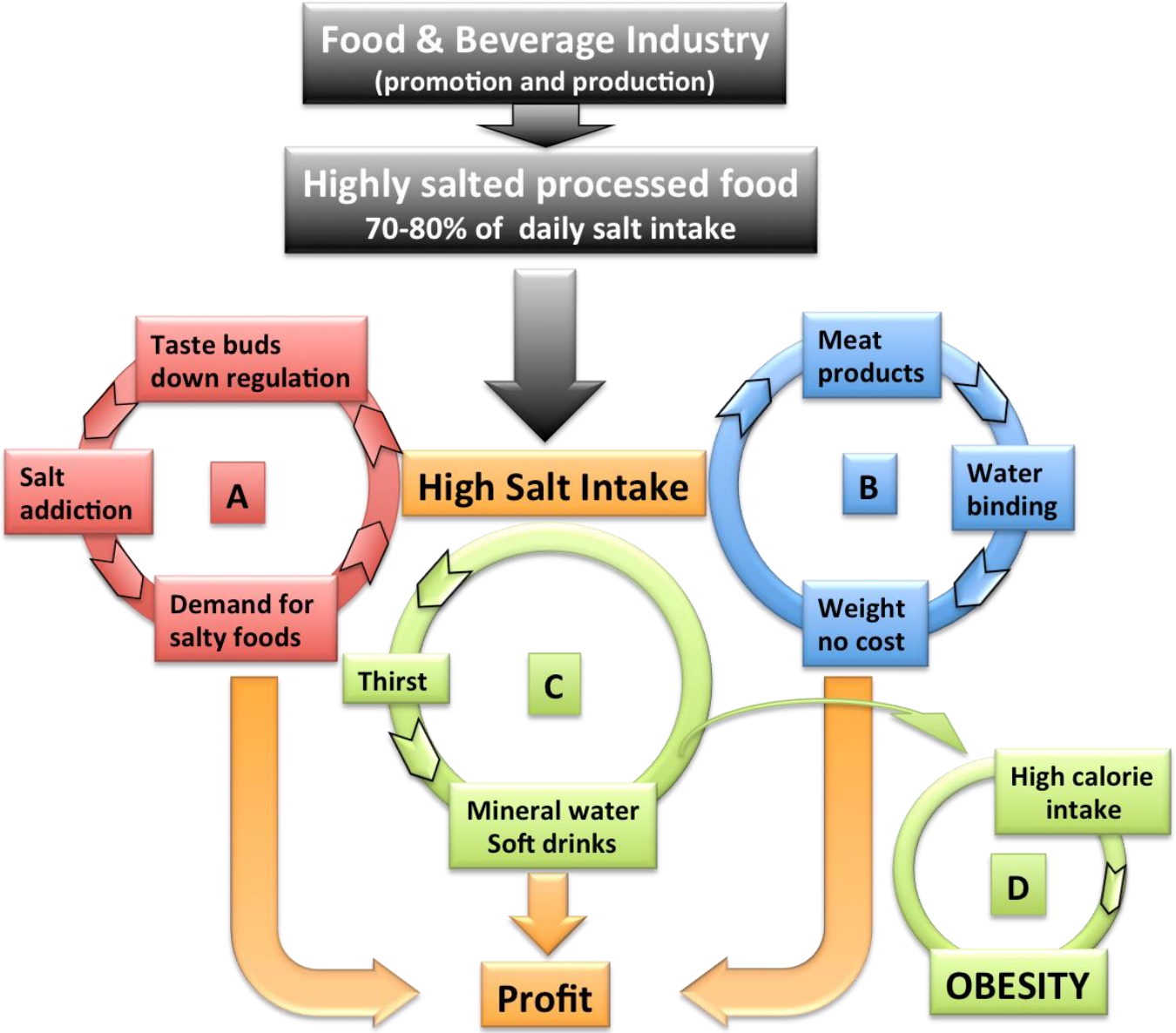
Cappuccio FP & Capewell S. Functional Food Rev 2015; 7: 41-61



Cappuccio FP & Capewell S. Functional Food Rev 2015; 7: 41-61

Who owns what in the food industry?

