Department of Agricultural Economics & Rural Development
Agricultural University of Athens

Doctoral Dissertation

Socio-economic and lifestyle determinants of childhood obesity in Greece

Georgia Papoutsi

Supervisor: **Lazaridis Panagiotis,** Professor AUA

Athens, March 2014

Doctoral Dissertation

Socio-economic and lifestyle determinants of childhood obesity in Greece

Georgia Papoutsi

Committee in Charge:
Lazaridis Panagiotis (Supervisor)**,** Professor, Agricultural University of Athens
Klonaris Stathis, Assistant Professor, Agricultural University of Athens
Yannakoulia Mary, Assistant Professor, Harokopio University

Examination Committee:
Lazaridis Panagiotis, Professor, Agricultural University of Athens
Klonaris Stathis, Assistant Professor, Agricultural University of Athens
Yannakoulia Mary, Assistant Professor, Harokopio University
Chletsos Michael, Associate Professor, University of Ioannina
Drichoutis Andreas, Lecturer, Agricultural University of Athens
Efthimia Tsakiridou, Assistant Professor, Aristotle University of Thessaloniki
Rezitis Anthony, Professor, University of Patras

Abstract

This thesis contributes to economic research in behavioral, food and experimental economics. In particular, it examines the determinants of childhood obesity in Greece with special emphasis on economic and social factors. The ultimate aim of the research is to evaluate several food fiscal policies as a mechanism for nudging parents towards a healthier way of eating and consequently forming a healthy food environment for children.

Like many western societies, Greeks are becoming more and more overweight. This trend affects adults as well as children. The extended literature review, presented in chapter 2, indicates that there is a multitude of factors that have contributed to the rapid childhood obesity growth rates, including changes in the food environment where children are raised. Although adults have the freedom to make their own choices over energy intake and expenditure, the child's choice set is limited by the environment created by the parents. Consequently, public policies and interventions targeting childhood obesity could focus on ways of changing the environment that affects children's health behavior and weight outcomes (i.e., the food environment created by their parents). Thus this doctoral thesis tries to partly understand the decision process underlying parental food choices and determine whether food fiscal policies can alter parental food choice behavior towards a healthier eating behavior.

There are four key questions that this thesis attempts to answer. Firstly, can food fiscal policies, such as fat tax (price increase) or subsidy (price reduction), either separately or in combination, alter the purchasing behavior of parents when they have to choose products for their kids? Secondly, can children's pestering power affect parental purchasing behavior when the aforementioned fiscal policies are adopted? A motivation for this objective is to assess the importance of taking into account the fact that children may have some decision power within the household. Thirdly, does the provision of information regarding the implementation of food fiscal policies influence parental food choices? And finally, are there correlations between parental and children's Body Mass Index (BMI) or gender and food choices?

To answer the above research questions, a sample of families (father/mother and a child) participated in a food choice experiment with real economic incentives. Parents were asked to choose between two food alternatives that differ in their fat or sugar content. The experimental design included four within- and four between-subjects treatments. The first question is answered by the four within-subjects treatments. The four within-subjects treatments correspond to the price variations caused by the four fiscal policies: (1) a baseline scenario of market prices, (2) a fat tax, (3) a subsidy, and (4) a fat tax and subsidy applied simultaneously (the both treatment).

The four between-subjects treatments vary the decision environment in order to investigate the second and third main questions of the thesis. The experimental design involved parents being randomly assigned to a control group (comparison) and three treatments. Parents belonging to the control group went through the choice tasks without the presence of their child and without knowing why there are differences in the food prices of the products presented to them. Parents in the first treatment made the food choices without the presence of their child but knowing that prices vary due to the implementation of food fiscal policies. Parents in the second treatment made the food choices with their child but without knowing why prices differ. Finally, parents in the third treatment made the food choices with their child and knowing that price variations correspond to the implemented food fiscal policies.

Results suggest that implementing a fat tax and a subsidy simultaneously can nudge parents to choose healthier food products for their children. The child's influence on parents' choices is investigated by allowing children, in one treatment, to interact with their parents. Results indicate that fiscal policies can be effective in nudging parental health behavior but that children's pestering power can reduce the effectiveness of such policies. The role of information was examined by providing information regarding the implemented fiscal policy. Results indicate that provision of information can further increase the impact of the intervention on parents' choices, even when the child is exercising his/her pestering power. Finally, although socio-demographic characteristics are rarely considered an important element of a utility formation in a choice experiment, this study attempts to incorporate anthropometric and demographic variables (which concern both the parent and the child) into the

estimated model. After controlling for parental and child's BMI and gender, results suggest that only parental BMI and gender play a significant role in purchasing behavior. Specifically, fathers have a 35% higher likelihood of purchasing unhealthier food products than mothers. Moreover, it is observed that as the parental BMI increases, the percentage of unhealthier choices increases as well. Finally, none of the variables related to the child appear to have significant effect on parental purchasing behavior.

Scientific field: Microeconomics – Consumer Behavior

Key words: Childhood obesity, Behavioral economics, Choice experiment, Fat tax, Subsidy, Information, Children's pestering power.

Περίληψη

Οικονομικό-κοινωνικοί παράγοντες και παράμετροι του τρόπου ζωής που σχετίζονται με την παιδική παχυσαρκία στην Ελλάδα

Στην διατριβή αυτή εξετάζονται οι προσδιοριστικοί παράγοντες της παιδικής παχυσαρκίας στην Ελλάδα με ιδιαίτερη έμφαση στους οικονομικούς, στους κοινωνικούς αλλά και σε αυτούς που αφορούν στον τρόπο ζωής των Ελληνικών οικογενειών. Απώτερος σκοπός της έρευνας είναι η αξιολόγηση διαφόρων πολιτικών τιμολόγησης των τροφίμων ως μηχανισμού διαμόρφωσης του καταναλωτικού προτύπου της οικογένειας και κατ' επέκταση του τρόπου διατροφής των παιδιών.

Όπως σε πολλές δυτικές κοινωνίες, έτσι και στην Ελλάδα ο πληθυσμός γίνεται ολοένα και πιο υπέρβαρος κάτι που αφορά τους ενήλικες αλλά κυρίως τα παιδιά. Η εκτεταμένη ανασκόπηση της βιβλιογραφίας, που παρουσιάζεται στο κεφάλαιο 2, δείχνει ότι υπάρχει μια πληθώρα παραγόντων που έχουν συμβάλει στην ταχεία αύξηση της παιδικής παχυσαρκίας, στους οποίους περιλαμβάνεται και το διατροφικό περιβάλλον στο οποίο μεγαλώνουν τα παιδιά. Σε αντίθεση με τους ενήλικες που έχουν την ελευθερία να κάνουν τις δικές τους επιλογές σχετικά με την ενεργειακή πρόσληψη και δαπάνη, οι επιλογές του παιδιού περιορίζονται από το διατροφικό περιβάλλον που δημιουργείται από τους γονείς. Κατά συνέπεια, οι κυβερνητικές πολιτικές και παρεμβάσεις που στοχεύουν στην μείωση της παιδικής παχυσαρκίας θα μπορούσαν να επικεντρωθούν σε μεθόδους που μπορούν να αλλάξουν το περιβάλλον αυτό. Η διατριβή εστιάζει στην κατανόηση της διαδικασίας λήψης αποφάσεων που σχετίζονται με την διατροφή, καθώς επίσης στην χάραξη και αξιολόγηση των πολιτικών τιμολόγησης που μπορούν να επηρεάσουν τις αποφάσεις αυτές. Ειδικότερα, εξετάζει τη χρήση των πολιτικών τιμολόγησης τροφίμων ως ένα πολλά υποσχόμενο μηχανισμό δημιουργίας κινήτρων στους γονείς για μια πιο υγιεινή διατροφική συμπεριφορά.

Τα βασικά ερωτήματα στα οποία προσπαθεί να απαντήσει η παρούσα διατριβή είναι τέσσερα. Πρώτον, κατά πόσο οι πολιτικές τιμολόγησης των τροφίμων, όπως είναι ο φόρος λίπους (αύξηση της τιμής) ή η επιδότηση (μείωση της τιμής), μπορούν η κάθε μια ξεχωριστά ή συνδυαστικά να αλλάξουν την αγοραστική συμπεριφορά των γονέων. Δεύτερον, αν η αγοραστική συμπεριφορά των γονέων επηρεάζεται από τις

προτιμήσεις των παιδιών ιδιαίτερα όταν εφαρμόζονται οι παραπάνω αναφερόμενες τιμολογιακές πολιτικές. Τρίτον, κατά πόσο η παροχή πληροφοριών σχετικά με την εφαρμογή των πολιτικών τιμολόγησης τροφίμων μπορεί να επηρεάσει τις αναμενόμενες διατροφικές επιλογές των γονέων. Τέλος, αν υπάρχει συσχέτιση ανάμεσα στον Δείκτη Μάζας Σώματος (ΔΜΣ)/φύλο, των γονέων και των παιδιών και τις διατροφικές επιλογές.

Για να επιτευχθούν οι παραπάνω στόχοι χρησιμοποιήθηκε δείγμα οικογενειών (πατέρας/μητέρα και ένα παιδί) οι οποίοι συμμετείχαν σε ένα πείραμα επιλογής τροφίμων σε συνθήκες πραγματικής οικονομικής θυσίας. Οι γονείς καλούνταν να επιλέξουν κάθε φορά ανάμεσα σε δύο είδη τροφίμων που διέφεραν ως προς την περιεκτικότητα τους σε λίπος ή ζάχαρη. Ο πειραματικός σχεδιασμός μετέβαλε τις τιμές ανάμεσα στις δύο εναλλακτικές σύμφωνα με τέσσερις πολιτικές τιμολόγησης τροφίμων: (1) μέση αγοραία τιμή, (2) επιβολή φόρου λίπους στην λιγότερο υγιεινή εναλλακτική, (3) επιβολή επιδότησης στην περισσότερο υγιεινή εναλλακτική, και (4) ταυτόχρονη επιβολή φόρου λίπους και επιδότησης.

Για να διερευνηθούν το δεύτερο και το τρίτο βασικό ερώτημα της διατριβής το πειραματικό σχέδιο περιελάμβανε μια ομάδα ελέγχου (σύγκρισης) και τρεις ομάδες χειρισμού. Έτσι οι γονείς που ανήκαν στην ομάδα ελέγχου έκαναν τις διατροφικές επιλογές χωρίς την παρουσία του παιδιού τους και χωρίς να γνωρίζουν τον λόγο διαφοροποίησης των τιμών. Οι γονείς της πρώτης ομάδας χειρισμού έκαναν τις διατροφικές επιλογές χωρίς την παρουσία του παιδιού τους, γνωρίζοντας όμως ότι οι τιμές διαφέρουν λόγω εφαρμογής συγκεκριμένων πολιτικών τιμολόγησης τροφίμων. Οι γονείς που ανήκαν στην δεύτερη ομάδα χειρισμού έκαναν τις διατροφικές επιλογές έχοντας μαζί το παιδί τους, χωρίς όμως να γνωρίζουν τον λόγο διαφοροποίησης των τιμών. Τέλος, οι γονείς που ανήκαν στην τρίτη ομάδα χειρισμού έκαναν τις διατροφικές επιλογές έχοντας μαζί το παιδί τους και γνωρίζοντας ότι οι τιμές διαφέρουν λόγω εφαρμογής συγκεκριμένων πολιτικών.

Σύμφωνα με τα αποτελέσματα η εφαρμογή φόρου λίπους και επιδότησης ταυτόχρονα μπορεί να ωθήσει τους γονείς σε επιλογές πιο υγιεινών τροφίμων για τα παιδιά τους. Επιπλέον, το δεύτερο σκέλος τις έρευνας αποδεικνύει ότι μπορεί οι πολιτικές τιμολόγησης να είναι αποτελεσματικές αλλά η παρουσία των παιδιών στη διαδικασία αγοράς τροφίμων μειώνει αισθητά την αποτελεσματικότητα τους.

Επίσης, τα αποτελέσματα δείχνουν ότι η παροχή πληροφοριών στο ράφι του κάθε προϊόντος σχετικά με την εφαρμογή της εκάστοτε πολιτικής μπορεί να αυξήσει περαιτέρω την επίδραση της παρέμβασης στις επιλογές των γονιών, ακόμη και όταν το παιδί είναι παρόν κατά την διάρκεια της αγοράς. Τέλος, αν και τα δημογραφικά χαρακτηριστικά σπάνια θεωρούνται σημαντικό στοιχείο στα πειράματα επιλογής, η μελέτη αυτή επιχείρησε να ενσωματώσει κάποιες σωματομετρικές και δημογραφικές μεταβλητές στο εκτιμώμενο υπόδειγμα οι οποίες αφορούν τόσο τον γονέα όσο και το παιδί. Διαπιστώθηκε όμως οτι μόνο το φύλο και ο ΔΜΣ του γονέα παίζουν σημαντικό ρόλο στην αγοραστική συμπεριφορά. Συγκεκριμένα, ο πατέρας έχει 35% αυξημένη πιθανότητα σε σχέση με την μητέρα να αγοράσει λιγότερο υγιεινά τρόφιμα. Επιπλέον, θετική επίδραση στην αγοραστική συμπεριφορά λιγότερο υγιεινών τροφίμων παίζει ο ΔΜΣ του γονέα, καθώς παρατηρήθηκε οτι αυξάνοντας ο ΔΜΣ, αυξάνει και το ποσοστό τον ανθυγιεινών επιλογών. Τέλος, καμία από τις μεταβλητές που αφορούν το ίδιο το παιδί δεν φαίνεται να επιδρά σημαντικά στην αγοραστική συμπεριφορά των γονέων.

Επιστημονική περιοχή: Μικροοικονομία – Συμπεριφορά Καταναλωτή

Λέξεις κλειδιά: Παιδική παχυσαρκία, Συμπεριφορική οικονομική, Πείραμα επιλογής, Φόρος λίπους, Επιδότηση, Πληροφορία, Επιρροή παιδιού

Acknowledgements

I would like to take this very special opportunity to acknowledge the importance of several people in the completion of this dissertation. Without their help I wouldn't be able to overcome all the barriers, personal and professional (and believe me there were many all these years) and accomplish my goal on time.

First, I would like to thank my supervisor Dr. Panagiotis Lazaridis, Professor in the Department of Agricultural Economics and Rural Development in Agricultural University of Athens for his continuing guidance and encouragement over the last 3.5 years. We met for the first time after the completion of my master's degree, in a time where my trust to the academic system was crashed. Although coming from a different University, he embraced my dream of pursuing a PhD degree. He was always there, sharing his knowledge, expertise and time with me; discussing my worries tirelessly and congratulating my achievements and decisions. I also want to thank him for encouraging me to work harder, for always telling me his sincere opinion and for creating a "steady" and "healthy" academic working environment.

I am also grateful to the rest of my committee members. I value the interest and trust that Dr. Stathis Klonaris, Assistant Professor in the Department of Agricultural Economics and Rural Development in Agricultural University of Athens has showed from the very beginning. He has contributed enormously towards this thesis by providing a vast amount of support, both professionally and personally. I would, also, like to thank him for the encouragement at the different stages of my PhD, as well as, for the opportunity he gave me to teach.

Dr. Mary Yannakoulia, Assistant Professor in the Department of Dietetics and Nutrition in Harokopio University although not present in my everyday life as the rest of my committee, has been a surprise in my life. Her dynamism and high level of expertise accompanied me from the beginning of this journey. She provided valuable help with the nutritional/health issues of this research, not only through emails but also through personal meetings. She is also the one who encouraged me to publish a version of the second part of Chapter 2 regarding the fiscal policies. She has been

extremely approachable during all these years and I'm sure this is a quality that her students appreciate.

During my PhD studies, I have been fortunate to spend some time at the other side of the Atlantic, at University of Arkansas. This great opportunity was given to me by Dr. Rodolfo M. Nayga, Jr., Professor and Tyson Chair in Food Policy Economics in University of Arkansas. Besides his continues guidance through hundreds of emails while being in distance, he spent a lot of time in front of a white board trying to provide shape to my blurry research ideas during my stay in Arkansas. He trusted me on the idea of parental obesogenic environment and he encouraged me to develop this idea further and use the method of experimental economics. He has helped me improve the presentation of my research work and working with him has been incredibly productive and enjoyable. I would, also, like to thank him and his wife, Jean Nayga, for their warm welcome during my stay in Arkansas, as they made me feel part of their family and made my time there more pleasant.

During my stay in Arkansas I had the pleasure and honour to meet a lot of people (professors, researchers, students and academic stuff) that gave me the opportunity to see a very different working environment from what I had been used to. From all these people, I feel the urge to express my gratitude to two specific people. I met them during one of the low times of the PhD journey, when I was less motivated about my research, and with their dynamic personality and their enthusiasm for research made me reposition my goal. Dr. Cary Deck, Professor in the Department of Economics and Director of the Behavioral Business Research Laboratory of University of Arkansas, gave me the opportunity to sit in his PhD class on experimental economics and be part of experiments in the Lab which have inspired a lot of the research I have pursued throughout my PhD. I would also like to thank him for his selfless help and all the time he spent giving me advice, sharing thoughts and discussing the pros and cons of my research ideas, although he knew me just for a few months. Dr. Salar Jahedi, Assistant Professor in the Department of Economics of University of Arkansas gave me the opportunity to attend his class on behavioral economics, which gave me the chance to organize in my mind all the knowledge gathered from random reading until then. I really enjoyed our brainstorming sessions

on experiments in behavioral economics during happy hours. Knowledge can be enjoyable!

Furthermore, I would like to acknowledge the help of Dr. Andreas Drichoutis, Lecturer in the Department of Agricultural Economics and Rural Development in Agricultural University of Athens. I met him while he was pursuing his PhD goal and he is the reason I became part of the Lab's research group after introducing me to Dr. Lazaridis. I have learned a lot from his expertise in food and experimental economics and his feedback and considerable contributions have been very important in the completion of my PhD. He is the one who encouraged me to publish my first work (a version of the first part of Chapter 2) and through his tirelessly editing taught me how to present my work in a publishable form. Andreas' attitude set an example for the researcher I would like to be.

I gratefully acknowledge financial support (3-year scholarship) from State Scholarships Foundation (IKY).

I would like to thank my two office mates; Dr. Spiros Stachtiaris and Mr. Achilleas Vassilopoulos. We have shared a lot of the PhD worries, anxieties and joys together.

Another big "thank you" goes to each one of my good friends who have accompanied me through the up and downs of the last years.

The last but the greatest thanks go to my family. I would like to thank my parents Savvas and Natasa, and my sister Dimitra who always encouraged me to dream big. I couldn't have completed this PhD without their love, psychological and financial support.

To my family who helped me see the light at the end of the tunnel; every day; all day. Without your love and insights I would have been so lonely in this journey.

TABLE OF CONTENTS

1 CHAPTER: Introduction

Overconsumption and excessive intake of sugar and fats along with sedentary lifestyles have been partly blamed for the worldwide obesity prevalence trend. Individual food choices are influenced by a wide variety of biological and environmental variables. Biological variables include hunger, taste, appetite; while environmental variables include economic determinants (cost, availability, income, access, and time), social determinants (socio-cultural status, meal patterns, peer and social networks), psychological determinants (mood, stress, guilt) and perceived nutrition determinants (knowledge about food, beliefs, attitudes) (The European Food Information Council (EUFIC), 2005). Individuals place different levels of importance on each of these evaluative dimensions.

However, when transferring this framework from adults to children, an additional dimension must be taken into account. The food environment created by parents for children likely plays a more important role. Although adults have the freedom to make their own choices over energy intake and expenditure, the child's choice set is limited by the environment created by their parents (Barlow and Dietz, 1998). In this respect, Cawley (2006) stresses that parental control and bounded rationality are of great importance for childhood obesity. The multidimensional concept of this problem rests on the fact that obesity is related to individual characteristics (that are genetic or acquired) and to individual's socioeconomic environment. While genetics or biological factors are important factors that can influence childhood obesity, the rapid increase in obesity rates over the last decades suggests that genetics is not one of the major drivers of recent increases in childhood obesity. At a basic level, the simplest and immediate determinant of childhood obesity is environmental-metabolic in nature i.e., the energy balance which is the amount of calories consumed and the amount of calories expended. With respect to caloric intake, children (after infancy) generally consume the same foods as their parents (Philipson and Posner, 2008), which implies that factors related to food that contribute to adult obesity may work similarly with children. Furthermore, caloric expenditures can also be determined by parents' decisions (or adult-framed decisions in general), as parents have the power to compel their children to allocate their time in certain ways. Energy can be

expended not only through physical activity but also through dietary thermogenesis and basal metabolic rate (Anderson and Butcher, 2006a), although it is usually difficult to collect data on the latter. Consequently, the socio-economic literature has mainly focused on the correlation between physical or sedentary activities and weight gain.

Thus, nudging healthy behaviors at home could play an important role in helping children develop healthy eating habits at a young age and adopt them throughout their adulthood. Evidence shows that habits are formed early on in life and are then kept into adulthood (Kelder et al., 1994; Resnicow et al., 1988; Singer et al., 1995). Therefore, interventions that focus on nudging parental food choice behavior may help in this direction. Due to the substantial negative externalities for society involved with increasing obesity rates, several governments worldwide have intervened with various policies with the goal of influencing people's dietary habits. These include fiscal (OECD, 2012), marketing/informational (Beaudoin et al., 2007; Maes et al., 2012), and educational policies (Cross-Government Obesity Unit, 2008; New York City Department of Health and Mental Hygiene, 2008) that aim to nudge people to make healthier food choices. In the literature, fiscal policies (i.e., those that limit access and provide price incentives and disincentives) have received great attention with respect to their effectiveness in improving dietary patterns (Thow et al., 2010). Generally, three types of price strategies have been applied: increasing unhealthier food prices (fat tax), decreasing healthier food prices (often called a thin subsidy) and a combination of both (Waterlander et al., 2012a).

While there is an extensive literature on the impact of information on demand for food, there is scant literature on the causal effect of information on the effectiveness of food fiscal policies. It is well established that information can help consumers better evaluate the value of goods and services they are interested in, resulting in more appropriate purchases. It can also significantly help buyers choose which market to participate in, and it can affect demand elasticity (Johnson and Myatt, 2006; Lewis, 2011; Tadelis and Zettelmeyer, 2011). Ashraf *et al.* (2013) examined information and subsidy as complements in health interventions and found that information can significantly increase the impact of price subsidies on purchases of

healthy products (the impact of price subsidies was 60% larger among the informed households).

All the above evidence on the effectiveness of health related food price incentives and disincentives comes from three sources: natural experiments, controlled trials of price changes in closed environments, and modelling studies (Mytton et al., 2012). To my knowledge, there are only a handful of studies that performed controlled experiments over food purchases under different fiscal policies and these studies come with some caveats. For example, two such studies (Epstein et al., 2010; Nederkoorn et al., 2011) lack enforcement of real incentives since both the purchases and the budget for the purchases were hypothetical. Another set of studies (Epstein et al., 2006; Epstein et al., 2007) lacks sufficient statistical power since they employed small sample sizes (10 and 47 couples of mother-child, respectively). The emphasis on experimental research is based on the wide belief that this kind of research can further enhance the contribution of economics on evaluating public interventions and hence improving public health.

The aim in this study is to identify some factors either inside or outside the home environment that can either weaken or enhance the expected outcomes of fiscal policies on food choices, through a controlled laboratory experiment. It focuses on how parents choose between healthier and unhealthier food items for their child under different fiscal policies. Furthermore, it evaluates how factors like the provision of information on fiscal policies and child's pestering power, may influence parental food choices. Moreover, the adopted experiment further contributes to the literature by providing an empirical examination of parents' choices between healthier and unhealthier alternatives when it comes to children's food products. To my knowledge, this is the first time a study has examined children's pestering power on parents' choices in the context of a lab experiment on food choices. This allows me to examine how fiscal policies and external influences can affect food choice behavior.

The question asked in this study is whether incentives can affect parental food choice behavior. These effects were examined through the recruitment of 189 parent-child pairs in a controlled laboratory choice experiment where an experimental market with real food products was created in the Lab of the Department of Agricultural

Economics & Rural Development of Agricultural University of Athens and parents actually had to purchase products presented under different pricing schemes. The sample consisted of four within-subject treatments and four between-subject treatments. In the *within-subjects* treatments, each participant faced 12 choice tasks. In each choice task, two food-for-kids products with different levels of healthiness and a no-buy option were displayed. The participants chose their preferred alternative in each choice task. Between choice tasks, the prices varied according to a base (market price) level and three different fiscal policies levels (i.e., fat tax, subsidy, fat tax and subsidy at the same time). To induce real economic incentives, one of the choice tasks was randomly drawn as binding at the end of the experiment and the participant had to buy the food product chosen in the binding task. In addition to the within-subjects treatments, there were four *between-subjects* treatments. The control treatment was as described above. The second treatment (the information treatment) was similar to the control treatment but with the addition of information regarding the food fiscal policies. The third treatment (the pestering power treatment) was similar to the control treatment but now the parent chose together with their child in each choice task while the final treatment was like the pestering power treatment but information about the food fiscal policies was also provided to the participants (pestering power + information treatment).

The results make three substantive contributions to the literature. Firstly, the intervention by itself has a moderate effect on parent's food choices. In particular, a fat tax or a subsidy can increase healthier choices but the simultaneous implementation of both fat tax and subsidy can further improve healthier choices among parents. Secondly, provision of information regarding the applied food fiscal policies can increase the impact of the intervention even further, even when the child is exercising his/her pestering power. Therefore, it appears that the lack of proper provision of information is one of the causes of the policy's moderate effectiveness. Thirdly, kid's pestering power strongly affects parents in making unhealthier choices.

Chapter 2 presents in brief statistics regarding childhood obesity prevalence, obesity's health and economic consequences as well as a literature review on the causes of childhood obesity and on food fiscal policies as a health intervention. The

literature review tries to give an insight for the research that has been done until now regarding the childhood obesity from a more socio-economic perspective.

Chapter 3 presents the methodology of studies based on experimental economics and especially the choice experiment method that is based our research. Furthermore, it illustrates the design of our experiment, the experimental procedures, the information regarding our sample and products used in the study.

Chapter 4 illustrates the results drawn from the descriptive and econometric analysis and we conclude with the importance and the implications of the findings in the last chapter (Chapter 5).

2 CHAPTER: Literature review

2.1 Childhood obesity prevalence and consequences

The World Health Organization (WHO) indicated that, globally, the percentage of overweight children under the age of five is estimated to be over 42 million and close to 35 million of these children are living in developing countries (WHO, Geneva,15–17 December 2009). In the United States, obesity rates among preschool U.S. children aged 2-5 increased from 5% to 10.4% between the periods 1976-1980 and 2007-2008 (Ogden and Carroll, 2010). Of more severity are the rates for obese children and adolescents. Specifically, Ogden *et al.* (2010) estimated that in 2008, 19.6% of U.S. children aged 6-11 were obese and during the same period the percentage of obese adolescents aged 12-19 was 18.1%. In 2010, more than one third of U.S. children and adolescents were overweight or obese (Ogden et al., 2012). The OECD indicates lower childhood obesity rates in the EU than in the US, although the numbers are not trivial; one in every seven children is overweight or obese across most EU countries (OECD, 2010).

The Hellenic Medical Association for Obesity used a national representative sample of 18,045 children and adolescents aged 7-12 years old, and in 2003 reported that 12.7% boys were overweight and 10% obese, though the percentages for girls were 11.1% and 7.2% respectively (Karayiannis et al., 2003). A more recent study, shows a slight increase in overweight rates and a decrease in obese rates. (Georgiadis and Nassis, 2007) used 6,448 students from schools throughout Greece aged 6-17 years old, and they reported that 16.9% of the boys were overweight and 3.8% obese, and 17.6% of the girls were overweight and 3.3% obese.

These numbers are depressing since if translated to health outcomes, it implies that roughly one in three children born in the year 2000 will develop diabetes at some point in their life (Narayan et al., 2003). Childhood obesity is recognised as a disease by the WHO (2000) and is associated with sleep apnea, asthma, cardiovascular diseases, dyslipidemia, hypertension, type II diabetes mellitus, osteoarthritis, gallbladder disease as well as renal, colon and genitourinary diseases (Bray, 2004;

Brennan et al., 2009; Eriksson et al., 2003; Franks et al., 2010; Must and Strauss, 1999; Williams et al., 2005). What is most worrying is that health conditions that were once almost exclusively associated with the elderly, such as type II diabetes, are now being diagnosed in children, mainly due to the increasing prevalence of childhood obesity. Furthermore, childhood obesity may inflict psychological harm, resulting from social stigmatization, depression, and poor body image (Paxton, 2005; Reeves et al., 2008; Strauss, 2000).

Despite the fact that childhood obesity rates in many countries are significantly increasing, limited attention has been paid on this issue in the past except in the biomedical and nutritional sciences fields. However, due to the vast and visible implications and consequences of childhood obesity, it has recently attracted a lot of attention from other disciplines, including economics. Childhood obesity affects all levels of the social spectrum and can also affect many aspects of an economy. The scientific literature to date has strongly linked childhood obesity with adult excess weight status (Power et al., 1997), with long-term consequences in terms of direct medical costs such as diagnostic/treatment costs, and indirect costs such as morbidity/disability/mortality costs. Finkelstein et al. (2009) estimated that in 2008, obesity related medical care expenditures in the US were approximately $147 billion; more than the annual medical expenditures associated with cigarette smoking. Cawley and Meyerhoefer (2010) reported even higher obesity related medical costs at 16.5% of US national health expenditures. The numbers outside the US territory, although of lower magnitude, are also non-trivial. For example, the estimates for Canada, France, Spain, Sweden and England indicate that 1%-2.6% of national direct health expenditures in these countries are due to obesity-related treatments (Barrett et al., 2008). As far as medical expenditures among children is concerned, Finkelstein and Trogdon (2008) examined data on US children aged 8-13 years old and concluded that medical expenditures per year per child are $220 more due to overweight children. At present, indirect cost estimates are mainly available for those associated with adult obesity and not childhood obesity (Hammond and Levine, 2010; Trogdon et al., 2008). Hence, there is a lack of comprehensive research on the estimation of indirect costs associated with childhood obesity.

2.2 Definitions

Childhood obesity has been measured or defined in various ways, which makes comparisons of trends at the international level challenging. For example, although measurement of the skin-fold thickness and percentage body fat would be ideal for classification of obese persons (Cole et al., 2000), it is considered impractical for epidemiological use. The use of the body mass index (BMI), which is the internationally recognized measure of adult obesity (WHO, 1995), is inappropriate for children because the medically optimal BMI is different for children and adolescents of different ages. In children weight varies with sex and age (Dietz and Robinson, 1998). The Centers for Disease Control and Prevention (CDC, 2009), however, has endorsed the use of BMI to assess weight status in children, and has provided sex-specific BMI distributions (percentile charts) for children aged 2–19 for this purpose. These BMI distributions are created from earlier National Health and Nutrition Examination Surveys (NHANES) so that BMI for the current population can be bench marked against an earlier period, before the current obesity epidemic.

Typically, the terms ‘overweight’ and ‘obese’ for children are based on BMI ranges for children that vary by gender and age. Thus, based on the Centers for Disease Control and Prevention Growth Charts (CDC, 2009), children with a BMI between the 85th and 95th percentile can be classified as overweight for a specific gender and age range and those with a BMI above the 95th percentile are considered obese. Opposition over the wider international use of the 85th and 95th percentile definitions have surfaced. Consequently, the International Obesity Task Force (IOTF) used data from six large nationally representative studies from Brazil, Great Britain, Hong Kong, the Nederlands, Singapore and the United States and linked the adult cut-off points and the BMI percentiles for children and adolescents aged 2-18 years (Cole et al., 2000).

Another issue that has been raised is the definition of the word ‘children’, which in many studies, includes ages of 2–19 years old. We acknowledge, however, that there can be significant behavioral differences between young and older children. Hence, in this thesis we distinctively refer to 2–11 year olds as children and to 12–19 year olds as adolescents. Although, in most of the findings discussed in the following

literature review, we explicitly mention the age groups being explored by the original studies reviewed.

2.3 Economic Theories of obesity

Existing economic explanations of weight gain and obesity are largely based on the utility maximization theory. From an economic point of view, individuals make decisions about their diet, physical activity, time allocation and weight in order to maximize their utility subject to constraints such as time, resources, genetic predisposition and biological factors. The rapidly growing economic literature on obesity presents several models of weight gain classified under the umbrellas of "Neoclassical Theory" and "Behavioral Theory" of weight gain.

The Neoclassical theory of weight stresses that "the marginal benefit of eating today is equal to the current pleasure of eating and the present-discounted marginal utility or disutility of weight gain" (Lakdawalla and Philipson, 2006). This theory includes the Capital Investment model of weight, developed by Philipson and Posner (1999) and Lakdawalla and Philipson (2002) and the Rational Addiction model of weight proposed by Cawley (1999).

The Capital Investment model is a dynamic model of weight in which weight is considered a durable capital good and individuals make decisions after comparing the lifetime costs and benefits of weight gain. Philipson and Posner (1999) claim that over-weightiness could be prevented by behavioral change since weight is the result of personal choices (food intake, occupation, leisure time activity or inactivity and area of residence) and people may rationally prefer to be under- or over-weight in a medical sense. They also argue that technological change provides the best and natural explanation of the growth in obesity trends. Along with Philipson and Posner (1999), Lakdawalla and Philipson (2002) argue that technological change has induced weight growth by decreasing food prices (through agricultural innovation) and by increasing the price of exercise (i.e., by making home and market production more sedentary). An examination of individual-level data from 1976 to 1994 showed that about 40% of the recent growth in weight could be due to innovation in agricultural production while 60% may be due to demand factors such as increased

productivity at home or market production associated with declining physical activity (Lakdawalla and Philipson, 2002). Later on, Lakdawalla *et al.* (2005) confirmed not only the changes in strenuousness of work leisure caused by economic development but also explored how declines in relative prices of certain types of foods can affect weight, health and well-being. Furthermore, Lakdawalla and Philipson (2009) illustrate how body weight varies with income within a country and across countries of different levels of technology adoption and stress that additional income might make people strive to move towards their perceived ideal weight. Income raises weight among the poorest groups but lowers it throughout the upper half of the income distribution (Philipson and Posner, 2008).

