

# Approaches to reducing obesity problems

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## Abstract

The essay addresses the rising obesity rates and the policies to help reduce obesity - focusing primarily in the US and the UK. The essay highlights the environmental nature of the problem and compares fiscal, marketing and behaviour-related methods to solve the obesity problem.

## 1 Obesity as a Problem

The discussions of obesity have dominated the media in recent years. The popularity of shows like *Biggest Loser* and *Celebrity fit club* survives on a revived dilemma of choosing health vs the palate. While there is evidence of rise in public concern for obesity due to increase in the size of the health-industry, the medical evidence linking obesity with illnesses is plentiful. The overweight are more likely to experience heart disease, stroke, high blood pressure, cancers of colon, breast and prostate, and diabetes. With more than 60% of UK adults reportedly obese[1], obesity is an area of policy concern.

## 2 High-Calorie Substances and Pigouvian taxes

Despite the popularity of BMI in almost all health-screening tests, it has come under a lot of criticism. Being an aggregate measure, a BMI-based category can mark a healthy individual with more than average muscle mass as overweight. Despite counting for false positives, the picture of rising obesity that appears isn't a particularly comforting one.

A lot of attention has been to the fat content and high-calorie density products. The combined effect of cheaper food and rising incomes has caused a trend of overeating purportedly responsible for obesity[2]. While economic nature of the problem and the past success of Pigouvian taxes for tobacco, one can hope for a prohibitive "sin" tax to work for high-calorie foods - but a careful analysis shows the peculiar case of food consumption. First off, the elasticities of nutrients consumption are small - hence a

tax-regime that can sufficiently bring down the consumption of target-nutrients would need to be really high[3] - a 50% tax on dairy product, for example, would lower fat intake by a mere 3% [4]. In countries with disparities of income, such tax burdens would affect the poor more and is likely to result in discontent.

It doesn't appear that food consumption in the UK is leaning towards growing high-calorie consumption. Plotting the high-calorie consumption vs other consumption for 30-35 year old participants in the household consumption surveys from 1995 and 2000 (total expenditure indicated as "income" is between 300, 400 and 400,500 in the two graphs), doesn't show an alarming trend of high-calorie consumption<sup>1</sup>. If anything, participants with higher income tend to spend less share of their income on high-calorie items - a result confirmed by the national food survey (See Figure 3,4).

The cross-price elasticities from the national food survey can illustrate some difficulties with a calorie-based incentive scheme on food-classifications. The income-elasticities of all food categories <1 (normal goods) - while the cross-price elasticity is nearly 0 for meat and  $\geq 0$  for sugars. The cross-price elasticity for fats with respect to fresh fruit is negative - but it is also negative with respect to fresh fish and eggs. That a higher price of fats would not result in increased demand for eggs or fatty fishes cannot be ruled out<sup>2</sup>[5].

Considerations of limits on expendable income and available time further indicate that increased prices can affect behaviour of a population split by health-consciousness and physical-activity levels rather differentially. It is argued that obesity would in fact rise for a weight-conscious and active person with taxes on high-calories items, as an active person might spend time cooking at home at the cost of physical exercise[6].

A sin tax for high-calories foods is essentially not

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<sup>1</sup>The categories seen as the high-calorie substances consisted of Butter, Margarine, Cooking oil and fats, Ham and bacon, Lamb, Beef, Sausages, Canned Meat, Cold Meat, Pies, Ready Meat and Meat type not specified.

<sup>2</sup>Cross-price elasticities tell whether the goods in consideration are substitutes, complements or independent. elasticity >0 implies a supplement, elasticity <0 implies a complement and elasticity = 0 implies an independent product.

