

Approaches to reducing obesity problems

January 15, 2016

Summary

The policy attempts to address rising obesity rates in the recent past have provided insights into consumer behaviour towards food, conflicts with trading communities and the medical aspects of obesity as a health concern. The current note focuses on the US and UK data to comment on the environmental nature of the problem of obesity. It observes that the problem of obesity cannot be observed as a side-effect of overeating - but that the problem needs to be seen as a consequence of technological changes in society. Admitting the market-failure in provision of healthy consumption, the current note advises a policy to address the environment of the target group instead of attempting to adjust the consumer eating behaviour alone.

1 Obesity as a Problem

The discussions of obesity have dominated the media in recent years - shows like Biggest Loser and Celebrity fit club seem to survive on a revived dilemma of the choice between health and taste. This recent rise in public concern for obesity might as well be due to the increase in size of health-industry but an alarm over obesity seems well-founded. Medical evidence links obesity with severe illnesses - the overweight being 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

To create obesity awareness, BMI has been included in almost all health-screening tests. It being an aggregate measure, however, a category based on BMI can mark a healthy individual with more than average muscle mass as overweight. The false positives are not nearly enough to argue that obesity isn't actually rising, but a focus on BMI does tend to underweight the problems surrounding obesity and runs the risk of letting psychological problems and side-effects of other diseases be classified as obesity.

A lot of attention has also been given to the habit of overeating and the products with high-calorie density or fat. The combined effect of cheaper food and rising incomes has resulted in a trend of overeating that is purportedly responsible for obesity[2]. The past success of Pigouvian taxes for tobacco has encouraged many a politicians to introduce a prohibitive "sin" tax - but a careful analysis (as well as implementation attempts) shows problems of non-identifiability, difficulties in implementation and inherent moral hazards. Particularly, since the elasticities of nutrients consumption are small - 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 are likely to result in discontent.

The data from household consumption itself doesn't present a promising case for a sin tax. Comparing 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), one doesn't see an alarming trend of high-calorie consumption¹. If anything, participants with higher income tend to spend less share of their income on high-calorie items and the budget share of high-calorie items is in gradual decline- a result confirmed by the national food survey as well (See Figure 3,4)[5].

The cross-price elasticities from the national food survey illustrate further difficulties with a calorie-based incentive scheme for food products. The income elasticities of all food categories are <1 (normal goods)² - while the cross-price elasticity is nearly 0 for meat and ≥ 0 for sugars[5]. The cross-price elasticity for fats with respect to fresh fruit is negative - but it is negative also with respect to fresh fish and eggs[5]. That a higher price of fats would not result in increased de-

¹The 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.

²Income elasticity of >1 implies a luxury good while an Income elasticity of <0 implies an inferior good.

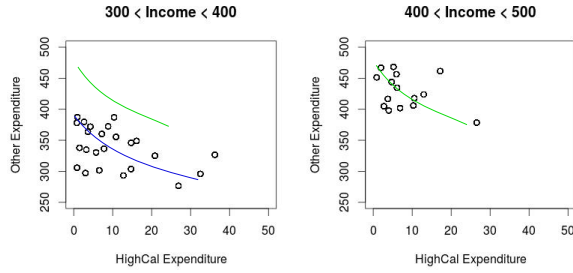


Figure 1: Consumption of High-calories foods in 1995 (Source: Household Consumption Survey)

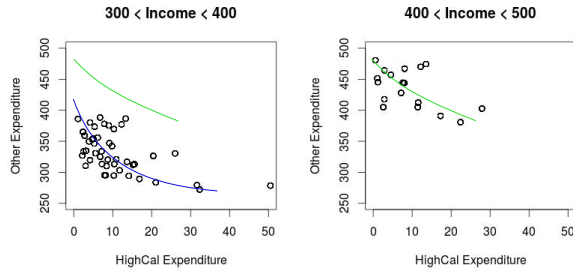


Figure 2: Consumption of High-calorie foods in 2000 (Source: UK Household Consumption Survey)

mand for eggs or fatty fishes cannot be ruled out ³[5] - a substitution that is not necessarily healthy.

Further considerations of limits on expendable income and available time indicate that increased prices affect behaviour of a population (split across health-consciousness and physical-activity levels) quite differentially. It is argued that obesity may in fact rise

³Cross-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.

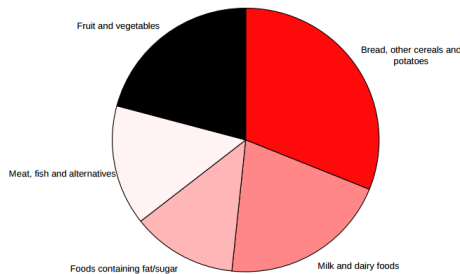


Figure 3: Proportion of Total Food - 1975 (Source: National Food Survey[5])

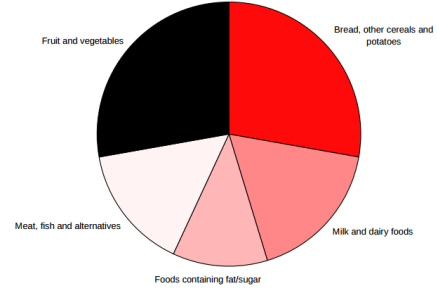


Figure 4: Proportion of Total Food - 2000 (Source: National Food Survey[5])

for a weight-conscious and active person when taxes on high-calories items are imposed, since the active person may spend more time cooking at home instead of spending that time on physical exercise[6].