Complementary to the Capital Investment model is the Rational Addiction model where eating is considered addictive and past eating raises the marginal utility of current eating. In this model, addiction is modelled as a forward-looking consumption plan under a budget constraint, full certainty and perfect information (Becker and Murphy, 1988). The addicted person knows how the good will affect him/her and consumes more of it because this consumption pattern maximizes his/her discounted utility. Cawley (1999) uses the Rational Addiction model to explain that the variation in weight is attributed to choices even if people have genetic predispositions to a certain outcome. He found support for the hypothesis that consumption of net calories (i.e., caloric intake minus energy expenditure) is addictive. He also emphasized that increases in the future price of food can lead to current reductions in food intake, because current food intake shifts up the future demand for food.

Overall, both the Capital Investment and the Rational Addiction models based on the Neoclassical theory of weight share the view that individuals are rational and forward looking about their weight. An alternative to the Neoclassical theory is the Behavioral theory of weight proposed by Cutler *et al.* (2003). Cutler *et al*. argue that although eating is considered addictive, individuals have problems of self control and time inconsistencies that deter them from committing in advance to a prescheduled plan for food, exercise and weight choices. For example, some people prefer current food (over)consumption to have immediate gratification, although they are aware of the health costs of this (over)consumption in the future. Other people also face times

of indulgence where they overeat even though they try to lose weight. Dockner and Feichtinger (1993) observed that consumption behavior seems to contradict rational choice theory. Using the Becker and Murphy (1988) rational addiction model to eating decisions and the assumption that food consumption is addictive, they concluded that consumption decisions, and the consequent weight path, can exhibit cycles with gradual increases followed by gradual decreases.

Levy (2002) explained cyclical food-consumption and over- and under- weightiness through a dynamic model where eating is neither addictive nor a form of habit. Consumers rationally balance the marginal satisfaction from current and future consumption against marginal deterioration of health and the risk for being over- and under-weight. He found that when physiological, psychological, environmental and socio-cultural reasons for divergence from a physiologically optimal weight do not exist, the steady state is a state of over-weightiness. He also showed that the optimal stationary level of over-weightiness is positively associated with the individual's rate of time-preference and elasticity of utility but negatively associated with his/her rate of calories burning. Even a small divergence from this rationally optimal stationary weight[1] is followed by cyclical food consumption and weight which may lead to chronic loss of weight in old age. After incorporating socio-cultural norms into his basic model, he concluded that the stationary weight of fat people is lower than otherwise and the stationary weight of lean people is greater than otherwise.

The studies discussed above generally pinpoint that weight gain and obesity are the result of individual choices. However, when transferring this framework from adults to children, an additional dimension must be taken into account. The food environment created by parents for children likely plays a more important role. A series of recent papers explicitly focus on parental influence as potential contributor to childhood obesity and present parental environment as a good explanation of the large socioeconomic differences that exist in children's health outcomes. These are presented separately in the next section.

[1] Levy (2002) defines as a rationally optimal weight trajectory the weight trajectory associated with the food-consumption path which maximizes the individual's expected lifetime-utility.

2.4 Causes of childhood Obesity

2.4.1 Parental Behavior and Child Health Outcomes

The socio-economic literature has developed behavioral models in order to gain an understanding of why people eat the foods they eat or why they do (or do not) participate in physical activity. It involves the traditional economic approaches, which emphasise utility maximisation and the combination of health capital, health investments and time, and the non-traditional models, which involve hyperbolic time discounting and bounded rationality. Individuals make decisions about their diet, physical activity, time allocation and weight in order to maximize their utility subject to constraints such as time, resources, genetic predisposition and biological factors.

However, when considering this framework (which applies to adult agents) for children, we must take into consideration that children are not perfectly rational, have time-inconsistent preferences, and are affected by the environment created by their parents. Although adults have the freedom to make their own choices over energy intake and expenditure, the child's choice set is limited by the environment created by the parents (Barlow and Dietz, 1998)[2]. In this respect, Cawley (2006) stresses that parental control and bounded rationality are of great importance for childhood obesity.

A series of papers recently focused on the effect of parental factors on childhood obesity and health. For example, Case and Paxson (2002) examined how parental actions in prenatal period and during childhood affect children's health and presented evidence on the correlation of parental behavior with income and socioeconomic status. They concluded that policy-makers should not focus on health insurance coverage and advances in medical treatment alone, even though these are important determinants of children's health. They remarked that governments should also focus on a broader set of policies that target the health behavior of parents. Dickie (2005), on the other hand, examined how family resource allocations affect children's health through a model of parental decision-making. He found that children with greater stocks of health capital (long term health status), whose parents invest in preventive

[2] One may argue that in certain circumstances, environmental and social factors constraint adults' food choices as well.

and remedial medical care, experience fewer days of illness. Furthermore, he found that, all else equal, single parents or parents that cannot afford insurance for their children are more willing to pay to avoid one day of illness. Anderson *et al.* (2007) also stressed the increased role of environmental factors created by parents on childhood obesity. They examined the correlation between parental and child BMI and concluded that the relationship between mother's and child's BMI has increased over time, pointing to the importance of the effect of shared environment on growing obesity rates. However, they also found that children's environment outside the family plays a substantial role in the determination of children's body mass.

The significance of parental influence on children's weight is also examined by McIntosh *et al.* (2006) through a novel approach. They adopted an interdisciplinary approach to study the influence of parenting on children's dietary intakes and weight status. Their theoretical framework is based on the collective household production model from economics coupled with role theory from sociology. With this model, behavioral expectations can be identified and preferences of household members can be different from each other. It is also assumed that there are incentives for the household decision makers to allocate their income and time in an efficient manner. This study was one of the first in the economics of obesity literature to examine the relationship between the time parents spend with children and children's dietary intake or obesity. This same data set and the collective household production model were also used in You and Davis (2010) to investigate the relationship between household food expenditures, parental time allocation and childhood overweight. The results from the collective model were then compared with the results from a unitary household production model. The traditional unitary model was rejected relative to the collective model. Policy implications from the two models were significantly different. Their model illustrates the importance of taking into account, in these types of studies, not only the mechanism that parents use to influence their children's choices but also the fact that parents implement this mechanism taking into consideration the response of the children (which in turn implies that children have some decision power within the household)[3].

[3] Admittedly, these theories are parental closed-world theories and do not reflect on the influence of other environmental systems. Bronfenbrenner (1979) developed an alternative child development model, the Ecological Systems Theory which holds the belief that child development reflects the

2.4.2 Obesity and the Food Market

Food availability and food markets evolved along with technological changes. Evidence suggests that the timing of these changes in the food market coincided with the growth in childhood obesity (Lakdawalla and Philipson, 2009; Lakdawalla et al., 2005). Food has become more convenient, cheaper and tastier but also more energy dense. Portion sizes have become larger (Nielsen and Popkin, 2003) and the consumption of beverages, particularly soft drinks, has become almost a "side dish" in children's and adolescents everyday life (French et al., 2003; Putnam and Gerrior, 1999). Anderson and Butcher (2006a) argued that convenience has been highly valued by families. As parents spend more and more hours at work and face tighter time constraints they are forced to find easy and convenient solutions for food consumption. Thus, food-away-from-home (FAFH) items such as snacks, soft drinks and fast foods seem more appealing than time-consuming healthy meals prepared at home. Anderson and Butcher (2006a) presented strong evidence for the contributing role of soft drinks on childhood obesity, followed by slightly mixed results on the role of fast food on childhood obesity and small evidence for the role of snack foods.

The positive association between children's soft drinks consumption and obesity rates has largely been acknowledged in nutrition and public health studies (Andersen et al., 2005; Ariza, 2004; Troiano et al., 2000). This link was confirmed by the recent findings of Chang and Nayga (2010) using a nationwide survey in Taiwan. The authors suggested that soft drinks consumption is influenced by children's characteristics and household features and is positively associated with children's overweightness and negatively associated with degree of unhappiness. Although the increased consumption of soft drinks or carbonated beverages among children is documented by French *et al*. (2003), there are conflicting evidence about the effect of taxing soft drinks on obesity rates. Fletcher *et al*. (2010b) concluded that soft drink taxation leads to a moderate decrease in the quantity of soft drinks consumed by children, but does not affect obesity rates, as any reduction in soft drinks consumption is offset by consumption of calories from other sources. On the other hand, Smith *et al.* (2010) found that a 20% tax included in the price of soft drinks

influence of five environmental systems namely the microsystem, mesosystem, exosystem, macrosystem, and the chronosystem.

would reduce the child at-risk-for-overweight prevalence from 32.2% to 27.0% and the overweight prevalence from 16.6% to 13.7%.

As far as FAFH is concerned, there are two points worth investigating in the economics literature: the types of food offered to children at these types of restaurants and the availability of FAFH by geographic location. Lin *et al.* (1999) showed that while the percentage of calories consumed from FAFH was only 18% in 1977-78, it increased to 27% by 1987-1988 and 34% by 1995. Interestingly, economists have not given prompt attention to the association between FAFH consumption and children's weight outcomes as much as they did for adults. However, recent evidence shows that children are eating more often away from home over time. Poti and Popkin (2011) showed that the percentage of calories eaten away from home by children aged 2-18 years increased from 23.4% in 1977 to 33.9% in 2006. In addition, they concluded that children now consume more calories from fast foods away from home than from school meals. Fast foods are now children's greatest source of calories consumed when not at home. Unfortunately, the amount of fast food consumption has clear and strong contribution to the increased risk of childhood obesity (Chang and Nayga, 2009). This is happening due to the high fat, cholesterol, salt and sugar content of children's menus (PCRM, 2010). Even when fast food restaurants provide healthier eating options in kids' menus, the number of less-healthy options still outweighs the healthier options. In a recent study (Fast Food FACTS, 2010), researchers looked at 20 fast food chains that provided more than 3,000 different kids' meal combinations and only 12 of these met researchers' nutritional criteria for pre-schoolers and 15 met the nutritional criteria for older children. In addition, household food expenditures data show that food consumption patterns have dramatically changed over the past several decades, with the greatest change being the rise of FAFH expenditures (Jekanowski et al., 2001). You and Nayga (2005) found that fast food expenditures has a statistically significant and negative effect on the diet quality of children and this effect differs between children younger than 11 years old and children at least 11 years old. They stressed that the elasticity of children's dietary quality with respect to household fast food expenditures is quite inelastic.

With respect to the availability of FAFH restaurants, Mellor *et al*. (2011) showed that children (middle and high school) who live near fast-food restaurants are more likely to be obese. The number of fast food restaurants around the school district was found to be deleterious to children's BMI as well. It is estimated that a fast food restaurant within 0.1 mile of a school results in a 5.2% increase in obesity rates (Currie et al., 2010). Moreover, Alviola *et al.* (2011) presented more recent evidence of a significant correlation between the number of fast-food restaurants within a 0.25 mile from a school and school level obesity rates. They pinpoint that this impact declines as distance between the school and fast-food restaurants increases. Other papers have also provided evidence on the significant and positive effect of per capita number of fast food restaurants on population's Body Mass Index (BMI) and obesity probability (Chou et al., 2004; Rashad, 2006).

In addition to FAFH, more attention should be given to the fact that although food prices (including preparation costs) have been decreasing over the last decades, high-fat high-sugar (HFHS) convenience food tend to be cheaper than healthier food. The combination of convenience and low cost attributes makes convenience foods more attractive not only to parents but also to children. It is worth noting that children nowadays have money in their possession to spend (i.e., pocket money)[4].

Lakdawalla and Philipson (2002) attributed 40 percent of the recent growth in body weight to lower food prices. However, one might argue that children and adolescents have preferences over specific foods and that these preferences may not be sensitive to changes in prices. On the contrary, French *et al.* (2001) and Hannan *et al.* (2002) presented evidence from data collected in school cafeterias and vending machines which indicates that adolescents tend to be sensitive to price changes of high-fat and low-fat foods. Specifically, the documented rise of the real price of vegetables and fruits over the years (Auld and Powell, 2009) has been strongly linked to higher BMI among American adolescents (Powell and Bao, 2009). Even among younger aged children, there are findings which support the idea that price variation may be a powerful way to affect their consumption. Among elementary school children in the US, lower real prices for vegetables and fruits were found to predict a significantly

[4] Data from England (and similar results from France) over a seventeen-year period up to 1996 show that pocket money have consistently been increasing disproportionately to annual inflation rate (Furnham and Argyle, 1998, pp.79).

lower gain in BMI (Sturm and Datar, 2005), although similar price effects were not found for fast food consumption (Sturm and Datar, 2011).

With respect to the effect of snack foods on childhood obesity, there is strong evidence that shows that the number of snacking occasions per day increased dramatically over the last years (Duffey and Popkin, 2011; Jahns et al., 2001; Zizza et al., 2001). However, there is very little and conflicting evidence on the direct effect of snacking on children's and adolescents' obesity rates. In fact, most of this evidence is on the effect of snacking on adolescent obesity rates, rather than on younger children's obesity rates. Specifically, Bandini *et al.* (1999), Phillips *et al.* (2004) and Field *et al.* (2004) concluded that there is no strong relationship between the consumption of snack foods and childhood obesity. In addition, French *et al.* (2001) and French (2003) mentioned that variation in snack food prices may cause adolescents to alter their consumption behavior; however, there is no evidence on the direct effect of price of snacks on children's obesity rates.

Furthermore, many scientists claim that the big change in the daily caloric intake is due to increased portion sizes and not because of decreased food quality. Nielsen and Popkin (2003) concluded that food portion sizes both at home and away from home increased between 1977 and 1996, but that the greatest increases appeared for food consumed at fast food restaurants. Similar evidence were provided by Young and Nestle (2002) for the years after the 1980s, a period which coincides with the increased rates of childhood obesity. This fact along with the conclusion presented by Rolls *et al.* (2000), which argues that children (with average age of 5 years old) eat more when they are provided larger portion meals[5], suggest the significant effect of portion sizes on childhood obesity.

In addition to the food environment, a number of studies have provided evidence that the built environment surrounding children can also significantly influence childhood obesity. These studies are discussed in the next section.

[5] Wansink (2004) found that individuals would eat more when given larger portions [which is consistent with previous findings by Rolls *et al*. (2002)] even when they had great distaste for the food. Geier *et al*. (2006) have termed this situation "unit bias".

2.4.3 Obesity, Built Environment and Urbanization

Lakdawalla and Philipson (2002) attributed 60% of the recent rise in body weight to demand factors such as increased productivity at home or market production associated with declining physical activity. Since technological developments increase the derived utility from sedentary leisure, economists would expect people to spend more time in sedentary leisure. In fact, in order to increase the utility derived from sedentary activities, people not only developed home equipment that makes their life more convenient, but they also designed their spatial environment in a sedentary friendly style (Robbins, 2006). Modern developments do not generally provide facilities such as parks that permit and encourage physical activity. In addition, public transportation and street networks discourage people from walking and bicycling, resulting in daily lifestyles that are more sedentary. A study conducted in the Atlanta-Georgia region in the US argued that every additional 30 minutes of driving per day is equivalent to a 3% increase in the likelihood of being obese (Frank et al., 2004). On the other hand, the same study found that each additional kilometer of walking per day was associated with a 4.8% reduction in the likelihood of being obese.

Changes in the built environment[6] can have a large impact on child's everyday life. Some years ago, going to school on foot or by bicycle was a routine. Nowadays, an overwhelming majority of children go to school by motor vehicles. In particular, Belden Russonello & Stewart Research and Communications (2003) conducted a national random telephone survey of 800 adults in the US and concluded that most school-aged children (7 to 17 years old) are driven to school by either parents (53%) or a school bus (38%). This happens because schools are often too far away from home and even if they are close, urban growth patterns do not provide safe walking and bicycling routes. Furthermore, fear of kidnapping or crime in the neighborhood has made parents reluctant in letting their children walk to school (Belden Russonello & Stewart Research and Communications, 2003). Some schools, which according to a 1999 survey accounted for 7% of schools in the US (Dellinger and Staunton, 2002), even have policies against children walking or biking to school.

[6] The built environment has been defined by Sallis and Glanz (2006) as "roads, building, neighbourhoods, food sources and recreational facilities in which people live, work are educated, eat and play".

In addition, over the last decades the hours of physical activity in school programs have decreased. In many cases, children even during gym classes do not follow a program that helps them expend calories (Burgeson et al., 2001; Grunbaum et al., 2004). Parents try to close this gap by enrolling their children in extracurricular activities involving gyms and athletic parks[7]; however, this is an additional economic burden that not all families can afford. Low-income families that live in neighborhoods with poor physical infrastructure and that are dangerous or unsafe cannot normally afford to pay for extracurricular activities. Researchers have consistently presented evidence that residents of these areas are less active and have a higher probability of becoming obese (Black and Macinko, 2008; Yen and Kaplan, 1998).

Overall, it is becoming clear that trends in the built environment and urban lifestyle have resulted in reduced physical activities and consequently have played a role in the growth of childhood obesity. Ewing *et al.* (2003) adhere to the theory that urban sprawl has strongly increased body weight. They studied residents of metropolitan counties of US that participated in the 2000 Behavioral Risk Factor Surveillance System Survey and used a sprawl index based on four measures of population density for each county and control variables for age, sex, education, diet and smoking status. They found significant evidence of the positive association between urban sprawl and obesity. Similar evidence were found in studies by Lopez (2004), Loureiro and Nayga (2005) and Zhao and Kaestner (2010), although the latter pointed a relatively modest association. On the contrary, Eid *et al.* (2008) controlled for unobserved heterogeneity and found no evidence that urban sprawl causes obesity. Finally, Plantinga and Bernell (2007) did not treat urban sprawl as exogenous to weight, as previous studies did, but recognized the endogeneity between BMI and sprawl. In particular, they concluded that although individuals moving to dense neighborhoods lose weight, such areas are unlikely to be selected by individuals with high BMI. Although these studies focused on adults, it is quite realistic to assume that they would also apply to children since both adults and children in a household face the same built environment.

[7] However, Cawley *et al*. (2007) criticized the effect of physical education on body weight as they concluded that more days of physical education have no measurable effect on BMI.

Another factor that has garnered attention in the childhood obesity literature apart from the built environment is the change in labour force participation of parents, particularly those of mothers. This topic is discussed in the next section.

2.4.4 Obesity and Parental Labour Force Participation

There are two noticeable structural changes over the last thirty years in the labour market: the rising female labour force participation and the non-standard working hours for both males and females. The inevitable effect of this recent family model i.e., the dual-career family[8], is the limited time available for other activities beyond work, including childcare. Researchers have found that standard working hours and more parental involvement in child's activities decrease the likelihood of emotional and behavioral problems and improves the well-being of children (Mashberg, 1999, May 23 ; Strazdins et al., 2004). Gutiérrez-Domènech (2010) concluded that if working parents finished their working day by 6 pm, the time allocated to childcare would rise significantly. In addition, Courtemanche (2009) estimated that changes in labour force participation can account for 10.4% of the rise in childhood overweightness.

In general, one could claim that a working parent who faces difficulties in controlling his/her working time may agree with his/her spouse to compensate for his/her time not allocated to the child. However, mothers and fathers provide different childcare and have different impacts on their children's' nutrient intake and outcomes (McIntosh et al., 2006). For instance, Gutiérrez-Domènech (2010) used data from the 2002-2003 Spanish Time Use Survey (STUS) and found that employed mothers provide almost three times as much time in basic primary childcare (e.g. feeding) than employed fathers, although insignificant differences were found in the time spent in quality primary childcare (e.g. reading) between the parents. This is why more and more scientists suggest that the growing maternal involvement in labour force may have a more detrimental effect on children's weight than paternal involvement since mothers tend to be more intensely involved with children's diet.

[8] It is worth noting that the dual-career family model in US was the product of post-world war II period that first took women out of the labour market (veterans reclaimed millions of factory jobs), then placed them into the role of mothers (hence the baby boom generation) and then transformed women into nation's primary consumer (Ayers et al., 2009, pp.793). The new consumer society, however, led women back into the labour force and gradually gave rise to the dual-career model.

The rising female labour force participation has increased the opportunity cost of time of women. Working mothers do not follow the traditional allocation of time in home activities and they have limited time to invest in quality of diet (cook, prepare meals) and in physical activities with their children (Cawley and Liu, 2007; Loureiro and Nayga, 2005). As a result, it is not unusual in dual-career families to skip some meals or consume pre-processed and ready to eat meals. This type of meals are likely to be more caloric dense with lower nutritional value than home cooked meals (Cutler et al., 2003). Furthermore, because of their limited spare time, parents cannot find enough time to play or exercise with their children[9]. Therefore, children may spend a lot of time in sedentary indoor activities (watching television, playing with game consoles, internet etc.), or in the care of others (after-school care, child caretakers) who may care less about the health of children than their parents (Anderson et al., 2003b; Fertig et al., 2009). Zhu (2007) analyzed data from the Longitudinal Survey of Australian Children (LSAC) and after addressing the problems of self-selection bias and endogeneity concluded that children of mothers who work have a slightly higher probability of becoming overweight/obese. Similar evidence have been found by García *et al.* (2006) and Möser *et al.* (2011) for European samples of children (Spanish and German respectively).

However, a strand of the literature about mother's labour supply on children's weight status argues that the main cause of the rising prevalence of childhood obesity/overweightness is the intensity of the work and not the work per se (Anderson et al., 2003b; Courtemanche, 2009; Fertig et al., 2009; Gutiérrez-Domènech, 2010; von Hinke Kessler Scholder, 2008). Analyzing matched mother-child data from the National Longitudinal Survey of Youth (NLSY), Anderson *et al.* (2003b) found that an increase of 10 hours of work per week will increase the probability of a child (aged 3-11) being overweight/obese by about 0.5% to 1%. Anderson *et al.* (2003b) did not investigate the channels for this effect but discussed that since working mothers may have less time to monitor their children, the children would then spend a significant amount of time under institutional child care or grand parents' supervision. To this point, Coneus *et al.* (2009) estimated that a 10 hour rise in mother's working time per week can lead to an 11% increase in the probability of

[9] Even if time is not limited it may be that non-working time is directed to other things than cooking and playing with the children. For example, cooking may be seen as discretionary time while television watching is not.

kindergarten attendance, which in turn may result in more exposure to poor quality foods. Other mechanisms that are affected by mother's labour force participation and simultaneously have an impact on children's BMI are the average number of meals, the time spent reading/talking/listening to music and the time spent watching television (Fertig et al., 2009). Although individually their magnitudes are relatively small, their cumulative effects can be significant.

Other related dimensions of maternal employment, such as education level and the timing of employment (point in life of the child), are also considered to be important factors determining children's probability of being overweight/obese. Fertig *et al.* (2009) concluded that excess working hours of highly educated mothers have more detrimental effect on child's BMI than those of less educated mothers, which is consistent with previous findings by Anderson *et al.* (2003b) and Ruhm (2005). Even if highly educated mothers can hire someone to provide high quality care for their children during their time spent at work, this care appears to be of less value than mothers' direct care on their younger children (3 years old) (Araneo, 2008). Timing of employment has also been found to be significantly associated with an increase in the risk of the child becoming overweight or obese. For example, von Hinke Kessler Scholder (2008) showed that children of mothers who work full time during their child's mid-childhood have greater probability of being overweight at age of 16. Similarly, Chia (2008) using a dataset of 0-11 year old Canadian children and their families across Canada, predicted that a 10 hour increase in working hours per week in the period after the child's birth and before the child starts school will increase the probability of a child becoming overweight/obese later on by a range of 2.5% to 4%.

In contrast to the above cited studies, Johnson *et al.* (1992) rejected the causality between maternal employment and obesity after analysing data on 442 child participants (2-5 years old) from the 1987-1988 Nationwide Food Consumption Survey. They concluded that the sample's nutrient intake is not directly related to maternal employment status. In fact, one could claim that when a mother works, she has more money to spend on childcare, healthful meals and extracurricular sports activities, which could then keep the children away from limited and unhealthy choices made at home. Even the argument about the detrimental effects of irregular bed and breakfast time on children's health seems weak. Anderson (2010) concluded

that although these are correlated with child weight, they could not explain the association between maternal employment and childhood obesity. Gutiérrez-Domènech (2010) examined the quality of primary childcare for children under 10-years old between working and non-working parents and showed similar results. In addition, she concluded that parents who work tend to reduce their time spent with children much less than an hour for every hour spent in the labour market. Goldberg and Lucas-Thompson (2009) found that mothers who work full-time spend only 100 minutes less per day with their children than do non-working mothers. They also pointed that mothers who work generally reschedule their activities so that they can use their time with children creatively, engage in interactive and social activities, and spend more time of their free time (non-working time) with their children.

2.4.5 Obesity, Schooling and School Environment

The school environment is of great importance because children spend a great deal of their time in schools and are bounded by the options offered at schools. Among all other activities, children eat and engage in physical activity during time spent in school. In this sense, parents' choice for their child's school (where children grow, are educated and acquainted with healthy or unhealthy eating habits) becomes part of the environment that their child grows in. Schooling could also act in a health promoting way through acquisition of knowledge.

Kenkel (1991) found that more schooling was related to healthier lifestyle choices regarding smoking, drinking and exercise, which is consistent with Anderson et al.'s (2011) conclusion that stressed that school exposure per se seems to unlikely cause weight gain. Unlike Kenkel's findings, Nayga (2000a), after controlling for diet-disease health knowledge, concluded that the effects of schooling on weight outcomes and the probability of being obese are due to differences in individual knowledge. In addition, Jürges et al. (2009) analysed data from the German Microcensus and found no causal effect of education on reduced overweight and obesity rates, although they did find causality among other health behaviors such as smoking. Furthermore, Nayga (2001) showed that schooling has a significant negative effect on the probability that a person becomes obese, while health knowledge has a negative effect on the probability that a female (but not a male) becomes obese. The causal effect of education on the probability of overweight and

obesity among multi-country European[10] females was investigated by Brunello *et al.* (2010) as well; they found that schooling has a negative effect on BMI. In all, these results suggest that governments should aim to increase individual health knowledge probably through more schooling to succeed in the fight against obesity. In fact, it has been reported that increased expenditures on educational policies can have a significant effect on decreasing weight outcomes (Loureiro and Nayga, 2005; Nayga, 2000b).

Further on this point, Cawley (2007) claims that governments act through schools in place of the parents and have some control on children's behavior by regulating the choices offered in schools. Children are susceptible to the school environment since a great percentage of them participate in subsidised school lunch programs if offered in their school and many consume food from the cafeteria and vending machines that are available at schools. Unfortunately, researchers have concluded that school lunch programs in US often fail to meet nutritional requirements (Gleason and Suitor, 2003; Schanzenbach, 2009). Specifically, Schanzenbach (2009) used a panel data set that followed children who participated in the National School Lunch Program lunch (NSLP). She found that children that consume school lunches are about 2% more likely to be obese than children that bring lunches prepared at home, all else equal. Similar findings are presented by Millimet *et al.* (2010) who concluded that NLSP is contributing to childhood obesity. However, he did not find similar evidence for the School Breakfast Program (SBP). On the contrary, Gleason *et al*. (2009) found no significant relationship between NSLP participation and students' BMI, although they found that students who participated in SBP exhibited significantly lower BMI. In fact some years before, Veugelers and Fitzgerald (2005) analysed a sample of Canadian elementary school children who participated in school healthy eating programs and concluded that these children had healthier lifestyle (healthier diet and more physically active) and exhibited lower obesity rates. Moreover, Howard and Prakash (2011) found evidence that students of subsidised programs consume significantly higher amounts of vegetables, fruits and juices than unsubsidized students and that they adopt healthy dietary patterns over a time period longer than one school week. A more recent study records a different aspect counter to the mixed

[10] The countries included in this dataset are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden and the United Kingdom.

results presented above. Campbell *et al.* (2011) showed that the NSLP affects the participants' dietary outcomes (i.e., increased vitamin, mineral and fat intakes), which is consistent with previous cited findings, but this effect is not due to quality differences but rather to higher quantity of food consumed by the NSLP participants.

Lunch meals offered by school lunch programs are not the only food offered in schools. The availability of ready-to-eat convenience foods containing high levels of saturated fats, salt, or sugar, snacks and beverages inside school campuses (school cafeterias and vending machines, also known as competitive foods in schools) has increased over the last decades (Anderson and Butcher, 2006a; Anderson et al., 2003a). Anderson and Butcher (2006b) found that these products are usually adopted by schools which have lower financial resources. They concluded that students with a genetic or a family susceptibility to obesity will exhibit a 2% increase in their BMI if access to junk food in school increases by 10%. In addition, positive associations have been found between a meal's fat content and the presence of à la carte foods and vending machines, which are thought to indirectly affect the nutrient content of USDA-subsidized meals (Newman et al., 2009). These findings are consistent with the findings presented by O'Toole *et al.* (2007) who concluded that elementary and middle schools with vending machines and access to junk food have increased since 2000. Therefore, children are recipients of fairly confusing messages; in the classroom they are taught about healthy eating and lifestyle (if at all) while at the same time they are surrounded by an obesogenic environment created by the school itself. This should prompt researchers to study how to overcome deficiencies created by the school environment on children's' choices. For instance, Just *et al.* (2008) found that college students that used a prepaid card that allowed them to buy only healthy foods, made more nutritious choices than students that used either cash or general debit cards. One could therefore apply this idea to younger-school aged children by allowing parents (instead of their children) to pre-commit to healthful meal options, which could result in increased consumption of healthier foods. However, to this point we should note that although there is a growing belief that certain kinds of foods inside schools are a contributor to childhood obesity, Datar and Nicosia (2009) using data from a US national sample of fifth graders presented evidence that there is no statistically or economically significant effect on BMI.

Food consumption is only one part of the picture on the effect of schools on obesity rates. Although the research is more limited, researchers have also focused on the effect of physical activity during school on students' BMI. School physical activities include school physical education, the available play or gym equipment in school and the available type of after-school child care. Cawley *et al.* (2007) investigated the effect of physical education time in schools on student's BMI and the probability that a student is overweight/obese. They concluded that such an effect does not exist, although they recommended future research to focus on fat and muscle measurements, rather than BMI, since it is possible that increased physical education decreases fat and increases muscle with no net effect on BMI. As far as the after-school child care is concerned, some researchers claim that it is more important not to leave the child at home unobserved (Anderson et al., 2003b; Chia, 2008) than to worry about the type of care (physically active or less active) the child receives. Although research on the impact of in-school physical education and obesity is rather limited, the benefits of physical activity on health in general (Maffeis, 2000; McGinnis and Foege, 1993) and the economic costs of physical inactivity (Chenoweth and Sugerman, 2005; McInnes and Shinogle, 2009) are well documented. A good way to go forward with this is for schools to find ways to incentivize children, perhaps through monetary and non-monetary competitions and symbolic awards (Johannesson et al., 2010), to actively engage in less sedentary way of living.

In addition to food, school and built environments discussed above, individual time preferences are also now considered an important factor that influences how people behave health wise. This issue is covered in the next section.

2.4.6 Obesity and Time Preferences

Although the relationship between time preferences and health outcomes has been largely recognized in the economics literature, the relation of time preferences to obesity rates had remained unexplored until the last decade. Time preference is the rate at which people are willing to trade current utility for future benefit (see Frederick *et al.* (2002) for an in depth treatise). Grossman (1972) used the concept of time preference and future utility to analyze health choices, followed by Fuchs (1982) who concluded that a number of health choices, such as diet, exercise and

smoking could be explained by differences in the rate of time preferences. In addition, Ehrlich and Chuma (1990) argued that individuals, who have high rates of time preference, will have a relatively low demand for future health capital and longevity. This has been reported as a positive correlation between time preference rates and unhealthy behavior (Scharff, 2009). Many other studies have examined the effect of time preferences on health behavior and weight outcomes (Komlos et al., 2004; Smith et al., 2005; Zagorsky, 2005; Zhang and Wang, 2004).

A strand of the literature (Cutler et al., 2003; Ikeda et al., 2009, 2010; Loewenstein and Prelec, 1992; Scharff, 2009; Shapiro, 2005; Thaler, 1981) criticizes the assumption of a constant rate of time preference and instead, argues that individuals' time preferences vary by the time horizon faced and that this strongly affects their health outcomes. In particular, individuals exhibit a higher level of impatience in decisions involving immediate gratification than they do in the case of delayed gratification in the distant future. These rates of time preference are characterized by a hyperbolic or a quasi-hyperbolic functional form. Although plenty of investigation has been done on the relationship between hyperbolic discounting and human behavior, little research has been made on the association between hyperbolic discounting and obesogenic behavior, most of which has been focused almost exclusively on adults.

While the issue of time preference and hyperbolic discounting and their role on weight gain is still an open research agenda, there is little doubt that children are not perfectly rational even with extensive information, and have time-inconsistent preferences. Although children may be persuaded by their parents to commit to a strategy that maximizes their health in the long term, they consistently succumb to unhealthy temptations and short-term gratification. The Stanford marshmallow experiment (Mischel and Ebbesen, 1970; Mischel et al., 1972), which is regarded as one of the most successful behavioral experiments on deferred gratification in psychology, showed that preschool children generally are impatient over short-run decisions and are ruled by a need to please the short-run self that demands immediate satisfaction. Mischel *et al.*(1989) re-examined their subjects some years after the experiment and found that there are significant links between self-control behavior during childhood and relevant social outcomes in adulthood.

More recent surveys indicate that there is a link between children's ability to delay gratification and overweightness at early adolescence and adulthood (Francis and Susman, 2009; Seeyave et al., 2009; Tan and Holub, 2011). The most recent survey (Tan and Holub, 2011) suggests that children who self-regulate while eating and children who show high global self-regulation abilities, such as inhibitory control, are less likely to be overweight than children who do not show the same capacities for self-regulation. Thus, children's tendency to have time-inconsistent preferences, along with the evidence presented by Tan and Holub (2011) and O'Donoghue and Rabin (2002) (which posits that self-control problems create a tendency to over-consume addictive products[11]), fits well with the increasing childhood obesity trend.