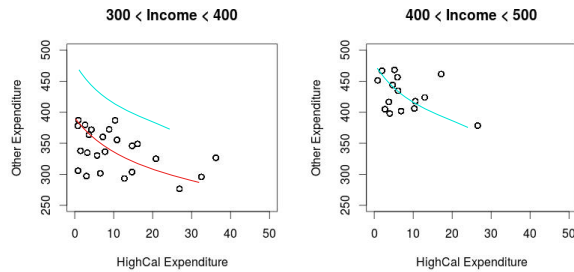


Figure 1: Consumption of High-calories foods in 1995 (Source: Household Consumption Survey)

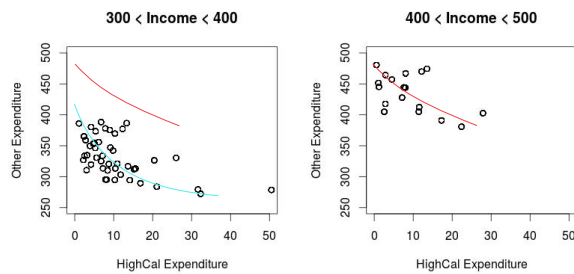


Figure 2: Consumption of High-calorie foods in 2000 (Source: UK Household Consumption Survey)

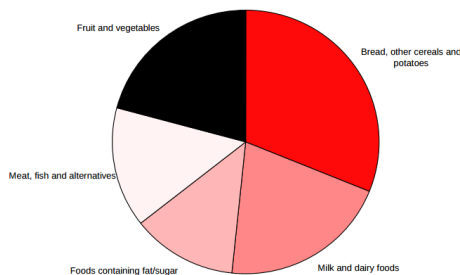


Figure 3: Proportion of Total Food - 1975 (Source: National Food Survey[5])

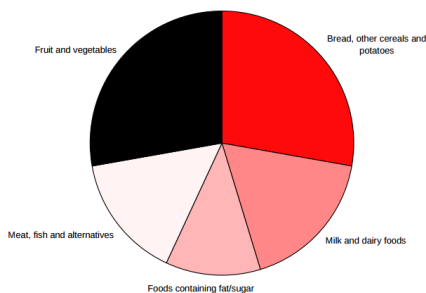


Figure 4: Proportion of Total Food - 2000 (Source: National Food Survey[5])

the same as that for tobacco-products - since i) the classification of high-calorie-items is not as clearcut and ii) high-calorie taxes apply to everybody (it isn't possible for people to give up high-calories foods completely). The medical evidence of the effect of substitutes (overloading on less calorie items) on obesity is far from conclusive[7] and make the case for the sin-tax weaker.

The implementation concerns with a Pigouvian fat-tax are more severe. When such a tax was imposed in Denmark, the consumers chose to shop for fatty items in Germany[7]. The tax was revoked mostly because of the discontent expressed by both consumers and businesses, but even if had succeeded, such a measure cannot be transplanted to another geography without considerations of income distributions, informational asymmetries (taxes used a license-to-eat) and legal difficulties[3].

### 3 Other Factors responsible for Obesity

The medical fact of extraneous fat accumulating in our bodies indeed holds - but reducing fat consumption alone cannot sufficiently address the problem of obesity in a population. There is also the risk of psychological problems and side-effects of other diseases reflecting themselves as obesity(See Table1). The medical evidence is clear on the environmental nature of the problem of obesity - making factors other than consumption of high-calorie items relevant.

The obesity of parents tends to be a strong indicator of the obesity of adolescents and children. Being a cross-sectional problem, genetics may be ignored for the problem of rising rates of obesity. However, what it highlights is the fundamental problem with obesity - the varied sensitivities to technological changes (leisure, working-hours) in an individual's environment (habit of overeating, economic conditions).

The technological changes have changed habits drastically. With food getting cheaper and disposable income having risen since the past decades (See Figure 7), food consumption has risen overall while the required hours of walking and sleeping have reduced. These are known to have increased obesity - despite the increase in average number of hours spent on exercising[8].

Americans are actually exercising more (not less). The change in technology environment has created more differences between sections of society (much the economic inequality itself seems being influenced by technology)[9]

Higher disposable income and the growth of pharmaceutical industry has also implied an increase in the average consumption of medical drugs with obesity as side-effects. Higher dependence on these drugs has increased the instances of obesity.

