16th European Congress on Obesity, Geneva, May 14 - 17, 2008

Financial Incentives in the Prevention of Obesity

Workshop Report

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1. Introduction

A well balanced diet and sufficient physical activity are key determinants of population health. Availability, type, quantity and quality of food, choices in the supermarket, the preparation of food and individual eating behaviour determine how healthy and well balanced a diet is. For physical activity behaviour, personal factors such as attitudes and motivation are important, but also an activity friendly physical environment and a supportive social environment.

There are thus determinants of healthy dietary behaviour and sufficient physical activity on the individual and the environmental level. Countless attempts addressing individual determinants have been undertaken to prevent or reduce overweight and obesity - some of them were successful, many others failed. These experiences demonstrate that information, campaigns and calls for more self-responsibility have their role, but are clearly not sufficient to stabilise - or ideally - reduce the overweight epidemic. Approaches to create environments and conditions that support healthy choices regarding diet and physical activity need to be explored.

Financial incentive measures are widely used and recognised as a tool for altering behaviour patterns that are potential threats to human health and the environment (e. g. charges on tobacco products, motor fuels, chemicals). Also in the prevention of overweight and obesity, financial incentives have moved to the centre of attention. Specific measures can be financial disincentives such as taxes or charges, they can also be positive incentives, like tax reductions, subsidies or a bonus for desired behaviours. These economic interventions can be conceptualised to target either dietary or physical activity behaviour or directly the reduction of body weight.

But is there any scientific evidence for positive effects of such measures on dietary behaviour, physical activity or body weight? - In fact, the scientific literature is still very scarce. Therefore, the Swiss NGO-Alliance Nutrition and Physical Activity undertook a first effort to document the current state of knowledge regarding selected topics for interested partners in the field. A workshop with international experts was organised in the context of the 16th European Congress on Obesity held in May 2008 in Geneva. This report summarises the key results and conclusions. Both selected results and conclusions represent the view of the authors of this report. Furthermore, the report provides the abstracts and handouts of the presentations.
2. Workshop Contributions

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<td>University of Aberdeen, UK</td>
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3. Financial incentives to change dietary behaviour - a Public Health Nutrition point of view: Summary and conclusions

Presentations
- Panos Konandreas: Agricultural policies and obesity in the international context
- Sean B. Cash: Taxes and subsidies on food, problems of implementation

Panos Konandreas presented the effects of taxes and subsidies on primary agricultural products, Sean B. Cash discussed taxes and subsidies on products on the consumer level.

Effects of taxes on consumer behaviour

Influencing eating behaviour via taxes on food is often discussed as a promising way of counteracting the obesity epidemic. Different taxes are suggested such as fat taxes, soft drink taxes and “couch potato” taxes, even a tax on an elevated Body Mass Index.
Both presentations named the main problems of taxes on food: Food is necessary to live, therefore changes in prices are not likely to have the desired effects on consumption - the price elasticity is small for most food items. Therefore taxes will only have substantial impacts on diets if the price increases are large and for poor consumers who spend a substantial part of their income on food. Also, in developed countries the bulk of final food expenditure (80% in the EU) results from marketing, processing etc. Therefore even substantial taxes on primary agricultural products will be masked.

Any new taxes on food are necessarily regressive, in that the largest relative impact will be on lower-income consumers. Taxing food with the concept of value added tax (VAT) and excluding basic food items could reduce the regressive effects; but to have some effect, the price increases of taxed foods would have to be substantial. In addition, taxes targeted on specific “undesirable” food items may shift consumption away from these items without actually improving dietary quality, as consumers may increase consumption of other foods in ways that may not be healthy.

Effects of subsidies on consumer behaviour

Subsidies could be used to make healthy foods cheaper and to enhance their consumption. Subsidies are progressive: it is known that low-income people who buy less fruit and vegetables are more often overweight or obese but they also respond more to price signals. By influencing consumer behaviour, subsidies may also have a positive impact on producers who would respond to increased and sustained demand and shift production to more healthy foods.

Subsidies may be more effective and are likely to be more acceptable to the public than taxes. However, careful targeting is necessary either in terms of the foods being subsidized and/or the beneficiary consumers.

There are some positive examples for subsidies:
- Lowering fresh fruit prices in a worksite cafeteria by 50% increased sales 3-fold.
- Price reductions of 10%, 25%, and 50% on low-fat snacks in vending machines combined with informational material increased sales by 9%, 39%, and 93%, respectively.

Some considerations

There are some questions regarding taxes and subsidies to be considered:
- Which food should be taxed/subsidised and to what extent?
- Are taxes effective in changing consumption habits of the target population? Low income people are likely to be affected more by taxes than rich individuals. What are the substitutes among those who can not afford the taxed foods?
- What is the goal of a tax: should it achieve a reduction of the prevalence of disease by changing consumption patterns, in which case tax rates would have to be large? Or should taxes be more modest and levied in order to raise revenue which can be used to run health promotion programs or pay for food subsidies?
- How will the producers react to taxes and subsidies on foods? Will they produce more of the desirable foods? Should incentives be offered to producers in order to produce more of the desirable foods?
- Are there any interactions with other regulations or programs?
- Will there be any undesired reactions? For example, in the last 30 years Canadian consumers reduced their whole milk consumption and drank more low-fat milk. At the same
time, the consumption of cream and cheese increased. Obviously, the fat removed from the milk appears on the market in other products. What will happen with a fruit and vegetable subsidy? Will consumers eat more fruits and vegetables or will they spend the money they have saved on more expensive products or more unhealthy foods?

- The Common Agricultural Policy of the European Union (CAP) taxed mainly “bad” foods associated with adverse health effects, notably sugar, dairy products and meat and subsidized amongst other things fruits and vegetables. Yet the energy supply to EU citizens has strongly increased in the past 40 years, also the supply of fat, saturated fat, cholesterol and sugar; the ratio of n-6- to n-3 fatty acids worsened and obesity has increased.

- One study suggests that a sustained one-percent subsidy of all fruits and vegetables could avoid 10,000 fatalities of heart disease and stroke for US $1.3 million each (the value of a statistical life is estimated to be between US $4 and $9 million), further highlighting that the focus should perhaps be on encouraging healthy eating rather than penalizing consumption of “bad” foods.

- Finally, the idea of taxing an elevated BMI is very problematic: Health does not steadily decrease with higher BMI (it even increases within some ranges and for specific cases); The BMI is determined jointly by behavioural factors and genetics (- should we tax our genes?); increased muscular mass also increases the BMI.

Conclusions

- The current agricultural policy of the EU isn’t the main culprit for EU’s dietary problems. And it isn’t an efficient instrument to curb obesity. If anything, future CAP reforms, making food cheaper than in the past, are likely to worsen EU’s nutritional problems.

- Food taxes as a stand-alone measure to reduce food intake are not desirable.

- Subsidies might be a promising way to influence eating behaviour in a positive way, but they require high funding and careful design of interventions to ensure effective targeting.

- Subsidies and taxes might encourage consumers to switch away from one close substitute for another, for example Coke to Diet Coke.

- Food taxes on certain products combined with subsidies on desired foods like fruits and vegetables may play a role in future nutrition policy. Food taxes might also be of value to raise funds which could be used for nutrition education and prevention programs.

- Perhaps taxing food via VAT is a viable option if basic food items are excluded and therefore regressive effects minimised.

- Governments subsidize many unhealthy programs. A “health filter” on these programs could prevent harmful effects on health and release funds for more healthy interventions.

4. Financial incentives to change physical activity: Summary and conclusions

Presentations

- Tom Rye: Financial incentives in mobility management
- David Ogilvie: The potential to promote physical activity through mobility management

Both presentations covered the potential of financial measures to change individual mode choice in the transport domain. The topic was introduced by Tom Rye, a transport researcher specialised e.g. in mobility management and the development of travel plans. Then David
Ogilvie, a public health physician interested in the relationship between the environment, transport, physical activity and health made the link to physical activity promotion. This summary integrates the key messages of both presentations.

Financial incentives in transport interventions

The workshop focused only on interventions attempting to influence transport choices (for getting from A to B) - even though financial measures to enhance physical activity could also be applied in interventions addressing leisure time activities (e.g. free entrance to swimming pools for children).

In the transport domain, there are different levels where decisions that may have an impact on physical activity could be influenced by financial measures (Frank et al, Am J Prev Med 2004):
1. Regional and local transportation investment decisions
2. Location choice decisions (for workplaces, services, housing) made by institutions, developers on the organisational level and finally end-users
3. Individual travel choice decisions

The workshop concentrated mainly on the third level, because this is the level at which financial incentives could most easily be applied to the individual, and also because it is the topic about which the most published research exists.