Given the current epidemic of overweight and obesity, it seems prudent to find ways to encourage children to change their time preference and place more value on their future well-being. Hence, if we take into consideration the claim of Maital and Maital (1977) that time preferences are probably nourished during childhood, future research could focus on finding out ways to lower the time preference of parents and their young children to help them overcome their temporally inconsistent preferences (e.g., through commitment mechanisms[12]).

2.4.7 Obesity and Information

Consumers make decisions about their caloric intake and caloric expenditure with imperfect information (Cawley, 2007). In particular, they generally lack credible nutritional information on the nutritional value and caloric content of foods consumed either at home or away from home and also lack information about the health consequences of their actions associated with poor eating habits and high levels of inactivity. Frazao and Allshouse (2003) found that consumers are generally misinformed or have mis-perceptions about the nutritional value of food they eat. The degree of consumers' misperception about the quality of their diet was analyzed by Variyam *et al.* (2001). They estimated that 40% of the people who prepare the meal in their household perceive that the quality of their diet is better than their actual diet is. Hence, even when information is present and full, sometimes it is too

[11] Richards *et al*. (2007) showed that specific food nutrients are strongly addictive (e.g. carbohydrates and fat).
[12] See, for example, Burger and Lynham (2010), Giné *et al*. (2010), Goldhaber-Fiebert *et al*. (2010) and http://www.stickk.com/

complicated or it requires a significant time investment to be processed and comprehended by an average consumer.

When it comes to children, however, information is more likely to be considered obscure. Even if information is full and credible, children are not what economists call "rational consumers" (Cawley, 2006) and this is why they are incapable of evaluating the future consequences of their actions as they weigh present gratification (e.g. taste) more highly than future benefits (e.g. stable weight). Thus, it is important for food companies to attract children's' attention in order to manipulate their preferences and eventually prompt them to pester their parents to purchase the company's products (Wooten, 2003). Even in the majority of occasions when children do not have the freedom to buy their own food and parents are the ones who purchase the food for them, children's persistent request (also known as "pester power") over a certain food could eventually persuade parents to give in.

Sometimes, unclear and misleading information may be intentionally provided to children, which could eventually make children misinterpret the information signal with deleterious results for their health. Thus, dissemination of information has become the target of many public programs and policies. Governmental education campaigns give credible information about nutrition and the health benefits of physical activity. This kind of information is presented to children through media, reports from doctors, and school dietary teaching classes. However, the governmental information dissemination campaigns are, most of the time, drown out by food industry advertising (Cawley, 2007). Other public policies of governments and non-profit organizations include mandatory food labelling and caloric posting in fast food restaurants which aim to provide accurate information to children and parents.

Although the introduction of nutritional labelling and calorie posting brought significant changes in the way information on nutrients and calories is disseminated to consumers (and there are many surveys with respect to the effectiveness of nutrition information on improving adult health outcomes), little work has examined whether there is an impact on children's choices. It has been documented that households with children under 18 years old are more likely to use food labels to determine the fat content of foods than their corresponding counterparts (McLean-

Meyinsse, 2001), but we do not really know much about children's attitude towards labels or calorie posting. A recent study (Stutts et al., 2011) examined whether the extra nutritional information in fast food menus or a symbol indicating the healthiness of the food affected the purchase decisions of 6-11 year old children. They found that a health symbol in menus have more impact on the children's meal choice than nutritional information in menus, especially for children who visit fast food restaurants at least once a week.

However, the aforementioned policies for dissemination of credible information mostly influence adults' choices rather than children's. A strand of the literature has emphasized the impact of advertising on children's diet and weight outcomes. Advertising provides some information about the product to children but it may be more than simple information transmission about the nutrient contents of the food product; it is a way of marketing the product and consequently it can manipulate children's food choices. According to Kovacic *et al.* (2008), 44 major food and beverage marketers in the US spent $1.6 billion in 2006 to promote their products to children under 12 and adolescents ages 12 to 17; the overall spending on advertising and promotion directed at children grew from $6.9 billion in 1992 to $15 billion in 2002 (Wooten, 2003). Furthermore, Kunkel (2001) estimated that the average American child in the 1970s watched 20,000 television advertisements per year and that this number increased to 40,000 advertisements per year in the late 1990s.

The amount of exposure to food and beverage advertisements is not uniform across ages. In particular, Gantz *et al.* (2007) found that children 8–12 years old watch more food advertisements than children of other ages. This is due to the fact that children between 8–12 years watch more TV and is therefore the group most affected and targeted by food marketers. This is consistent with the findings by Burros (2005, December 7) who concluded that television advertisements mostly influence the food preferences of children under 12, thus contributing to unhealthy food choices of these children. The age differential is very important because age is closely related to children's cognitive ability and cognitive ability is central to interpreting and decoding television advertisements. Therefore, cognitive differences among the age groups can lead to varying attitudes towards advertisements, different levels of vulnerability to deceptiveness and consequently to varying demand for the

commercialised products (Oates et al., 2002; Priya et al., 2010). In fact, children's excess weight status has been found to be related to the quantity of advertisements per hour broadcasted on children's television (Lobstein and Dibb, 2005).

Recent work on food advertising clearly highlights the severity of the impact of fast-food advertising on childhood obesity rates. Chou *et al.* (2008) analysed data of US children and their families' background and found a strong positive effect of fast-food restaurant advertising on the probability that children and adolescents are overweight. In particular, they found that the effect is stronger for males than females. For boys aged 3-11 years old, increased exposure to fast-food advertising by half an hour per week results in a 15% increase in the number of overweight boys in the population. For girls of the same age, the effect seems to be less in magnitude (a 12% increase in the number of overweight girls in the population). This effect is not restricted to studies using US data. Chang and Nayga (2009) analysed data drawn from the National Health Research Institute of Taiwan (NHRIT) in 2001 and showed why fast-food advertising bans could potentially decrease childhood overweightness and obesity. Similar findings were presented by Garde (2008) who suggested tighter marketing regulations in the EU. Finally, interesting evidence came to light from Dhar and Baylis (2011) who not only provided evidence from a Canadian dataset that a ban on advertising targeting children can be effective in lowering or moderating fast food consumption, but also found some evidence that the effect of the ban persists as the children become young adults.

Nowadays, TV advertising is not the only tool that food marketers use since food companies have increased their use of other media and marketing venues in order to reach children. Product packages with children's heroes (cartoons), toys in boxed meals, web sites, advergaming[13], billboards at bus stations, banners in school vending machines and children's magazines are a few new venues. Companies are now using these new ways to target children in response to tighter governmental food television advertising regulations imposed lately in many parts of the world. Indicative of the intensity of food marketing is the fact that the food industry is the second largest advertiser in the US, right behind the automotive industry (Story and French, 2004).

[13] Advergaming is a portmanteau of "advertising" and "gaming" and defines the practice of using (online) video games with embedded brand messages to engage a target audience.

2.4.8 Obesity, Socio-Cultural Status and Social Networks

The behavioral and socioeconomic literature posits that for centuries, body image was used as a gauge of socioeconomic status and cultural beliefs. Fat was often considered to be a sign of good health and prosperity and thinness was a sign of poverty. Nowadays this image has been reversed, although some developing populations still value fatness highly (Monteiro et al., 2004).

Generally, researchers have highlighted a strong association of low socioeconomic status of adults and children [e.g., population groups with high poverty rates and low education (Drewnowski and Specter, 2004)], ethnic minority groups (Kumanyika, 2002), and immigrants (Ali and Crowther, 2009)) to excess weight. The assumption that people desire to have a weight close to other people's weight has been largely used in recent literature in order to construct models of weight problems related to social norms (Burke and Heiland, 2007; Etilé, 2007). However, lately many studies have recorded evidence of imitative excess body weight status within social networks such as classmates, household members, friends and colleagues (Blanchflower et al., 2011; Carrell et al., 2011; Christakis and Fowler, 2007; Costa-Font and Gil, 2004).

For youths, the perception they have about their weight compared to their ideal weight standards and social norms is strongly influenced not only by their current socioeconomic status, but also by the socio-cultural environment at home during childhood (Baum and Ruhm, 2009; Thompson et al., 1997). Therefore, it is possible that overweight children who grow up in obesogenic home environments have higher ideal weights and different social norms than normal-weight children. Specifically, Maximova *et al.*(2008) examined children and adolescents (9 and 13 years old respectively) and found that those who live in environments in which family members are overweight and/or obese may develop inaccurate perceptions about what constitutes an appropriate weight status.

However, in raising a child, the home environment is only one part of the picture. Children are also significantly affected by their communities where they are trying to gain social acceptance. Children's behavior is strongly influenced by the behavior of those in their classroom or in their neighbourhood and that of their friends. The new wave of economics literature on the role of social interactions (see Zanella (2004) for

more details) stresses that the social context can be a powerful motivator of human behavior. If the social interactions and impact are strong enough, they can lead to the existence of a so-called social multiplier effect [See Glaeser *et al.* (2003) and Glaeser and Scheinkman (Glaeser and Scheinkman, 2001)] which could partly explain the rapid growth of obesity over the last years.

In particular, Carrell *et al.* (2011) examined freshmen and sophomore students from 2001-2005 at the US Air Force Academy and found that poor physical fitness spreads among friends. A person's utility may depend on relative weight and people subconsciously compare themselves with each other and emulate their weight with that of their peers. Furthermore, weights among siblings and spouses tend to be less correlated with each other than among friends (Carrell et al., 2011), which indicates that social distance is more crucial on people's weight status than geographic distance within social networks. These conclusions are enhanced by similar evidence presented for adults (Blanchflower et al., 2011; Christakis and Fowler, 2007).

However, more research is indeed warranted to definitively assess the impact of social networks or peers on the growth of childhood obesity, as newer evidence shows a weak causal effect of social multipliers on adults' body weight (Auld, 2011; Cohen-Cole and Fletcher, 2008). Despite all the criticism, policymakers can not completely rule out the possibility of the social spread of childhood obesity. We stress that these causative factors may not be discrete but rather multi (and inter) dimensional.

2.5 Food fiscal policies as a health intervention

Due to the alarming growth of childhood obesity rates, childhood obesity has become the topic of research of various and diverse disciplines as well as the target of many public policy programs. These include fiscal (OECD, 2012), marketing/informational (Beaudoin et al., 2007; Maes et al., 2012), and educational policies (Cross-Government Obesity Unit and Department of Health and Department of Children Schools and Families, 2008; New York City Department of Health and Mental Hygiene, 2008) that aim to nudge people to make healthier food choices. In the literature, fiscal policies (i.e., those that limit access and provide price incentives and

disincentives) have received great attention with respect to their effectiveness in improving dietary patterns (Thow et al., 2010). Generally, three types of price strategies have been applied: increasing unhealthier food prices (fat tax), decreasing healthier food prices (often called a thin subsidy) and a combination of both (Waterlander et al., 2012a).

2.5.1 Types

Among the three fiscal policies mentioned above, great political as well as scientific attention has been given to examining the effect of price increases of unhealthier products. This price increase can be levied either by increasing the VAT or by imposing an additional tax (fat tax) (Leicester and Windmeijer, 2004). Leicester and Windmeijer (2004) note that this policy can be implemented in two ways. One way is by taxing certain types of products of low nutritional value such as soft drinks and snacks which provide too much calories for their weight but not similar amounts of nutrients (Bowman, 1999). The second way is by taxing a variety of products based on their nutritional composition, i.e. percentage of fat, salt, calories, etc. The first way of taxation has been applied to alcohol and tobacco ("sin taxes") which are taxed based on their effects on human health. Those who support the first way of taxation, i.e. taxation of certain food categories which are widely recognized for their low nutritional value, argue that it is more politically feasible or practical for the legislative bodies than the second one (Jacobson and Brownell, 2000). More specifically, Jacobson and Brownell (2000) claim that the implementation of the second way of taxation could affect consumers unfairly. For example, some nutrient contents such as lipids/fat are classified as unhealthy even though they can be important components of a daily diet when consumed in recommended amounts. So, if a fat tax is, for instance, implemented on full-fat dairy products to encourage a switch to low-fat dairy products, then families with young children will have to pay more for full-fat milk which is otherwise necessary for the daily needs of a child up to 2 years old[14]. Therefore, in this case, ideally, governments would actually want to tax the overconsumption of fat which would be costly to implement and enforce (Leicester and Windmeijer, 2004).

[14] According to the National Health Service in the UK, children aged 2 years old should consume whole milk daily, as they may not get the necessary daily vitamins and calories from the consumption of low-fat milk (National Health Service, 2013).

However, opponents of this policy claim that the policy is ineffective and unfair (Salois and Tiffin, 2010). It is ineffective because wealthy consumers are not very responsive to food prices and because of its regressive nature which costs the poor relatively more than the rich. The argument is that taxing food would further reduce the disposable income of the poor as taxation is implemented on foods with high percentages of fats, sugar and calories, which are consumed disproportionately by low-income households (Frazao et al., 2007). This happens because unhealthy foods are generally cheaper than healthy foods (Waterlander et al., 2010) which makes them more affordable for low socioeconomic status households (Pieroni et al., 2010). In addition, this policy is unfair because it punishes both those who are obese as well as those who are not.

The second fiscal policy, i.e. reducing the price of products considered healthier, can be applied in a similar manner. This would be possible either by reducing the prices of specific product categories that are considered healthier (such as salads, fruits, etc.) or by reducing the prices of products which have lower amounts of certain nutrients such as fat and sugar. These reductions can be made directly on product's price or through discount coupons. Thus, healthier products could become more accessible to the average consumer and researchers conclude that this could lead to increased consumption of healthier products as well (Andreyeva et al., 2010; Ni Mhurchu et al., 2000; Waterlander et al., 2012b).

However, evidence shows that this policy leads to more calorie purchases because consumers buy larger quantities of healthy products (Epstein et al., 2010; Waterlander et al., 2012a) or it is counterproductive because consumers use the saved money to purchase unhealthier products (Giesen et al., 2012). This behavior could be explained using the familiar concepts of income and substitution effects (McInnes and Ozturk, 2011). Subsidizing healthier products, ceteris paribus, makes the consumer wealthier and thus he has proportionately more disposable income to spend (either on more calories or less healthy products). The reduced efficacy of this policy compared with the taxation of unhealthier products could also be explained using insights from behavioral economics such as reference dependence and loss aversion (McInnes and Ozturk, 2011). Specifically, reference dependence refers to options being valued as gains and losses relative to a reference point while loss

aversion refers to people's tendency to strongly prefer avoidance of losses than acquiring gains (Kahneman and Tversky, 1984). Therefore, consumers weigh losses more heavily from the purchase of a taxed unhealthier product than equivalent gains from the purchase of a subsidized healthier product.

Given the pros and cons of the two policy options discussed above, a third policy that combines these two policies could be considered. This policy can be designed to be revenue neutral so that the subsidy exactly offsets the revenue from the fat tax (Salois and Tiffin, 2011). Furthermore, this policy seems to combine the benefits of the two previous policies (i.e., reduction of sales of unhealthier products and increased sales of healthier products) and overcomes the negative side effects (purchase of more calories, use of the saved money to purchase unhealthier products and being regressive to the poor) (Powell and Chaloupka, 2009; Waterlander et al., 2012a).

2.5.2 Implementation worldwide

Although food fiscal policies are still an open research agenda regarding their benefits on forming attitudes towards a healthier lifestyle or forming just a temporary healthy food behavior, several countries have adopted them. USA, Canada, France, Hungary and Denmark are some of the countries that implemented food fiscal policies in the past. Various states in the USA have sales taxes on soft drinks, snacks and sweets (Leicester and Windmeijer, 2004). In Canada, although most of the food products are free from taxes, a sales tax has been applied on sweets, soft drinks and snacks. On the other side of the Atlantic Ocean, in Europe, France has imposed higher taxes on some food products such as chocolates, candies, margarine and vegetable fat (VAT of 20.6%) whilst other products attract a VAT of only 5.5% (Leicester and Windmeijer, 2004). In addition, France since January 2012 has included one more tax on beverages with added sugar and artificial sweeteners at a rate of 0.072 euros per liter (OECD, 2012). Similar efforts have been made by Finland, Norway and Australia, but none of these countries have introduced a food fiscal policy explicitly designed to combat the consumption of less healthy products and consequently to combat obesity (Lorek, 2011).

In October of 2011, Denmark adopted a new tax ("fat tax") designed to combat the country's rising obesity rates. It targeted all food products with a saturated fat content exceeding 2.3%. It hit several food products including cheese, butter, margarine and milk as well as products made from these foods. This fat tax amounted to 16 Danish Kroner (almost 2.15 euros) per kilogram of saturated fat (Smed, 2012). In addition, Denmark, along with Australia and Switzerland, are among the first countries that raised restrictions and prohibitions on the content of food in trans fat (Coombes, 2011). Following, Denmark's fat tax example, Hungary imposed a tax ("junk food tax" or "crisptax") which targeted a wide range of pre-packaged foods containing high salt and sugar contents such as crisps, salted nuts, chocolates, sweets, biscuits, ice creams, and energy drinks (Holt, 2011).

However, the Danish tax ministry withdrew the fat tax after one year of implementation, as most of Danish consumers crossed the borders in order to purchase not only the products that had attracted the fat tax but also beer and soft drinks which had attracted higher sales taxes than the other products (Alemanno, September 3, 2012; Jensen and Smed, 2012; Smed and Robertson, 2012). This mass movement to the borders resulted not only in government's revenues loss but also in not achieving the objective for which the measure was imposed (healthier diet). Thus in October 2012, Danish government abolished the fat tax and they also cancelled plans to introduce a "sugar tax" from January 2013 in order to target products such as chocolates, sweets and ice cream (Stafford, 2012).

2.5.3 Fiscal policies' impact on nutritional behavior and weight

Results from a number of studies suggest that rising price through taxation or decreasing price through subsidy is an effective mean of shifting food consumption away from unhealthier food towards healthier alternatives not only among adults (Andreyeva et al., 2010; Dong and Lin, 2009; Epstein et al., 2012; French, 2003; Goldman et al., 2011; Powell and Chaloupka, 2009; Waterlander et al., 2012a) but also among young children and adolescents (French et al., 2001; French et al., 2003; Hannan et al., 2002).

French et al. (1997) studied the correlation between prices and food consuming behavior and indicated that consumers are primarily influenced by prices when

purchasing food products. Initially, French et al. (1997) recorded the sales of vending machines. After that, they reduced the prices of low-fat products and they recorded again the sales of vending machines. In the end, they set the prices of food products to their original levels and they observed once more the sales. Their conclusion was that low-fat product sales increased from 25.7 % to 45.8 % in the second phase of the study and decreased to 22.8 % at the end of the study; indicating that the price plays a crucial role when purchasing food products.

However, fiscal policies have provoked many opposing opinions among researchers regarding their effectiveness on obesity prevalence. Lakdawalla and Philipson (2002) yielded the 40% of obesity epidemic trend in low food prices and therefore any fiscal policy that would make more affordable healthier products or inaccessible less healthy products to consumers would have positive consequences not only in their consumer behavior but also to their body weight. This theory is confirmed by several empirical investigations involving either adults or children (Goldman et al., 2011; Powell, 2009; Smith et al., 2010; Sturm and Datar, 2005; Wendt and Todd, 2010) and rejected by others (Fletcher et al., 2010b; Sturm and Datar, 2011) which argue that any sales reduction that occurs to tax levied products is offset by the consumption of calories from other sources.

A significant role in the effectiveness of food fiscal policies as a measure to combat obesity is the availability of substitutes (Schroeter et al., 2008). For example, if a tax is imposed on soft drinks (a beverage category that has been linked with the increased obesity rates), it may induce consumers to switch from buying soft drinks to substitutes, such as chocolate milk, juices, etc. These substitutes, however, have almost equal calories and thus, according to energy balance, no reduction will occur to consumers' body weight.

Another significant role in the effectiveness of food fiscal policies on consumer behavior and thus on obesity rates is the magnitude of fat tax and/or subsidy. In particular, the magnitude of the price change (increase or decrease) has to be significant in order not only consumers to be aware of the change but also in order to cause to consumers a purchasing "discomfort" or "euphoria". Waterlander et al. (2012a) examined the efficacy of various levels of food price changes (increases as well as decreases) in order to promote healthier consuming behavior and they

concluded that price reductions of 25% and 50% are effective, though price increases up to 25% are ineffective. Lots of other studies indicate that substantial price changes have to be implemented in order to detect significant associations between fiscal policies and weight outcomes (Fletcher et al., 2010a; Lin et al., 2011; Powell and Chaloupka, 2009). For example, Smith *et al*. (2010) found that a 20% tax in the price of soft drinks would reduce the child at-risk-for-overweight prevalence from 32.2% to 27.0% and the overweight prevalence from 16.6% to 13.7%. In contrast, Schroeter *et al.* (2008) demonstrated a case where a tax on food away from home could actually increase weight. These controversial results suggest the need for further research that evaluates whether changes in prices influence not only short term consumption behavior but also body weight (Jacobson and Brownell, 2000; Schroeter et al., 2008).

2.5.4 How fiscal policies affect people of low socioeconomic status

According to classical economic theory, taxing food would further reduce the disposable income of lower income classes. This happens because tax is levied on products with high lipid content, sugar and calories, which are consumed disproportionately greater than households of low economic status (Frazao et al., 2007). Unhealthy foods are cheaper compared to healthy foods with high nutritional value (Waterlander et al., 2010) which makes these foods more affordable for households of low socioeconomic status (Pieroni et al., 2013).

According to the model of taxation of Leicester and Windmeijer (2004), poor households spend 0.7% of their income in fat tax, though rich households spend barely 0.1% of their income. They also argue that this burden on low income households remains unchanged, regardless of how the tax is implemented (either according to product category or based on product's nutritional composition). Moreover, finding shops in poor neighborhoods that provide fresh foods or healthier versions of foods is rare (although this observation may not apply in countries like Greece), and thus levying a tax on less healthy and pre-prepared foods reduces the income of consumers. Consequently, if policy makers impose tax in products that do not cover the people's daily nutritional needs but these products are considered a key part of the diet for low socioeconomic level households, it can have unintended negative consequences in their diet, such as malnutrition. If, however, governments

overcome the above negative effects, and consumers of lower economic classes become more elastic in price changes they would benefit more from the reduced consumption of less healthy products compared to consumers of higher economic classes. Specifically, the literature seems to agree upon the positive influence of the tax imposition on the bodyweight of mainly medium and low socioeconomic status consumers (Finkelstein et al., 2010; Zhang et al., 2011).

The next chapter presents the methodology of studies based on experimental economics and especially the choice experiment method that is based our research. Furthermore, it illustrates the design of our experiment, the experimental procedures, the information regarding our sample and products used in the study.

3 CHAPTER: Methodology

3.1 Methodology of Experimental Research

Experimental economics is a discipline in which data on economic phenomena are collected in a controlled environment in the field or in laboratory settings, whether of individual or group behavior (Smith, 2008). Most well known categories of economic experiments are: (1) Market experiments, (2) Game experiments, (3) Choice experiments.

There are two types of experimental designs used in economic studies; between-subject and within-subject designs. A between-subject design is an experimental design in which subjects are randomly assigned into different treatments. One group of participants is provided with experimental condition A and a second group is provided with experimental condition B, all else being equal, so that any change can be attributed to the experimental manipulations. Hence, there is always a control group to which other groups are compared to. Alternatively to the between-subject design is the within-subject design in which the same group of participants is provided with multiple experimental conditions. Thus, the same group of participants is tested to experimental condition A, B etc., so that repeated measures are taken from the same people controlling for individual characteristics. Ideally, by exposing participants to different treatments, one is able to achieve identification of causality (Charnessa et al., 2012). Both types of experiments can be computerized or use paper and pencil and are following a double blinded procedure which means that no-one in the room (even the experimenter) can figure out who gave a specific answer. Furthermore, the norm is that economic experiments have to be incentive compatible, which means that the participant has to be provided with monetary incentives when eliciting his/her preferences. Incentive compatibility resolves or minimizes the hypothetical bias that was prevalent with hypothetical methods.

In this study we have tried to elicit preferences through an increasingly favored method; choice experiment. Initially, the choice experiment method was widely used among others (e.g., contingent valuation and travel cost-type models) as a non-

market environmental valuation method (see Hanley et al. (1988), Hoyos (2010), Kragt (2013) for an in depth treatise). Lately, choice experiments have been increasingly used in determining preferences for new or existing/real products especially (but not exclusively) in the case of food. Recent examples of choice experiments in food sector include: Alfnes (2004)analyzed consumer preferences for hormone status and country of origin of beef; Alfnes et al. (2006) studied consumers' willingness to pay for the color of salmon as well as, whether information on the color of salmon influence consumer preferences; Lusk and Schroeter (2006) conducted a steak preference experiment in the meat laboratory on the local university campus; and Olesen et al. (2010) studied consumers' willingness to pay a price premium for organic and animal welfare-labelled salmon.

In a choice experiment, participants are given a series of choice tasks where they have to choose among a number of (at least two) alternatives, their preferred option. The alternatives are described by different levels of attributes or characteristics, which depict the good that is being valued. In other words participants are asked to assess trade-offs among the levels of the attributes or characteristics and researchers are able to investigate the relative importance of the different attributes. Lately, economic incentives have been included in choice experiments, and a no-buy option has been incorporated among the alternatives in the event that participants do not prefer any of the presented options. According to Louviere and Street (2000) it is not realistic to force participants to choose one of the available options and therefore including a no-buy option is to be preferred. Before the inclusion of economic incentives, data collected from experiments had many chances to suffer from hypothetical bias. Participants could overstate their willingness to pay for the depicted goods since they lacked enforcement of real incentives. Specifically, List and Gallet (2001) present evidence that when subjects face hypothetical scenarios and there is no actual commitment on buying their preferred alternatives, they tend to misrepresent their preferences.

3.2 Methodology of my experiment/survey

3.2.1 Experimental Design

Table 1 exhibits the four within and four between subjects treatments used in the study, along with the number of parent-child pairs that participated in each treatment. Each cell in the table represents a between-subject treatment. Within each cell, the four within subjects treatments are listed which correspond to the price variations caused by the four fiscal policies: (1) a baseline scenario of market prices, (2) a fat tax, (3) a subsidy, and (4) a fat tax and subsidy applied simultaneously (the both treatment). The between subjects treatments vary the decision environment (parent goes through the choice tasks with or without the presence of the child which corresponds to the with and without pestering power treatments) and information provision (where the parent is provided with information about the fiscal policies or not, hereafter referred to as the info and no info treatments). All sessions were conducted by a single experimenter and the experiment was conducted using the zTree software (Fischbacher, 2007).

Table 1. Experimental design

	No information for fiscal policy	**Information for fiscal policy**
Without pestering power	47 Market price, Fat tax, Subsidy, Both	47 Market price, Fat tax, Subsidy, Both
With pestering power	47 Market price, Fat tax, Subsidy, Both	48 Market price, Fat tax, Subsidy, Both

The role of food fiscal policies

Our experiment allows us to study the role of food fiscal policies as a tool that can influence healthier food purchasing behavior. We varied within subjects the posted prices of the products according to four within-subjects treatments. The market price

(MP) treatment was always displayed first in order to create a common reference point to all subjects. In this treatment, the healthier and unhealthier versions of a product on any given choice task were set to the same level. The price level was set to the average value of market prices we found in major supermarket chains prior to the experiment. After the MP treatment, the three food fiscal policies (three treatments) followed in random order to avoid order effects. The only thing that was varied in these treatments was prices for the products (see Table 2). One of the treatments imposed a fat tax on the price of the unhealthier product (as judged by the fat or sugar content) while keeping the price of the healthier product constant at market price (FT treatment). Another treatment imposed a subsidy on the price of the healthier product keeping the price of the unhealthier product constant at market price (SB treatment). The third treatment combined a fat tax on the price of the unhealthier product with a subsidy on the healthier product (BO treatment).

Table 2. Overview of the within subjects treatments

Treatment	**Description**
Control Treatment	Prices are set to the average value of market prices we found in major supermarket chains prior to the experiment. Prices are equal between the healthier and unhealthier alternative.
Fat tax (FT) Treatment	Fat tax on the unhealthier alternative (25% increase on the market price)
Subsidy (SB) Treatment	Subsidy on the healthier alternative (25% decrease on the market price)
Both (BO) Treatment	Fat tax on the unhealthier alternative and subsidy on the healthier alternative at the same time (25% increase on the market price of the unhealthier product & 25% decrease on the market price of the healthier product)

The full list of choice tasks displayed in the four within-subjects treatments is listed in Appendix A.

The role of provision of information

Our rational for including a (between-subjects) provision of information treatment is that information regarding the relation of a price change and the healthiness of a product can potentially alter purchase behavior. Such information provision can be enacted using several methods, including mass media, governmental/community-level agents' announcements and informative labels on the shelves next to the price. In the context of our laboratory experiment a labeling scheme was more realistic. Therefore, in the information treatment, subjects were informed on the actual reason on why a price change occurred (e.g., implementation of a fat tax or a subsidy or both) using a descriptive label on the top of the screen. In the no-information treatment, subjects remained unaware of the actual reason of the price increases/decreases.

The role of kid's pestering power

Our second between-subjects treatment examined the role of making food purchasing decisions together with the child. While a parent may rationally choose to purchase a healthier product for their child, the mere presence of a child could adversely affect purchase decisions if the parent decides to give in to the child's demands (which may be motivated by factors other than nutrition). To vary the child's ability to potentially pester the parents on their choices (i.e., hereon referred to as child's pestering power), we allowed children in half of the sessions to seat next to their parent while the parent was going through the choice tasks. The child and the parent could freely communicate and discuss about the choice options[15]. In the no pestering power treatments, the parent decided on their own without any external influence from the child. Hence, in these treatments, the child did not participate in the choice tasks and was kept engaged in the lab's lobby where he/she could watch cartoons or draw using paper and pencils. See Appendix B for more details.

[15] We observed that in the pestering power treatment all children interacted with their parent.

3.2.2 Participants

A random sample of families (one adult who is the primary grocery shopper and makes the household meal decisions and one child) from the general population of Athens, Greece, was recruited by a market recruitment research company based on random digit dialing. The research company ensured that the interested families met the following study criteria: (1) the child in the family was between the ages of 6 and 10[16] (if there was more than 1 child in the family in this particular age range, the company randomly picked one child) and (2) the family consumed the products used in the study moderately or more often (parents were screened for consumption patterns from a large list of food and stationery products, which included the products used in our study, so that we would avoid any prior associations with the aims of the study. Subjects were offered a fixed fee of 30€ per family to participate in a "children's snack and stationery preference study", conducted in the experimental economics laboratory of the Agricultural University of Athens. A total of 189 families participated in the experiment. Subjects participated in one of the 4 between subject treatments and they were randomly assigned to a time slot between July 2012 and September 2012. Experimental sessions were split between morning (97 sessions) and afternoon (92 sessions) snack time hours, i.e., from 9.00-13.00 o'clock and 16.00-20.00 o'clock each day of the week except Sundays[17]. All subjects were given a short orientation and training before the experiment begun.

3.2.3 Experimental procedures

Each experimental session consisted of four tasks. It included a real choice experiment (RCE), a manipulation check questionnaire, a socio-demographic questionnaire and anthropometric measurements. Each session lasted approximately

[16] We chose this specific age range because, on the one hand, children of this age range have almost no pocket money and are totally dependent on what their parents purchase for them while, on the other hand, they are old enough to accompany parents at the supermarket.

[17] Lunch and dinner time in Greece are usually later than other parts of Europe or North America. Lunch is usually served between 13.30 and 15.00 o'clock while dinner between 20.00 and 21.30. Two parent-child pairs participated in the experiment at 14.00 and 14.45 o'clock because they were late and early, respectively.

40 minutes. In each session a single parent-child pair participated. Depending on the treatment, the child could have an active role in the choice experiment or not.

In the RCE task, participants faced different choice tasks where they had to choose between two similar products of the same brand (e.g., cheese) differentiated by their healthiness status (healthier vs. unhealthier alternative) and price (three levels). The healthiness or unhealthiness status was not explicitly labeled as such. Choices also included a no-buy option in the event that subjects did not prefer any of the products[18].

The experiment was conducted as follows: first, each parent was assigned a unique ID number to guarantee his/her anonymity and s/he was informed that their fixed participation fee of 30€ would be given to them at the end of the experiment. In addition, subjects could examine the products offered for sale in a display section in the lab. They were given enough time to see and inspect all products. Subjects were then seated in front of a computer and they were informed that they will go through 20 choice tasks showing various combinations of the products on display in the lab. They were also informed that when they complete all choice tasks, one of these would be chosen as binding and they would have to purchase the product of their choice at the indicated price. The price of the product would be deducted from their participation fee. To determine the binding round, subjects had to draw a number from a jar with folded papers listing numbers from one to twenty (as many as the choice tasks). To make sure parents were choosing products for their child, they were told that the product would be given to their child right away to consume while s/he would be filling out the socio-demographic questionnaire. We emphasized to subjects that actual payment would occur for the binding choice task and that they should evaluate each choice task carefully, since all tasks were equally likely to become binding. Subjects were also told that choosing the "none of these" option (i.e., the no-buy option) is an acceptable choice and that if they had chosen the no-buy option in a binding task, no purchase would be made and they would keep their full endowment. The exact instructions given to the participants are provided in Appendix C.

[18] According to Louviere and Street (2000) it is not realistic to force participants to choose one of the available options and therefore including a no-buy option is to be preferred.

In order to confirm that our experiment worked well, that there was no experimenter demand effect and participants adhered to the experimental instructions, we incorporated a manipulation check questionnaire right after the choice experiment was finished (see Appendix D for more details)[19].

The socio-demographic questionnaire, which elicited parental perceptions about their child's weight status, family's dietary habits, and family's socio-demographics, were addressed to parents. The exact questions (in Greek) given to parents are provided in Appendix E.

Each session concluded with anthropometric measurements of the parent and the child (see Appendix F). Physical measurements of body weight and height were obtained from all children and their parents (light summer clothing, no shoes). Body weight was measured on a levelled platform scale with a beam, movable weights and body height on a wall-mounted stadiometer, to the nearest 0.5 kg and 0.5 cm, respectively. Body Mass Index (BMI) was computed as weight (in kilograms) divided by height (in meters squared) and it was used for participants' classification as normal-weight, overweight or obese (Cole et al., 2000; Cole et al., 2007; WHO, 1995).