Type	Contents	Side-Effects
Antidepressants	Tricyclics	1-9 pounds per month
	Selective Serotonin reuptake inhibitors	15-20 pounds <sup>3</sup>
Antipsychotics	Conventional Neuroleptics,	9 pounds
	2nd-generation antipsychotics(SGA)	10 pounds (clozapine), 22 pounds per year (olanzapine)
Diabetes Treatments	Theazolidinediones	upto 17-pounds
	Sulfonyureas	11-pounds
Seizure Medication and Mood Stabilizers	Anticonvulsants	upto 40-pounds
Steroid Hormones	Corticosteroids	4-to-28 pounds gain in 50% of polymaglia rheumatica patients

Table 1: Common drugs with obesity as side-affects (US patients)[2]

## 4 Suggested Solutions

The evidence for failure of sin-taxes in controlling obesity may be strong but still leaves questions on feasibility of enforcing a certain recommended diet. Policy-makers and economists are often divided over whether the government should play a paternalistic or an advisory role. On one hand, we have adherents of ideal-diets who find penalties and ceilings as necessary to have segments of population stick to the right nutrient levels<sup>4</sup> while on the other hand there are proponents of the Nudge Program and Healthy-Living-Vouchers (HLVs) who find encouragement as the only solution to the problem of obesity.

Vouchers for less-calorie items seem a better option than sin-taxes - as these can be distributed to a particular income group and must be used for specific items (or services e.g. gyms). Unlike sin taxes, They don't rotate the budget line<sup>5</sup> and avoid the substitution problems that a sin-tax would face with license-to-eat consumer behaviours (See Figure 5) . The primary limitations of HLVs is still that of cost.

Despite their promise, Nudge programs are unlikely to work for children and those with health-conditions[1]. Evidence also suggests that shoppers who appear to be health-conscious, do not succeed in purchasing a diet lower in saturated fat[1]. Without awareness and control on advertising concerns, weight reduction in itself - even if achieved through policy - is not as beneficial since almost 95 percent of those who lose weight regain the pounds shed within five

<sup>4</sup>Scandinavian countries have tried national diets (e.g. NNUD) more enthusiastically than the US and the UK.

<sup>5</sup>If total expenditure is comprising of high-calorie product  $F$  and low-calorie products of  $NF$  and total expenditure  $I$  the,  $I = p_F x_F + p_{NF} x_{NF} \Rightarrow x_{NF} = \frac{I}{p_{NF}} - \frac{p_F}{p_{NF}} x_F$  (where prices are quantities are denoted with  $p, x$  respectively). A higher price of  $p_F$  would increase the slope of the budget line ( $NF$  with respect to  $F$ ).

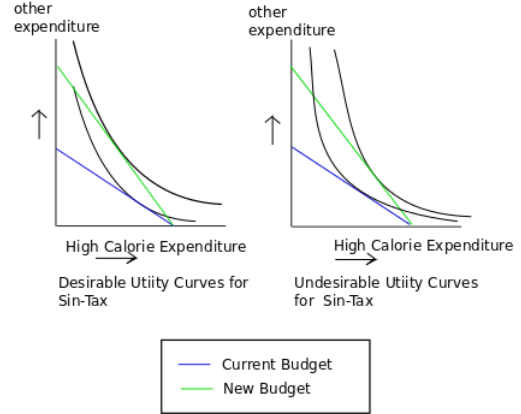


Figure 5: Problems with sin-taxes

years[10]. Framing models and experiments on social contagion[11] suggest that the way options are presented to the consumer can improve dietary nutritional levels[1].

Instead of command and control, societies have turned to negotiation and persuasion. Attempts to control diets may face opposition from trading organizations (e.g. WTO) on grounds of legal disparity[3].