Mobility management addresses individual travel choices and covers a broad range of measures among them for example mobility plans for companies or schools. There are further measures to influence mode choice using financial incentives, e.g. parking space management or congestion charging. To alter mode choice, usually financial disincentives to use cars are applied (e.g. parking fees, taxes, charges), but sometimes also financial incentives to make alternative modes of transports more attractive are offered (e.g. bonus for not requesting a parking space, subsidies for public transport, free bikes at employment sites). When studying the effectiveness of interventions in the transport sector (using financial incentives - but also other measures) one has to be aware that outcome measures used in transport research are often different from those outcomes that would be most relevant for physical activity promotion (fig. 1). While transport research often uses traffic counts to evaluate interventions, walking and cycling behaviour (and - ideally - total physical activity) would be most relevant in physical activity promotion and the prevention of overweight and obesity. Changes in traffic counts or modal shifts can be some indication of a development in the desired direction but more evidence is needed to demonstrate the effectiveness of such measures to increase physical activity.

**Effectiveness of interventions using financial incentives**

![Figure 1. Studying the effectiveness of transport interventions: different outcomes](image)

- Traffic counts
  - Number of: cars / bicycles / pedestrians
- Modal split (regarding duration of trips or distances covered)
  - Percentage of care use / public transport use / cycling / walking
- Transport behaviour (duration of trips or distances covered)
  - Transport cycling behaviour / transport walking behaviour
- Physical activity behaviour (duration, frequency and intensity of activities)
  - Cycling behaviour / walking behaviour
  - Total physical activity behaviour

relevance for physical activity promotion
It seems that until today little evidence is available to demonstrate that financial incentives targeting individuals to change their mode choice can - or cannot - increase physical activity. However, for other outcomes, some statements can already be made:

- Usually transport interventions (not only those using financial incentives and disincentives) aim at inducing a modal shift, primarily away from car use or a reduction of cars in absolute numbers. There seems to be good evidence that it is possible to reduce car use and change modal splits by a variety of measures including financial disincentives or incentives. And it seems, that the most successful travel plans to reduce car use all include financial incentives and disincentives.

- Substitutes for using one's own car can be public transport, car sharing, active modes of transport or new combinations of modes. Thus, reducing car use does not automatically result in an increase of active transport.

- There seems to be some weaker evidence, that financial disincentives, such as parking fees can increase the number of cyclists (and pedestrians); increases seem to be highest in locations where there is appropriate infrastructure for active transport.

- Moreover, after the introduction of the congestion charge in London the number of cyclists entering the city centre increased by some 50% between 2002 and 2006.

- Usually, walking has not been assessed in transport interventions using financial incentives (neither pedestrian counts nor walking behaviour).

- A shift from car use to public transport can result in an increase in walking, but – depending on the location of the destinations an individual usually visits - this is not automatically the case.

- Therefore, it does not seem possible to date to estimate the potential of financial incentives to increase the number of pedestrians or improve walking behaviour, at least within the context of site-based mobility management.

**General considerations**

It is obvious, that positive incentives are more acceptable than disincentives. However, the funds to offer incentives have to be raised first, before the money can be distributed. The advantage of applying disincentives is that the money collected can be redistributed as positive incentives or used for other purposes.

Furthermore, it has to be considered that disincentives have regressive properties: They may primarily have an effect among individuals with low incomes by forcing them to change their behaviour whereas those with higher incomes are not affected because they can easily pay the fees or taxes.

**Conclusions**

- There is sufficient evidence for using financial incentives at the population level in mobility management for the reduction of car use. The effects on cycling and walking are less clear (because often not assessed), other factors like access, quality/availability of infrastructure and motivation might be at least as important.

- The potential of financial incentives to influence decisions at the organisational level regarding location choices should be explored.

- More pilot interventions linking financial incentives with behaviour change that are properly evaluated are needed.
5. Financial incentives to prevent obesity: Summary and conclusions

Presentations

- Dieter Gaubatz: Financial incentives on life insurance fees in US products
- Virginia Paul-Ebbohimhen: Financial incentives in treatments for obesity and overweight: a systematic review of randomised controlled trials

5.1 Financial incentives on life insurance fees in US products

Dieter Gaubatz works with Swiss Re USA on preferred risks schemes in US life insurance products. The basic principle of preferred risk schemes is that the lower the health risks of a potential client, the lower the costs of his or her life insurance policy. A vast majority of the insurance plans sold in the US have a preferred risk design.

Preferred risk schemes

In this presentation, criteria related to nutrition and physical activity used to define prices of life insurance products - among other criteria - were discussed. These are blood pressure, treatment for hypertension, cholesterol level, treatment for high cholesterol, family presence of non communicable diseases (cancer, cardiovascular diseases, diabetes, stroke; either death from or diagnosed with the disease) and BMI. After the inclusion of all criteria (related to nutrition and physical activity as well as other factors) the best risk profile can result in a discount of up to 40%. Not all criteria are used by each insurance company, but BMI is an important factor. The importance of BMI varies depending on which other factors are included in any particular company's specific product design. It should also be noted that the effect varies by gender, smoking status and along the age spectrum.

The life insurers are able to quantify real health risks, not for scientific, but for commercial purposes based on their broad data bases. These data capture cross sectional associations between risk factors and mortality very accurately, producing premium rates which are consistent with the insured's particular risk profile. The overall effects are a mixture of causal relationships between health risks and mortality and the selection of the population with a specific risk profile.

Conclusions

- Criteria related to nutrition and physical activity - particularly BMI - are important factors in the estimation of an individual's health risk profile.
- It has to be emphasised that the economic mechanisms of preferred risk schemes are not designed to induce behaviour change in potential clients and can therefore not be regarded as financial incentives to change dietary and physical activity behaviour.
- Nevertheless, they demonstrate how the economic consequences of health risks can be modelled in a way that the system is in balance for a private enterprise. And the models demonstrate what the financial bonus for an individual could be if he or she had lower health risks.
5.2 Financial incentives in treatments for obesity and overweight: a systematic review of randomised controlled trials

Virginia Paul-Ebhohimhen has trained in Medicine and Health Services Research. She has special interest in delivery of complex interventions, and systematic reviews. Nine studies were included in a systematic review of randomised controlled trials of treatments for obesity and overweight in adults, involving the use of financial incentives [1]. These studies reported follow up of at least one year.

Types of interventions

- Apart from financial incentives, all intervention groups were offered behaviour change support and diet/physical activity advice, coordinated by psychologists.
- In seven of the nine studies, the financial incentives were provided from the participants' deposited money; refunds were made for weight loss or compliance to the behaviour change programme. In two studies, the incentives where freely supplied.
- The monetary value of the incentive ranged from 0.2% to 10.2% of the personal disposable income (PDI) per year.
- Duration of use of incentives ranged from 8 weeks to 18 months (typically, incentive use discontinued after about 16 - 24 weeks).
- Participants were mainly recruited through media advertisements.
- All trials were conducted in North America.
- Participants were mostly women, mean age ranged from 35.7 to 52.8 years.
- Mean BMI ranged from 29.3 to 31.8kg/m².

Effectiveness of interventions

A meta-analysis could be conducted with seven of the nine studies. Results showed no significant effect of use of financial incentives on weight loss at 12 months and 18 months. However, some clinically relevant weight changes were observed. Further sub-analysis by mode of delivery and amount of incentives revealed some weak trends - although not statistically significant: Interventions using incentives greater than 1.2% of the personal disposable income, rewards for behaviour change rather than for weight change, and rewards based on group performance rather than for individual performance seem to be most promising to support weight loss. Based on the available data base, no cost-effectiveness calculations were possible.

Conclusions

- Only a few studies with limited effects were conducted until today.
- Chances of effectiveness seem more likely if monetary rewards are applied for behaviour change rather than for weight loss, if applied at the group level and if the proportion of the personal disposable income employed was an amount perceived to be of sufficient motivation.
- Future studies should use discrete choice experiments to elucidate patients' preferences regarding amount, frequency and administration for financial incentives schemes that are sufficiently motivating in weight loss programmes.

Appendix I: Abstracts of the presentations
Panos Konandreas. Agricultural policies and obesity in the international context

The paper examines first global trends in food consumption and the rapid transition of diets in many countries, including developing countries where undernourishment coincides with an increasing problem of obesity. How agricultural policy affects food prices is considered next, differentiating between rich consumers and poor consumers. The conclusion is that, unlike poor consumers, taxation of food has little effect on the total food consumption of rich consumers because of the low elasticity in their demand for food.

The paper then turns to some empirical evidence by focusing on the Common Agricultural Policy (CAP) of the European Union and how EU diets have been influenced by the CAP. Long-term trends in the EU diet reveal that generally it has become less healthy over time, despite the high food prices paid by EU consumers relative to other countries.

The paper concludes that the CAP is not to be blamed for EU’s dietary problems. If at all, it may have contributed to an improved diet by taxing certain “bad” foods. However, the CAP as a food tax is not an efficient instrument to curb obesity. Higher farm prices are ineffective means to change final consumer prices due to high margins in vertical price transmission and low price elasticities for food demand. They are also regressive on consumers with high calorie needs. But food taxes could have some role to play in addressing the obesity problem, as a specific, targeted tax on unhealthy foods combined with a small subsidy on healthy substitutes. Also, taxation of foods can raise funds (low elasticities mean high tax revenues) which could be used for nutrition education, prevention, and other more effective measures.