3.2.4 Products and choice tasks

The food products chosen were products commonly purchased by Greek families as snacks for children. In each product category (choco milk beverage, cheese, and yogurt) there were two products of the same size and weight that differed only on the basis of percentage of calories, fat and sugar and so it was easy for parents to distinguish between the healthier and the unhealthier alternative (for example all healthier products carried nutritional claims such as "free", "2%", "light"). We did not explicitly mention, however, if a product would be considered more or less healthy. We also did not label any of the products as such. Each choice task depicted

[19] The results of the manipulation check questionnaire reinforce the validity of our experimental results. All subjects in the information treatment responded that their responses were based on the information given at the beginning of the session along with what s/he and/or their child wanted; not based on what they thought the experimenter wanted from them. All subjects in the no-information treatment responded that the purpose of the study was to examine consumption patterns on food and/or stationery products for kids.

the alternative products using photo stimuli. To mute any brand effects, we chose products of the same brand in each product category, that is, each pair of healthier and unhealthier products were of the same brand[20]. One week before the official start of the experiment, the experimenter visited supermarkets of the four largest chain stores in the city and collected prices for the products of the experiment. The average of these prices was used in the baseline control (market price) treatment and prices for the other within-subjects treatments varied accordingly.

To cover up the aim of the study and preclude subjects from potentially succumbing to experimenter demand effects, two additional non-food categories were added to the list of choice tasks. We used stationery products (colored markers, pens/pencils) as a decoy. The prices of the decoy products in the market price treatment were the average of prices observed in the same four supermarkets as the food items. Decoy products were selected so that their price range lied between the lowest and the highest price of the market prices of food products, in order to avoid exposing subjects to any irrelevant price anchors. Prices did not change for the decoy products under the fat tax, subsidy and both treatments since the fiscal policies were irrelevant for stationery products.

In all, the real choice experiment incorporated 20 different choice tasks [4 within subject treatments (MP, FT, SB and BO) × 5 product categories (3 food and 2 non-food)]. The choice tasks pertaining to the stationery products will not be further analyzed. Appendix G shows sample choice screens from the market price treatment. In the rest of the within-subjects treatments, prices were adjusted accordingly.

The next Chapter illustrates the results drawn from the descriptive and econometric analysis.

[20] The products were: milko vs. milko free, babybel vs. babybel light, delta yogurt vs. delta yogurt 2%.

4 CHAPTER: Analysis/Results

4.1 Descriptive analysis

Before proceeding with testing our hypotheses, insights can be gained by looking at some descriptive statistics. We first explore whether randomization to treatment worked by testing whether observable characteristic are balanced across the between subjects treatments. With respect to the socio-economic status of families, results from an ANOVA test indicate that the parents' age (mean=40.48 years old) as well as children's age (mean=8.16 years old) do not differ significantly between treatments (p-value=0.41 and 0.86 respectively). Kruskal-Wallis tests produce similar results with respect to parents' and children's age. In addition, Pearson's χ^2 tests indicate that the distribution of parents' gender as well as children's gender are not significantly different between treatments (χ^2 =2.51, p-value=0.47 and χ^2 =2.35, p-value=0.50, respectively).

Given that parent-children pairs would have different compositions (i.e., father-son, father-daughter, mother-son, mother-daughter), a question that might arise is whether the proportions of parent-child gender combinations differ across the treatments. We cannot reject the null of no difference between treatments (Pearson's χ^2 =10.85, p-value=0.29).

In addition, our between subject treatments do not differ in terms of income level (Kruskal Wallis χ^2=1.15, p-value=0.77), education level (Kruskal Wallis χ^2=1.37, p-value=0.71), family's geographical location residence (Pearson's χ^2=6.95, p-value=0.96), working status (Pearson's χ^2=7.35, p-value=0.83), marital status (Pearson's χ^2=9.66, p-value=0.38) and smoking status (Pearson's χ^2=5.51, p-value = 0.79). We also classified individuals according to parental weight status using Body Mass Index (WHO, 1995). Results show that 31% of those in our parent sample have a healthy weight status, 37% are overweight and 32% are obese. A Pearson's χ^2 of whether the distribution of weight status differs between treatments does not reject the null (χ^2 =3.86, p-value=0.69). We get a similar null effect if we use the raw BMI measurements (instead of the BMI categories) with an ANOVA test (p-value=0.85)

as well as a Kruskal Wallis test (p-value=0.78). As far as child's weight status is concerned, we used the International Obesity Task Force (IOTF) cut offs (Cole et al., 2000) to categorize children into weight categories. Our children sample consists of 61% children of healthy weight status, 28% of overweight children and 11% obese. None of our results changes when we use Centers for Disease Control (CDC) cut offs (CDC, 2009) since the distribution of weight categories did not significantly change. In particular, a Fisher's exact test of whether the distribution of weight status according to Cole measurement differs between treatments does not reject the null hypothesis (p-value=0.61). Similar results are given by a Pearson's χ^2 test when we use the weight status classification according to CDC (χ^2=4.29, p-value=0.64). Results from the use of the raw BMI (instead of BMI categories) produces the same null effect (ANOVA test, p-value= 0.33, Kruskal Wallis test, p-value=0.19).

Before moving to the econometric analysis, it is also important to have a first look at the raw choices of subjects. Subjects had to choose among three alternatives in each choice set. They could select the unhealthier alternative, the healthier alternative or none of the two alternatives. Our priors are that if parents are aware that a product for children has been taxed because it is unhealthier compared to others, it may discourage purchases of it; or if they are aware that a product has been subsidized because it is considered healthier than other products, it may enhance purchases of it. Overall, we expect that when information is provided about products whose price has been changed according to some fiscal policy, the purchasing behavior of parents would shift to healthier product choices. This hypothesis is confirmed by a proportion test when we test for differences in choices when information about fiscal policies is provided. For example, while 36% of choices are allocated to the healthier alternative in the "No pester - No info" treatment, the proportion rises to 72% in the "No pester - Info" treatment. This difference is statistically significant when we test using a proportions test (p-value<0.001). Similar behavior is observed in the "pester" treatments where choices shift from 21% to 58% to the healthier alternative when information about fiscal policies is provided. These are clear cut evidence that communicating the nature of the fiscal policy has a positive and significant effect on healthier choices. In both cases, the percentage of healthier choices increases more than twice.

On the other hand, children's pestering power has a negative effect on healthier choices. In the "No info" treatment, allowing the child to be able to communicate its preferences to the parent results in a significant decline of healthier purchases from 36% to 21% (p-value<0.001). Similarly, in the "Info" treatment, healthier choices decline from 72% to 58% (p-value<0.001) when children can exercise pestering power. In sum, we find that information about fiscal policies and pestering power can have opposite effects. The incidence of healthier choices increases when information is provided and children cannot exercise their pestering power.

To illustrate this further, Figure 1 graphs the proportion of healthier and unhealthier choices by treatment. The graphs ignore non-choices given the low number throughout our experiment (only 20 choices were non-choices out of 2268 choices that the 189 subjects did in our experiment).

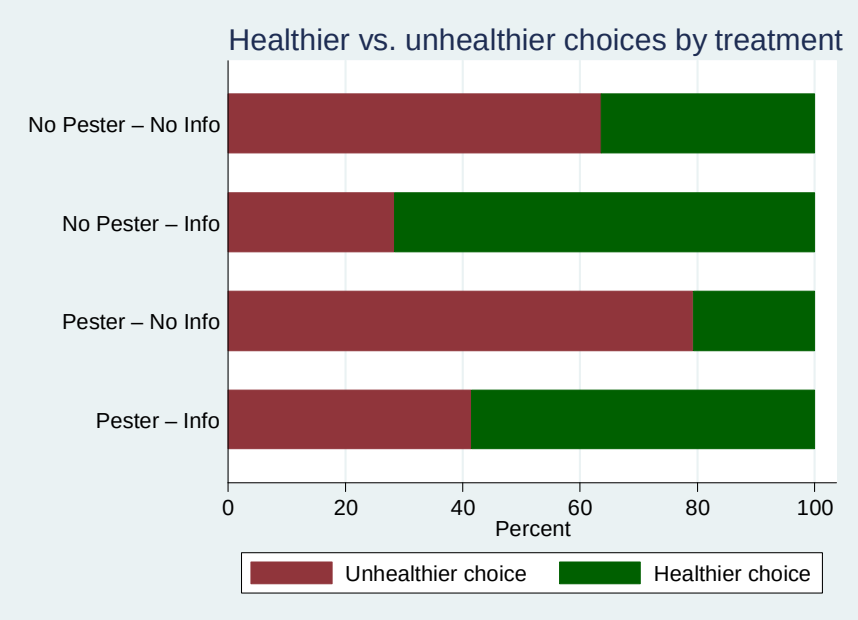


Figure 1. Healthier and unhealthier choices by (between-subjects) treatments

After controlling for parental gender we observe no big differences in the purchasing behavior between the subgroup of fathers (Figure 2) and the subgroup of mothers (Figure 3). There is a slight bigger proportion of unhealthier choices for the subsample with fathers when information is available and children exercise their pestering power. This may indicate that fathers give in to children's nagging more easily than mothers, even when information regarding the healthiness of a product is provided.

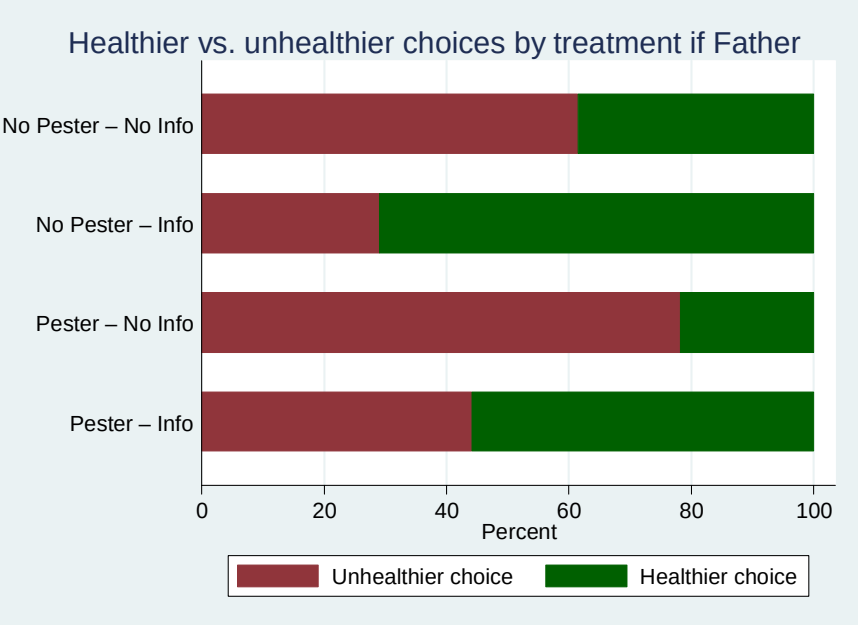


Figure 2. Healthier and unhealthier choices by (between-subjects) treatments for the fathers' subsample.

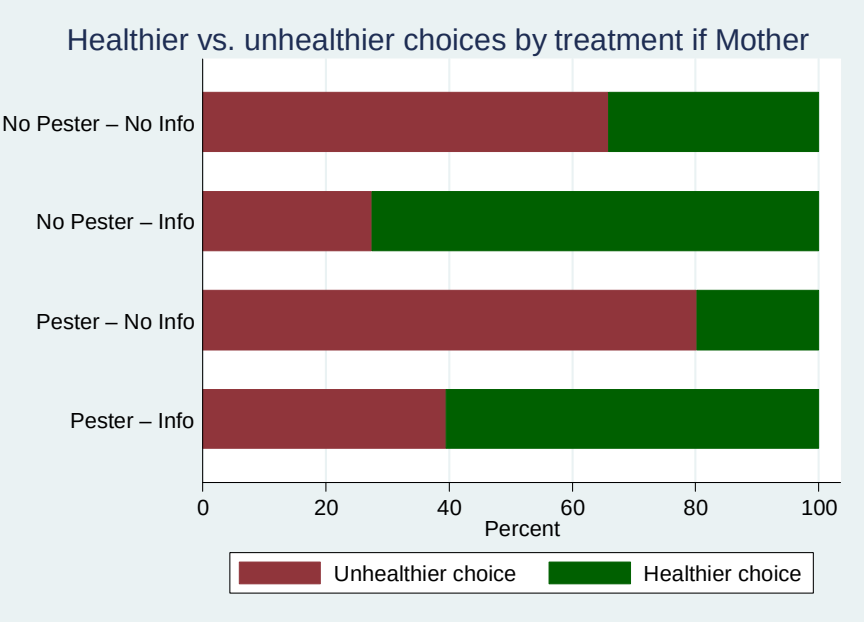


Figure 3. Healthier and unhealthier choices by (between-subjects) treatments for the mothers' subsample.

More insights can be gained after controlling for other factors. Splitting our group in subgroups according to children's weight status, we see no major differences from the previous diagrams. However, we see a particular behavior in the subgroup of families with obese children in the No Pester – Info treatment (Figure 5). Although, parents have received information regarding the fiscal policies and consequently the

healthiness of the products, they seem to increase the proportion of unhealthier purchases in contrast to the other subgroups (For more comparisons see Appendix H1).

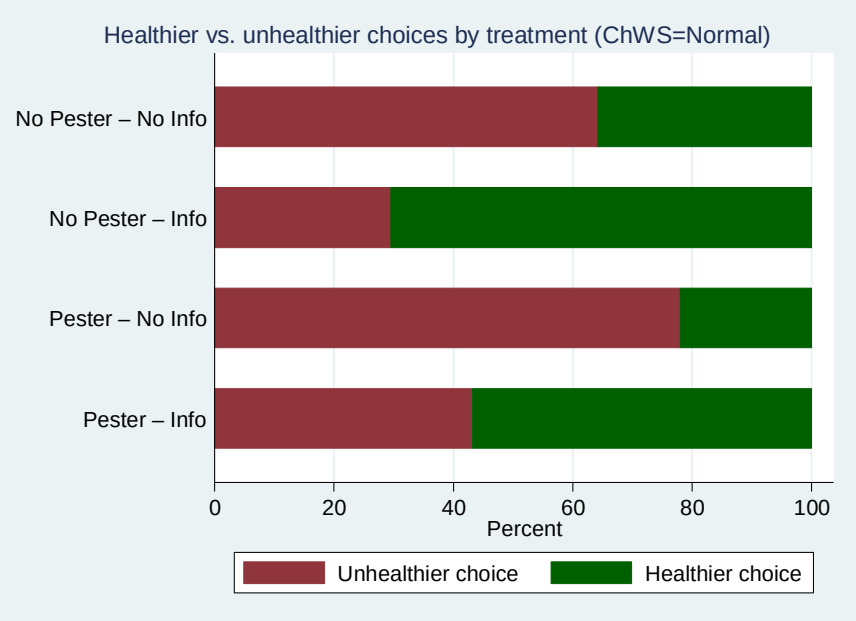


Figure 4. Choices by treatment for the normal weighted children subsample

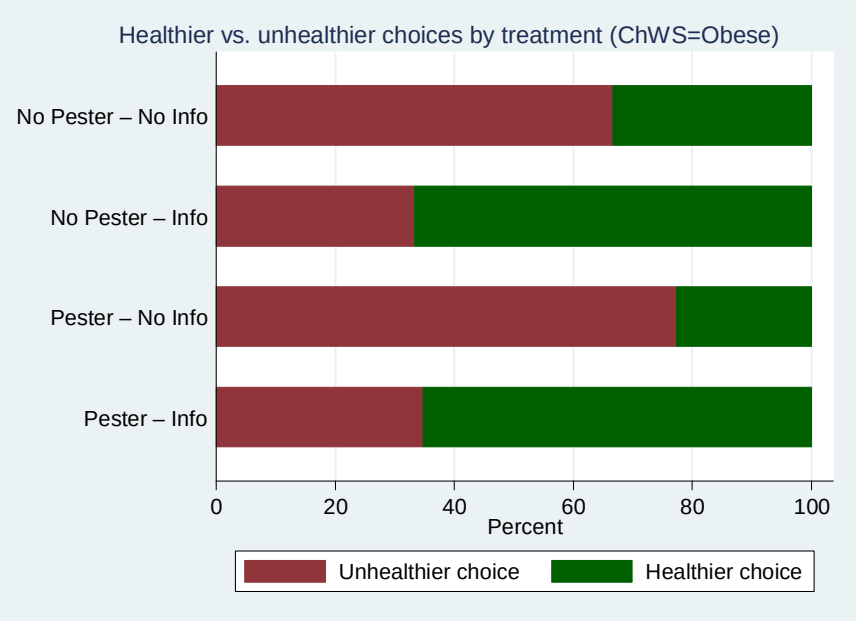


Figure 5. Choices by treatment for the obese children subsample

This could have a multitude of explanations, such as that they adopt wrong dieting behavior which may be the reason for having heavier kids or that they might have wrong perceptions for the weight status of their kid.

When we breakdown our group according to parental weight status we observe a much more clear trend. On average, as the BMI of the parent increases, more unhealthier purchases occur. In the obese parental subgroup in the No Pester - Info treatment (Figure 7) where the child is not present and information is available, the proportion of unhealthier purchases is bigger in contrast to all the other subgroups in the same treatment (For more comparisons see Appendix H2).

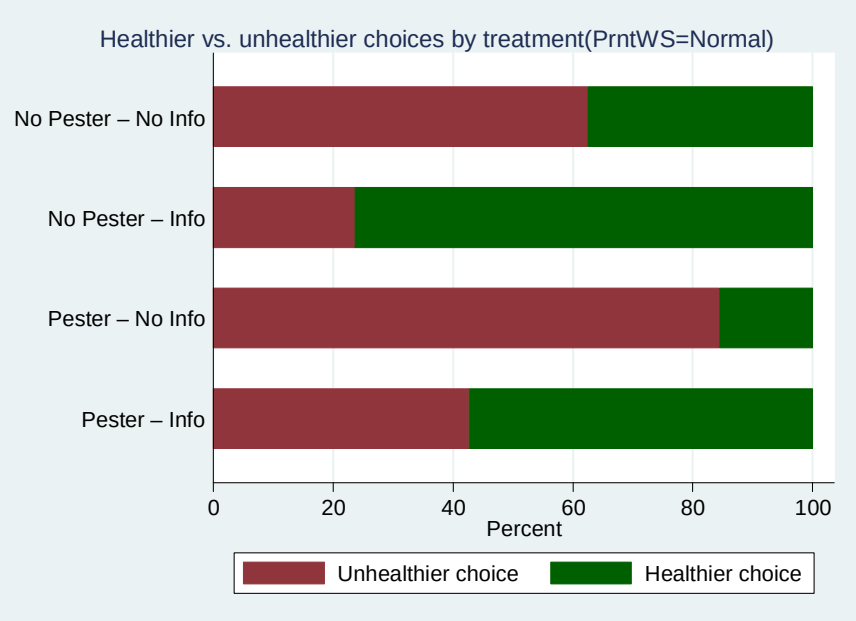


Figure 6. Choices by treatment for the normal weighted parent subsample

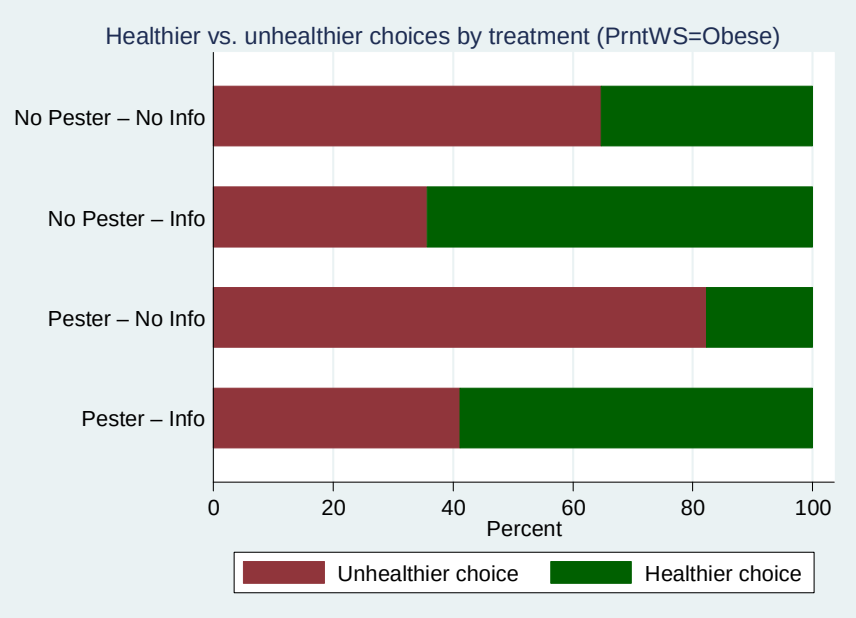


Figure 7. Choices by treatment for the obese parent subsample

After splitting our sample in subsamples according to parental and kid's weight status, the healthier purchasing behavior, over all treatments, is adopted by the subsample where both are overweight (Figure 8). On the contrast, it is interesting that when both parent and kid are obese (Figure 9) a very unhealthy behavior occurs (For more comparisons see Appendix H3).

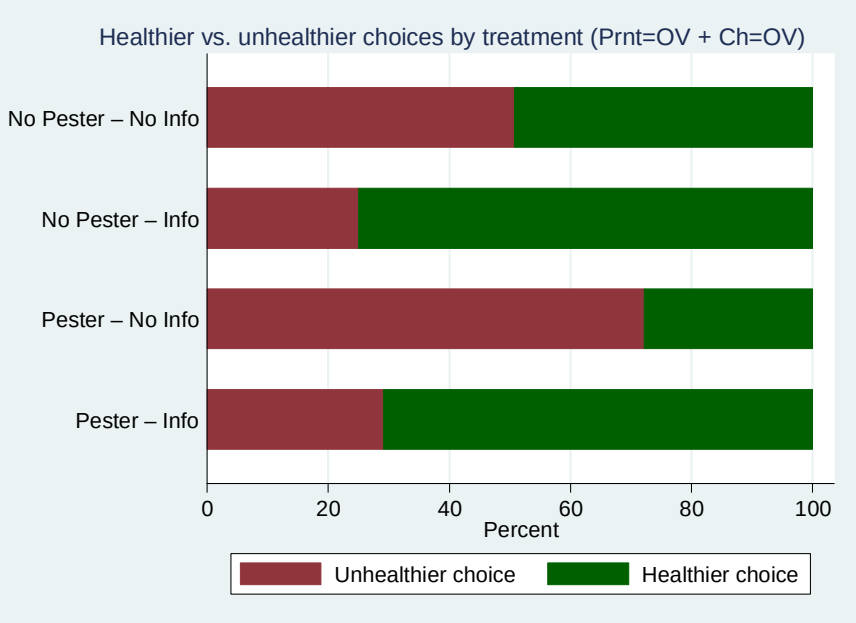


Figure 8. Choices by treatment for the over-weighted parent and over-weighted children subsample

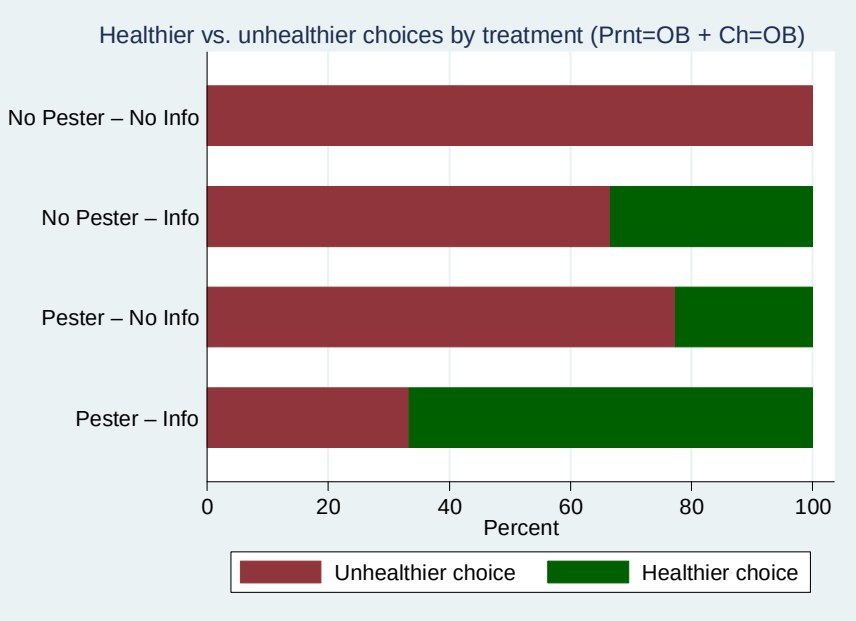


Figure 9. Choices by treatment for the obese parent and obese children subsample

To examine the effect of specific fiscal policies (i.e., fat tax, subsidy or both) on healthier choices, Figure 10 displays the proportions of healthier and unhealthier choices by fiscal policy. The market price treatments are the benchmark (control treatments). It is clear that a) imposing fat tax *or* subsidy leads to increased healthier choices and b) imposing fat tax *and* subsidy at the same time can further improve healthier choices. We should pinpoint that healthier choices can go up to 83% of all choices when a fat tax and a subsidy are combined, when subjects receive information about fiscal policies, and children cannot exercise pestering power. In the case when information about fiscal policies is provided and there is pestering power, healthier choices go down to 71%. Finally, it is important to mention that even when information is not available and the kid is present (the two factors that favor unhealthier purchases), the combination of a fat tax and a subsidy produce the largest percentage of healthier choices when compared with the other fiscal policies (which amounts to 28%).

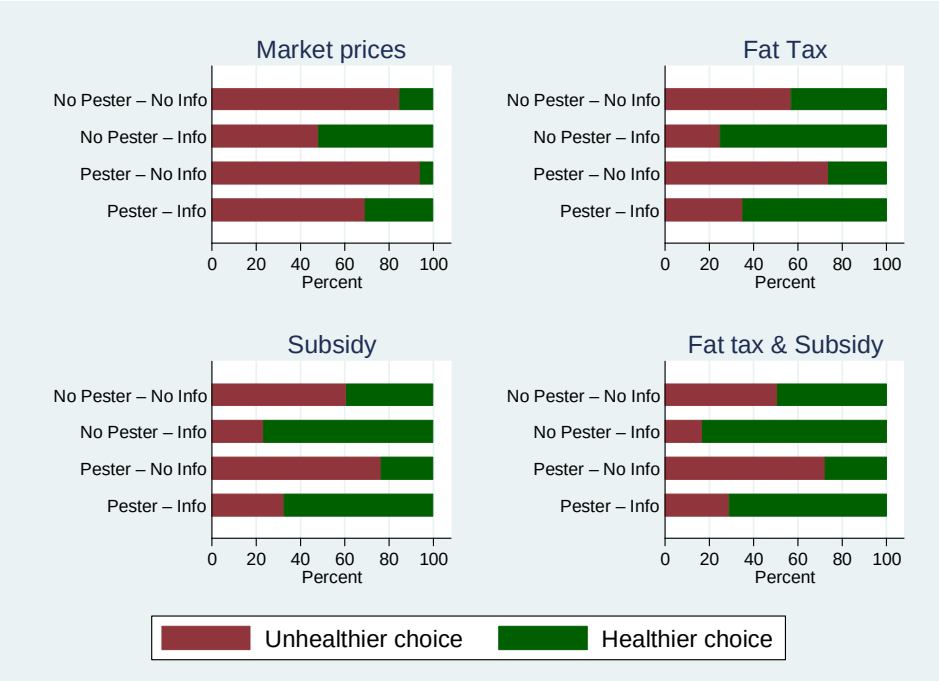


Figure 10. Healthier and unhealthier choices by (within-subjects) treatments

If we further breakdown our sample according to children's weight status, we notice that when both fiscal policies are applied simultaneously a family with an overweight kid increases healthier purchases by a larger percentage, especially in the treatments where information is available (Figure 11). Even when the kid exercises pestering power, unhealthier purchases don't exceed 20% (For more comparisons see

Appendix H4). On the contrary, no such behavior occurs when parent's weight status is overweight (See Figure H5.2. in Appendix H5).

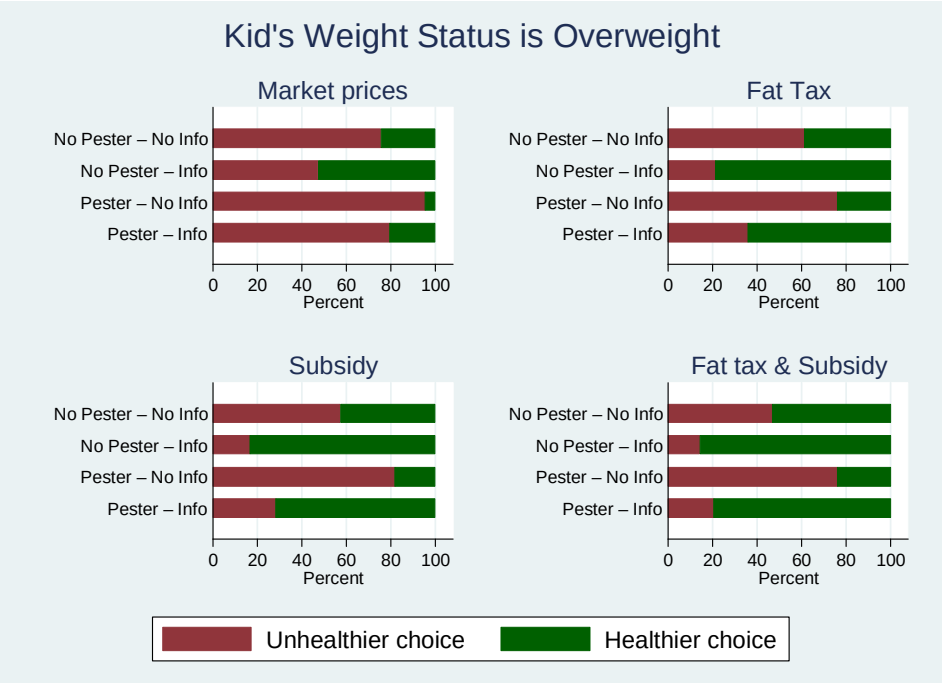


Figure 11. Healthier and unhealthier choices by (within-subjects) treatments for the over-weighted children

4.2 Econometric analysis

To check whether the insights gained from the descriptive analysis above hold under the scrutiny of conditional analysis, we estimated a mixed logit model [also referred to as the "random parameter logit model" or "mixed multinomial logit model" (Hensher et al., 2005)]. The mixed logit model solves three primary limitations of the standard logit model. It allows for random taste variation, unrestricted substitution pattern and correlation in unobserved factors over time (Train, 2003). McFadden and Train (2000) showed that under mild regularity conditions, a mixed logit model can calculate to any degree of accuracy any random utility model of discrete choice.

We assume that a sampled individual (n = 1,…, N) faces a choice among i alternatives in each of s choice tasks. The utility associated with each alternative i, as evaluated by each individual n in choice task s, is represented by the following model:

$$U_{nis} = \beta_n' x_{nis} + \varepsilon_{nis} \quad (1)$$

where x_{nis} is the full vector of explanatory variables that are observed by the analyst; β_n' is a vector of fixed and random coefficients across individuals parameters; and ε_{nis} is an i.i.d. extreme value error term.

In our experiment, the participants were asked to make 12 choices between dairy products for kids offered at various pricing levels. The choices can be analyzed using the following mixed logit model:

$$U_{nis} = \beta_{0ni} + \beta_1 ChocoMilk + \beta_2 Cheese + \beta_{3i} Price + \beta_{4ni} Info + \beta_{5ni} Pester + \varepsilon_{nis} \quad (2)$$

where β_{0ni} is the alternative specific constant (ASC) for alternative *i*; *ChocoMilk* and *Cheese* are product dummies (*Yoghurt* is the excluded category); *Price* is the price of the products; *Info* is a dummy variable for when information about the fiscal policies are provided to subjects; and *Pester* is a dummy variable indicating the treatment where the parent-child pair choose together (allowing the child to exercise pestering power).

The coefficient β_{0ni} captures parents' sensitivity to the health attribute and we model this as a random parameter that is triangularly distributed[21]. The coefficients of *Info* and *Pester*, which capture consumers' sensitivity to information provision and child's pestering power, are modelled as random and triangularly distributed as well. The parameters $\beta_1, \beta_2, \beta_3$ are non-random and capture consumer sensitivity towards product category and price changes. Finally, the alternative-specific constant for the "none-of-these" alternative is normalized to zero.

Table 3 shows the estimated coefficients of the parameters and respective standard errors from the estimated model of equation (2) (mixed logit (I) columns). For

[21] We tried several other distributions for the random coefficients of our model like the normal and the uniform distribution. Differences between models with different distributions for the random coefficients are negligible. We only report results from the models with triangular distribution because it is a limited distribution and therefore it does not imply that anyone has an unlimited high willingness to pay for snacks (Alfnes et al., 2006). See Hensher and Greene (2003) for a discussion on the various distributions in mixed logit models.

comparison, a multinomial logit model is also displayed as well as a mixed logit model for which only the alternative specific constants are modeled as random (mixed logit (2) columns). We can see that both the mixed logit models (LL= -1127.017 and LL= -1126.947) are an improvement to the more restrictive multinomial logit model (LL=-1394.050). Likelihood ratio tests indicate the mixed logit model (1) is to be preferred than the multinomial logit model (χ^2=534.07, p-value<0.001). A similar result is obtained when we compare the mixed logit model (II) with the multinomial logit model (χ^2=534.21, p-value<0.001). On the other hand, the two mixed logit models do equally well (χ^2=0.14, p-value=0.998). AIC values support these conclusions. Note that the two mixed models are qualitatively and quantitatively indistinguishable in terms of the estimated coefficients[22].