Another consequence of difficulties in the controlling demand, is that prohibitive measures are easier to implement on the supply side. Government-issued agricultural subsidies have contributed to obesity trends in America through provision of cheaper food [12, 13]. Other than providing incentives for healthier products, resolving informational asymmetries in the health-insurance market and controlling the firm-advertising impacts on respective age-groups can help address the environmental issues that create

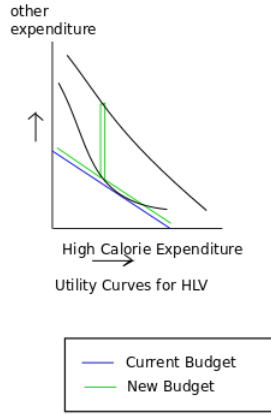


Figure 6: The case for HLVs

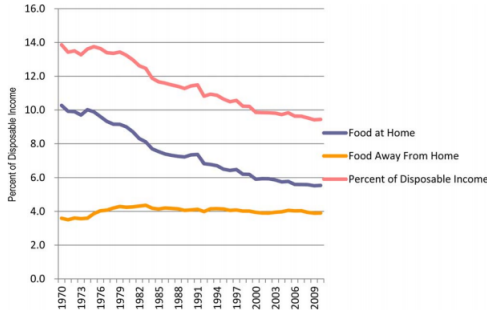


Figure 7: Expenditure on Food as fraction of Disposable Income in the US[9]

obesity.

## 5 Conclusion

Higher incomes have resulted in a lot of us eating more for pleasure than subsistence. Policy must consider obesity as an environmental concern and avoid focusing on implementing a super-diet - which may create a costly competition with health and food industries that have already adapted themselves to indulgent consumption. The paper considers attempts to control advertising and subsidies more economical than those to modify consumer demand - particularly due the environment nature of the problem obesity.

The evidence from medical sciences to back up the environmental nature of obesity reduction methods is found instructive in this regard. Bringing good sleep and sufficient walking in one's life as well as trying to live healthier rather than attacking the problem of obesity may also have second-order benefits with through improvement of psychological health and re-

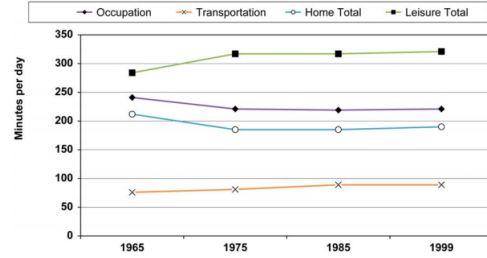


Figure 8: Time Spent on leisure in the US[9]

duction on dependence on medical drugs.