Source: Fritz Kreiss/Occupy Monsanto

"The world's 10 largest food and non-alcoholic beverage companies feed daily an estimated global population of several hundred million in >200 countries, generating a combined annual revenue of >$422b" (Source: IFBA, 2012)

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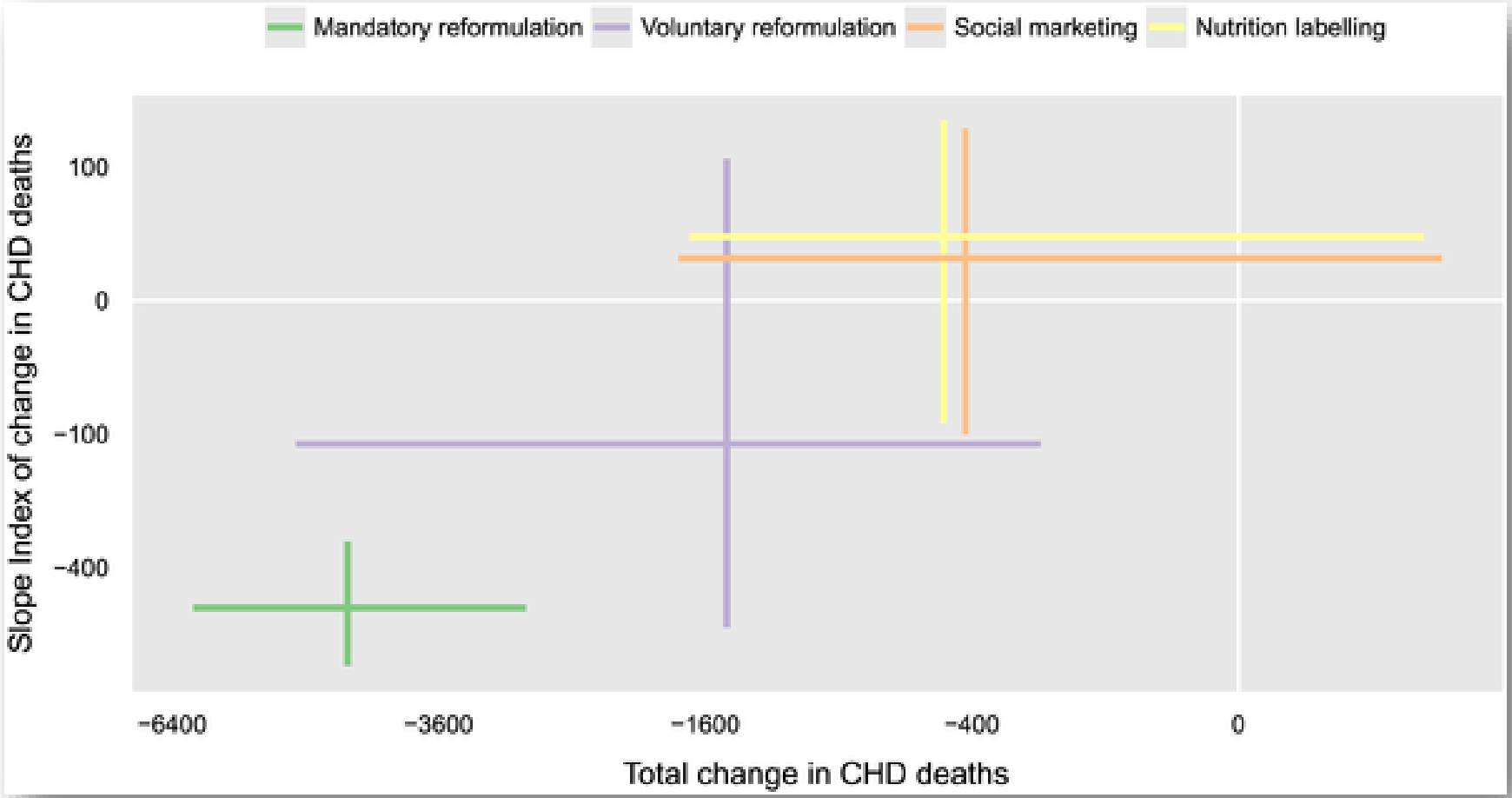
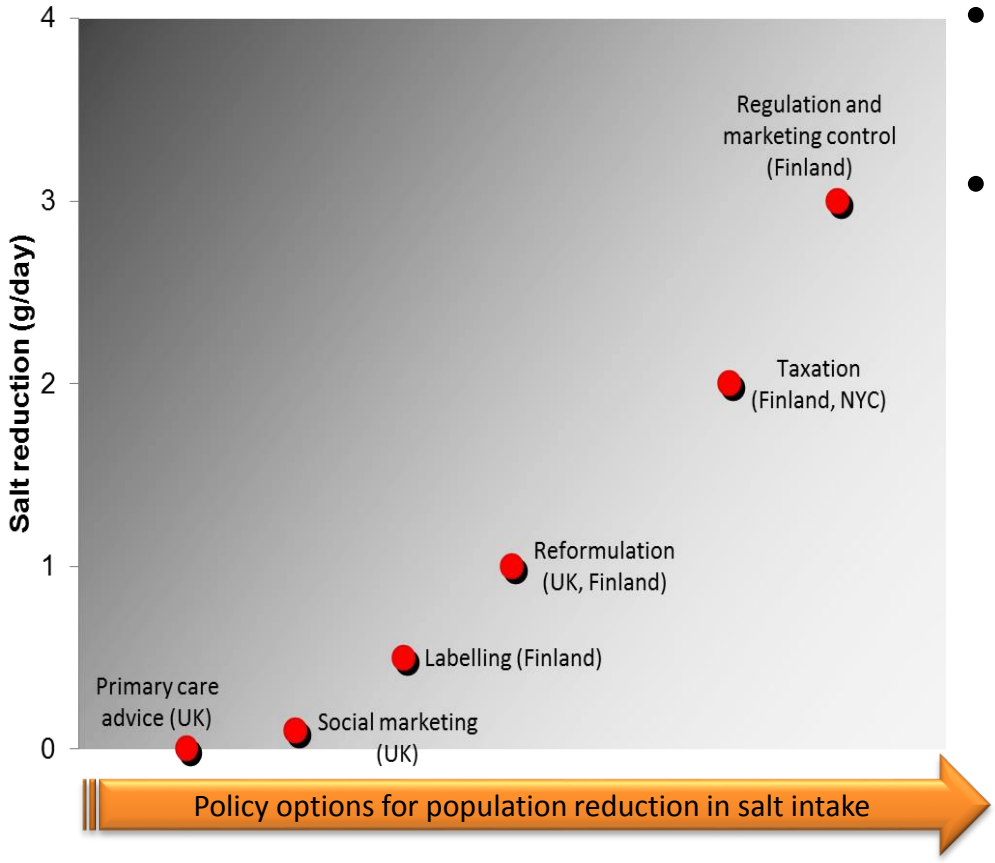
Policy forecast for England up to 2025:
health equity and effectiveness