The alternative specific constants represent the utility of the alternatives (unhealthier-healthier) at base level and the alternative with the highest utility on the base level is the unhealthier alternative, namely ASC_U, which is significantly higher than the healthier alternative (Wald test-statistic: χ^2=46.69, p-value<0.001). The product dummies have no effect on the utilities of the alternatives. Furthermore, the coefficient of the *Price* variable for both the healthier and unhealthier alternatives is negative, as one would normally expect.

The coefficient of the information variable for the healthier alternative is positive and statistically significant at the 1% level, while for the unhealthier alternative, it is not statistically significant and of small magnitude. This means that providing information about fiscal policies affects the utility of the healthier alternative much more than the utility of the unhealthier alternative. A similar pattern in terms of statistical significance is observed for the child's pestering power coefficients. The pestering power dummy has a negative statistically significant effect for the healthier alternative but is not significant and is of small magnitude for the unhealthier alternative.

[22] We also estimated models that included a time of the session dummy (morning vs. afternoon sessions) to control for time of the day differences. The dummy was never statistically significant and of small magnitude. In addition, likelihood ratio tests indicate that the model with the time of the day dummy does not significantly improve the fit of the model (χ^2=0.928, p-value=0.629).

Table 3. Estimated parameters for the multinomial logit and mixed logit models

Multinomial logit			Mixed logit (I)			Mixed logit (II)		
Variable	**Coefficient**	**S.E.**	**Variable**	**Coefficient**	**S.E.**	**Variable**	**Coefficient**	**S.E.**
ASC_U	8.251***	1.056	$ASC_{U\,(R)}$	10.388***	1.120	$ASC_{U\,(R)}$	10.434***	1.121
ASC_H	7.040***	1.054	$ASC_{H\,(R)}$	8.197***	1.121	$ASC_{H\,(R)}$	8.196***	1.125
ChocoMilk	-1.621	1.052	ChocoMilk	-1.235	1.060	ChocoMilk	-1.237	1.060
Cheese	0.121	1.074	Cheese	1.566	1.099	Cheese	1.562	1.099
$Price_U$	-2.178***	0.179	$Price_U$	-3.505***	0.249	$Price_U$	-3.504***	0.249
$Price_H$	-2.348***	0.217	$Price_H$	-3.756***	0.294	$Price_H$	-3.755***	0.294
$Info_U$	0.970	0.631	$Info_{U\,(R)}$	0.662	0.703	$Info_U$	0.606	0.694
$Info_H$	2.683***	0.632	$Info_{H\,(R)}$	3.803***	0.742	$Info_H$	3.781***	0.743
$Pester_U$	0.061	0.456	$Pester_{U\,(R)}$	0.210	0.540	$Pester_U$	0.201	0.540
$Pester_H$	-0.673	0.459	$Pester_{H\,(R)}$	-1.239**	0.603	$Pester_H$	-1.238**	0.593
Log likelihood	-1394.050			-1127.017			-1126.947	
AIC	2808.100			2286.034			2277.894	
N	2268							

Note: ***, **, * denotes statistical significance at the 1%, 5% and 10% level, respectively.
(R): Denotes random coefficient for the respective variable.

Given that the estimates of the coefficients from the mixed logit model are meaningless for quantitative interpretations, we also calculated the effect of changes in prices on the choice probabilities for each of the alternatives (see Table 4). Since market prices between the three products differ, we simulated the fiscal policy changes separately for each product. Results show that changing the food fiscal policy for the choco milk beverage from a basic level of market prices to imposing a 15% fat tax, increases choices of the healthier alternative by 6.8% and decreases choices of the unhealthier alternative by 7.07%. The effect is proportional to a 25% fat tax and results in a 11.25% increase in healthier choices and a 11.8% decrease in unhealthier choices. The results from a corresponding subsidy of the healthier alternative show that the effect is even stronger in increasing the incidence of healthier choices. For example, a 25% subsidization of the price of the healthier cheese alternative results in a 19.6% increase in the healthier choice share while the equivalent fat tax imposed on the unhealthier alternative results in a 15.6% increase in the healthier choice share. This indicates that the implementation of a subsidy is more effective than the implementation of a fat tax in increasing healthier choices, at least in the context of our experiment.

Table 4. Two scenarios of fiscal policies and their effects on choice probabilities (%)

		Choco Milk			**Cheese**			**Yogurt**		
		FT	**SB**	**BO**	**FT**	**SB**	**BO**	**FT**	**SB**	**BO**
25%	**U**	-11.79	-12.16	-24.57	-21.41	-18.14	-38.52	-9.09	-9.65	-19.03
	H	11.25	12.25	24.29	15.61	19.62	35.97	8.96	9.68	18.95
	N	0.54	-0.09	.028	5.80	-1.48	2.55	0.13	-0.3	0.08
15%	**U**	-7.07	-7.35	-14.65	-12.49	-10.51	-23.09	-5.36	-5.68	-11.31
	H	6.81	7.42	14.48	9.36	11.39	21.77	5.29	5.70	11.28
	N	0.26	-0.07	0.17	3.13	-0.88	1.32	0.07	-0.02	0.03

Note: H: Healthier alternative, U: Unhealthier alternative, N: Non of these
FT: Change price from market price to fat tax, SB: Change price from market price to subsidy,
BO: Change price from market price to both policies.

The combined effect of a fat tax and a subsidy is even more robust. The most prominent case is for the cheese product where a 25% fat tax on the unhealthier alternative and a 25% subsidy on the healthier alternative increase (decrease) the choice share of the healthier (unhealthier) alternative by 36% (38.5%).

Although socio-demographic characteristics are rarely considered important element of a utility formation, we have tried to incorporate some in our estimated model in order to check if insights gained from the descriptive analysis are robust.

The adopted mixed logit model (I) after controlling for the BMI of parents and children can be transformed to the following model:

$$U_{nis} = \beta_{0ni} + \beta_1 ChocoMilk + \beta_2 Cheese + \beta_{3i} Price + \beta_{4ni} Info + \beta_{5ni} Pester + \beta_{6ni} PBMI + \beta_{7ni} CBMI + \varepsilon_{nis} \quad (3)$$

where *PBMI* is the BMI for the n^{th} participating parent; and *CBMI* is the BMI for the n^{th} participating child. Both variables are continuous. The coefficients of the socio-demographic variables β_{6ni} and β_{7ni} capture the effect of parent's and kid's BMI on the ASC and consequently on the utility. Table 5 shows the estimated coefficients of the parameters and respective standard errors from the estimated model of equation (3) (mixed logit (III) columns).

We observe that only parental BMI has an effect in utility and it affects only the unhealthy alternative. Specifically, as the BMI of the parent increases, the utility derived from the unhealthy alternative increases as well. On the contrary, no effect exists for the BMI of the child.

Table 5. Estimated parameters for the estimated mixed logit model including BMI variables

Mixed logit (I)			Mixed logit (III)		
Variable	**Coefficient**	**S.E.**	**Variable**	**Coefficient**	**S.E.**
$ASC_{U\,(R)}$	10.388***	1.120	$ASC_{U\,(R)}$	7.876***	2.548
$ASC_{H\,(R)}$	8.197***	1.121	$ASC_{H\,(R)}$	4.703*	2.657
ChocoMilk	-1.235	1.060	ChocoMilk	-1.274	1.065
Cheese	1.566	1.099	Cheese	1.522	1.104
$Price_U$	-3.505***	0.249	$Price_U$	-3.501***	0.250
$Price_H$	-3.756***	0.294	$Price_H$	-3.753***	0.294
$Info_{U\,(R)}$	0.662	0.703	$Info_{U\,(R)}$	0.532	0.725
$Info_{H\,(R)}$	3.803***	0.742	$Info_{H\,(R)}$	3.741***	0.768
$Pester_{U\,(R)}$	0.210	0.540	$Pester_{U\,(R)}$	0.466	0.583
$Pester_{H\,(R)}$	-1.239**	0.603	$Pester_{H\,(R)}$	-1.060*	0.625
-			$PBMI_U$	0.145**	0.068
-			$PBMI_H$	0.103	0.072
-			$CBMI_U$	-0.078	0.100
-			$CBMI_H$	0.041	0.108
Log likelihood	-1127.017			-1122.429	
AIC	2286.034			2284.859	
N	2268				

Note: ***, **, * denotes statistical significance at the 1%, 5% and 10% level, respectively.
(R): Denotes random coefficient for the respective variable.

Our literature review indicates that gender of the parent and child may be an important explanatory variable, therefore equation (2) becomes:

$$U_{nis} = \beta_{0ni} + \beta_1 ChocoMilk + \beta_2 Cheese + \beta_{3i} Price + \beta_{4ni} Info + \beta_{5ni} Pester + \beta_{6ni} Pgen + \beta_{7ni} Cgen + \varepsilon_{nis} \quad (4)$$

where *Pgen* is a dummy variable taking the value of one when the participating parent is father; and *Cgen* is a dummy variable taking the value of one when the participating child is a boy. The coefficients β_{6ni} and β_{7ni} capture the effect of the participants' gender on the utility. From Table 6 we can see the estimated coefficients of the parameters and respective standard errors from the estimated model of equation (4) (mixed logit (IV) columns).

The coefficients of the parental gender is negative and statistical significant at the 5%, and it is of greater magnitude in the unhealthy alternative than in the healthy alternative. This indicates, that men tended to make more unhealthier purchases. On the other hand, child gender seems to play no role in the utility function and consequently to parental purchasing behavior.

Table 6. Estimated parameters for the estimated mixed logit model including Gender variables

Mixed logit (I)			Mixed logit (IV)		
Variable	**Coefficient**	**S.E.**	**Variable**	**Coefficient**	**S.E.**
$ASC_{U\,(R)}$	10.388***	1.120	$ASC_{U\,(R)}$	11.535***	1.264
$ASC_{H\,(R)}$	8.197***	1.121	$ASC_{H\,(R)}$	9.364***	1.274
ChocoMilk	-1.235	1.060	ChocoMilk	-1.263	1.063
Cheese	1.566	1.099	Cheese	1.535	1.102
$Price_U$	-3.505***	0.249	$Price_U$	-3.499***	0.249
$Price_H$	-3.756***	0.294	$Price_H$	-3.751***	0.294
$Info_{U\,(R)}$	0.662	0.703	$Info_{U\,(R)}$	0.791	0.722
$Info_{H\,(R)}$	3.803***	0.742	$Info_{H\,(R)}$	3.921***	0.762
$Pester_{U\,(R)}$	0.210	0.540	$Pester_{U\,(R)}$	-0.013	0.562
$Pester_{H\,(R)}$	-1.239**	0.603	$Pester_{H\,(R)}$	-1.451**	0.624
-			$Pgen_U$	-1.505**	0.652
-			$Pgen_H$	-1.539**	0.691
-			$Cgen_U$	-0.133	0.567
-			$Cgen_H$	-0.136	0.610
Log likelihood	-1127.017			-1123.348	
AIC	2286.034			2286.696	
N			2268		

Note: ***, **, * denotes statistical significance at the 1%, 5% and 10% level, respectively.
(R): Denotes random coefficient for the respective variable.

Moving one step further, in Table 7, we test how gender impacts upon the choice probabilities for the model estimated from equation 4 (mixed logit model (IV)). We conclude that fathers have a 35% higher likelihood of purchasing unhealthier purchases than mothers.

Table 7. Parental gender effect on choice probabilities

Scenarios	**Choice Probabilities (%)**
Scenario: Change the gender from woman (mother) to man (father)	
Unhealthier alternative	35.17
Healthier alternative	-40.32
Non-choice alterative	5.15

The next Chapter presents the importance and the implications of our findings, as well as, specific areas of childhood obesity that seem to need future research particularly for economists.

5 CHAPTER: Conclusions

In light of the recent dramatic rise in childhood obesity rates, identifying the factors that have contributed to this growth is becoming the target of many studies from diverse disciplines. Policymakers have proposed a large number of policy measures to halt or reverse this trend. Some of the most well known mechanisms are food fiscal policies which may be used to nudge consumers towards a healthier way of eating. This study collected the most well known factors that may have contributed in the rapid rise in childhood obesity, as well as, it investigated the effects of food fiscal policies as a health intervention mechanism. This is extremely important given that adult eating habits are acquired during childhood (Birch, 1988; Kelder et al., 1994; Lien et al., 2001). Thus, children are more apt to adopt healthier eating behavior while they grow up under a healthy parental food "umbrella". Parental food choices are considered important since young children's choices are normally constrained by what their parents provide them. In this study, food fiscal policies were perceived as a promising incentive mechanism that could create a parental environment that supports healthy eating in the family. However, specific factors that influence the effectiveness of food fiscal policies have to be taken into account.

The literature review, presented in Chapter 2, indicates that there is multitude of factors that can act as possible contributors to childhood obesity. It is known that genetic susceptibility and heredity are major contributors to this problem; however they cannot explain the recent rapid growth by themselves since many complementary behavioral and environmental changes have simultaneously contributed to the obesity epidemic. The high costs of obesity as well as the high costs of public interventions coupled with undesirable results in some cases make the identification of the major causes of childhood obesity essential and necessary for efficacious policy responses. The conclusion is that childhood obesity is a complex problem that can be caused by a variety of factors. However, from the literature review, some factors seem to be clearly and strongly correlated with childhood obesity. Firstly, the shared food environment created by parents affects children's choices and eventually their body weight outcomes; and it is more likely

the intensity of parental work, not the work per se, that is one of the causes of childhood obesity. Secondly, the increased consumption of calories (either as a result of technological advance, lower pricing or bigger portion sizes) seems more responsible for weight gain than changes in physical activity. Thirdly, food advertising that targets children seems to have an influence on children's food choices, and possibly their weight. Finally, food prices and especially the gap between prices of high-fat high-sugar food and prices of healthier food seem to be a determinant in adults' and children's unhealthy purchasing behavior and consequently on their body weight outcome.

In order the connection that might exist between food prices as a health intervention and family's food environment to be investigated, experimental method is used. Specifically, it is widely believed that this kind of research, i.e. experimental method, can further enhance the contribution of economics on evaluating public interventions and hence improving public health. Chapter 3 describes the procedure of economic experiments and especially the method of choice experiment which has been used in this study. From an economics perspective, this study tries to simulate the choices parents face in the real world using real choice experiments. Choice experiment is an incentive-compatible method that is easy for consumers to understand. In this experiment, subjects were tested in a "closed environment" as they could choose between three alternatives: a healthier and an unhealthier product of the same product category, brand and size, or the no-buy option. Although in real life, far more many options (brands, sizes, substitutes) are available in a grocery store that can create more complex substitution patterns resulting from fiscal policies, this small scale choice environment provides a clean illustration of the effects of these policies.

Empirical analysis and results are presented in Chapter 4 which confirm the initial hypothesis based on the literature review. In terms of policy making, this study illustrates that the magnitude of the effect of any fiscal policy can be weakened or enhanced by several other factors. For example, this study shows the significant (negative) influence that kids could exert on parental choice decisions (i.e., with their pestering power) when it comes to healthier foods. On the other hand, the findings suggest that if proper provision of information regarding the cause of the

price increase/decrease is provided (e.g., on the shelf close to the price), the effect of a food fiscal policy can be enhanced. This finding implies that food fiscal policies should be accompanied by information campaigns to become more effective. More importantly, the results indicate that although there is an impact on healthier choices after the implementation of a fat tax or a subsidy, the simultaneous implementation of fat tax and subsidy can further improve healthier choices.

Overall, one of the ways for price increasing fiscal policies to gain public acceptance, is to convince consumers that the revenues from the difference in the payable price will be returned to them. This could be done with the implementation of subsidies to products considered healthier, ensuring that food taxes are not more regressive to poor consumers; through educational programs related to healthy eating behavior among adults and children; through public information campaigns and fitness equipments/parks available to public; as well as through funding of the public health system. For example, Reger et al. (1999) reported that after a six-week mass media campaign and implementation of media public relation strategies in east Virginia to encourage consumers to switch from whole-fat milk (2%) to low-fat milk (1%), there was a 17% rise in low fat milk purchases. This effect lasted at least six months after the intervention ended.

However, while it would be tempting to generalise the results of this study, policy makers are cautioned about examining specific factors differentiated per country that may alter the expected results. Future research should test the robustness of the findings in other places where parenting styles, family structures, eating culture and the country's percentage of overweight/obese population could be different. Furthermore, despite the amount of work that has been done, there is no doubt that additional work that will bring more economic perspectives to childhood obesity research is needed. For example, economists could be more involved in the evaluation of programs and policies related to childhood obesity and in the development of robust econometric methods that can accurately measure their effectiveness in improving obesity outcomes of children (see Nayga (2008)). Also, due to the complexity of factors affecting childhood obesity, researchers could explore innovative methods from areas such as behavioral and neuro-economics that

can complement existing methods and provide additional insights into behavioral aspects related to childhood obesity issues.

Three other specific areas that seem to be still an open research agenda, particularly for economists, are the following: (1) identification of the causal effects of parental and children behavioral factors (e.g., rationality, time preference, gratification, addiction) on children's body weight outcomes; (2) the need for more information on the effect of various types of information (e.g., caloric posting, nutritional/price labeling, advertisements) and the environment (i.e., food, school, built environment) on children's food choices and weight outcomes; and (3) the need for more longitudinal research to study the effect of social networks and peers on childhood obesity rates. In addition, studies must also consider not just the important factors influencing childhood obesity but also the complexities and potential interactions between these factors especially when making social welfare judgments and recommendations[23] due to possible tradeoffs and heterogeneity issues involved when dealing with public policy.

[23] See discussion in Bhattacharya and Sood (2011).

APPENDICES

Appendix A: Full list of choice tasks

	Price of unhealthier alternative	Price of healthier alternative	No-Buy Alternative	Product category
Choice task 1:	1.3	1.3	None of these	Choco Milk Beverage
Choice task 2:	1.62	1.3	None of these	
Choice task 3:	1.3	0.98	None of these	
Choice task 4:	1.62	0.98	None of these	
Choice task 5:	2	2	None of these	Cheese
Choice task 6:	2.5	2	None of these	
Choice task 7:	2	1.5	None of these	
Choice task 8:	2.5	1.5	None of these	
Choice task 9:	1	1	None of these	Yogurt
Choice task 10:	1.25	1	None of these	
Choice task 11:	1	0.75	None of these	
Choice task 12:	1.25	0.75	None of these	
Choice task 13:	1.5	1.5	None of these	Decoy Markers
Choice task 14:	1.5	1.5	None of these	
Choice task 15:	1.5	1.5	None of these	
Choice task 16:	1.5	1.5	None of these	
Choice task 17:	1.2	1.2	None of these	Decoy Pencils
Choice task 18:	1.2	1.2	None of these	
Choice task 19:	1.2	1.2	None of these	
Choice task 20:	1.2	1.2	None of these	

Appendix B: The Lab

Picture B1. Family allocated to the "No Pester" treatment where parent is making choices alone.

Picture B2. Family allocated to the "Pester" treatment where the parent and the kid are making choices together

Appendix C: Experimental Instructions

[This is an English translation of the original instructions written in Greek. Text in brackets was not shown to subjects.]

Thank you for taking the time to participate in this survey. This study is a children's snack and stationery preference survey.

You have been randomly assigned a participant identity number (ID). You will use this ID to identify yourself. The ID must be written on the computer screen and on all papers handed in today. All information collected is strictly confidential and will only be used for this specific project.

Your participation fee is 30€. You will receive a voucher with a value of 30€. The voucher can be exchanged for money when you have completed all parts of the study. During the study you will be able to make real purchases if you wish to. I will give you more details on this part later on. The cost of any purchases you make will be deducted from the 30€ participation fee.

If you have any questions you may ask the moderator.

[Depending on the treatment, the experimenter enters the computer lab with the parent only or with the parent and the child together. Children that are not participating in the real choice experiment in treatments 1 and 3, spend their time in the lobby of the computer lab within eye contact distance from their parents. These children can watch cartoons or draw using paper and pencils.]

The first thing I want you to do is to examine all the products in this product display. You can see 5 product categories: milk drink, cheese, yogurt, pencils and markers. As you can see the products within a product category are of the same size and of the same brand.

[For treatments 2 and 4, where fiscal policy information was made available, the following paragraph was read to the participants while they were examining the products:]

"As you can see there are five product categories and each category has two products of the same size and brand but with different fat and sugar ingredient content. Now imagine that the health minister makes the following announcement on mass media: Due to the alarming obesity prevalence rates among children in our country we decided to apply the following food fiscal policies on dairy products that are commonly consumed by children. From next week, we will impose 3 different fiscal policies. The one, which is called fat tax, will increase the price of the product that is considered unhealthier by 25%; the second, which is called subsidy, will decrease the price of healthier products by 25%; and the third will combine a fat tax with a subsidy i.e., there will be a simultaneous increase of the price of the unhealthier product by 25% and a 25% decrease of the price of the healthier product.]

[Subject is then seated in front of a computer]

The products that were shown on display are going to appear on your screen in dyads. In total you will go through 20 choice tasks. Between tasks different products will appear but you might also see the same products at various price levels. In each choice task, you can choose between any of the two products or you can choose the no-buy option by selecting the "none of these" alternative.

When you complete all choice tasks, one of the choice tasks will be randomly selected as a binding task and you will have to purchase the product/alternative that you chose in this choice task. The price of the purchased product will be deducted from your participation fee. If you chose the "none of these" option in the binding choice task, then you won't purchase any product and the full participation fee will be given to you. The random draw for the binding task will be performed in front of you using this jar. The jar contains folded papers listing numbers from one to twenty (as many as the choice tasks). That is, each choice task has a one out of twenty

chance (5%) of being binding. More importantly, all tasks are equally likely to be selected as binding. Today, you will purchase at most one product. The purchased product will be given to your child to be consumed while you will participate in the second part of this survey which is a socio-demographic questionnaire.

Are there any questions?

[If there are no questions, the experimenter proceeds with starting the computerized treatment and subject is instructed to proceed with the choice task.]

Appendix D: Manipulation Check Questionnaire

[This is an English translation of the original manipulation check questionnaire]

1. Did you enjoy participating?

2. Were you bored at any point?

3. Do you have an idea about what was the purpose of the experiment?

4. Did you choose based on the information provided to you at the beginning of the experiment?

5. Did you respond based on what you think the experimenter wanted from you because you think that the experimenter could see your answers?

Appendix E: Questionnaire administered to subjects in the lab.

Ερωτήσεις σχετικά με το παιδί σας:

1. Ποιο είναι το βάρος του παιδιού σας (σε κιλά, χωρίς ρούχα και παπούτσια):
   _____

2. Ποιο το ύψος του παιδιού σας (σε εκατοστά, χωρίς παπούτσια):
   _____

3. Πόσο συχνά ζυγίζετε το παιδί σας;
   - □ 1 φορά την ημέρα
   - □ 5-6 φορές την εβδομάδα
   - □ 2-4 φορές την εβδομάδα
   - □ 1 φορά την εβδομάδα
   - □ 1-3 φορές τον μήνα
   - □ Λίγες φορές τον χρόνο
   - □ Ποτέ

4. Πώς αξιολογείτε το παιδί σας σε σχέση με το βάρος του;
   - □ Πολύ αδύνατο
   - □ Αδύνατο
   - □ Κανονικού βάρους
   - □ Υπέρβαρο
   - □ Παχύσαρκο

5. Ποιο πιστεύετε είναι το ιδανικό βάρος για το παιδί σας (σε κιλά): _____

6. Πόσο συχνά τρώει όλη η οικογένεια μαζί (γονείς-παιδί/παιδιά);
   - □ 1 ή και περισσότερες φορές την ημέρα
   - □ 5-6 φορές την εβδομάδα
   - □ 2-4 φορές την εβδομάδα
   - □ 1 φορά την εβδομάδα
   - □ 1-3 φορές τον μήνα
   - □ Λίγες φορές τον χρόνο
   - □ Ποτέ

7. Πόσο πολύ πιστεύετε ότι έχετε τον έλεγχο του τί καταναλώνει το(α) παιδί(ά) σας;

Καθόλου	Λίγο	Μετρίως	Αρκετά	Πολύ
1	2	3	4	5

8. Πόσο συχνά δίνετε στο(α) παιδί(ά) σας φαγητό από το σπίτι για να καταναλώσει στο σχολείο;

- □ Κάθε μέρα
- □ 3-4 φορές την εβδομάδα
- □ 1-2 φορά την εβδομάδα
- □ 1-3 φορές τον μήνα
- □ Λίγες φορές τον χρόνο
- □ Ποτέ

9. Πόσο συχνά δίνετε στο(α) παιδί(ά) σας χρήματα για να αγοράσουν τρόφιμα/σνακ από το κυλικείο του σχολείου;

- □ Κάθε μέρα
- □ 3-4 φορές την εβδομάδα
- □ 1-2 φορά την εβδομάδα
- □ 1-3 φορές τον μήνα
- □ Λίγες φορές τον χρόνο
- □ Ποτέ

10. Πόσο συχνά παίρνετε το(α) παιδί(ά) σας μαζί όταν πάτε στο σουπερ μάρκετ;

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

11. Πόσο πολύ σας επηρεάζει το(α) παιδί(ά) σας στις επιλογές τροφίμων;

Καθόλου	Λίγο	Μετρίως	Αρκετά	Πολύ
1	2	3	4	5

12. Σκοπεύετε να προχωρήσετε σε αλλαγές στην διατροφή του παιδιού σας ή/και στη σωματική του δραστηριότητα προκειμένου να διατηρεί το παιδί σας ένα υγιές βάρος;

- □ Δε σκοπεύω να το κάνω
- □ Σκέφτομαι να το κάνω, αλλά δεν είμαι σίγουρος/η
- □ Θα το κάνω άμεσα, μέσα στον επόμενο μήνα
- □ Το κάνω ήδη, για λιγότερο από 6 μήνες
- □ Το κάνω ήδη για περισσότερο από 6 μήνες

Ερωτήσεις σχετικά με το εαυτό σας:

1.Ποιο είναι το βάρος σας (σε κιλά): _____

2. Ποιο το ύψος σας (σε εκατοστά): _____

3.Πόσο συχνά ζυγίζεστε;

- □ 1 φορά την ημέρα
- □ 5-6 φορές την εβδομάδα
- □ 2-4 φορές την εβδομάδα
- □ 1 φορά την εβδομάδα
- □ 1-3 φορές τον μήνα
- □ Λίγες φορές τον χρόνο
- □ Ποτέ

4.Πως αξιολογείτε τον εαυτό σας ως προς το βάρος;

- □ Πολύ αδύνατο
- □ Αδύνατο
- □ Κανονικού βάρους
- □ Υπέρβαρο
- □ Παχύσαρκο

5.Ποιο νομίζετε είναι το ιδανικό βάρος για εσάς (σε κιλά); _____

6. Πόσο συχνά ελέγχετε τις διατροφικές πληροφορίες στις ετικέτες τροφίμων που αγοράζετε για το(α) παιδί(ά) σας;

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

7. Πόσο συχνά ελέγχετε τις διατροφικές πληροφορίες στις ετικέτες τροφίμων που αγοράζετε για το υπόλοιπο νοικοκυριό σας

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

8. Πόσο συχνά λαμβάνετε υπόψη τις τιμές όταν αγοράζετε τρόφιμα για το(α) παιδί(ά) σας;

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

9. Πόσο συχνά λαμβάνετε υπόψη τις τιμές όταν αγοράζετε τρόφιμα για το υπόλοιπο νοικοκυριό;

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

10. Ποσό ανησυχείτε για το αν η διατροφή του(ων) παιδιού(ών) σας του δίνει το ιδανικό του βάρος

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

11. Πόσο συχνά προτιμάτε τις light εκδοχές των τροφίμων όταν αγοράζετε για να καταναλωθούν από το(α) παιδί(ά) σας:

Ποτέ	Σπάνια	Μετρίως ή Μερικές φορές	Συχνά	Πάντα
1	2	3	4	5

12. Πόσο συμφωνείτε ή διαφωνείτε με την άποψη ότι η παιδική παχυσαρκία είναι ένα ανερχόμενο πρόβλημα στην Ελλάδα;

Διαφωνώ απόλυτα	Τείνω να διαφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Τείνω να συμφωνώ	Συμφωνώ απόλυτα
1	2	3	4	5

Δημογραφικά στοιχεία ερωτώμενου:

1. Παρακαλώ συμπληρώστε την ηλικία σας:

- □ <25
- □ 26-30
- □ 31-35
- □ 36-40
- □ 41-45
- □ 45-50
- □ <50 _____

2. Φύλο:

- □ Άνδρας
- □ Γυναίκα

3.Εκπαίδευση: Απόφοιτος

- □ Δημοτικού

- □ Γυμνασίου
- □ Λυκείου (ή εξατάξιου γυμνάσιου)
- □ ΙΕΚ/τεχνικής σχολής
- □ ΑΕΙ/ΑΤΕΙ
- □ Μεταπτυχιακού

4.Οικογενειακή κατάσταση:

- □ Πυρηνική οικογένεια (μητέρα/πατέρας/παιδιά)
- □ Πυρηνική οικογένεια από 2^{ο} γάμο
- □ Άγαμη/ος
- □ Διαζευγμένη/ος
- □ Χήρα/ος

5. Ποιος είναι ο αριθμός των μελών του νοικοκυριού σας (συμπεριλαμβανομένου του εαυτού σας): _____

6. Πόσα παιδιά έχετε συνολικά; _____

7.Ποιο είναι το συνολικό μηνιαίο καθαρό οικογενειακό σας εισόδημα;

- □ <750€
- □ 751-1.100€
- □ 1.101-1.450€
- □ 1.451-1.800€
- □ 1.801-2.200€
- □ 2.201-2.800€
- □ 2.801-3.500€
- □ 3.501-4.500€
- □ >4.501€

8. Ποιό από τα παρακάτω περιγράφει καλύτερα την τωρινή επαγγελματική σας κατάσταση:

- □ Πλήρους απασχόλησης (περισσότερο από 40 ώρες/εβδομάδα)
- □ Μερικής απασχόλησης
- □ Εργασία από το σπίτι
- □ Φοιτήτρια/ης
- □ Άνεργη/ος
- □ Οικοκυρικά

9. Ποιό από τα παρακάτω περιγράφει καλύτερα την τωρινή σας κατοικία:

- □ Ιδιόκτητο σπίτι
- □ Ενοικιαζόμενο σπίτι
- □ Διαμονή στο σπίτι των γονέων μου
- □ Άλλο

10. Πόσα τετραγωνικά μέτρα περίπου είναι το σπίτι που μένετε; _____

11. Σε ποια περιοχή της Αττικής διαμένετε;
    - □ Δυτικά προάστια
    - □ Ανατολικά προάστια
    - □ Νότια προάστια
    - □ Βόρεια προάστια
    - □ Κέντρο Αθήνας
    - □ Πειραιάς

12. Πώς θα αξιολογούσατε την οικονομική κατάσταση του νοικοκυριού σας.

Πολύ κακή	Κακή	Κάτω από το μέσο	Μέτρια	Πάνω από το μέσο	Καλή	Πολύ καλή
1	2	3	4	5	6	7

13. Καπνίζετε;
    - □ Ναι, καπνίζω
    - □ Όχι, δεν καπνίζω
    - □ Είμαι περιστασιακός καπνιστής
    - □ Κάπνιζα αλλά έχω σταματήσει να καπνίζω

Appendix F. Anthropometric measurement Questionnaire

Δεδομένα Μέτρησης

Ώρα μέτρησης:_____

ΓΟΝΕΑΣ

ID γονέα:_____

Βάρος (κιλά):_____

Ύψος (εκ.):_____

ΠΑΙΔΙ

Φύλο:_____

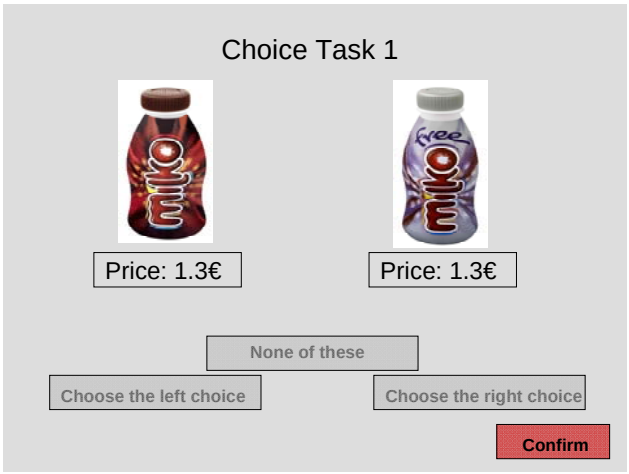
Ακριβής ημερομηνία γέννησης:_____

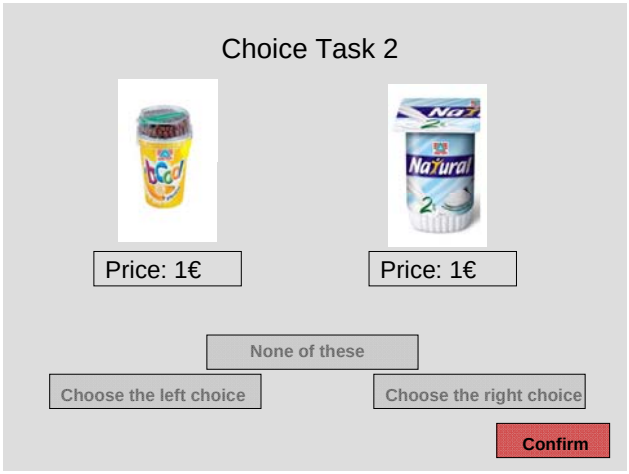
Βάρος (κιλά):_____

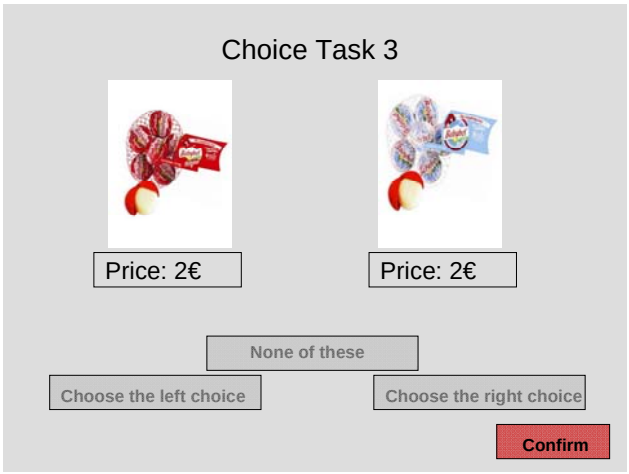
Ύψος (εκ.):_____

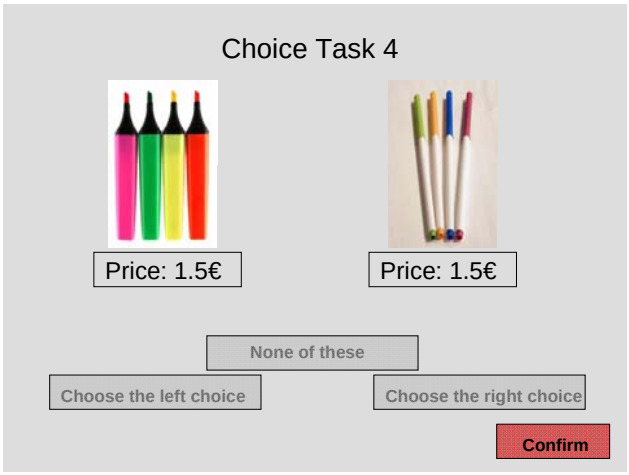
Appendix G: Example decision tasks for the market price treatment.