The implementation concerns with a Pigouvian fat-tax are even 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 (e.g. disparity in laws amidst the EU member states)[3].

In summary, a sin tax for high-calories foods is not the same as that for tobacco-products - simply because the classification of high-calorie-items is not as clearcut. In addition, high-calorie taxes apply to everybody (unlike tobacco taxes which apply only to smokers). The medical evidence of the effect of substitutes (overloading on less calorie items) on obesity is far from conclusive[7] and makes the case for the sin-taxes even weaker.

3 Other Factors responsible for Obesity

The medical fact of extraneous fat accumulating in our bodies still holds - but reducing fat consumption alone cannot sufficiently address the problem of obesity. The obesity of parents, for example, is a strong indicator of the obesity of adolescents and children. Being only of cross-sectional importance, genetics factor may be ignored for the problem of *rising* rates of obesity - but it nevertheless highlights the fundamental problem with obesity - *varied sensitivities of a population to technological changes* (leisure, working-hours) *through environmental factors* (habit of overeating, economic conditions, social stratum).

The technological changes of last decades have changed our habits and incomes drastically. With food getting cheaper and disposable income having risen since the past decades (See Figure 7), food con-

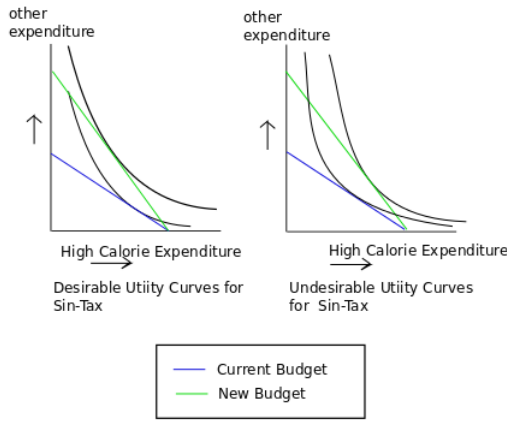


Figure 5: Problems with sin-taxes

sumption has risen overall while the average hours of walking and sleeping have reduced. The growth of pharmaceutical industry has seen an increase in the average consumption of medical drugs that have obesity as side-effects (See Table1). All of these have contributed to rise in obesity - despite an increase in average number of hours spent on exercising[8, 9].

4 Suggested Solutions

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 necessary to have the population stick to right nutrient levels while on the other hand, we have proponents of Healthy-Living-Vouchers (HLVs) and Nudge Programmes who find encouragement as the only solution to the problem of obesity[10].

At first glance, Vouchers for less-calorie items seem an option much better than sin-taxes - since 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 line⁵ and avoid the substitution problems that a sin-tax would face with license-to-eat consumer behaviours (See Figures 5, 6). The major limitation of HLVs however, is their heavy costs with no immediate benefits - making their implementation somewhat difficult.

Despite their shown promise, Nudge programs (awareness and training) too are not likely to work for chil-

⁵If 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).

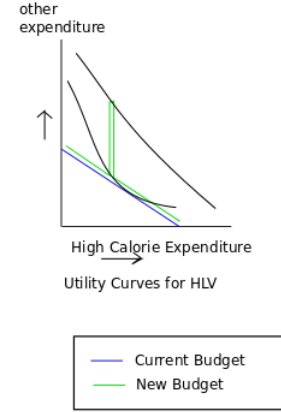


Figure 6: The case for HLVs

dren and those with health-conditions[1, 10]⁶. Evidence suggests that shoppers who appear to be health-conscious do not always succeed in purchasing a diet lower in saturated fat[1]. Nudge approaches can be adjusted with framing models and social contagion[12] - so the consumer is more likely to make healthier choices[1].

That said, with almost 95 percent of those who lose weight regaining the lost pounds within five years' time [11], one needs to make sure that the environment of healthier choices doesn't change once the weight reduction targets are achieved. A control on advertising and food-prices becomes a necessary supplement to the Nudge efforts.

Implementation concerns are indeed severe for any method that attempts to ascertain consumer behaviour. In most countries, law has already receded from punishment to minimal control - as societies have turned to negotiation and persuasion rather than command and control. The attempts to control diets are to face opposition from trading organizations (e.g. WTO) on grounds of legal disparity as well[3]. Still, prohibitive measures are easier to implement on the supply side. The way government-issued agricultural subsidies had contributed to obesity trends in the US through provision of cheaper food [13, 14], a provision of incentives for healthier products can influence consumer decisions in the opposite direction. Addressing informational asymmetries in the health-insurance market and controlling the firm-advertising impacts on target age-groups (e.g. controlling the school environment for adolescents) is more feasible than attempting to directly control aggregate consumer behaviour.