Sean B. Cash. Taxes and subsidies on food to address rising obesity rates

Many observers have suggested that tax policy and/or food subsidies can be used to change the relative prices of foods in ways that will produce desirable health outcomes. I briefly review the economic evidence regarding such claims, and discuss several conceptual and pragmatic issues surrounding the use of such interventions to achieve public health objectives. The low price elasticity of many food items means that “fat taxes” may be a good way to raise revenue for health promotion activities or other social goals, but will only have substantial impacts on diets if the price changes are large. Furthermore, any new taxes on food are necessarily regressive, in that the largest relative impact will be on lower-income consumers. Fat taxes may also be difficult to target, possibly in ways that will lead to perverse outcomes. “Thin subsidies” on beneficial food items are progressive and are more easily targeted, but require large government outlays. Both taxes and subsidies are subject to the criticism that they target individual food items rather than overall dietary composition. There are also many programs, such as agricultural price supports and production programs, that currently affect food prices in ways that may not be in accordance with public health goals. In some circumstances, reducing existing distortions may be preferable to creating new financial incentives. Finally, there are important issues of both consumer and producer behaviour that, if ignored, are likely to reduce the efficacy of any attempts to influence health outcomes through food price interventions.

Tom Rye. Financial incentives in mobility management

This presentation will first introduce the concept of mobility management as defined by the European Platform on Mobility Management (EPOMM), and will highlight within that the areas in which financial incentives can be used. There is a general paucity of monitoring data in the area, but the presentation will draw on that limited data that is available evaluating the impacts of more “established” mobility management measures, such as travel plans. This will consider the degree to which there is evidence that those travel plans giving financial incentives to use non-car alternatives and/or financial disincentives to car use, registered any increase in walking and cycling and, if so, how much. The relative importance of financial incentives/disincentives compared to physical infrastructure improvements will also be dis-
cussed. Whilst not affecting end-users financially, regulatory requirements on companies and developers to manage mobility to their sites has acted as an important driver of mobility management activity in the UK and Switzerland especially, and these results will also be explored.

There are other mobility management measures that also have a financial element to them, including company car taxation and the taxation of commuting benefits provided by employers, including subsidised bicycle purchase. As far as is possible, evidence to illustrate the modal shift associated with changes in these factors will be presented, although it is unlikely to show definitively that they increase walking and cycling for trips to work or on works’ business. Evidence of the impacts of parking management on modal share for travel to large employment sites, and within cities, will also be presented. Finally, the impacts of London and Stockholm’s congestion charging schemes on walking and cycling will be considered – particularly in London, there have been very significant increases in cycling although not all of this can be attributed to the congestion charge. All findings will be subject to the caveat that the relatively poor quality data make it difficult to be precise about the overall physical activity impacts of such measures.

David Ogilvie. The potential to promote physical activity through mobility management

It has been established in principle that health-related behaviour can be influenced by financial considerations such as the price of cigarettes or the provision of monetary rewards for adhering to treatment. However, the evidence from intervention studies suggests that in general, financial incentives are more effective in encouraging simple, short-term, discrete actions than in promoting sustained changes in lifestyle, and few such studies have examined changes in physical activity as the outcome of interest. Of all the domains of physical activity, that associated with mobility (transport) may be particularly appropriate for economic intervention because mobility largely depends on state provision of public goods (transport infrastructure and, to some extent, services) and because using motor vehicles creates externalities such as congestion, injuries and pollution. The effect of offering people financial incentives specifically to walk or cycle does not appear to have been studied very often; there is, however, more evidence about the potential effects of financial disincentives to use cars. Econometric studies indicate that car use is sensitive to changes in the price of fuel, and a handful of intervention studies suggest that congestion charging or financial disincentives related to parking may help to promote active travel. Increasing the cost of using cars therefore has the potential to contribute to a shift towards using active modes of transport. However, the outcome measures used in existing studies are weak proxies for physical activity and it remains an open question whether interventions of this kind necessarily bring about an increase in overall physical activity in practice. Measures such as congestion charging may also produce inequitable effects in certain circumstances. The debate should therefore be broadened to consider the potential to influence structural constraints on individual mobility through financial incentives applied to developers, employers and transport providers to influence decisions about where new housing and workplaces are built and how they are linked.

Dieter Gaubatz. Financial incentives on life insurance fees in US products

Preferred risk products are the standard in the United States. In 2007, 62% of individual life insurance face amounts sold in the U.S. was through term insurance policies (no cash values). Of this, 97% of the business sold for face amounts of USD100,000 and larger had a preferred risk design. A significant proportion of the other popular plan types also used this structure.

This presentation will discuss the design features of preferred risk products. Individuals who are healthy receive significant premium discounts. One of the main elements of determining the health of applicants is their Body Mass Index.
Virginia Paul-Ebhoimhen and Alison Avenell. Financial incentives in treatments for obesity and overweight; a systematic review of randomised controlled trials

We systematically reviewed randomised controlled trials of treatments for obesity and overweight in adults, involving the use of financial incentives, with reported follow up of at least one year.

Nine trials met the criteria. There was no mention of sample size justification or blinding, or analysis on an intention to treat basis in any study. Three studies described attrition rates and reasons. Participants were mostly women recruited through media advertisements. Mean age ranged from 35.7 to 52.8 years, and mean body mass index from 29.3 to 31.8kg/m2.

Financial incentives were associated with huge attrition rates when employed in the absence of a structured weight programme. Meta-analysis showed no significant effect of use of financial incentives on weight loss or maintenance at 12 months and 18 months but sub-analysis by mode of delivery and amount of incentives were suggestive of trends for effectiveness in certain settings than others. We recommend that future research involving use of financial incentives in treatments for obesity is conducted within the context of a complex intervention such as is informed by discrete choice experiments.
Appendix II: Handouts of the presentations
Agricultural policies and obesity in the international context

16th European Congress on Obesity 2008
Workshop on Financial Incentives
Swiss NGO-Alliance Nutrition and Physical Activity, with the support of the Swiss Federal Office of Health and the Swiss Federal Office of Sport
May 16, 2008

Panos Konandreas and Josef Schmidhuber
FAO

Overview

• Global trends
  – from undernourishment to obesity?
• Food policy impacts on consumption
  – is taxation efficient/effective?
• Case study: the EU CAP
  – taxation of consumers
  – what impact of CAP on consumer prices?
• Worsening diets in the EU
  – taxation not the answer
• Conclusions
The undernourished

Driving forces: income

Note: PPP is purchasing power parity dollars. Each data point represents a developing country.
Driving forces: declining prices

Long-term drastic decline in real prices

Source: World Bank, “Pink Sheets”

Dev’g world catching up

Per capita food consumption

kcal/person/day

<table>
<thead>
<tr>
<th>Year</th>
<th>World</th>
<th>Developed countries</th>
<th>Developing countries</th>
<th>Sub-Saharan Africa</th>
<th>Near East and North Africa</th>
<th>Latin America and the Caribbean</th>
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... not only in calories

Consumption of different food commodities in developing countries

...higher-fat diets

Rising incomes mean higher-fat diets

As incomes rise, even poor nations have access to diets relatively high in fat. A diet containing 20 percent fat corresponded with a GNP of US$ 1,475 in 1962. By 1990, that figure was only US$ 750.

Source: Adapted from B. Popkin, Bellagio, Italy, 2001.
...higher-fat diets

Composition of food consumption in developing countries (%)

... more from the supermarket

Supermarket share of retail food sales

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<th>Region</th>
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<tr>
<td>Kenya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China (urban)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* excl. China

Source: Reardon et al.
Less hunger = more obesity?

From least to most developed countries: overweight is on the rise

<table>
<thead>
<tr>
<th>Percentage of population</th>
<th>Underweight</th>
<th>Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>0.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Least developed countries</td>
<td>1.0%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Developing countries</td>
<td>2.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Economies in transition</td>
<td>3.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Developed market</td>
<td>4.0%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

As countries develop, they face many of the problems common in industrialized nations. Obesity is one of the most worrisome.

... bulging with income

(BMI distribution in Brazil among the poorest and wealthiest segments of the population (PNSSN Survey 1993))

...bulging with inactivity

(BMI Distribution among Congolese adults)

% of population

10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42

BMI

Urban-Brazzaville
Rural-Plateau

Source: Delpeuch, 1992, based on data presented at a meeting "Functional Significance of Low Body Mass Index (AM/)", Rome, 4-6 November, 1992.

...women more vulnerable

Overweight in women

Percentage of population

50

South Asia Sub-Saharan Africa Latin America and Caribbean CEE/CIS Middle East and North Africa

Nutrition experts are concerned about the growing problem of obesity in the developing world. Unfortunately, data are scarce. National nutrition surveys from 38 developing nations are the source of this graph, but they focused only on women.