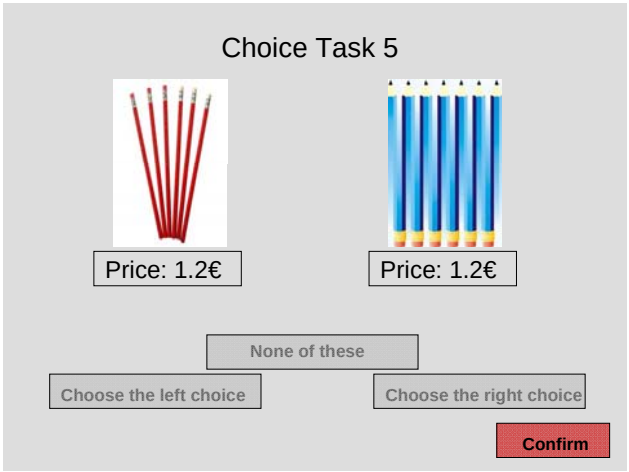
[This is an English version of the original screens that appeared in Greek for the market price treatment. Similar screens were shown for the fat tax, subsidy and both treatments with appropriate price adjustments.]








Choice Task 4
Price: 1.5€
Price: 1.5€
None of these
Choose the left choice
Choose the right choice
Confirm


Choice Task 5
Price: 1.2€
Price: 1.2€
None of these
Choose the left choice
Choose the right choice
Confirm

Appendix H: Choices when controlling for children's and parent's weight status

H1. Overall healthier and unhealthier Choices by Treatment according to kids' weight status

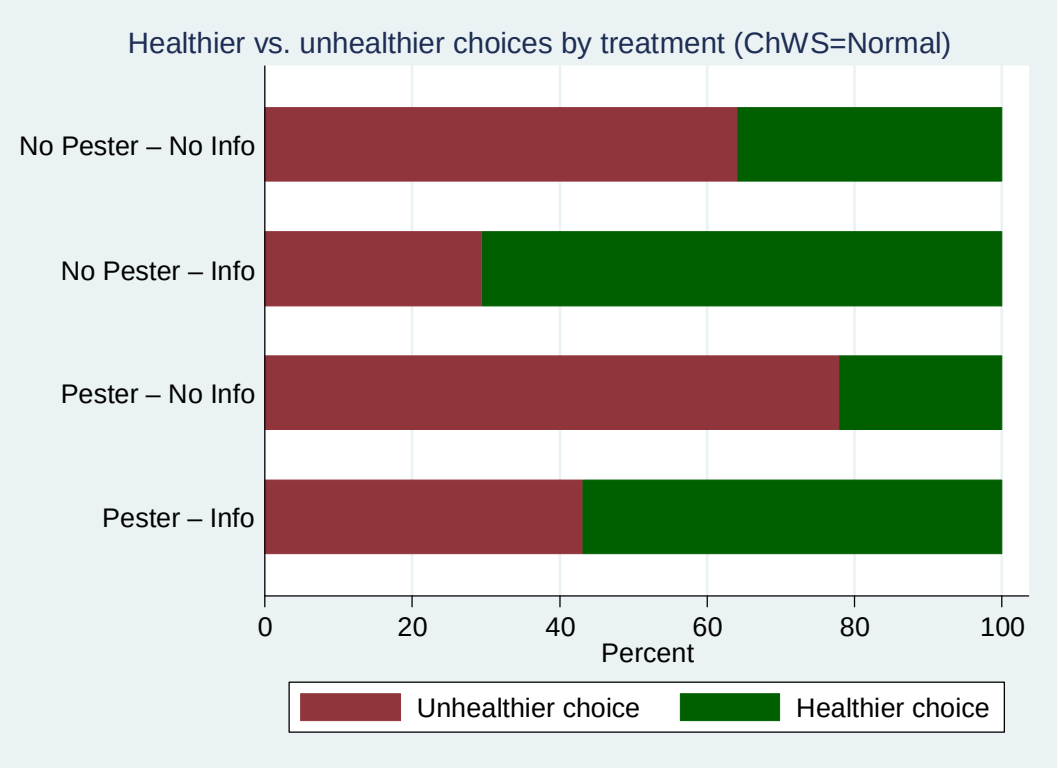


Figure H1.1. Choices by treatment for the normal weighted children subsample

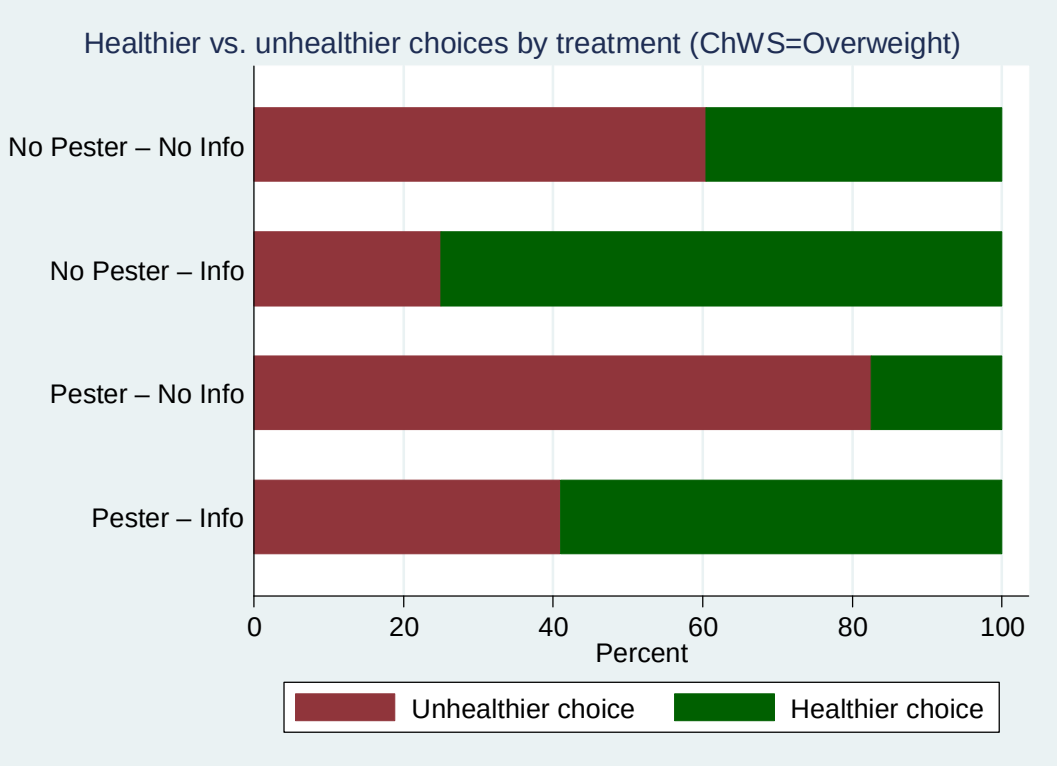


Figure H1.2. Choices by treatment for the over-weighted children subsample

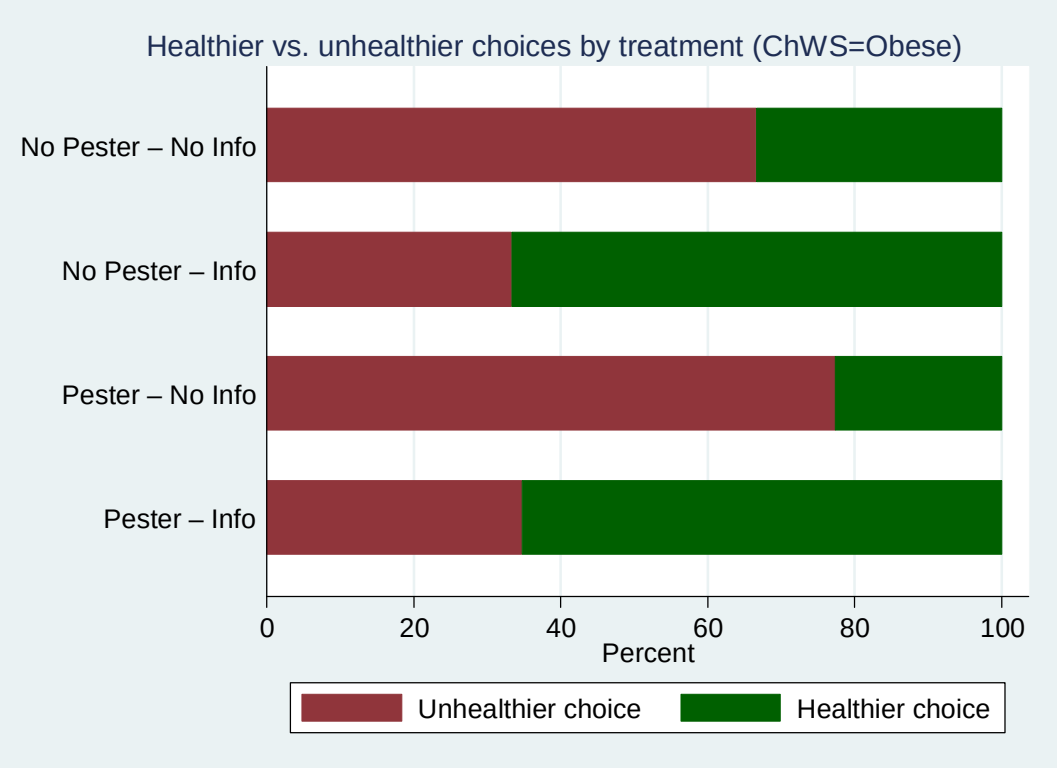


Figure H1.3. Choices by treatment for the obese children subsample

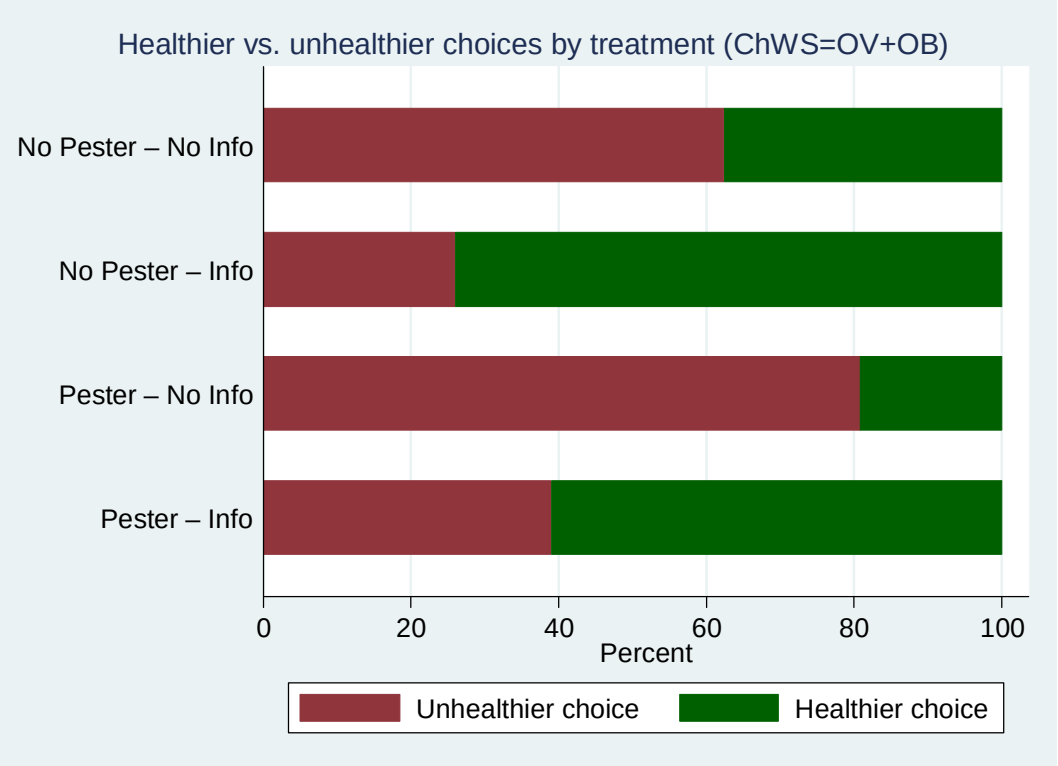


Figure H1.4. Choices by treatment for the over-weighted and obese children subsample

H2.Overall Healthier and Unhealthier Choices by Treatment according to parental weight status

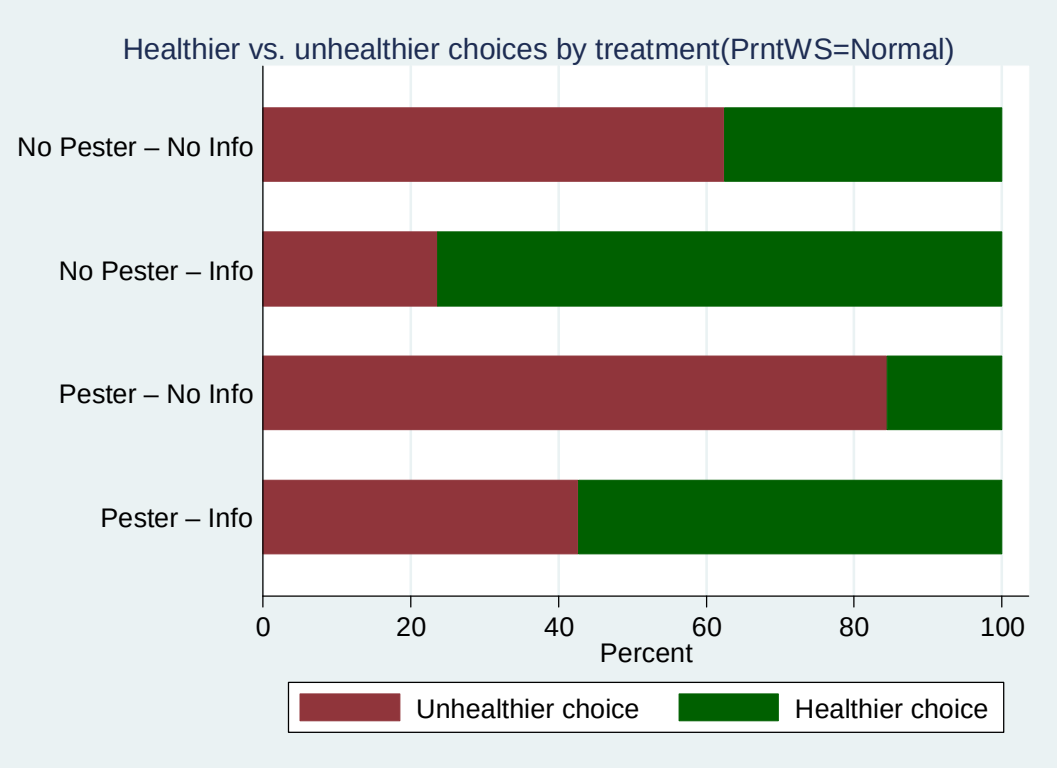


Figure H2.1. Choices by treatment for the normal weighted parent subsample

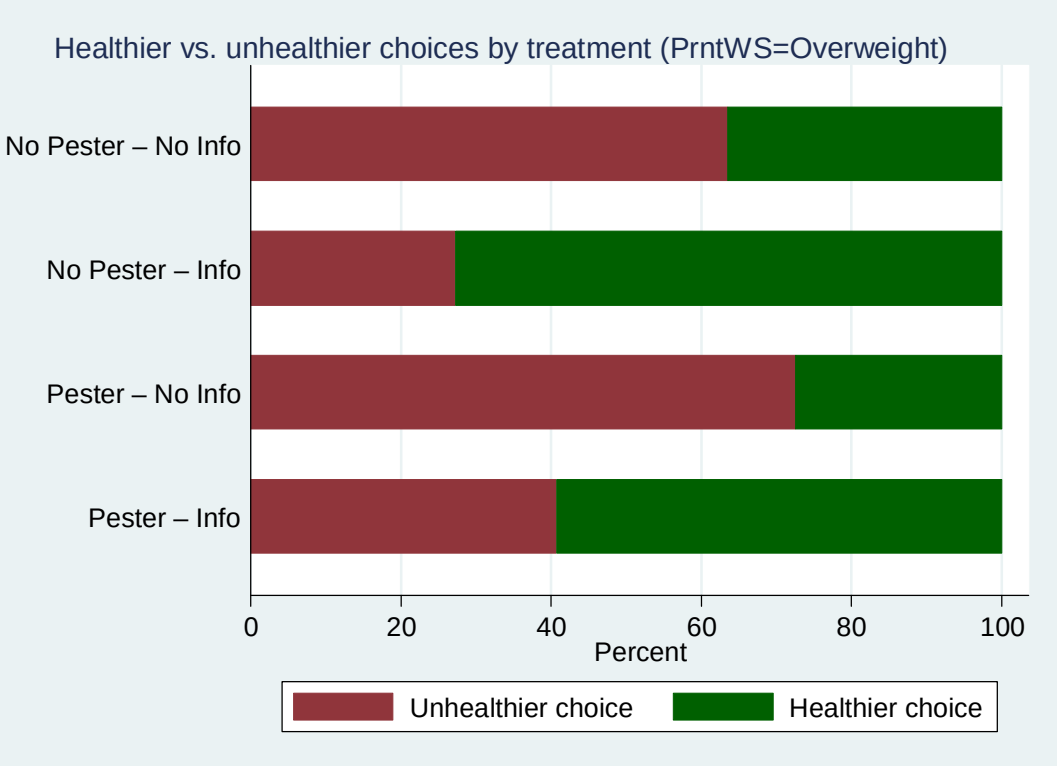


Figure H2.2. Choices by treatment for the over-weighted parent subsample

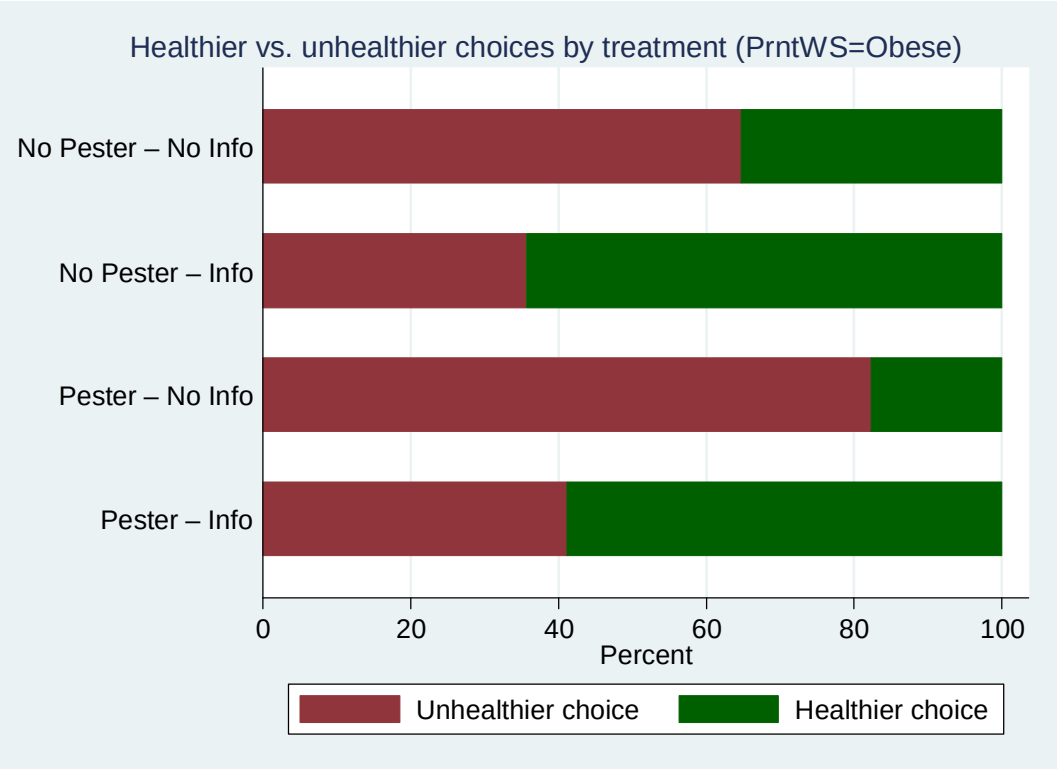


Figure H2.3. Choices by treatment for the obese parent subsample

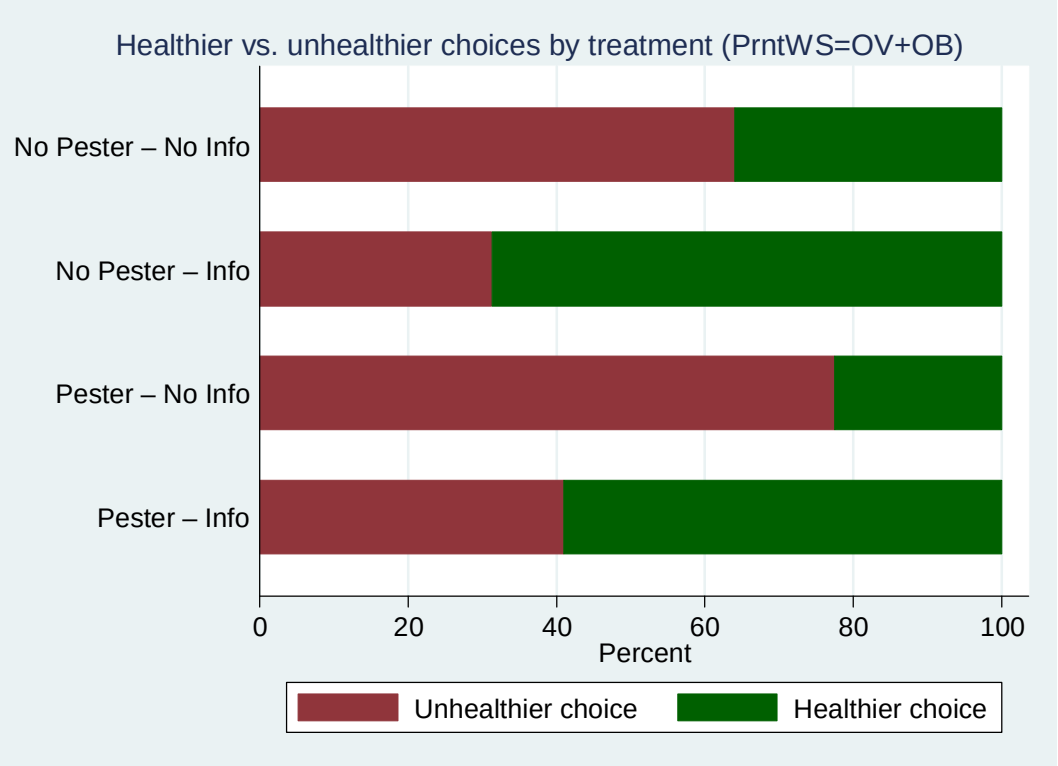


Figure H2.4. Choices by treatment for the overweight and obese parent subsample

H3.Overall Healthier and Unhealthier Choices by Treatment according to parental & kids' weight status

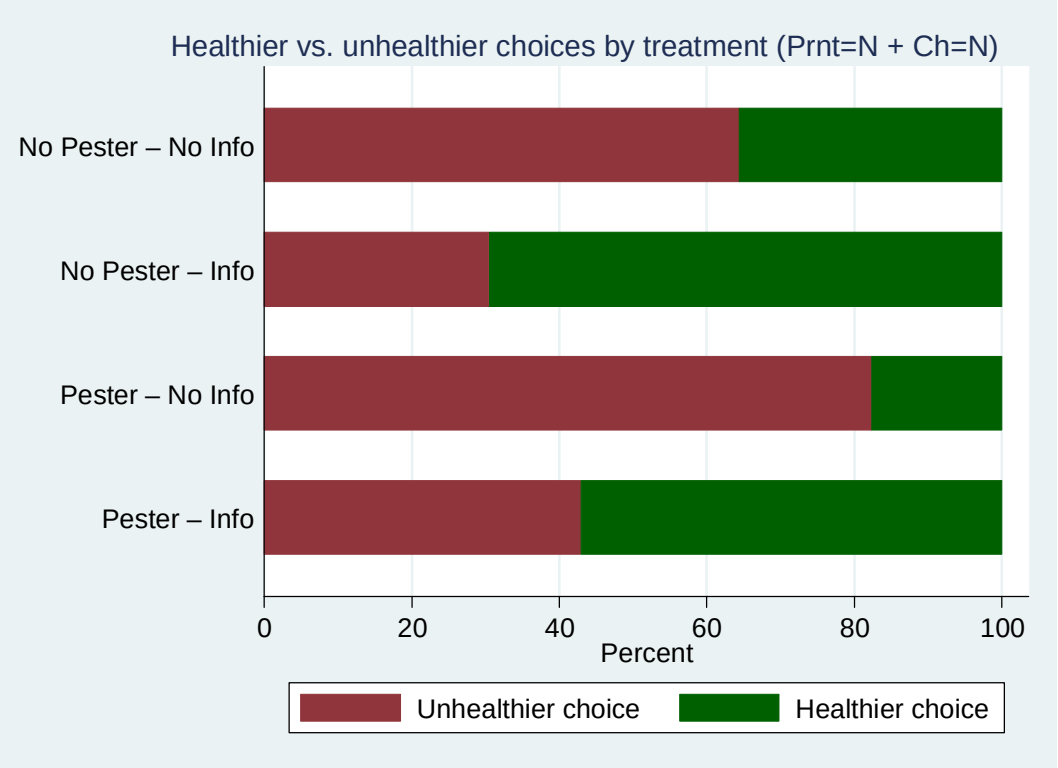


Figure H3.1. Choices by treatment for the normal weighted parent and normal weighted children subsample

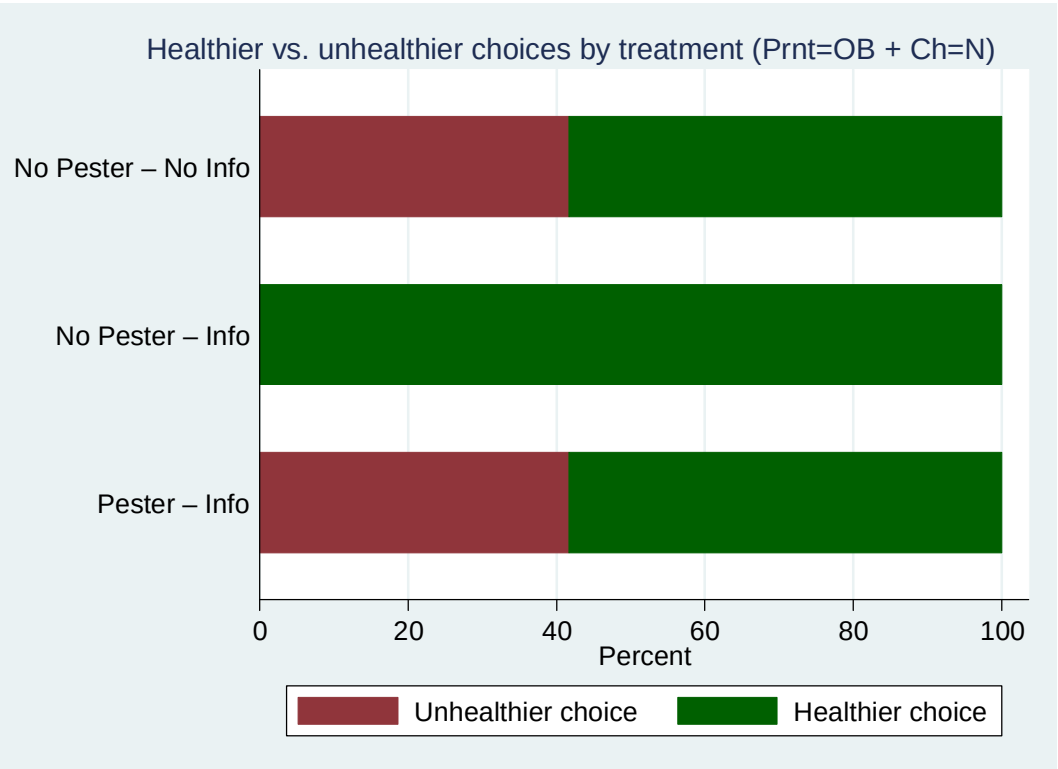


Figure H3.2. Choices by treatment for the obese parent and normal weighted children subsample (there was no family with this weight combination in the Pester – No info treatment)

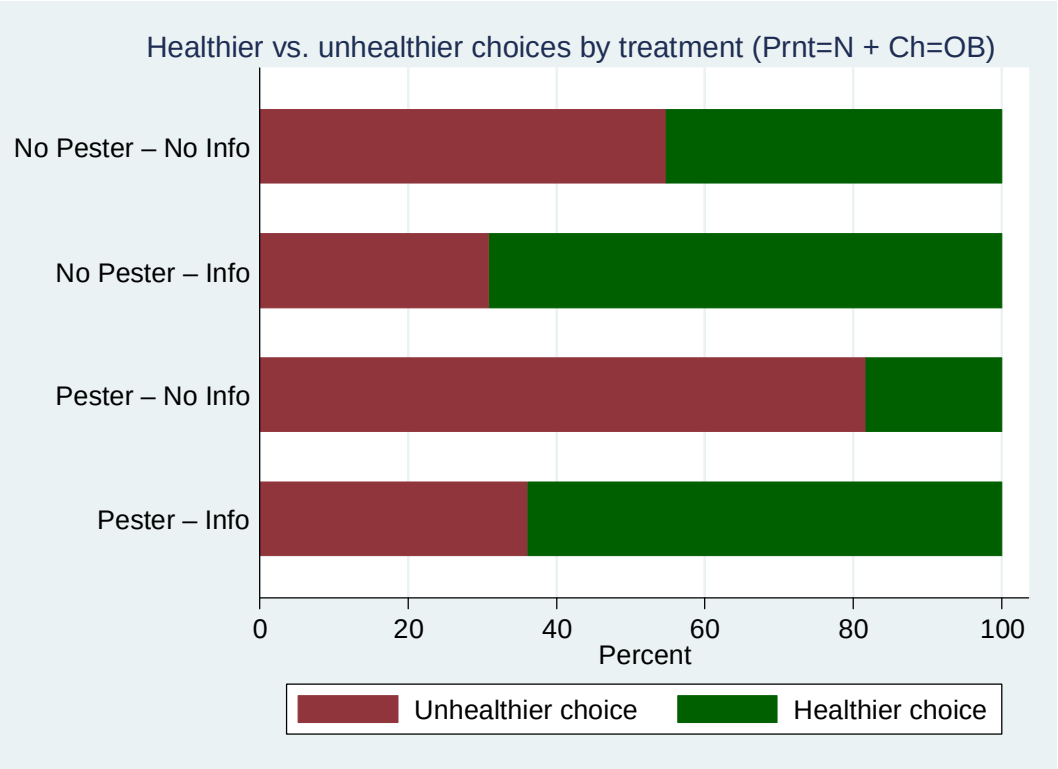


Figure H3.3. Choices by treatment for the normal weighted parent and obese children subsample

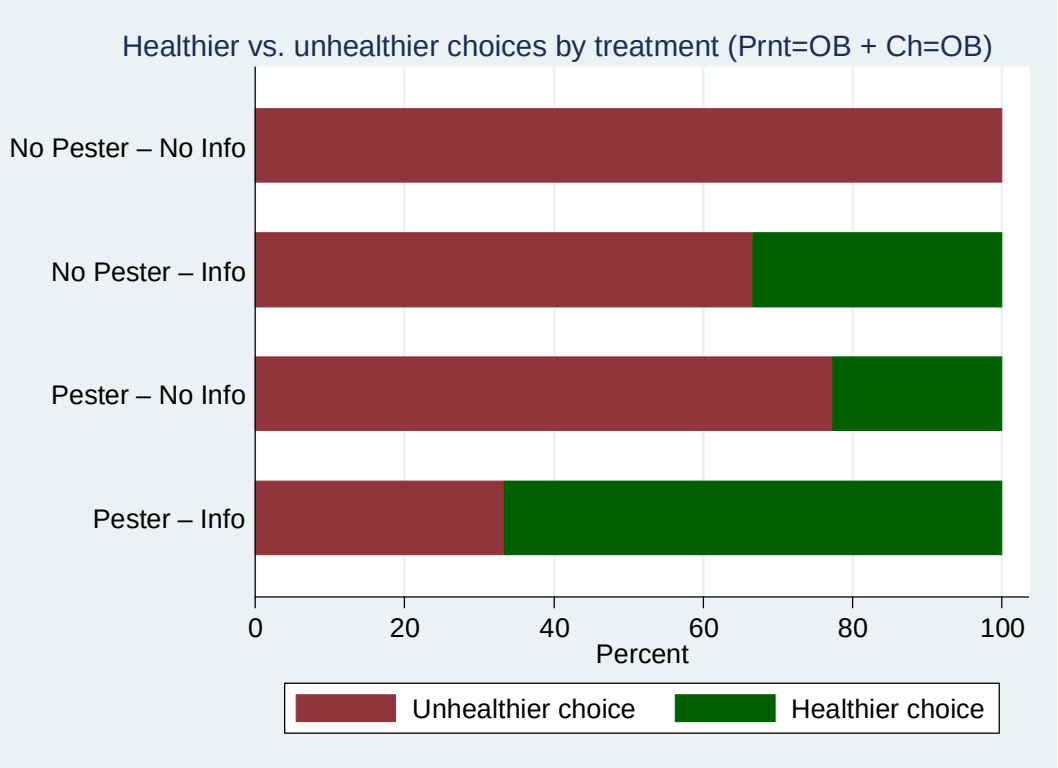


Figure H3.4. Choices by treatment for the obese parent and obese children subsample