Gillespie DOS et al. PLoS ONE 2015; 10: e0127927

Policy options: health equity and effectiveness



- Set in Marmot Reviews (UK and WHO, 2010)
- Policy interventions:
  - Structural ('upstream' affecting food environment) – e.g. legislative and fiscal changes, mandatory reformulation – effective and reducing inequalities
  - Agentic ('downstream' reliance on individual choice) – e.g. social marketing, awareness, health promotion, behavioural – politically more likely but fewer benefits and potentially widen inequalities.

Cappuccio FP et al. Br Med J 2010;343:402-5

Conclusions

- Salt intake is too high.
- Cause of avoidable ill-health and associated healthcare and social costs.
- A moderate reduction is feasible, achievable and cost-effective (saving).
- Different economies have different sources of dietary salt (from processed food and industrial food production to social and cultural behaviour in salt use).
- Strategies include public awareness campaigns, comprehensive reformulation programmes and surveillance of salt intake and food salt content.
- The food manufacturing and retail industries have the capability and the responsibility to contribute substantially to these aims given their outreach.
- Voluntary and effective food reformulation has been the preferred choice.
- Mandatory actions and state-led market interventions are available and being used (e.g. South Africa for mandatory reformulation, Belgium for salt in bread).
- Policies should be set to narrow the social inequalities in salt consumption.

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