⁶Thaler and Sunstein have argued in favour of driving programs over wearing of helmets. Obesity among children and those with health-conditions requires a significant degree of monitoring[11].

Type	Contents	Side-Effects
Antidepressants	Tricyclics	1-9 pounds per month
	Selective Serotonin reuptake inhibitors	15-20 pounds ⁴
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]

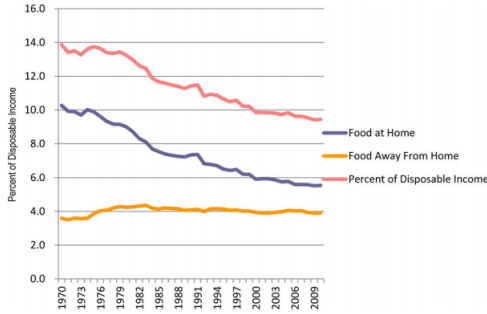


Figure 7: Expenditure on Food as fraction of Disposable Income in the US[9]

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 current note considers attempts to control advertising and subsidies more sound than those to modify consumer demand - particularly due to the environmental nature of the problem of obesity.

To back up the environmental nature of obesity reduction methods, the factors that medical sciences point to are instructive. Bringing good sleep and sufficient walking in one's life seems to be a better medical technique than trying. The change of perspective (trying to live healthier than attack a problem of obesity) has clear second order affects through psychological health and reduced dependence on medical drugs.

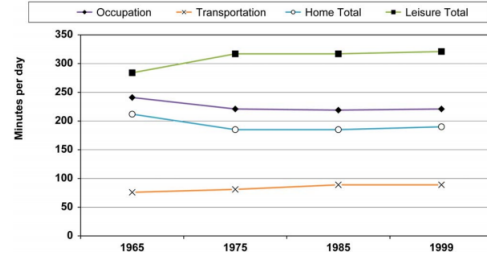


Figure 8: Time Spent on leisure in the US[9]

	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	0.06	0.02	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])

References

- [1] R. Griffith and M. O. Connell, "Public policy towards food consumption," *Journal of Applied Public Economics*, vol. 31, no. 4, pp. 481–507, 2010.
- [2] E. A. Finkelstein and L. Zuckerman, *Fattening of America: How Economy Makes Us Fat*. John Wiley And Sons.
- [3] A. Alemanno and I. Carreno, "Fat taxes in eu-rope - a legal and policy analysis under eu and wto law," *European Food and Feed Law Review*, vol. 8, no. 2, pp. 97–112, 2013.
- [4] H. H. Chouinard, D. E. Davis, J. T. LaFrance, and J. M. Perloff, "Fat taxes: Big money for small change," *Forum for Health Economics and Policy*, vol. 10, no. 2, 2007.
- [5] "National food survey," 2013.
- [6] G. Yaniv, O. Rosin, and Y. Tobol, "Junk-food, home cooking, physical activity and obesity: The effect of the fat tax and the thin subsidy," *Journal of Public Economics*, vol. 93, pp. 823–830, 2009.
- [7] C. Snowdon, "The proof of the pudding," *IEA Current Controversies*, May 2013.
- [8] A. Amarasinghe and G. D'Souza, "Individual, social, economic, and environmental model: A paradigm shift for obesity prevention," *ISRN Public Health*, 2012.
- [9] R. Sturm and R. An, *CA: A Cancer Journal for Clinicians*, vol. 64, no. 5, pp. 337–350, 2014.
- [10] C. Sunstein, *Nudge*. Yale University Press, 2009.
- [11] W. Bogart, *Regulating Obesity?: Government, Society, and Questions of Health*. Oxford University Press, 2014.
- [12] N. A. Christakis, , and J. H. Fowler, "Social contagion theory: examining dynamic social networks and human behavior," *Statistics in Medicine*, 2011.
- [13] C. Franck, S. M. Grandi, and M. J. Eisenberg, "Agricultural subsidies and the american obesity epidemic," *American Journal of Preventive Medicine*, 2013.
- [14] J. Foster, "Subsidizing fat: How the 2012 farm bill can address america's obesity epidemic," *University of Pennsylvania Law Review*, vol. 160, pp. 235–276, Dec 2011.
- [15] O. Rosin, "The economic causes of obesity: A survey," *Journal of Economic Surveys*, vol. 22, no. 4, pp. 617–647, 2008.
- [16] D. Thompson, R. Aldritt, C. Bolton-Smith, J. Buttress, A. Chester, S. Church, N. Ritchie, S. Henson, R. Hutchins, T. Manners, M. Nelson, S. Platt, R. Price, T. Stainer, R. Wenlock, and M. Wisemann, "Report of the national food survey committee," 2000.
- [17] J. G. Trogon, E. A. Finkelstein, T. Hylands, P. S. Della, and S. J. Kamal-Bah, "Indirect costs of obesity: a review of the current literature," *Obesity Reviews*, no. 9, pp. 489–500, 2008.