*CEE/CIS: Central Eastern Europe and the Commonwealth of Independent States
The obesity pyramid

Obesity in Industrial, Developing and Transition Economies
Prevalence differentiated by Sex

Share in total Population (in %)

BMI>30

Sources: IOTF and OECD, Years from 1991 to 2001
FAO, Global Perspectives Studies Group, Josef Schmidhuber, 2000

... trends to continue

Urbanization in developing countries, 1960-2030
Population billion

Changes in GDP per capita by region, 1980-2015
GDP per capita, average annual change (%)

Average daily caloric intake by region, 1997-2000
Kcal/capita

Source: IOTF

Source: World Bank

Source: FAO
… towards a less healthy future?

Ag policy and obesity: a link?

Sources: WHO, FAO, Global Perspectives Studies Unit, 2006
Elasticity of demand: key concept

Own-price elasticity for food

Elasticity

-0.3
-0.2
-0.1
0

Low-income countries
Middle-income countries
High-income countries

1980
1995


Taxing food: minor impact on rich consumer

Rich consumer

Food (input)

body weight (output)

P_0
P_1

Q_o=DES_0
Q_i=DES_1

D_i

BMI

BMI_1

DES
DES

DES_0

DES_1
**Taxing food: major impact on poor consumer**

![Graph showing the impact of food taxation on poor consumers](image)

**Principal policy effects of the CAP 2001/03**

<table>
<thead>
<tr>
<th></th>
<th>MILLION €</th>
<th>€/PERSON</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Taxes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Taxes through higher prices than world prices</td>
<td>-51,904</td>
<td>-136.8</td>
</tr>
<tr>
<td>• Other taxes on consumers</td>
<td>-698</td>
<td>-1.8</td>
</tr>
<tr>
<td><strong>2. Subsidies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Subsidies from taxpayers to consumers</td>
<td>3,762</td>
<td>9.9</td>
</tr>
<tr>
<td>• Excess feed cost (not relevant as a food tax/subsidy)</td>
<td>570</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Net effect (total tax)</strong></td>
<td>-48,271</td>
<td>-127</td>
</tr>
</tbody>
</table>

Source: own calculations (JS) based OECD
## Most taxed: sugar, dairy and meat

<table>
<thead>
<tr>
<th></th>
<th>1986-88 (million €)</th>
<th>1994-96 (million €)</th>
<th>2001-03 (million €)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total per person (€)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oilseeds</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Eggs</td>
<td>900</td>
<td>262</td>
<td>0</td>
</tr>
<tr>
<td>Wheat</td>
<td>6254</td>
<td>1343</td>
<td>157</td>
</tr>
<tr>
<td>Rice</td>
<td>377</td>
<td>317</td>
<td>180</td>
</tr>
<tr>
<td>Potatoes</td>
<td>619</td>
<td>900</td>
<td>444</td>
</tr>
<tr>
<td>Coarse grains</td>
<td>7043</td>
<td>2703</td>
<td>559</td>
</tr>
<tr>
<td>Sheep</td>
<td>2497</td>
<td>1376</td>
<td>1113</td>
</tr>
<tr>
<td>Sugar</td>
<td>2699</td>
<td>2100</td>
<td>2739</td>
</tr>
<tr>
<td>Poultry</td>
<td>2950</td>
<td>3995</td>
<td>3179</td>
</tr>
<tr>
<td>Pork</td>
<td>4473</td>
<td>2973</td>
<td>4401</td>
</tr>
<tr>
<td>Beef</td>
<td>10208</td>
<td>7205</td>
<td>10470</td>
</tr>
<tr>
<td>Milk</td>
<td>16667</td>
<td>17278</td>
<td>16373</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>54686</td>
<td>40452</td>
<td>39615</td>
</tr>
</tbody>
</table>

Source: own calculations (JS) based OECD

## … two-three times world levels

<table>
<thead>
<tr>
<th></th>
<th>1986-88</th>
<th>1994-96</th>
<th>2001-03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domestic price distortions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>2.14</td>
<td>1.14</td>
<td>0.98</td>
</tr>
<tr>
<td>Rice</td>
<td>2.43</td>
<td>1.84</td>
<td>1.32</td>
</tr>
<tr>
<td>Coarse grains</td>
<td>2.33</td>
<td>1.41</td>
<td>1.05</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Potatoes</td>
<td>1.17</td>
<td>1.15</td>
<td>1.1</td>
</tr>
<tr>
<td>Milk</td>
<td>2.78</td>
<td>2.14</td>
<td>1.84</td>
</tr>
<tr>
<td>Beef</td>
<td>2.25</td>
<td>1.63</td>
<td>2.54</td>
</tr>
<tr>
<td>Pig meat</td>
<td>1.38</td>
<td>1.17</td>
<td>1.25</td>
</tr>
<tr>
<td>Poultry</td>
<td>1.79</td>
<td>2.07</td>
<td>1.55</td>
</tr>
<tr>
<td>Sheep meat</td>
<td>2.86</td>
<td>1.59</td>
<td>1.36</td>
</tr>
<tr>
<td>Eggs</td>
<td>1.4</td>
<td>1.22</td>
<td>1.04</td>
</tr>
<tr>
<td>Sugar</td>
<td>3.32</td>
<td>2.13</td>
<td>2.75</td>
</tr>
</tbody>
</table>

Source: own calculations (JS) based OECD
... but huge margins dampen tax impact

What would be expected?

- CAP has not encouraged over-consumption
  - if anything, discouraged it by taxing food
  - more importantly, CAP taxed much more ‘bad’ foods associated with adverse health effects, notably sugar, dairy products and meat, particularly beef
  - little or no taxation of ‘good’ foods: unsaturated fats (olive oil)
  - also some positive incentives (subsidization of fruits and vegetables)
- a positive policy from a nutrition perspective
  - not by design but a windfall benefit from pursuit of (unrelated) ag policy goals
- a priori, a healthier diet in the EU
  - is that the case?
### Guidelines for a healthy diet (1)

<table>
<thead>
<tr>
<th>Dietary Factor</th>
<th>FAO/WHO Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>15 - 30%</td>
</tr>
<tr>
<td>Polyunsaturated FA</td>
<td>6-10 %</td>
</tr>
<tr>
<td>Saturated FA</td>
<td>&lt;10 %</td>
</tr>
<tr>
<td>Trans FA</td>
<td>&lt;1 %</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>55 – 75 %</td>
</tr>
<tr>
<td>Free sugars*</td>
<td>&lt;10 %</td>
</tr>
<tr>
<td>Protein</td>
<td>10 - 15%</td>
</tr>
</tbody>
</table>

* *Free sugars* refers to all monosaccharides and disaccharides added to foods, plus sugars naturally present in honey, syrups and fruit juices

### Guidelines for a healthy diet (2)

<table>
<thead>
<tr>
<th>Dietary Factor</th>
<th>FAO/WHO Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>&lt; 300 mg/day</td>
</tr>
<tr>
<td>Sodium chloride (sodium)</td>
<td>&lt;5 g/day (&lt;2 g/day)</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>≥ 400 g per day</td>
</tr>
<tr>
<td>Total dietary fiber/Non-starch polysaccharides (NSP)</td>
<td>(&gt;25 g, or 20g/d of NSP) from whole grain cereals, fruits, and vegetables</td>
</tr>
</tbody>
</table>
Rising glycemic load (1961)

Rising glycemic load (2003)
Too sweet and too fat (1961)

Too sweet and too fat (2003)
Too much saturated fat (1961)

Too much saturated fat (2003)
Too much cholesterol (1961)

Too much saturated fat and cholesterol in the European diet?

Too much cholesterol (2003)

Too much saturated fat and cholesterol in the European diet?
Rising PUFAs but also Omega-6/3 ratio (1961)

Rising PUFAs but also Omega-6/3 ratio (2003)
Enough F&V but not enough fibre (1961)

Enough F&V but not enough fibre (2003)
Conclusions

Is the CAP the main culprit for EU’s dietary problems?
NO (clear and resounding)

Is the CAP an efficient instrument to curb obesity?
NO (equally clear and resounding)
Higher farm prices ineffective means to change final consumer prices
  – high margins in vertical price transmission
  – low price elasticities => no impact on consumption
  – regressive on consumers with high calorie needs
  – unfair: all consumers are affected and not only the obese (violates the “polluter pays principle”)

Will CAP reforms help address EU’s nutritional problems?
NO, likely the contrary!

Do food taxes have role to play at all?
NO, as a stand-alone measure to reduce food intake
YES, as a specific, targeted tax on unhealthy foods combined with a small subsidy on healthy substitutes
YES, to raise funds (low elasticities mean high tax revenues) which could be used for nutrition education, prevention, and other measures

References

Taxes and subsidies on food to address obesity

Sean B. Cash, Ph.D.
Associate Professor, Department of Rural Economy,
University of Alberta, Edmonton, Canada
Faculty Associate, Department of Consumer Science,
University of Wisconsin, Madison, USA

Workshop on Financial Incentives
16th European Congress on Obesity
Geneva, Switzerland
May 16, 2008

Obesity: An Inherently Economic Issue
(at least, to an economist it is!)