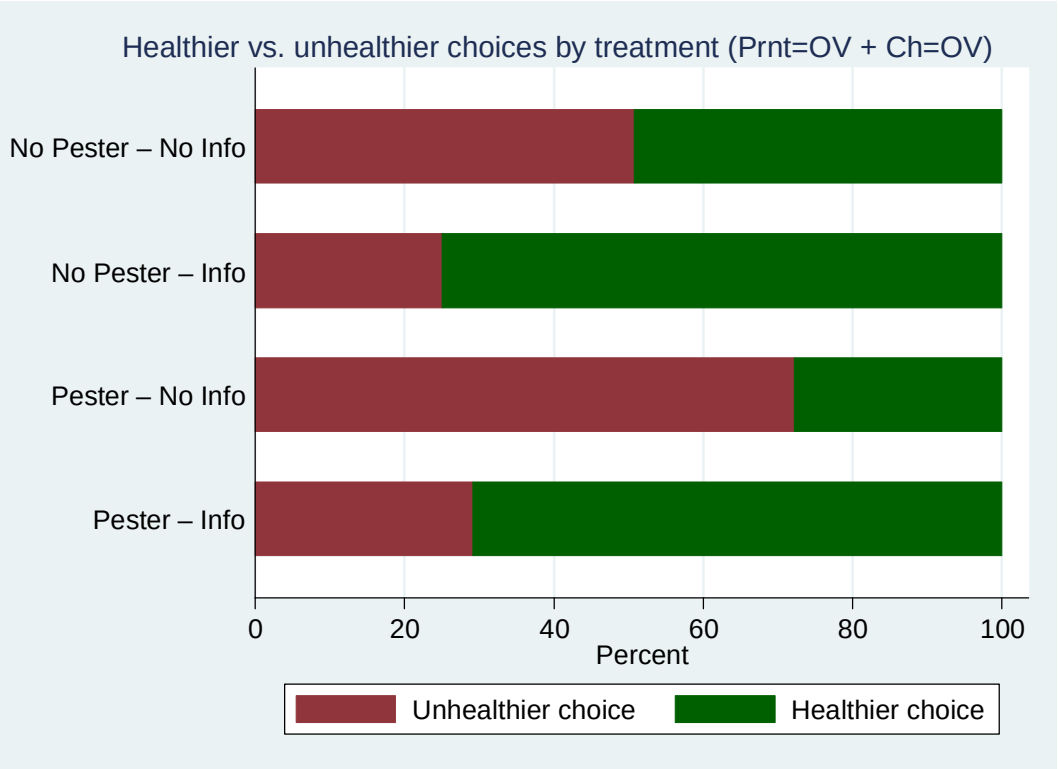


Figure H3.5. Choices by treatment for the over-weighted parent and over-weighted children subsample

H4. Combined Graph of Healthier and Unhealthier Choices by Treatment and Fiscal Policy and over Kids weight status

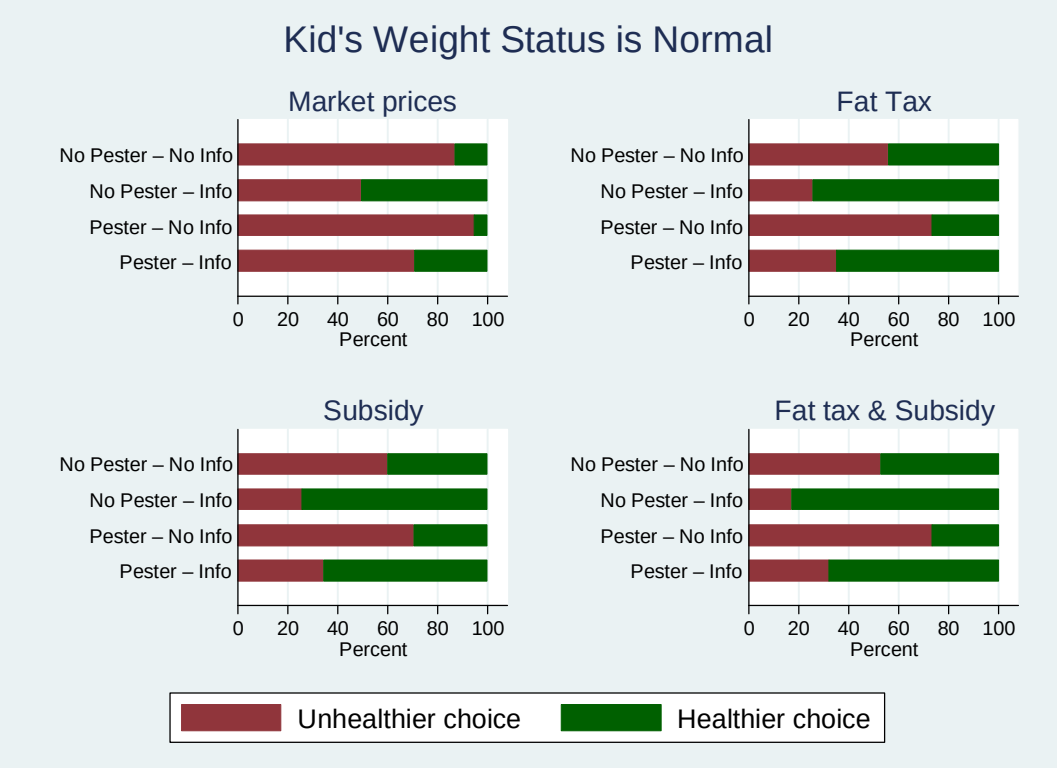


Figure H4.1. Choices by treatment and fiscal policy for the normal weighted children subsample

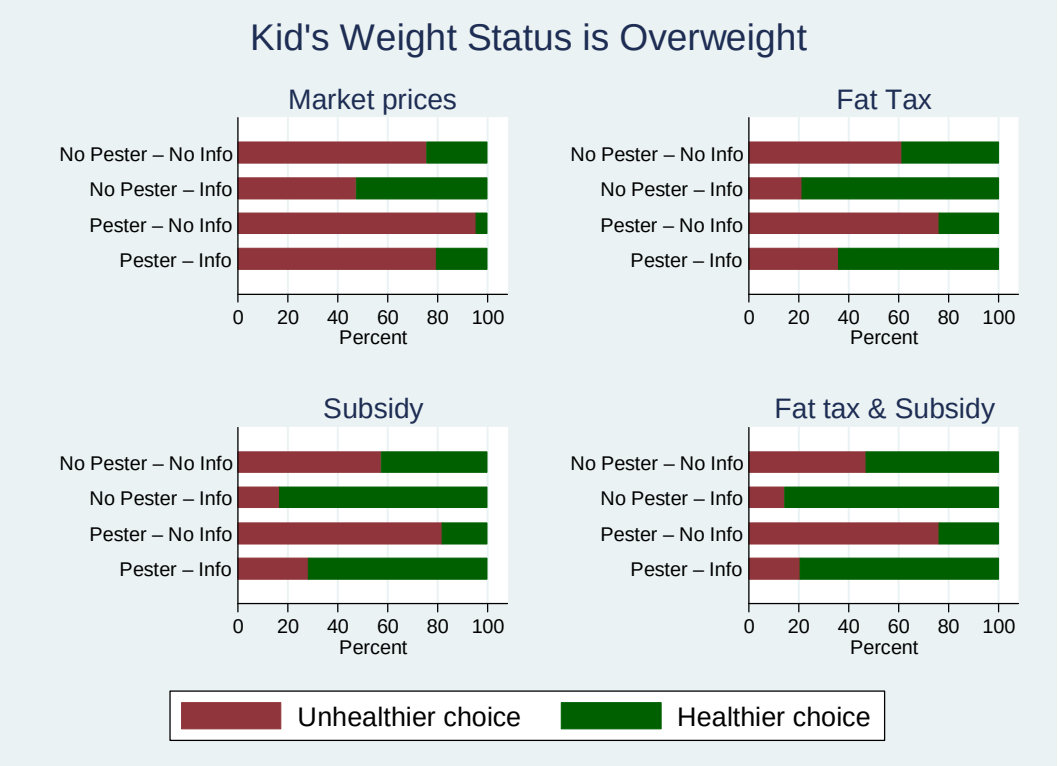


Figure H4.2. Choices by treatment and fiscal policy for the over-weighted children

subsample

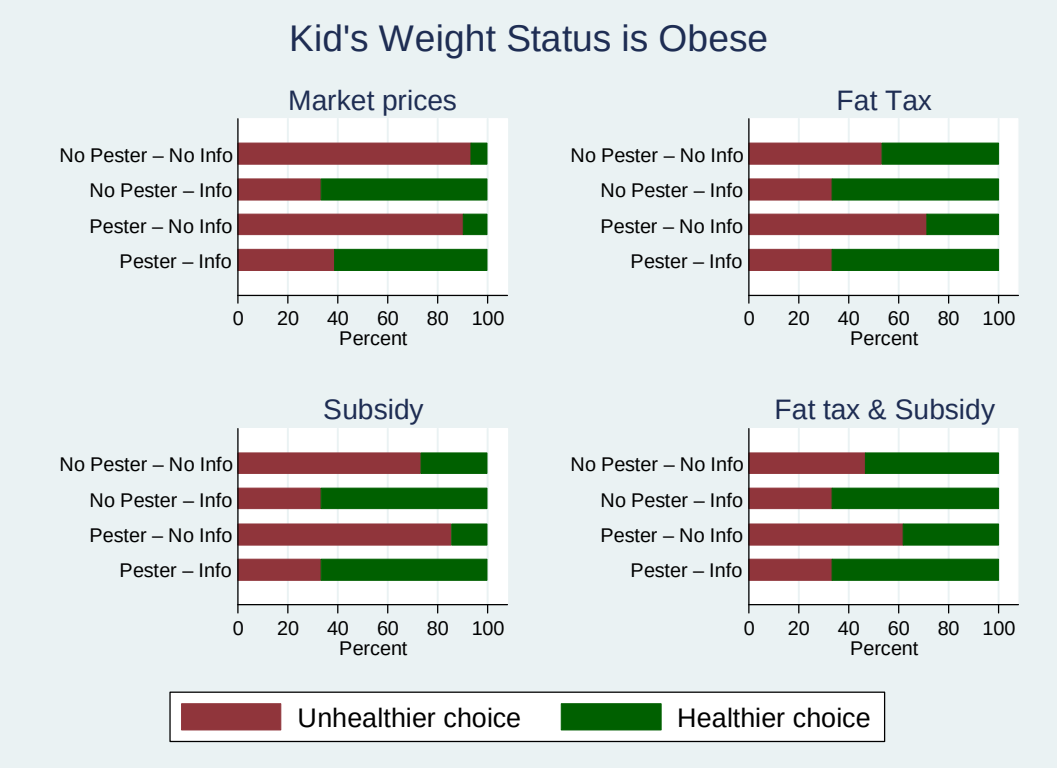


Figure H4.3. Choices by treatment and fiscal policy for the obese children subsample

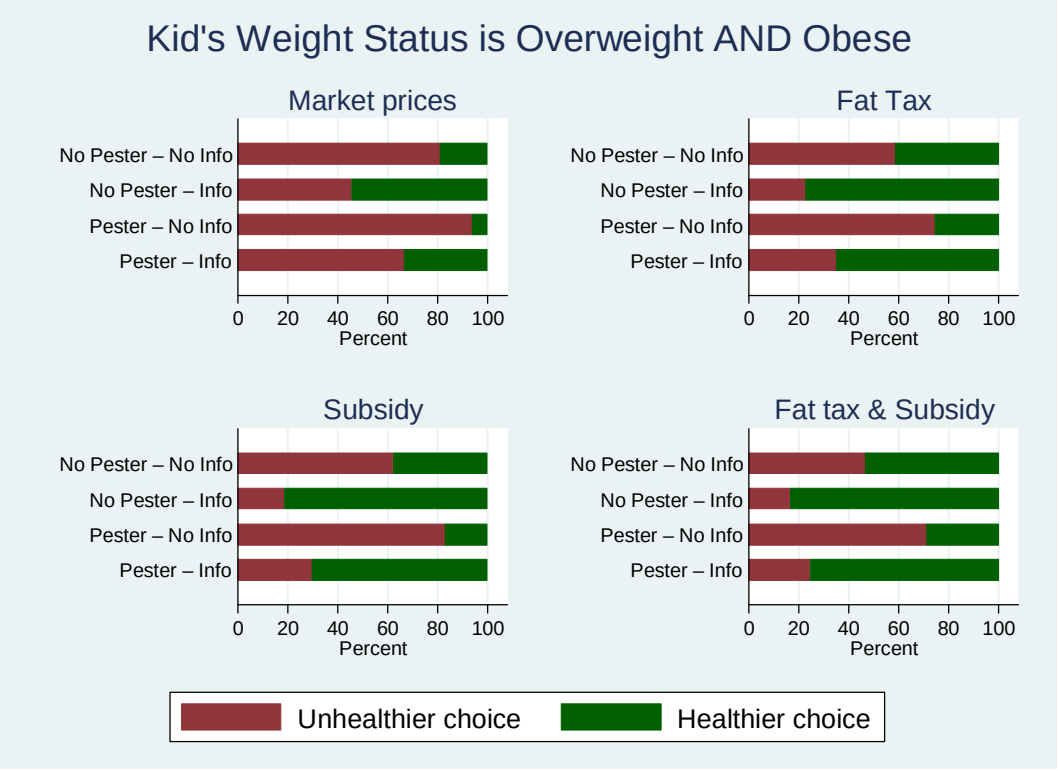


Figure H4.4. Choices by treatment and fiscal policy for the overweighted and obese children subsample

H5.Combined Healthier and Unhealthier Choices by Treatment and Fiscal Policy and over Parental weight status

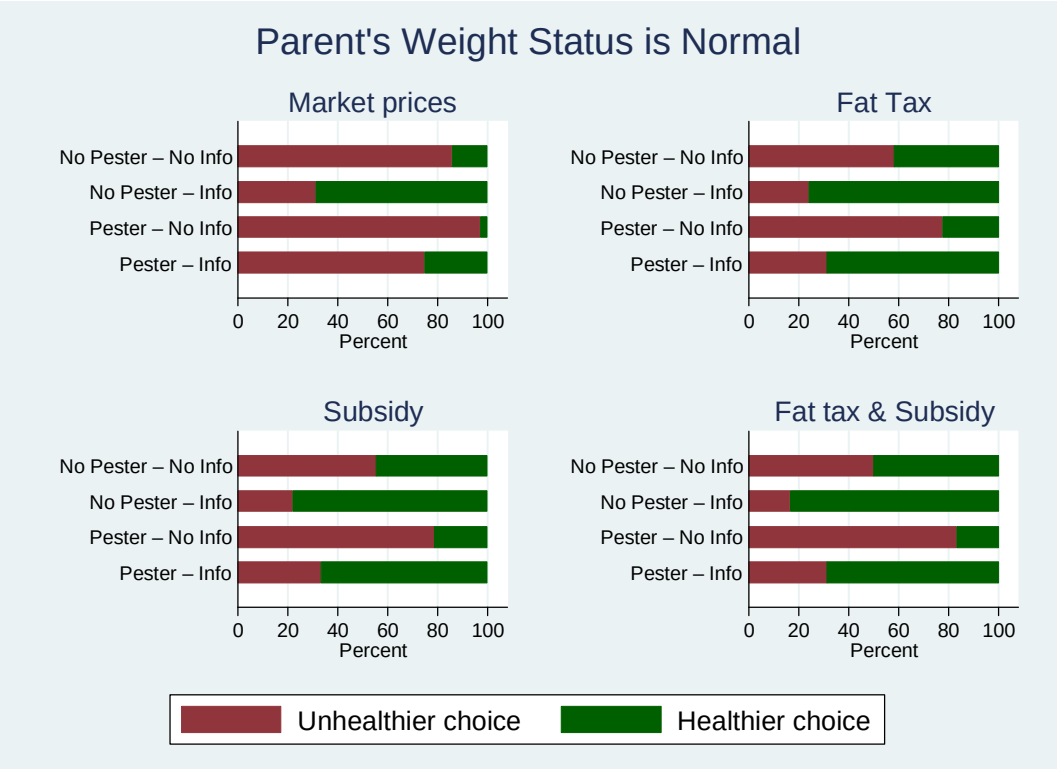


Figure H5.1. Choices by treatment and fiscal policy for the normal weighted parent subsample

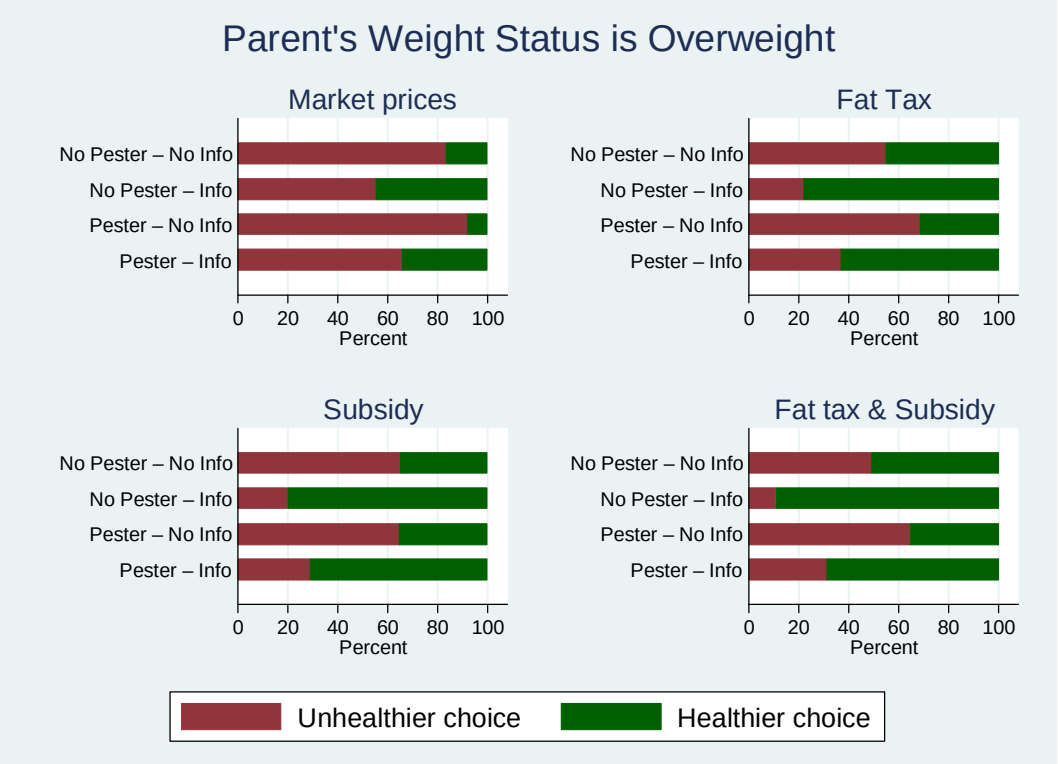


Figure H5.2. Choices by treatment and fiscal policy for the over-weighted parent subsample

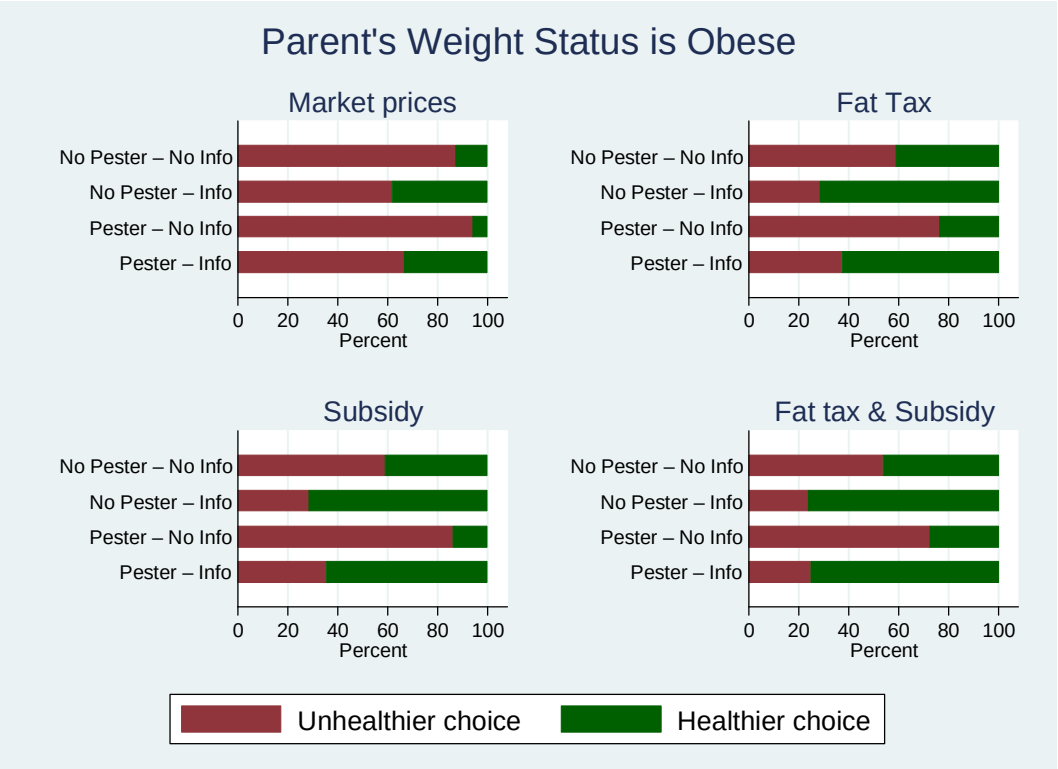


Figure H5.3. Choices by treatment and fiscal policy for the obese parent subsample

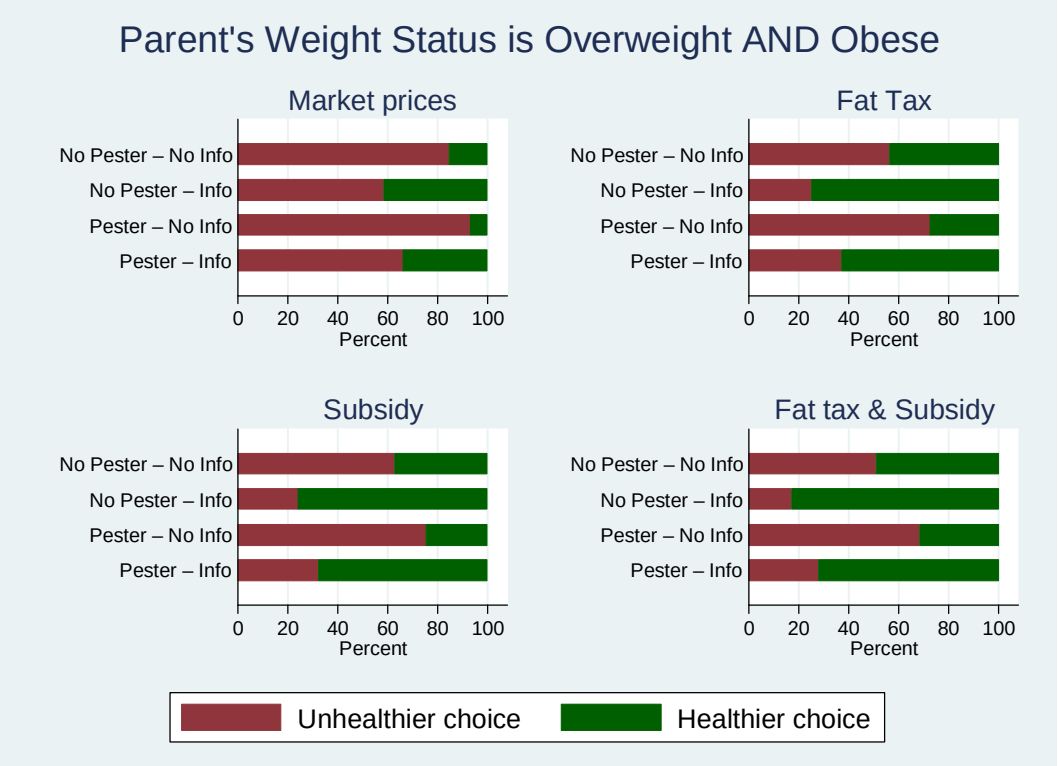


Figure H5.4. Choices by treatment and fiscal policy for the over-weighted and obese parent subsample

REFERENCES

Alemanno, A., September 3, 2012, The Future of Fat Taxes after Denmark's withdrawal of its fiscal scheme.

Alfnes, F., 2004. Stated preferences for imported and hormone-treated beef: application of a mixed logit model. European Review of Agricultural Economics 31(1), 19-37.

Alfnes, F., Guttormsen, A.G., Steine, G., Kolstad, K., 2006. Consumers' Willingness To Pay For The Color Of Salmon:A Choice Experiment With Real Economic Incentives. American Journal of Agricultural Economics 88(4), 1050-1061.

Ali, A., Crowther, N., 2009. Factors predisposing to obesity: a review of the literature. Journal of Endocrinology, Metabolism and Diabetes of South Africa 14(2), 81-84.

Alviola, P.A., Nayga, R.M., Thomsen, M., Danforth, D., Smartt, J., 2011. The Effect of Fast-Food Restaurants on School-Level Obesity, Department of Agricultural Economics and Agribusiness, University of Arkansas.

Andersen, L.F., Lillegaard, I.T.L., Øverby, N., Lytle, L., Klepp, K.-I., Johansson, L., 2005. Overweight and obesity among Norwegian schoolchildren: Changes from 1993 to 2000. Scandinavian Journal of Public Health 33(2), 99-106.

Anderson, P.M., 2010. Parental Employment, Family Routines and Childhood Obesity, Dartmouth College.

Anderson, P.M., Butcher, K.F., 2006a. Childhood obesity: trends and potential causes. The Future of Children 16(1), 19-45.

Anderson, P.M., Butcher, K.F., 2006b. Reading, Writing, and Refreshments: Are School Finances Contributing to Children's Obesity? Journal of Human Resources 41(3), 467-494.

Anderson, P.M., Butcher, K.F., Cascio, E.U., Schanzenbach, D.W., 2011. Is Being in School Better? The Impact of School on Children's BMI When Starting Age is Endogenous, National Bureau of Economic Research, Inc.

Anderson, P.M., Butcher, K.F., Levine, P.B., 2003a. Economic perspectives on childhood obesity. Economic Perspectives 27, 30-48.

Anderson, P.M., Butcher, K.F., Levine, P.B., 2003b. Maternal employment and overweight children. Journal of Health Economics 22(3), 477-504.

Anderson, P.M., Butcher, K.F., Schanzenbach, D., 2007. Childhood Disadvantage and Obesity: Is Nurture Trumping Nature?, National Bureau of Economic Research, Inc.

Andreyeva, T., Long, M.W., Brownell, K.D., 2010. The Impact of Food Prices on Consumption: A Systematic Review of Research on the Price Elasticity of Demand for Food. Am J Public Health 100(2), 216-222.

Araneo, J., 2008. The Effects of Maternal Employment on Childhood Obesity in the United States. 1083, Princeton University, Woodrow Wilson School of Public and International Affairs, Center for Research on Child Wellbeing.

Ariza, A.J., 2004. Risk Factors for Overweight in Five- to Six-Year-Old Hispanic-American Children: A Pilot Study. Journal of Urban Health: Bulletin of the New York Academy of Medicine 81(1), 150-161.

Ashraf, N., Jack, B.K., Kamenica, E., 2013. Information and subsidies: Complements or substitutes? Journal of Economic Behavior & Organization 88(C), 133-139.

Auld, M.C., 2011. Effect of large-scale social interactions on body weight. Journal of Health Economics 30(2), 303-316.

Auld, M.C., Powell, L.M., 2009. Economics of Food Energy Density and Adolescent Body Weight. Economica 76(304), 719-740.

Ayers, E.L., Gould, L.L., Oshinsky, D.M., Soderlund, J.R., 2009. American passages, A history of the United States, Volume II: since 1865. Wadsworth, Boston, MA, USA.

Bandini, L., Vu, D., Must, A., Cyr, H., Goldberg, A., Dietz, W., 1999. Comparison of high-calorie, low-nutrient-dense food consumption among obese and non-obese adolescents. Obesity Research 7(5), 438-443.

Barlow, S.E., Dietz, W.H., 1998. Obesity Evaluation and Treatment: Expert Committee Recommendations. Pediatrics 102(3), e29.

Barrett, A.M., Colosia, A.D., Boye, K.S., Oyelowo, O., 2008. Burden of Obesity: 10-Year Review of the Literature on Costs in Nine Countries. Paper presented at: ISPOR 13th Annual International Meeting, Toronto, Ontario, Canada.

Baum, C.L., Ruhm, C.J., 2009. Age, socioeconomic status and obesity growth. Journal of Health Economics 28(3), 635-648.

Beaudoin, C.E., Fernandez, C., Wall, J.L., Farley, T.A., 2007. Promoting Healthy Eating and Physical Activity: Short-Term Effects of a Mass Media Campaign. American Journal of Preventive Medicine 32(3), 217-223.

Becker, G.S., Murphy, K.M., 1988. A Theory of Rational Addiction. The Journal of Political Economy 96(4), 675-700.

Belden Russonello & Stewart Research and Communications, 2003. Americans' Attitudes Toward Walking and Creating Better Walking Communities, Washington, D.C.

Bhattacharya, J., Sood, N., 2011. Who Pays for Obesity? Journal of Economic Perspectives 25(1), 139-158.

Birch, L., 1988. Development of food acceptance patterns in the first years of life. Proceedings of the Nutrition Society 57(4), 617-624.

Black, J.L., Macinko, J., 2008. Neighborhoods and obesity. Nutrition Reviews 66(1), 2-20.

Blanchflower, D.G., Oswald, A.J., Van Landeghem, B., 2011. Imitative Obesity and Relative Utility. Journal of the European Economic Association 7(2-3), 528-538.

Bowman, S., 1999. Diets of individuals based on energy intakes from added sugars. Family Economics and Nutrition Review 12(2), 31-38.

Bray, G.A., 2004. Medical Consequences of Obesity. J Clin Endocrinol Metab 89(6), 2583-2589.

Brennan, P., McKay, J., Moore, L., Zaridze, D., Mukeria, A., Szeszenia-Dabrowska, N., Lissowska, J., Rudnai, P., Fabianova, E., Mates, D., Bencko, V., Foretova, L., Janout, V., Chow, W.-H., Rothman, N., Chabrier, A., Gaborieau, V., Timpson, N., Hung, R.J., Smith, G.D., 2009. Obesity and cancer: Mendelian randomization approach utilizing the FTO genotype. International Journal of Epidemiology 38(4), 971-975.

Bronfenbrenner, U., 1979. The Ecology of Human Development: Experiments by Nature and Design. Harvard University Press, Cambridge, MA.

Brunello, G., Fabbri, D., Fort, M., 2010. Years of Schooling, Human Capital and the Body Mass Index of European Females.

Burger, N., Lynham, J., 2010. Betting on weight loss … and losing: personal gambles as commitment mechanisms. Applied Economics Letters 17(12), 1161-1166.

Burgeson, C.R., Wechsler, H., Brener, N.D., Young, J.C., Spain, C.G., 2001. Physical education and activity: results from the School Health Policies and Programs Study 2000. Journal of School Health 71(7), 279-293.

Burke, M.A., Heiland, F., 2007. Social Dynamics of Obesity. Economic Inquiry 45(3), 571-591.

Burros, M., 2005, December 7, Federal Advisory Group Calls for Change in Food Marketing to Children. The New York Times, pp. C4.

Campbell, B.L., Nayga, R.M., Park, J.L., Silva, A., 2011. Does the National School Lunch Program Improve Children's Dietary Outcomes? American Journal of Agricultural Economics Forthcoming

Carrell, S.E., Hoekstra, M., West, J.E., 2011. Is Poor Fitness Contagious? Evidence from Randomly Assigned Friends. Journal of Public Economics 95(7-8), 657-663

Case, A., Paxson, C., 2002. Parental Behavior And Child Health. Health Affairs 21(2), 164-178.

Cawley, J., 1999. Obesity and Addiction. Ph.D dissertation Thesis, University of Chicago.

Cawley, J., 2006. Markets and Childhood Obesity Policy. The Future of Children 16(1), 69-88.

Cawley, J., 2007. The Economics of Childhood Obesity Policy. In: Z.J. Acs, A. Lyles (Eds.). Obesity, Business and Public Policy. Edward Elgar, Cheltenham, UK, 27-56.

Cawley, J., Liu, F., 2007. Maternal Employment and Childhood Obesity: A Search for Mechanisms in Time Use Data. 13600, National Bureau of Economic Research, Inc.

Cawley, J., Meyerhoefer, C., 2010. The Medical Care Costs of Obesity: An Instrumental Variables Approach, National Bureau of Economic Research, Inc.

Cawley, J., Meyerhoefer, C., Newhouse, D., 2007. The impact of state physical education requirements on youth physical activity and overweight. Health Economics 16(12), 1287-1301.

CDC, 2009. How is childhood overweight and obesity measured?

Chang, H.-H., Nayga, R.M.J., 2009. Television Viewing, Fast-Food Consumtion, and Children's Obesity. Contemporary Economic Policy 27(3), 293-307.