	price 1	price 2	price 3	price 4	price 5	price 6	price 7	price 8	price 9	price 10	price 11	price 12	price 13	price 14	price 15	price 16	price 17	price 18	price 19	price 20
1 Milk and cream	-0.36	0.34	0.04	-0.09	0.38	0.56	-0.01	-0.11	-0.40	-0.16	-0.20	-0.24	-0.02	0.05	-0.13	-0.27	0.27	-0.14	-0.05	-0.04
2 Cheese	0.12	-0.35	-0.02	0.26	0.06	0.02	-0.09	0.01	0.07	0.14	0.43	-0.13	-0.20	0.23	-0.03	-0.04	-0.29	0.24	0.02	-0.02
3 Carcase meat	0.05	-0.02	-0.69	0.26	0.15	0.40	0.20	0.07	0.15	0.21	0.08	0.19	-0.11	-0.09	-0.02	-0.17	0.21	-0.12	-0.03	0.19
4 Other meat and meat products	-0.14	0.10	0.53	-0.52	-0.02	0.09	0.35	-0.04	0.03	0.01	-0.26	-0.11	0.00	-0.01	-0.11	-0.11	-0.04	0.11	0.27	0.01
5 Fresh fish	0.05	0.02	0.02	0.00	-0.80	-0.06	0.11	-0.09	0.14	-0.13	0.01	0.02	0.00	0.00	-0.06	0.04	0.10	0.08	0.05	0.00
6 Processed and shell fish	0.04	0.00	0.04	0.00	-0.04	-0.17	-0.06	0.04	0.02	0.03	0.09	0.05	-0.02	0.00	0.02	-0.02	0.05	-0.03	0.01	-0.08
7 Prepared fish	0.00	-0.05	0.04	0.04	0.17	-0.15	0.00	-0.05	-0.22	-0.09	-0.15	-0.01	0.00	-0.13	0.01	-0.07	-0.22	0.01	0.01	-0.09
8 Frozen fish	-0.01	0.01	0.01	0.00	-0.10	0.06	-0.03	-0.32	0.19	0.01	0.03	0.05	0.05	0.06	-0.07	0.02	0.13	-0.02	-0.01	-0.10
9 Eggs	-0.05	0.03	0.02	0.00	0.16	0.04	-0.16	0.20	-0.28	-0.10	0.20	0.05	-0.08	0.02	-0.08	0.06	0.00	-0.01	0.02	0.02
10 Fats	-0.04	0.11	0.07	0.00	-0.30	0.12	-0.13	0.03	-0.19	-0.75	0.02	0.00	0.14	-0.07	0.01	-0.15	0.21	0.08	-0.03	0.02
11 Sugar and preserves	-0.02	0.16	0.01	-0.02	0.01	0.16	-0.10	0.03	0.20	0.01	-0.79	-0.04	0.11	-0.03	-0.01	0.04	0.07	-0.04	-0.03	0.06
12 Fresh potatoes	-0.05	-0.08	0.04	-0.01	0.04	0.15	-0.02	0.07	0.07	0.00	-0.06	-0.12	0.03	0.02	-0.02	-0.02	-0.09	0.00	-0.02	0.07
13 Fresh green vegetables	0.00	-0.11	-0.02	0.00	0.00	-0.05	0.00	0.08	-0.10	0.09	0.16	0.02	-0.66	0.01	0.00	-0.01	0.12	-0.02	0.03	0.09
14 Other fresh vegetables	0.02	0.26	-0.04	0.00	-0.01	0.00	-0.27	0.17	0.05	-0.10	-0.09	0.04	0.01	-0.33	0.03	0.09	0.05	0.04	-0.05	-0.02
15 Processed vegetables	-0.07	-0.06	-0.01	-0.04	-0.35	0.14	0.05	-0.31	-0.39	0.02	-0.05	-0.05	-0.02	0.05	-0.60	-0.05	0.03	-0.02	0.06	-0.19
16 Fresh fruit	-0.14	-0.07	-0.11	-0.03	0.16	-0.15	-0.20	0.06	0.25	-0.30	0.16	-0.06	-0.04	0.12	-0.04	-0.29	0.11	-0.10	-0.06	0.10
17 Other fruit and fruit products	0.07	-0.22	0.06	-0.01	0.23	0.17	-0.30	0.25	0.00	0.20	0.13	-0.11	0.17	0.03	0.01	0.05	-0.81	-0.02	-0.03	0.15
18 Bread	-0.07	0.36	-0.07	0.03	0.36	-0.22	0.03	-0.07	-0.04	0.15	-0.14	-0.01	-0.05	0.05	-0.02	-0.10	-0.04	-0.40	0.07	0.12
19 Other cereals and cereal products	-0.05	0.07	-0.05	0.18	0.48	0.16	0.06	-0.10	0.20	-0.15	-0.29	-0.09	0.22	-0.16	0.11	-0.13	-0.13	0.15	-0.94	-0.30
20 Beverages	-0.01	-0.02	0.07	0.00	0.00	-0.33	-0.16	-0.23	0.04	0.02	0.21	0.11	0.15	-0.02	-0.10	0.06	0.19	0.08	-0.08	-0.37

(a) An entry on the diagonal is the own price elasticity of the demand for the good with respect to its own price

(b) An entry off the diagonal, eg row 2 column 1 is the price elasticity of demand for cheese with respect to the price of milk and cream.