- Obesity is the result of choices about food and physical exertion
- Limited time and income
- Competing goods and activities
- Competing goals

*Economics studies people’s choices under precisely these circumstances.*

Philipson et al., 2004
Energy Density and Price

- What if your primary concern is meeting daily energy needs?
- Collected data from several grocery stores
- Recorded price and energy data
- Calculated price per calorie

Price per Calorie

Figure 1. Average Price per Calorie for Each Food Basket
Figure 2. Relationship Between Energy Density and Energy Cost

WHO Recommendations

- Limit energy intake from fat and shift consumption from saturated and trans-fats
- Increase consumption of fruits, vegetables, whole grains, legumes, nuts
- Limit consumption of free sugars
- Limit salt and ensure that it is iodized
- Achieve energy balance for weight control
- Engage in adequate physical activity
Policy Instruments

- R&D policy
- Advertising and social marketing
- Marketing restrictions
- Process restrictions
- Taxes and Subsidies
- Agricultural Policy
Fat Taxes in North America

- BMA, CMA calls for fat taxes
- Failed Ontario proposal to extend PST to restaurant meals under $4.00
- Maine soda tax, San Francisco HFCS soft drink tax proposal
- New York “couch potato” tax proposal
- Double dividend argument (Jacobsen and Brownell, 2000)

Can They Work?

- Consumers are responsive to price – so can indeed decrease consumption
- Low price elasticities of demand for most food items (<< 1)
- Small taxes can raise revenue, but can they lower incidence of disease?
Problems with Fat Taxes

- Unlike addictive products (e.g., nicotine), snack foods can be safely consumed in moderation
- What’s the “optimal” tax?
- Involves a reduction in real consumer income
- Regressive distributional effects

Distributional Implications

![Distributional Implications Diagram]

- Price
- Quantity
- Market Demand
- S: Supply
- S': Supply
- P: Price
- P': Price
- Low Income Demand
- High Income Demand
Implementation Problems

- The targeting problem
- Consumer response
- Producer response
- Interaction with existing programs and price distortions

The Problem of Targeting
~ (Spot The Soft Drink!)
Health-Conscious Consumers: A Dairy Example


Health-Conscious Consumers???
BMI Tax

- Schmidhuber (2004) argues this can function as a Pigovian tax
- Addresses energy balance, not just inputs
- British restaurant critic Giles Coren proposes following formula:

\[ F_{\text{tax}} = \left( \frac{\sqrt{BMI}}{100} \right) \times L_{\text{tax}} \]

Give Me a Break!

- Health does not steadily decrease with higher BMIs (and even increases in some ranges)
- BMI determined jointly by behavioural factors and genetics – tax your genes!
- Increased muscular structure also increases BMI
- Larger families pay more?
Agricultural Policy

We have policies to:

– increase fluid milk prices
– increase poultry prices
– grade beef on fat content
– reduce export of grains
– subsidize sugar beet production
– encourage corn syrup production

What About Subsidies?

● Easier to target
● Progressive, not regressive
● Will encourage more beneficial producer responses
● BUT – require large government expenditures!
Are Subsidies Worth It?
Fruit and Vegetable Subsidy Study Results

- A one-percent subsidy of all fruits and vegetables can save 10,000 lives for US $1.3 million each
- Value of a statistical life estimated to be between US $4 and $9 million (passes benefit-cost test)
- Compare to $65 million per cancer case for (U.S.) toxics and pesticide programs


Distributional Costs of Subsidies
(millions of dollars US)
by Avoiding Heart Disease and Strokes through Subsidies

<table>
<thead>
<tr>
<th>Health Outcome</th>
<th>All Incomes</th>
<th>Low Income</th>
<th>Medium Income</th>
<th>High Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and Vegetables</td>
<td>1.29</td>
<td>1.02</td>
<td>1.19</td>
<td>1.45</td>
</tr>
<tr>
<td>Fruits</td>
<td>2.19</td>
<td>1.82</td>
<td>2.17</td>
<td>2.31</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1.80</td>
<td>1.33</td>
<td>1.62</td>
<td>2.12</td>
</tr>
</tbody>
</table>

Present Value of a forty-year subsidy of one percent of retail price. Low income refers to families below 130% of the poverty income guidelines, and high income households are above 300% of this level. All numbers are in millions of U.S. dollars.
Experimental Evidence

- Lowering fresh fruit prices in a worksite cafeteria by 50% increased sales 3-fold (Jeffery et al. 1994)
- Similar results in high school cafeteria (French et al. 1997)
- Vending machine study (French et al. 2001)
  - 55 vending machines, 4 price levels
  - informational treatments
  - Price reductions of 10%, 25%, and 50% on low-fat snacks increased sales by 9%, 39%, and 93%, respectively

Food Insecurity

- “Limited or uncertain availability of nutritionally adequate and safe foods or limited and uncertain ability to acquire acceptable food in socially acceptable ways” (HHS, 2000)
- Not just a poor country problem – North American estimates of 7 – 11%
Food Insecurity and Obesity

- “Mildly” food insecure women in CSFII 30% more likely to be overweight than food secure (Townsend et al., 2001)
- Even stronger findings in sample from California Women’s Health Survey, but with racial confounds (Adams et al. 2003)
- Finnish sample exhibits a “curvilinear” relationship between food insecurity and BMI (Sarlio-Lähteenkorva and Lahelma, 2001)

Toward Better Policy

- Western governments subsidize many things that aren’t healthy – why not put a “health filter” on programs?
- “Sensible” health information policies may help, but only to a point
- Taxing in the absence of market failures causes other problems
Toward Better Policy

- Subsidies are progressive and may be easier to target, but require outlays.
- As we learn more about diet-health links, we should factor them into our regulatory decision-making process.

Acknowledgements

David Zilberman, UC Berkeley
David Sunding, UC Berkeley
Ryan Lacanilao, University of Alberta
Ellen Goddard, University of Alberta
Mel Lerohl, University of Alberta

Questions? scash@ualberta.ca
Financial incentives in mobility management (MM)

Tom Rye,
Professor in Transport, Napier University, Edinburgh, UK

Workshop on financial incentives at ECO 2008

Structure of presentation

- Definitions
- Theoretical link MM to physical activity
- Effects of MM on travel choices
- Influence of financial measures on effectiveness of MM
- Some other financial transport measures:
  - Congestion charging
  - Parking charging
  - Transport and personal taxation
- Relative impact financial vs other measures
Definitions

- MM tries to change travellers' attitudes and behaviour, via "soft" measures like information and communication, organising and coordinating services and activities. To the user, MM could mean:
  - campaigns and promotions for walking, cycling and public transport
  - personalised travel assistance to help people reduce car use
  - employers paying for public transport tickets as part of travel (mobility) plan for work trips
  - carsharing service on street
  - mobility plans at schools so parents use cars less to drop kids
  - local mobility centre to advise on sustainable travel
  - building permits conditional on minimising mobility impact of the new development, e.g. mobility plan for site

- More info – see www.max-success.eu

Links (in theory…)

- MM to physical activity:
  - Less car use, more cycling and walking

- Financial incentives to physical activity:
  - Financial incentives within MM have greatest effect on change to active travel

- Both links hard to demonstrate in practice

- Most MM includes no financial measures!
Measuring effectiveness of MM

- Evaluation data limited (< 200 cases in Europe) and poor quality
- Weak quasi-experimental one-group pre-post test design
- No control groups, no significance testing, evidence of sampling bias and presentation only of positive results
- Most “robust” data for workplace travel plans
- Moeser and Bamberg (2008) meta-analysis found average 12% (point) decrease in car use from these

What makes workplace MM effective?

- Various Dutch, UK, US studies conclude:
  - Parking management, parking charging
  - Financial incentives
  - Provision of quality alternative modes
  - Regulation
  - Location
- Hard to isolate effects of each
- Hard to link to active travel
Effect of financial incentives on active travel

- 21 UK MM case studies – incentives and parking reduced car use most

Walking and cycling increased most at sites with good walk/cycle access and marketing

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Cars per 100 staff after change</th>
<th>Change these entitled to park</th>
<th>Weekly parking cost on site/off site</th>
<th>Payments for using alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange (Temple Point)</td>
<td>27 -52</td>
<td>-</td>
<td>14/yes</td>
<td>-</td>
</tr>
<tr>
<td>Bluewater</td>
<td>21 -38</td>
<td>-</td>
<td>7 - 18/yes</td>
<td>-</td>
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<tr>
<td>University of Bristol</td>
<td>35 -9</td>
<td>-</td>
<td>Yes £5.75/£25.50</td>
<td>-</td>
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<td>Government Office for the East Midlands</td>
<td>20 -7</td>
<td>-</td>
<td>High</td>
<td>-</td>
</tr>
<tr>
<td>Egg</td>
<td>53 -9</td>
<td>-</td>
<td>£3.75/£20</td>
<td>-</td>
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<td>Plymouth Hospitals NHS Trust</td>
<td>34 -24</td>
<td>Yes -</td>
<td>£43/yes</td>
<td>-</td>
</tr>
<tr>
<td>Oxford Radcliffe Hospitals NHS Trust (UK site)</td>
<td>34 -4</td>
<td>Yes -</td>
<td>£0.43/yes</td>
<td>-</td>
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<tr>
<td>Buckinghamshire County Council</td>
<td>35 -15</td>
<td>-</td>
<td>£50.00/yes</td>
<td>-</td>
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<tr>
<td>Addenbrooke’s NHS Trust</td>
<td>60 -14</td>
<td>Yes -</td>
<td>£1.50/Free</td>
<td>-</td>
</tr>
<tr>
<td>Nottingham City Hospital NHS Trust</td>
<td>63 -12</td>
<td>Yes -</td>
<td>£1.20/Free</td>
<td>-</td>
</tr>
<tr>
<td>Boots</td>
<td>62 -1</td>
<td>-</td>
<td>/</td>
<td>-</td>
</tr>
<tr>
<td>Agilent Technologies</td>
<td>45 -8</td>
<td>-</td>
<td>Free</td>
<td>-</td>
</tr>
<tr>
<td>Wycombe District Council</td>
<td>65 -12</td>
<td>-</td>
<td>£0.00/Free</td>
<td>-</td>
</tr>
<tr>
<td>Pfizer</td>
<td>60 -7</td>
<td>-</td>
<td>/</td>
<td>-</td>
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<td>BP</td>
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<td>Computer Associates</td>
<td>74 -13</td>
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<td>Yes</td>
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<td>Vodafone</td>
<td>25 -9</td>
<td>-</td>
<td>/</td>
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</tr>
<tr>
<td>Orange (Wembley Park)</td>
<td>80 -12</td>
<td>-</td>
<td>-</td>
<td>Free</td>
</tr>
<tr>
<td>Marks and Spencer Financial Services</td>
<td>80 -12</td>
<td>-</td>
<td>-</td>
<td>Free</td>
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<tr>
<td>Sloughley Park</td>
<td>&lt;64 -4</td>
<td>-</td>
<td>/</td>
<td>-</td>
</tr>
</tbody>
</table>

Other financial measures to influence travel

- Congestion charging:
  - Stockholm 2006
    - 10% of cyclists said they cycled more as result of charge; no data on pedestrians
  - London
    - 49% increase in cycling into central area 2002-2006
    - No data on pedestrian trips
Other financial measures to influence travel

- Parking management/pricing
  - At municipal level
    - Cycling in Freiburg
    - Cycling in Netherlands (Rietveld and Daniel, 2004)
  - At company level
    - Hague, closure of 200 space company car park (16% reduction) – main impact on PT use but walking distance from car park increased 200m perarker per day
    - Nottingham Workplace Parking Levy
      - All 37000 staff parking spaces in city taxed at £185 per space, from Apr 2010
- Personal taxation changes – no data

Conclusions

- Evaluation of MM measures – methodologically weak
- Many MM measures – not financial
- Where MM measures include financial elements – more effective
- BUT – difficult to link this to increases in cycling/walking
- At city level, parking and congestion charging increases cycling
- As usual, almost no data on walking
- And, just one more slide…
Sustainable transport online resource

ELTIS www.eltis.org

Case studies
Tools for practitioners
News
Events
Calls and tenders
EU initiatives & policies
The potential to promote physical activity through mobility management

David Ogilvie, MRC Epidemiology Unit, Cambridge

Workshop on financial incentives, ECO 2008

Is there any evidence?

‘Economic interventions to increase physical activity have received little consideration to date, and almost no evidence exists regarding the efficacy of these strategies.’

Intervention ladder

Eliminate choice
Restrict choice
Guide choice through disincentives
Guide choice through incentives
Guide choice through changing default policy
Enable choice
Provide information
Do nothing

Nuffield Council on Bioethics 2007
### Financial incentives and physical activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Incentives</th>
<th>Disincentives</th>
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</thead>
<tbody>
<tr>
<td>Domestic</td>
<td></td>
<td></td>
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<tr>
<td>Leisure</td>
<td></td>
<td></td>
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<tr>
<td>Mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Time is a limited resource

‘While public health advocates may encourage people to exercise [...] people will only exercise when it is the best use of their scarce time.’

Cawley, Am J Prev Med 2004

‘By interpreting travel time as a disutility or burden, transport policy has been driven by the goal of quicker journeys.’

Jain and Lyons, J Transport Geogr 2008

Levels of intervention

- Regional and local transportation investment decisions
- Location choice decisions made by institutions, developers and resulting end-users
- Individual travel choice decisions that result from the marginal cost and convenience of walking or cycling versus other modes of transport

Frank et al, AJPM 2004
Declining real cost of car travel

Department for Transport 2004

Increasing the cost of using cars

WRC | Medical Research Council
Price and consumption of gasoline

Econometrics of fuel use

Fuel price  +10%
Fuel consumption  -6%
Traffic volume  -3%
Car ownership

Goodwin et al, Transport Rev 2004
Parking

Cashing-out workplace parking in California was associated with an increase in the proportion of commuting journeys made by walking or cycling from 3% to 4%.

Shoup, Transport Policy 1997

UK workplace travel plans that included parking measures were more effective in reducing solo driving than those that did not.

Cairns et al, Department for Transport 2002

Congestion charging
Traffic flows into central London

Transport for London 2004

Traffic flows into central Stockholm

Stockholmsförsöket 2006
Caveats

Data
- Reduction in car use ≠ increase in active travel
- Vehicle counts are not sufficient
- Main mode of travel is not sufficient

Impacts
- Increase in active travel ≠ increase in physical activity
- Potential for inequitable effects

Conclusions

- Financial incentives, particularly those which increase the cost of using cars, could contribute to promoting a shift towards using active modes of transport
- This is a desirable goal on multiple public health grounds
But...

- Further research is needed to quantify the benefits in terms of an increase in physical activity
- The needs of people who cannot walk, cycle or use public transport must be considered
- People’s travel choices are constrained by locational and infrastructural factors beyond their control
- The debate should be therefore be broadened to consider the use of economic incentives to influence developers, employers and transport providers

Selected references

Cairns et al, Department for Transport <www.dft.gov.uk> 2002
Graham and Glaister and Goodwin et al, Transport Rev 2004; 24 (3)
Ogilvie et al, BMJ 2004; 329: 763-766
Ogilvie et al, J Epidemiol Community Health 2005; 59: 886-892
Stockholmsförsöket <www.stockholmsforsoket.se> 2006
Ogilvie et al, BMJ 2007; 334: 1204-1214
Jain and Lyons, J Transport Geogr 2008; 16: 81-89
David Ogilvie
MRC Epidemiology Unit
Cambridge

dbo23@medschl.cam.ac.uk
Financial Incentives in Life Insurance
(Preferred risk products)

16th European Congress on Obesity
Geneva, Switzerland
May 16, 2008

Dieter Gaubatz, FSA, FCIA, MAAA

Agenda
- Overview
- History
- Product design
### Impact on mortality

- Impact of obesity on mortality expectations is significant and well documented
- Not the focus of this presentation

---

### Financial incentive

- As individual becomes healthier
- Opportunity to purchase life insurance policy at reduced rate
- Protection part of insurance premium decreases
Experience in USA

- Preferred plans are very popular in USA
- Term insurance policies with face amounts of $100,000 and higher
  - Plans are usually para-medically underwritten (nurse)
  - Verifies measurements
  - Almost all new sales are on a “Preferred risk” structure
- Common in other plan structures
  - Whole life
  - Universal/variable life

Term ins accounts for 62% of U.S. individual life ins sales (by face amount) in 2007, steadily increasing trend, 97% of sales $100K+ use preferred structure

Preferred plan structures started in the 1980s

Became popular in the early 1990s

For larger size policies, now the main structure for life policies with a significant “protection” component

2008 CSO - new standard USA insurance mortality table
  - project almost completed
  - recognizes preferred plan structures
Underwriting structure for traditional products

Automatic underwriting

Facultative underwriting defines the substandard class (or back to standard)

Traditional risk segmentation

X = avg mortality

Lower--- Relative mortality risk ---higher---
Adding a preferred risk class structure

Medical information - preferred criteria

- Blood pressure systolic (80 – 160)
- Blood pressure diastolic (50 – 105)
- Accept / reject / modify if being treated for hypertension
- Cholesterol level (121 – 330)
- Cholesterol ratio (2.0 – 9.5)
- Accept / reject / modify if being treated for cholesterol
- Build (BMI) (19 – 40)
### Family History - Preferred Criteria