(c) Homogeneity and symmetry imposed

significant at 1% level  
 significant at 5% level  
 significant at 10% level

Figure 9: Cross-Price elasticities 1988-2000 (Source: UK National Food Survey[5])

	Budget Share	Income Elasticity	Standard Error	Lower 90% confidence limit	Upper 90% confidence limit
All Foods	15.07	0.20	0.02	0.17	0.23
Milk and cream	1.26	0.05	0.03	0.01	0.10
of which:					
Liquid wholemilk	0.35	-0.17	0.06	-0.27	-0.07
Yoghurt	0.23	0.19	0.06	0.10	0.29
Cheese	0.46	0.23	0.05	0.15	0.32
of which:					
Natural cheese	0.41	0.22	0.06	0.13	0.31
Processed cheese	0.05	0.32	0.08	0.19	0.44
Carcase meat	0.94	0.20	0.04	0.13	0.26
of which:					
Beef and veal	0.48	0.25	0.05	0.17	0.34
Mutton and lamb	0.22	0.15	0.09	0.01	0.29
Pork	0.23	0.13	0.07	0.02	0.23
Other meat and meat products	2.54	0.19	0.03	0.14	0.24
of which:					
Bacon and ham, uncooked	0.33	0.18	0.05	0.10	0.27
Broiler chicken, uncooked	0.41	0.16	0.06	0.06	0.26
Other poultry	0.15	0.16	0.12	-0.04	0.35
Frozen meat	0.32	0.03	0.08	-0.10	0.17
Fish	0.70	0.27	0.05	0.20	0.35
Eggs	0.17	-0.01	0.05	-0.10	0.08
Fats	0.35	0.06	0.04	0.00	0.13
of which:					
Butter	0.11	0.20	0.06	0.11	0.30
Margarine	0.03	-0.37	0.14	-0.60	-0.14
Sugar and preserves	0.16	0.00	0.05	-0.08	0.09
Fresh potatoes	0.31	0.09	0.04	0.02	0.15
Fresh green vegetables	0.29	0.27	0.05	0.20	0.35
Other fresh vegetables	0.53	0.22	0.04	0.15	0.29
Processed vegetables	0.90	0.12	0.04	0.06	0.18
of which:					
Frozen peas	0.04	0.06	0.11	-0.12	0.24
Frozen chips and other	0.12	0.05	0.07	-0.07	0.18
Fresh fruit	0.79	0.30	0.03	0.25	0.35
of which:					
Apples	0.06	-0.07	0.14	-0.29	0.16
Oranges	0.16	0.23	0.05	0.15	0.31
Bananas	0.19	0.12	0.04	0.06	0.19
Other fruit and fruit products	0.33	0.37	0.06	0.28	0.46
of which:					
Fruit juices	0.19	0.45	0.06	0.35	0.56
Bread	0.68	0.12	0.03	0.07	0.17
Cakes and biscuits	0.71	0.13	0.04	0.06	0.19
Other cereals and cereal products	1.04	0.19	0.04	0.13	0.25
of which:					
Breakfast cereals	0.33	0.19	0.05	0.12	0.27
Frozen convenience cereal foods	0.15	0.17	0.08	0.03	0.31
Beverages	0.44	0.10	0.05	0.02	0.18
of which:					
Tea	0.19	-0.02	0.06	-0.12	0.08
Instant coffee	0.17	0.16	0.07	0.04	0.28

(a) Variations in income elasticities over the period 1979 to 2000 are shown in Figures 7.1 to 7.4. For all foods, the estimated elasticity was close to 0.20 throughout the period.

  indicates significance at the 1% level  
  indicates significance at the 5% level  
  indicates significance at the 10% level

Figure 10: Income Elasticities 1998-2000 (Source: UK National Food Survey[5])

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