<table>
<thead>
<tr>
<th>Types of Criteria</th>
<th>Qualification Standards</th>
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</thead>
<tbody>
<tr>
<td>Family Presence of</td>
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<tr>
<td>- Cancer</td>
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<tr>
<td>- Cardiovascular Disease</td>
<td></td>
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<tr>
<td>- Diabetes</td>
<td></td>
</tr>
<tr>
<td>- Stroke</td>
<td></td>
</tr>
<tr>
<td>Is presence defined as “Death” or “Diagnosis”</td>
<td></td>
</tr>
<tr>
<td>Maximum age at which presence was determined</td>
<td></td>
</tr>
<tr>
<td>Does family include only parents or also siblings</td>
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</tr>
</tbody>
</table>

### Personal History - Preferred Criteria

<table>
<thead>
<tr>
<th>Types of Criteria</th>
<th>Qualification Standards</th>
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</thead>
<tbody>
<tr>
<td>History of Alcohol Abuse</td>
<td></td>
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<tr>
<td>History of Substance Abuse</td>
<td></td>
</tr>
<tr>
<td>History of Non-Melanoma Cancer</td>
<td></td>
</tr>
<tr>
<td>Length of time in the past in which this last occurred (last 2 years, 5 years, ever, etc)</td>
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</table>
### Preferred Risk Qualification Criteria

<table>
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<th>Other Standards</th>
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<tr>
<td><strong>Motor vehicle history</strong></td>
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<tr>
<td>- Driving under the influence</td>
</tr>
<tr>
<td>- Moving violations</td>
</tr>
<tr>
<td>- Reckless driving violations</td>
</tr>
<tr>
<td>- No. of incidences allowed</td>
</tr>
<tr>
<td>- Length of period of history</td>
</tr>
<tr>
<td><strong>Hazardous avocations</strong></td>
</tr>
<tr>
<td><strong>Private aviation exclusions</strong></td>
</tr>
</tbody>
</table>

### Definition of Smoker

- Cigarette smoker or Tobacco user (use of any nicotine products)
- Classification of cigar only user for preferred class qualification
- Length of time since quit smoking
Preferred plans - product design

- A large variety of plan structure differences among companies
  - No. of non-smoker classes
  - No. of smoker classes
  - Criteria used
  - Qualifying level (or definition) of criteria
  - Preferred criteria structure
    - must meet all qualifications; or
    - scoring system which gives a score to the various criteria values; qualification depends on total score

Build

- Body Mass Index (BMI) is only one of the indicators
- Correlations
  - Usually factors have positive correlation
- Not necessary to have all factors
- Multiple factors provide better mortality evaluation
Value of financial incentives

- Overall best financial incentives vary significantly based on design definitions
  - It could reach up to a 40% discount

- BMI value varies based on
  - whether other factors are included
  - by issue age, gender and smoking status
  - relative to overall average standard mortality
    - 70% - 200%
Long term effects of financial incentives in treatments for obesity

Virginia Paul-Ebhoimhen and Alison Avenell

Health Services Research Unit
University of Aberdeen

Background

- Economic theory suggests people can be motivated for behaviour change by changing the costs and benefits associated with a specific behaviour.

- Some systematic reviews support the use of financial incentives for some clinical behaviours and conditions:
  - screening, compliance with medication (Giuffrida *BMJ* 1997; 315: 703-07)
  - hypertension, depression (Weingarten, *BMJ* 2002; 325:925)
A priori criteria

To systematically review
- randomised controlled trials
- of obesity treatments using financial incentives
- in adults (mean age ≥ 18 years)
- BMI group ≥ 28kg/m²
- at least one year follow up
- outcome including weight

Methods

We searched
MEDLINE, EMBASE, CINAHL, PsychINFO, SPORDDiscus, Cochrane Register of Controlled Clinical Trials and Cochrane Database of Systematic Reviews, hand-searched journals and reviewed reference lists from 1966 until May 2008

First author performed quality assessment and data extraction and the second checked the data
Studies and participants

- 9 trials (8 in U.S, 1 in Canada)
- all included behaviour change, diet and physical activity advice
- recruited through the media
- financial incentives freely provided in 2 studies
- mainly female (only one all male study)
- age 36 to 53 years
- body mass index 29 to 32 kg/m²

Quality of studies

No included studies:
- described power calculations
- mentioned concealment of allocation or blinding
- analyzed results on an intention to treat basis

Only three studies described dropouts with reasons
### Effect of financial incentives on weight at 12 months

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Treatment (Mean(SD))</th>
<th>R</th>
<th>Control (Mean(SD))</th>
<th>R</th>
<th>WMD (95% CI)</th>
<th>Weight %</th>
<th>WMD (95% CI)</th>
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<tr>
<td>(i) Use of financial incentives vs no financial incentives at 12 months</td>
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<td>Socorro 1976a</td>
<td>12</td>
<td>6</td>
<td>-3.20(6.20)</td>
<td>3</td>
<td>-2.25 (-7.84, 3.34)</td>
<td>1.75</td>
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<td>Socorro 1976b</td>
<td>14</td>
<td>9</td>
<td>-3.09 (6.08)</td>
<td>4</td>
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<tr>
<td>Jeffrey 1984c</td>
<td>20</td>
<td>5</td>
<td>-3.27 (6.22)</td>
<td>7</td>
<td>-3.62 (-7.13, 0.21)</td>
<td>3.31</td>
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<tr>
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<td>5</td>
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<td>-3.72 (-7.55, 1.11)</td>
</tr>
<tr>
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<td>9</td>
<td>-3.03 (6.17)</td>
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<td>9</td>
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<td>-0.70 (-4.77, 2.64)</td>
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<tr>
<td>Subtotal (65%)</td>
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<td>0.74</td>
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<tr>
<td>Test for heterogeneity: $Q = 10.42, df = 11, P = 0.90$, $P = 0.90$, $P = 0.90$</td>
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<tr>
<td>Test for overall effect: $Z = 0.00 (P = 0.94)$</td>
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</table>

### Effect of financial incentives on weight at 18 and 30 months

<table>
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<tr>
<th>Study or sub-category</th>
<th>Treatment (Mean(SD))</th>
<th>R</th>
<th>Control (Mean(SD))</th>
<th>R</th>
<th>WMD (95% CI)</th>
<th>Weight %</th>
<th>WMD (95% CI)</th>
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<tbody>
<tr>
<td>(ii) Use of financial incentives vs no financial incentives at 18 months</td>
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<td>-3.00 (7.27)</td>
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<td>-3.00 (7.27)</td>
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<td>-3.10 (6.30)</td>
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<tr>
<td>Subtotal (65%)</td>
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<td>159</td>
<td></td>
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<td>100.00 (0.74)</td>
<td>0.74</td>
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<tr>
<td>Test for overall effect: $Z = 0.00 (P = 0.94)$</td>
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<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Treatment (Mean(SD))</th>
<th>R</th>
<th>Control (Mean(SD))</th>
<th>R</th>
<th>WMD (95% CI)</th>
<th>Weight %</th>
<th>WMD (95% CI)</th>
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<tr>
<td>(iii) Use of financial incentives vs no financial incentives at 30 months</td>
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<td>-1.04 (3.92)</td>
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<tr>
<td>Subtotal (65%)</td>
<td>124</td>
<td>159</td>
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<td>100.00 (0.74)</td>
<td>0.74</td>
<td>-2.05 (-1.05, 0.96)</td>
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<tr>
<td>Test for overall effect: $Z = 0.00 (P = 0.94)$</td>
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### Effect of financial incentives by mode of delivery (1)

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Treatment N</th>
<th>Treatment Mean (SD)</th>
<th>Control N</th>
<th>Control Mean (SD)</th>
<th>WMD (95% CI)</th>
<th>Weight %</th>
<th>95% CI</th>
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<tr>
<td>Jersey 1995a</td>
<td>17</td>
<td>-8.55 (8.31)</td>
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<td>-5.56 (7.43)</td>
<td>-3.00 (-5.61, 1.18)</td>
<td>30.24</td>
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<tr>
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<td>15</td>
<td>-7.89 (8.01)</td>
<td>-2.70 (-4.63, 3.65)</td>
<td>29.47</td>
<td>-2.70 (-4.63, 3.65)</td>
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<tr>
<td>Jersey 1995c</td>
<td>13</td>
<td>-6.44 (7.74)</td>
<td>14</td>
<td>-6.64 (7.58)</td>
<td>-0.46 (-6.01, 4.41)</td>
<td>32.39</td>
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<td>Subtotal (95% CI)</td>
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<td>-10.00 (-25.43, 5.11)</td>
<td>100.00</td>
<td>-10.00 (-25.43, 5.11)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: Chi² = 8.53, df = 2, P = 0.016, P = 0%
Test for overall effect: Z = 1.25 (95% CI)

### Health Services Research Unit

---

### Effect of financial incentives by mode of delivery (2)

<table>
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<tr>
<th>Study or sub-category</th>
<th>Treatment N</th>
<th>Treatment Mean (SD)</th>
<th>Control N</th>
<th>Control Mean (SD)</th>
<th>WMD (95% CI)</th>
<th>Weight %</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saccone 1996a</td>
<td>6</td>
<td>0.77 (6.23)</td>
<td>7</td>
<td>-4.12 (7.15)</td>
<td>11.08</td>
<td>6.45</td>
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<td>Saccone 1998a</td>
<td>6</td>
<td>6.17 (7.48)</td>
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<td>-3.13 (6.34)</td>
<td>12.96</td>
<td>9.00</td>
<td>11.26 (9.14)</td>
</tr>
<tr>
<td>Kanner 1995a</td>
<td>27</td>
<td>5.40 (5.41)</td>
<td>29</td>
<td>9.18 (7.72)</td>
<td>79.68</td>
<td>70.40</td>
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<tr>
<td>Subtotal (95% CI)</td>
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<td>108.00</td>
<td>9.38</td>
<td>11.10 (11.10)</td>
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</table>

Test for heterogeneity: Chi² = 7.32, df = 2, P = 0.03, P = 7.1%
Test for overall effect: Z = 0.75 (95% CI)

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### Health Services Research Unit

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Effect of financial incentives by mode of delivery (3)

<table>
<thead>
<tr>
<th>Study</th>
<th>Mode</th>
<th>Effect size</th>
<th>95% CI</th>
<th>Test for heterogeneity</th>
<th>Test for overall effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicone 1976a</td>
<td>Psychologist vs. non-psychologist at 12 months</td>
<td>6.72 (1.64)</td>
<td>6.04 (1.39)</td>
<td>0.03 (0.12)</td>
<td>0.10 (0.09)</td>
</tr>
<tr>
<td>Silicone 1976b</td>
<td></td>
<td>-2.63 (1.64)</td>
<td>-4.12 (1.15)</td>
<td>0.06 (0.12)</td>
<td>0.00 (0.09)</td>
</tr>
<tr>
<td>Slutsky 1997</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test for heterogeneity: CH² = 0.57, df = 1 (P = 0.45), I² = 0%
Test for overall effect: Z = 1.05 (P = 0.29)

Limitations

- Few studies with small numbers
- Methodological issues of trials
- No trials involving use in drug or surgical treatments
- All conducted in North America
- Possible interaction from other motivators (e.g. food provision/personal trainers)
Further evidence

- (Finkelstein, *JOEM* 2007; 49:981-9)
  - trials employing financial incentives are associated with greater weight loss
  - the larger the financial incentive, the greater the weight lost (6 months)

- (Paul-Ebhohimhen, ECO2008; poster T2:36)
  - significant weight loss ($p=0.04$) in studies employing monetary reward
  - no difference ($p=0.40$) in studies not employing financial incentives

Further evidence 2

- (Jochelson, *King’s Fund* December 2007) suggests use
  - for clearly defined, time-limited, simple behavioural tasks
  - can encourage participation in programmes
  - does not always translate to long term behaviour change
Conclusion 1

- Not recommended in the absence of structured weight program (Harris, Behav. Res. & Ther 1971; 9: 347-354)

- Although trials employing financial incentives are associated with greater weight loss....

- ...there was no statistically significant effect of use of financial incentives in the long term (>1 year)

Conclusion 2

- Confidence intervals of subgroups suggests could include worthwhile clinically significant effects

- Effective in settings employing social support (group setting)

- Future trial(s) should use within the context of a complex intervention (MRC framework)
MRC framework for complex interventions (April 2000)

Research recommendations (1)

Discrete choice experiments:
- How much?
- What form?
- Which (socioeconomic) groups?
- Source?
- How long?
- How to reward?
Research recommendations (2)

- who to deliver reward?
- frequency of reward?
- effects of social setting?
- reward for weight vs reward for self-reported behaviour?

Acknowledgements

- This work was funded by the Chief Scientist Office, Scottish Government Health Directorates (the views expressed here are those of the authors)
- Luke Vale (Health Economics Research Unit Aberdeen) for his very useful suggestions
Appendix III: Biographies of the speakers
Panos A. Konandreas

Panos A. Konandreas, a Greek national, has a Ph.D. in Agricultural Economics, University of California (Davis and Berkeley) and a M.S. in Electrical and Mechanical Engineering, National Technical University of Athens.

His career with FAO comes to an end in May 2008 as Acting Director of FAO’s Liaison Office in Geneva, where he worked since 1998 on trade issues related in particular to the negotiations on agriculture under the WTO. He spent 16 years (1982-98) at the Commodities and Trade Division at the FAO in Rome, where he was Chief of the Trade Policy and Commodity Projections Service. Earlier positions include that of Principal Economist at the International Livestock Centre for Africa (1979-82) and Research Associate at the International Food Policy Research Institute (1976-79).

His main areas of research include international trade policy issues, commodity markets, food security and food aid policy, biofuel trends and development assistance. He has authored over 50 research works on these subjects, including individual research monographs, technical reports and articles in refereed professional journals and books. He was member of the Editorial Board of Food Policy for over 12 years and edited a special issue of this Journal on the Implications of the Uruguay Round for developing countries.

Sean B. Cash

Sean Cash is an Associate Professor in the Department of Rural Economy, University of Alberta (Canada) and a Faculty Associate in the Department of Consumer Science, University of Wisconsin, Madison (USA). His research focuses on how food and nutrition policies affect both producers and consumers. Current and recent projects in this area include the efficacy of food price interventions as public health tools; the role of agricultural policies on nutrition; the relationship between food security and obesity; how consumers value social aspects of food relative to other attributes; and how health information impacts consumers’ demand for food. He also conducts research in the areas of environmental regulation and resource conservation, and teaches in the agriculture and environmental conservation programs at the University of Alberta. He serves on the executive committees of the Canadian Agricultural Economics Society, the Alberta Agricultural Economics Association and Growing Food in Security Alberta.

Sean holds a Ph.D. and M.S. in Agricultural and Resource Economics from the University of California at Berkeley, as well as an M.A. in Economics from the University of Michigan and a B.A. in International Relations from the Johns Hopkins University. His work experience includes working as a researcher in the regulatory practice of a large Washington, D.C. law firm; internships in the U.S. Environmental Protection Agency and at D.C. think tanks; and consulting on food and resource issues.

Tom Rye

Tom Rye is a Reader in Transport at Edinburgh Napier University where his research activities cover mobility management, parking management, travel plans, concessionary fares, public transport scheme development and evaluation, and the development of local and regional transport policy. He has also carried out previous work on cross-national comparisons of transport policy implementation. During much of his twelve years at Napier he was seconded part-time to the transport consultancy Colin Buchanan, and to the City of Edinburgh Council, and he maintains close links with government and industry. He is also well-known internationally, as chair of the US Transportation Research Board’s Parking Management Sub-committee, and a regular participant in EU projects and as a member of the European Platform on Mobility Management's Task Force on mobility management in Europe. In his spare time, Tom enjoys travel, studying foreign languages, mountain biking, ski touring, origami and gardening.
David Ogilvie

David Ogilvie qualified in medicine from Cambridge and subsequently trained in general practice and then in public health medicine. He was a research fellow at the Medical Research Council Social and Public Health Sciences Unit in Glasgow before joining the MRC Epidemiology Unit in Cambridge in October 2007. He is a member of the Scottish Physical Activity Research Collaboration and served on the programme development group for physical activity and the environment at NICE. His research is mainly concerned with understanding how population health can be improved through efforts to influence the 'wider' (environmental or societal) determinants of health. He is particularly interested in the relationships between transport, the environment, physical activity and health, which he has explored both in systematic reviews and by establishing a study of health effects associated with a new urban motorway in Glasgow.

Dieter Gaubatz

FSA, FCIA, MAAA
Vice President, Life & Health Products
Swiss Re Life & Health America Inc.

Dieter Gaubatz works out of one of Swiss Re’s office in the United States, but is currently on a 6 month project in Zurich. He has been with Swiss Re for 11 years. He has had responsibilities in experience studies, assumption setting, product development in International Markets and new product development for direct company clients of Swiss Re. He is a member of the Society Of Actuaries (SOA) Individual Life Experience Committee and a member of the oversight committee and various subcommittees of the Preferred Valuation Table Project effort jointly sponsored by the SOA and American Academy of Actuaries (AAA). This project will be publishing a new USA valuation table in 2008 which specifically recognizes preferred risks in anticipation of new valuation standards under the new Principles Based Approach being implemented for reserving in the USA. Dieter has thirty-three years of experience in the life insurance business, including twenty-two years at a major direct life insurer where he held various actuarial positions in Canada and the U.S. Dieter has a Bachelor of Mathematics degree with a major in actuarial science from the University of Waterloo (Canada).

Virginia Paul-Ebhohimhen

Virginia Paul-Ebhohimhen has trained in Medicine and Health Services Research. She is pursuing higher specialist training in Public Health and conducts health services research with special interest in delivery of complex interventions in public/primary care settings, and systematic reviews.