Chang, H.-H., Nayga, R.M.J., 2010. Childhood Obesity and Unhappiness: The Influence of Soft Drinks and Fast Food Consumption. Journal of Happiness Studies 11(3), 261-275.

Charnessa, G., Gneezyb, U., Kuhnc, M.A., 2012. Experimental methods: Between-subject and within-subject design. Journal of Economic Behavior & Organization 81(1), 1-8.

Chenoweth, D., Sugerman, S.B., 2005. The Economic Costs of Physical Inactivity, Obesity, and Overweight in California Adults: Health Care, Workers' Compensation, and Lost Productivity.

Chia, Y.F., 2008. Maternal Labour Supply and Childhood Obesity in Canada: Evidence from the NLSCY. Canadian Journal of Economics 41(1), 217-242.

Chou, S.-Y., Grossman, M., Saffer, H., 2004. An economic analysis of adult obesity: results from the Behavioral Risk Factor Surveillance System. Journal of Health Economics 23(3), 565-587.

Chou, S.-Y., Rashad, I., Grossman, M., 2008. Fast-Food Restaurant Advertising on Television and Its Influence on Childhood Obesity. The Journal of Law and Economics 51(4), 599-618.

Christakis, N.A., Fowler, J.H., 2007. The Spread of Obesity in a Large Social Network over 32 Years. New England Journal of Medicine 357(4), 370-379.

Cohen-Cole, E., Fletcher, J.M., 2008. Is obesity contagious? Social networks vs. environmental factors in the obesity epidemic. Journal of Health Economics 27(5), 1382-1387.

Cole, T., Bellizzi , M., Flegal, K., Dietz, W., 2000. Establishing a standard definition for child overweight and obesity worldwide: international survey. BMJ 320(7244), 1240-1243.

Cole, T.J., Flegal, K.M., Nicholls, D., Jackson, A.A., 2007. Body mass index cut offs to define thinness in children and adolescents: international survey. British Medical Journal 335(7612), 194-197.

Coneus, K., Goeggel, K., Muehler, G., 2009. Maternal employment and child care decision. Oxford Economic Papers 61(suppl_1), i172-i178.

Coombes, R., 2011. Trans fats: chasing a global ban. BMJ 343:d5567.

Costa-Font, J., Gil, J., 2004. Social interactions and the contemporaneous determinants of individuals' weight, FEDEA.

Courtemanche, C., 2009. Longer Hours and Larger Waistlines? The Relationship Between Work Hours and Obesity. Forum for Health Economics & Policy 12(2), article 2.

Cross-Government Obesity Unit, 2008. Healthy weight, healthy lives: a cross government strategy for England, Department of Health and Department of Children Schools and Families.

Cross-Government Obesity Unit and Department of Health and Department of Children Schools and Families, 2008. Healthy weight healthy lives: a

crossgovernment strategy for England., Available from: www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_082378?IdcService=GET_FILE&dID=163391&Rendition=Web.

Currie, J., DellaVigna, S., Moretti, E., Pathania, V., 2010. The Effect of Fast Food Restaurants on Obesity and Weight Gain. American Economic Journal: Economic Policy 2(3), 32-63.

Cutler, D.M., Glaeser, E.L., Shapiro, J.M., 2003. Why Have Americans Become More Obese? The Journal of Economic Perspectives 17(3), 93-118.

Datar, A., Nicosia, N., 2009. Junk Foods in School and Childhood Obesity Much Ado About Nothing?, Santa Monica, Calif.: RAND Corporation.

Dellinger, A.M., Staunton, C.E., 2002. Barriers to Children Walking and Biking to School—United States, 1999. Morbidity and Mortality Weekly Report 51(32), 701-704.

Dhar, T., Baylis, K., 2011. Fast-Food Consumption and the Ban on Advertising Targeting Children: The Quebec Experience. Journal of Marketing Research 48(5), 799-813.

Dickie, M., 2005. Parental Behavior and the Value of Children's Health: A Health Production Approach. Southern Economic Journal 71(4), 855-872.

Dietz, W., Robinson, T., 1998. Body mass index as a measure of adiposity among children and adolescents: a validation study. Journal of Pediatrics 132(2), 191-193.

Dockner, E.J., Feichtinger, G., 1993. Cyclical Consumption Patterns and Rational Addiction. The American Economic Review 83(1), 256-263.

Dong, D., Lin, B.-H., 2009. Fruit and vegetable consumption by low-income americans: Would a price reduction make a difference? Economic Research Report 70, U.S. Dept. of Agriculture, Economic Research Service, Washington, D.C.

Drewnowski, A., Specter, S.E., 2004. Poverty and obesity: the role of energy density and energy costs. The American Journal of Clinical Nutrition 79(1), 6-16.

Duffey, K., Popkin, B., 2011. Energy density, portion size, and eating occasions: contributions to increased energy intake in the United States, 1977-2006. PLoS Med 8(6): e1001050.

Ehrlich, I., Chuma, H., 1990. A Model of the Demand for Longevity and the Value of Life Extension. Journal of Political Economy 98(4), 761-782.

Eid, J., Overman, H.G., Puga, D., Turner, M.A., 2008. Fat city: Questioning the relationship between urban sprawl and obesity. Journal of Urban Economics 63(2), 385-404.

Epstein, L., Dearing, K., Handley, E., Roemmich, J., Paluch, R., 2006. Relationship of mother and child food purchases as a function of price: a pilot study. Appetite 47(1), 115-118.

Epstein, L., Dearing, K., Paluch, R., Roemmich, J., Cho, D., 2007. Price and maternal obesity influence purchasing of low- and high-energy-dense foods. American Journal of Clinical Nutrition 86(4), 914-922.

Epstein, L., Jankowiak, N., Nederkoorn, C., Raynor, H., French, S., Finkelstein, E., 2012. Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review. American Journal of Clinical Nutrition 95(4), 789-809.

Epstein, L.H., Dearing, K.K., Roba, L.G., Finkelstein, E.A., 2010. The influence of taxes and subsidies on energy purchased in an experimental purchasing study. Psychological Science 21(3), 406-414.

Eriksson, J.G., Forsén, T., Tuomilehto, J., Osmond, C., Barker, D.J.P., 2003. Early adiposity rebound in childhood and risk of Type 2 diabetes in adult life. Diabetologia 46(2), 190-194.

Etilé, F., 2007. Social norms, ideal body weight and food attitudes. Health Economics 16(9), 945-966.

Ewing, R., Schmid, T., Killingsworth, R., Zlot, A., Raudenbush, S., 2003. Relationship between urban sprawl and physical activity, obesity, and morbidity. American Journal of Health Promotion 18(1), 47-57.

Fast Food FACTS, 2010. Food Advertising to Children and Teens Score (FACTS) Report, available at http://www.fastfoodmarketing.org/consumers.aspx.

Fertig, A., Glomm, G., Tchernis, R., 2009. The connection between maternal employment and childhood obesity: inspecting the mechanisms. Review of Economics of the Household 7(3), 227-255.

Field, A.E., Austin, S.B., Gillman, M.W., Rosner, B., Rockett, H.R., Colditz, G.A., 2004. Snack food intake does not predict weight change among children and adolescents. International Journal of Obesity 28, 1210-1216.

Finkelstein, E.A., Trogdon, J.G., 2008. Public Health Interventions for Addressing Childhood Overweight: Analysis of the Business Case. American Journal of Public Health 98(3), 411-415.

Finkelstein, E.A., Trogdon, J.G., Cohen, J.W., Dietz, W., 2009. Annual Medical Spending Attributable To Obesity: Payer-And Service-Specific Estimates. Health Affairs 28(5), 822-831.

Finkelstein, E.A., Zhen, C., Nonnemaker, J., Todd, J.E., 2010. Impact of targeted beverage taxes on higher- and lower-income households. Archives of Internal Medicine 170(22), 2028-2034.

Fischbacher, U., 2007. z-tree: Zurich toolbox for ready-made economic experiments. Experimental Economics 10(2), 171-178.

Fletcher, J.M., Frisvold, D., Tefft, N., 2010a. Can soft drink taxes reduce population weight? Contemporary Economic Policy 28(1), 23-35.

Fletcher, J.M., Frisvold, D.E., Tefft, N., 2010b. The effects of soft drink taxes on child and adolescent consumption and weight outcomes. Journal of Public Economics 94(11-12), 967-974.

Francis, L.A., Susman, E.J., 2009. Self-regulation and Rapid Weight Gain in Children From Age 3 to 12 Years. Arch Pediatr Adolesc Med 163(4), 297-302.

Frank, L.D., Andresen, M.A., Schmid, T.L., 2004. Obesity relationships with community design, physical activity, and time spent in cars. American Journal of Preventive Medicine 27(2), 87-96.

Franks, P.W., Hanson, R.L., Knowler, W.C., Sievers, M.L., Bennett, P.H., Looker, H.C., 2010. Childhood Obesity, Other Cardiovascular Risk Factors, and Premature Death. N Engl J Med 362(6), 485-493.

Frazao, E., Allshouse, J., 2003. Strategies for Intervention: Commentary and Debate. The Journal of Nutrition 133(3), 844s-847s.

Frazao, E., Andrews, M., Smallwood, D., Prell, M., 2007. Food spending patterns of low-income households: Will increasing purchasing power result in healthier food choices? Economic Information Bulleting Number 29-4, U.S. Dept. of Agriculture, Economic Research Service, Washington D.C.

Frederick, S., Loewenstein, G., O'Donoghue, T., 2002. Time Discounting and Time Preference: A Critical Review. Journal of Economic Literature 40(2), 351-401.

French, S., A, Jeffery, R., W, Story, M., Breitlow, K., K, Baxter, J., S, Hannan, P., Snyder, M., P, 2001. Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. American Journal of Public Health 91(1), 112-117.

French, S.A., 2003. Pricing Effects on Food Choices. Journal of Nutrition 133(3), 841S-843S.

French, S.A., Jeffery, R., W, Story, M., Hannan, P., Snyder, M., P, 1997. A pricing strategy to promote low-fat snack choices through vending machines. American Journal of Public Health 87(5), 849–851.

French, S.A., Lin, B.-H., Guthrie, J.F., 2003. National trends in soft drink consumption among children and adolescents age 6 to 17 years: Prevalence, amounts, and sources, 1977/1978 to 1994/1998. Journal of the American Dietetic Association 103(10), 1326-1331.

Fuchs, V.R., 1982. Time Preference and Health: An Exploratory Study. In: V.R. Fuchs (Ed.). Economic Aspects of Health. National Bureau of Economic Research, Inc, New York, 93-120.

Furnham, A., Argyle, M., 1998. The psychology of money. Routledge, New York.

Gantz, W., Schwartz, N., Angelini, J.R., Rideout, V., Kaiser Family Foundation, 2007. Food for thought: television food advertising to children in the United States. Menlo Park, CA: Kaiser Family Foundation.

García, E., Labeaga, J.M., Ortega, C., 2006. Maternal Employment and Childhood Obesity in Spain. 2006-17, FEDEA.

Garde, A., 2008. Food Advertising and Obesity Prevention: What Role for the European Union? Journal of Consumer Policy 31(1), 25-44.

Geier, A.B., Rozin, P., Doros, G., 2006. Unit Bias: A New Heuristic That Helps Explain the Effect of Portion. Psychological Science 17(6), 521-525.

Georgiadis, G., Nassis, G., 2007. Prevalence of overweight and obesity in a national representative sample of Greek children and adolescents. European Journal of Clinical Nutrition 61(9), 1072-1074.

Giesen, J.C.A.H., Havermans, R.C., Nederkoorn, C., Jansen, A., 2012. Impulsivity in the supermarket: Responses to calorie taxes and subsidies in healthy weight undergraduates. Appetite 58(1), 6-10.

Giné, X., Karlan, D., Zinman, J., 2010. Put Your Money Where Your Butt Is: A Commitment Contract for Smoking Cessation. American Economic Journal: Applied Economics 2(4), 213-235.

Glaeser, E.L., Sacerdore, B.I., Scheinkman, J.A., 2003. The Social Multiplier. Journal of the European Economic Association, 1(2-3), 345-353.

Glaeser, E.L., Scheinkman, J.A., 2001. Non-Market Interactions, Harvard Institute of Economic Research.

Gleason, P., Briefel, R., Wilson, A., Dodd, A.H., 2009. School Meal Program Participation and Its Association with Dietary Patterns and Childhood Obesity, Mathematica Policy Research, Inc. Princeton.

Gleason, P., Suitor, C.W., 2003. Eating at School: How the National School Lunch Program Affects Children's Diets. American Journal of Agricultural Economics 85(4), 1047-1061.

Goldberg, W.A., Lucas-Thompson, R., 2009. Effects of Maternal and Paternal Employment. In: J.B. Benson, M.M. Haith (Eds.). Social and Emotional Development in Infancy and Early Childhood. Academic Press San Diego, 229-240.

Goldhaber-Fiebert, J.D., Blumenkranz, E., Garber, A.M., 2010. Committing to Exercise: Contract Design for Virtuous Habit Formation, National Bureau of Economic Research, Inc.

Goldman, D.P., Lakdawalla, D., Zheng, Y., 2011. Food Prices and the Dynamics of Body Weight. In: M. Grossman, N.H. Mocan (Eds.). Economic Aspects of Obesity. University of Chicago Press, 65 - 90.

Grossman, M., 1972. The Pure Consumption Model. In: M. Grossman (Ed.). The Demand for Health: A Theoretical and Empirical Investigation. NBER Chapters. National Bureau of Economic Research, Inc, 31-38.

Grunbaum, J.A., Kann, L., Kinchen, S., Ross, J., Hawkins, J., Lowry, R., Harris, W.A., McManus, T., Chyen, D., Collins, J., 2004. Youth Risk Behavior Surveillance - United States, 2003. Journal of School Health 74(8), 307-324.

Gutiérrez-Domènech, M., 2010. Parental employment and time with children in Spain. Review of Economics of the Household 8(3), 371-391.

Hammond, R.A., Levine, R., 2010. The economic impact of obesity in the United States. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 3, 285-295.

Hanley, N., Wright, R.E., Adamowicz, V., 1988. Using Choice Experiments to Value the Environment. Environmental and Resource Economics 11(3-4), 413-428.

Hannan, P., French, S., Story, M., Fulkerson, J., 2002. A pricing strategy to promote sales of lower fat foods in high school cafeterias: acceptability and sensitivity analysis. American Journal of Health Promotion 17(1), 1-6.

Hensher, D.A., Greene, W.H., 2003. The Mixed Logit model: The state of practice. Transportation 30(2), 133-176

Hensher, D.A., Rose, J.M., Greene, W.H., 2005. Applied Choice Analysis: A Primer. Cambridge: Cambridge University

Holt, E., 2011. Hungary to introduce broad range of fat taxes. The Lancet 378(9793), 755.

Howard, L.L., Prakash, N., 2011. Do School Lunch Subsidies Change the Dietary Patterns of Children from Low-Income Households?, Centre for Research and Analysis of Migration (CReAM), Department of Economics, University College London.

Hoyos, D., 2010. The state of the art of environmental valuation with discrete choice experiments. Ecological Economics 69(8), 1595 - 1603.

Ikeda, S., Kang, M.-I., Ohtake, F., 2009. Fat Debtors: Time Discounting, Its Anomalies, and Body Mass Index, Institute of Social and Economic Research, Osaka University.

Ikeda, S., Kang, M.-I., Ohtake, F., 2010. Hyperbolic discounting, the sign effect, and the body mass index. Journal of Health Economics 29(2), 268-284.

Jürges, H., Reinhold, S., Salm, M., 2009. Does Schooling Affect Health Behavior? Evidence from the Educational Expansion in Western Germany, Institute for the Study of Labor (IZA).

Jacobson, M., Brownell, K., 2000. Small taxes on soft drinks and snack foods to promote health. American Journal of Public Health 90(6), 854-857.

Jahns, L., Siega-Riz, A.M., Popkin, B.M., 2001. The increasing prevalence of snacking among US children from 1977 to 1996. J Pediatr. 138(4), 493-498.

Jekanowski, M., Binkley, J., Eales, J., 2001. Convenience, Accessibility, and the Demand for Fast Food. Journal of Agricultural and Resource

Economics & Human Biology 26(1), 58-74.

Jensen, J.D., Smed, S., 2012. The Danish tax on saturated fat: Short run effects on consumption and consumer prices of fats, Institute of Food and Resource Economics, University of Copenhagen, Copenhagen.

Johannesson, M., Östling, R., Ranehill, E., 2010. The Effect of Competition on Physical Activity: A Randomized Trial. The B.E. Journal of Economic Analysis & Policy 10(1), article 91.

Johnson, J.P., Myatt, D.P., 2006. On the Simple Economics of Advertising, Marketing, and Product Design. The American Economic Review 96(3), 756-784.

Johnson, R.K., Smiciklas-Wright, H., Crouter, A.C., Willits, F.K., 1992. Maternal Employment and the Quality of Young Children's Diets: Empirical Evidence Based on the 1987-1988 Nationwide Food Consumption Survey. Pediatrics 90(2), 245-249.

Jou, J., Techakehakij, W., 2012. International application of sugar-sweetened beverage (SSB) taxation in obesity reduction: factors that may influence policy effectiveness in country-specific contexts. Health Policy 107(1), 83-90.

Just, D.R., Wansink, B., Mancino, L., Guthrie, J., 2008. Behavioral Economic Concepts To Encourage Healthy Eating in School Cafeterias: Experiments and Lessons From College Students, ERS-Washington DC: U.S. Department of Agriculture.

Kahneman, D., Tversky, A., 1984. Choices, Values, and Frames. American Psychologist 39(4), 341-350.

Karayiannis, D., Yannakoulia, M., Terzidou, M., Sidossis, L.S., Kokkevi, A., 2003. Prevalence of overweight and obesity in Greek school-aged children and adolescents. European Journal of Clinical Nutrition 57(9), 1189-1192.

Kelder, S.H., Perry, C.L., Klepp, K.I., Lytle, L.L., 1994. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. American Journal of Public Health 84(7), 1121-1126.

Kenkel, D.S., 1991. Health Behavior, Health Knowledge, and Schooling. Journal of Political Economy 99(2), 287-305.

Komlos, J., Smith, P.K., Bogin, B., 2004. Obesity and the Rate of Time Preference: Is there a Connection? Journal of Biosocial Science 36(2), 209-219.

Kovacic, W.E., Harbour, P.J., Leibowitz, J., Rosch, J.T., 2008. Marketing Food to Children and Adolescents: A Review of Industry Expenditures, Activities, and Self-Regulation: A Report to Congress, Washington, DC: Federal Trade Commission.

Kragt, M.E., 2013. Evidence-based Research in Environmental Choice Experiments Working Paper 1310, School of Agricultural and Resource Economics, The University of Western Australia.

Kumanyika, S.K., 2002. Obesity in Minority Populations. In: K.D. Brownell, C.G. Fairburn (Eds.). Eating disorders and obesity: a comprehensive handbook. The Guilford Press, New York, 439-443.

Kunkel, D., 2001. Children and Television Advertising. In: D.G. Singer, J.L. Singer (Eds.). Handbook of children and the media. SAGE Publications, Inc, Thousand Oaks, CA, 375-392.

Lakdawalla, D., Philipson, T., 2002. The Growth of Obesity and Technological Change: A Theoretical and Empirical Examination, National Bureau of Economic Research, Inc.

Lakdawalla, D., Philipson, T., 2009. The growth of obesity and technological change. Economics & Human Biology 7(3), 283-293.

Lakdawalla, D., Philipson, T., Bhattacharya, J., 2005. Welfare-Enhancing Technological Change and the Growth of Obesity. American Economic Review 95(2), 253-257.

Lakdawalla, D., Philipson, T.J., 2006. Economics of obesity. In: A.M. Jones (Ed.). The Elgar companion to health economics. Edward Elgar Publishing Limited UK, 72-82.

Leicester, A., Windmeijer, F., 2004. The 'fat tax': economic incentives to reduce obesity. Briefing Note No.49, The institute for fiscal studies, London.

Levy, A., 2002. Rational eating: can it lead to overweightness or underweightness? Journal of Health Economics 21(5), 887-899.

Lewis, G., 2011. Asymmetric Information, Adverse Selection and Online Disclosure: The Case of eBay Motors The American Economic Review 101(4), 1535-1546.

Lien, N., Lytle, L., Klepp, K., 2001. Stability in Consumption of Fruit, Vegetables and Sugary Foods in a Cohort from Age 14 to Age 21. Preventive Medicine 33(3), 217-226.

Lin, B.-H., Guthrie, J., Frazao, E., 1999. Nutrient Contribution of Food Away From Home. In: E. Frazao (Ed.). America's Eating Habits: Changes and Consequences. US Department of Agriculture, Economic Research Service, Food and Rural Economics Division, Washington DC, 213-242.

Lin, B., Smith, T., Lee, J., Hall, K., 2011. Measuring weight outcomes for obesity intervention strategies: the case of a sugar-sweetened beverage tax. Economics and Human Biology. 9(4), 329-341.

List, J.A., Gallet, C.A., 2001. What experimental protocol influence disparities between actual and hypothetical stated values? Environmental and Resource Economics 20(3), 241-254

Lobstein, T., Dibb, S., 2005. Evidence of a possible link between obesogenic food advertising and child overweight. Obesity Reviews 6(3), 203-208.

Loewenstein, G., Prelec, D., 1992. Anomalies in Intertemporal Choice: Evidence and an Interpretation. The Quarterly Journal of Economics 107(2), 573-597.

Lopez, R., 2004. Urban Sprawl and Risk for Being Overweight or Obese. Am J Public Health 94(9), 1574-1579.

Lorek, S., 2011. Taxes to promote sustainable food, Sustainable Europe Research Institute, CORPUS Germany.

Loureiro, M.L., Nayga, R.M.J., 2005. International dimensions of obesity and overweight related problems: an economics perspective. American Journal of Agricultural Economics 87(5), 1147-1153.

Louviere, J., Street, D., 2000. Stated-preference methods. In: D. Hensher, K. Button (Eds.). Handbook of Transport Modelling. Elsevier, Amsterdam, 132-143.

Lusk, J.L., Schroeter, T.C., 2006. Auction bids and shopping choices. Advances in Economic Analysis & Policy 6(1), 1-39.

Maes, L., Cauwenberghe, E.V., Lippevelde, W.V., Spittaels, H., Pauw, E.D., Oppert, J.-M., Lenthe, F.J.V., Brug, J., Bourdeaudhuij, I.D., 2012. Effectiveness of workplace interventions in Europe promoting healthy eating: a systematic review. European Journal of Public Health 22(5), 677-683

Maffeis, C., 2000. Aetiology of overweight and obesity in children and adolescents. European Journal of Pediatrics 159(13), 35-44.

Maital, S., Maital, S.L., 1977. Time Preference, Delay Gratification and the Intergenerational Transmission of Economic Inequality: A Behavioral Theory of Income Distribution. In: O.C. Ashenfelter, W.E. Oates (Eds.). Essays in labor market analysis in memory of Yochanan Peter Comay. Wiley Publishing, NY, 179-199.

Mashberg, T., 1999, May 23 Childhood Obesirty Reaches Epidemic Proportions. Boston Herald, pp. 1.

Maximova, K., McGrath, J.J., Barnett, T., O'Loughlin, J., Paradis, G., Lambert, M., 2008. Do you see what I see? Weight status misperception and exposure to obesity among children and adolescents. International Journal of Obesity 32, 1008–1015.

McFadden, D., Train, K., 2000. Mixed MNL models for discrete response. Journal of Applied Econometrics 15(5), 447–470.

McGinnis, J.M., Foege, W.H., 1993. Actual causes of death in the United States. JAMA: The Journal of the American Medical Association 270(18), 2207-2212.

McInnes, M.M., Ozturk, O., 2011. Taxing Sin or Subsidizing Virtue?An Experimental Study of the Impact on Nutrition Content of Food Choices. Paper presented at: Healthy Eating In Context: The role of political, physical, economic, and social structures in nutrition, March 18, University of South Carolina, Columbia, SC.

McInnes, M.M., Shinogle, J., 2009. Physical Activity: Economic and Policy Factors, National Bureau of Economic Research, Inc.

McIntosh, A., Davis, G., Nayga, R.J., Anding, J., Torres, C., Kubena, K., Perusquia, E.Y., You, W., 2006. Parental time, role strain, and children's fat intake and obesity-related outcomes, US Department of Agriculture.

McLean-Meyinsse, P.E., 2001. An Analysis Of Nutritional Label Use In The Southern United States. Journal of Food Distribution Research 32(1), 110-114.

Mellor, J., Dolan, C., Rapoport, R., 2011. Child body mass index, obesity, and proximity to fast food restaurants. International Journal of Pediatric Obesity 6(1), 60-68.

Millimet, D.L., Tchernis, R., Husain, M., 2010. School Nutrition Programs and the Incidence of Childhood Obesity. Journal of Human Resources 45(3), 640-654.

Mischel, W., Ebbesen, E.B., 1970. Attention in delay of gratification. Journal of Personality and Social Psychology 16, 329-337.

Mischel, W., Ebbesen, E.B., Zeiss, A.R., 1972. Cognitive and attentional mechanisms in delay of gratification. Journal of Personality and Social Psychology 21, 204-218.

Mischel, W., Shoda, Y., Rodriguez, M.I., 1989. Delay of gratification in children. Science 244(4907), 933-938

Monteiro, C.A., Moura, E.C., Conde, W.L., Popkin, B.M., 2004. Socioeconomic status and obesity in adult populations of developing countries: a review. Bulletin of the World Health Organization 82(12), 940-946.

Möser, A., Chen, S., Nayga, R.M.J., 2011. The effect of maternal employment on time use of mothers and their children, Department of Agricultural Economics and Agribusiness, University of Arkansas.

Must, A., Strauss, R.S., 1999. Risks and consequences of childhood and adolescent obesity. International Journal of Obesity 23, 2-11.

Mytton, O.T., Clarke, D., Rayner, M., 2012. Taxing unhealthy food and drinks to improve health. British Medical Journal 344:e2931.

Narayan, K.M., Boyle, J.P., Thompson, T.J., Sorensen, S.W., Williamson, D.F., 2003. Lifetime risk for diabetes mellitus in the United States. JAMA 290(14), 1884-1890.

National Health Service, 2013, Milk and dairy foods, Available at http://www.nhs.uk/Livewell/Goodfood/Pages/milk-dairy-foods.aspx.

Nayga, J.R.M., 2001. Effects of Schooling on Obesity: Is Health Knowledge a Moderating Factor? Education Economics 9(2), 129-137.

Nayga, R.M., 2000a. Schooling, health knowledge and obesity. Applied Economics 32, 815- 822.

Nayga, R.M.J., 2000b. Nutrition Knowledge, Gender, and Food Label Use. Journal of Consumer Affairs 34(1), 97-112.

Nayga, R.M.J., 2008. Nutrition, obesity and health: policies and economic research challenges. European Review of Agricultural Economics 35(3), 281-302.

Nederkoorn, C., Havermans, R., Giesen, J., Jansen, A., 2011. High tax on high energy dense foods and its effects on the purchase of calories in a supermarket. An experiment. Appetite 56(3), 760-765.

New York City Department of Health and Mental Hygiene, 2008. Board of health votes to require chain restaurants to display calorie information in New York City. Available at: www.nyc.gov/html/doh/html/pr2008/pr008-08.shtml, Accessed November 7, 2013.

Newman, C., Guthrie, J., Mancino, L., Ralston, K., Musiker, M., 2009. Meeting Total Fat Requirements for School Lunches: Influences of School Policies and Characteristics, ERS-Washington DC: U.S. Department of Agriculture.

Ni Mhurchu, C., Blakely, T., Jiang, Y., Eyles, H.C., Rodgers, A., 2000. Effects of price discounts and tailored nutrition education on supermarket purchases: a randomized controlled trial. American Journal of Clinical Nutrition 91(3), 736-747.

Nielsen, S.J., Popkin, B.M., 2003. Patterns and trends in food portion sizes, 1977-1998. Journal of the American Medical Association 289(4), 450-453.

O'Donoghue, T., Rabin, M., 2002. Addiction and Present-Biased Preferences, Center for Analytic Economics, Cornell University.

O'Toole, T.P., Anderson, S., Miller, C., Guthrie, J., 2007. Nutrition Services and Foods and Beverages Available at School: Results From the School Health Policies and Programs Study 2006. Journal of School Health 77(8), 500-521.

Oates, C., Blades, M., Gunter, B., 2002. Children and television advertising: When do they understand persuasive intent? Journal of Consumer Behaviour 1(3), 238-245.

OECD, 2010. Health at a Glance: Europe 2010. OECD Publishing.

OECD, 2012. http://www.oecd.org/health/49716427.pdf

Ogden, C., Carroll, M., 2010. Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2007-2008.

Ogden, C., Carroll, M., Curtin, L., Lamb, M., Flegal, K., 2010. Prevalence of high body mass index in U.S. children and adolescents, 2007-2008. Journal of the American Medical Association 303(3), 242-249.

Ogden, C., Carroll, M., Kit, B., Flegal, K., 2012. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. Journal of the American Medical Association 307(5), 483-490.

Olesen, I., Alfnes, F., Røra, M.B., Kolstad, K., 2010. Eliciting consumers' willingness to pay for organic and welfare-labelled salmon in a non-hypothetical choice experiment. Livestock Science 127(2), 218-226.

Papoutsi, G., Nayga, R., Lazaridis, P., Drichoutis, A., 2013. Nudging parental health behavior with and without children's pestering power: Fat tax, subsidy or both? MPRA Paper No. 52324, University Library of Munich, Germany.

Paxton, H.L., 2005. The effects of childhood obesity on self-esteem. Thesis for the degree of Education Specialist School Psychology Thesis, Marshall University.

PCRM, 2010. The Five Most Unhealthful Fast-Food Kids Meals.

Philipson, T., Posner, R.A., 2008. Is the obesity epidemic a public health problem? A decade of research on the economics of obesity, National Bureau of Economic Research, Inc.

Philipson, T.J., Posner, R.A., 1999. The Long-Run Growth in Obesity as a Function of Technological Change, National Bureau of Economic Research, Inc.

Phillips, S.M., Bandini, L.G., Naumova, E.N., Cyr, H., Colclough, S., Dietz, W.H., Must, A., 2004. Energy-Dense Snack Food Intake in Adolescence: Longitudinal Relationship to Weight and Fatness. Obesity 12(3), 461-472.

Pieroni, L., Lanari, D., Salmasi, L., 2010. Food Prices and Overweight Patterns in Italy, Economics and Econometrics Research Institute (EERI), Brussels.

Pieroni, L., Lanari, D., Salmasi, L., 2013. Food Prices and Overweight Patterns in Italy. The European Journal of Health Economics 14(1), 133-151.

Plantinga, A.J., Bernell, S., 2007. The Association between Urban Sprawl and Obesity: Is it a Two-Way Street? . Journal of Regional Science 47(5), 857-879.

Poti, J.M., Popkin, B.M., 2011. Trends in Energy Intake among US Children by Eating Location and Food Source, 1977-2006. Journal of the American Dietetic Association 111(8), 1156-1164.

Powell, L.M., 2009. Fast food costs and adolescent body mass index: Evidence from panel data. Journal of Health Economics 28(5), 963-970.

Powell, L.M., Bao, Y., 2009. Food prices, access to food outlets and child weight. Economics and Human Biology 7, 64–72.

Powell, L.M., Chaloupka, F., 2009. Food prices and obesity: evidence and policy implications for taxes and subsidies. Milbank Quarterly 87(1), 229–257.

Power, C., Lake, J.K., Cole, T.J., 1997. Measurement and long-term health risks of child and adolescent fatness. International Journal of Obesity 21(7), 507-526.

Priya, P., Baisya, R.K., Sharma, S., 2010. Television advertisements and children's buying behaviour. Marketing Intelligence & Planning 28(2), 151-169.

Putnam, J., Gerrior, S., 1999. Trends in the U.S. food supply. In: E. Frazao (Ed.). America's Eating Habits: Changes and Consequences. U.S. Department of Agriculture, Economic Research Service, Washington, D.C., 133-159.

Rashad, I., 2006. Structural estimation of caloric intake, exercise, smoking, and obesity. The Quarterly Review of Economics and Finance 46(2), 268-283.

Reeves, G.M., Postolache, T.T., Snitker, S., 2008. Childhood Obesity and Depression: Connection between these Growing Problems in Growing Children. International Journal of Child Health and Human Development 1(2), 103-114.

Reger, B., Wootan, M., Booth-Butterfield, S., 1999. Using mass media to promote healthy eating: a community-based demonstration project. Preventive Medicine 29(5), 414–421.

Resnicow, K., Smith, M., Baranowski, T., Baranowski, J., Vaughan, R., Davis, M., 1988. 2-year tracking of children's fruit and vegetable intake. Journal of the American Dietetic Association 98(7), 785-789.

Richards, T.J., Patterson, P.M., Tegene, A., 2007. Obesity And Nutrient Consumption: A Rational Addiction? Contemporary Economic Policy 25(3), 309-324.

Robbins, J., 2006, Technology and the Gene for Minimizing Effort. the IEEE International Symposium on Technology and Society (ISTAS) 2006.Queens, NY. IEEECatalog Number 06CH37814C. ISBN 1-4244-0479-7.

Rolls, B., Engel, D., Birch, L., 2000. Serving Portion Size Influences 5-Year-Old but Not 3-Year-Old Children's Food Intake. Journal of American Dietetic Association 100, 232-234.

Rolls, B.J., Morris, E.L., Roe, L.S., 2002. Portion size of food affects energy intake in normal-weight and overweight men and women. American Journal of Clinical Nutrition 76(6), 1207-1213.

Ruhm, C., 2005. Maternal Employment and Adolescent Development, Institute for the Study of Labor (IZA).

Sallis, J.F., Glanz, K., 2006. The Role of Built Environments in Physical Activity, Eating, and Obesity in Childhood. The Future of Children 16(1), 89-108.

Salois, M., Tiffin, R., 2011. The Impacts of Fat Taxes and Thin Subsidies on Nutrient Intakes. Paper presented at: 85th Annual Conference of the Agricultural Economics Society, April 18-20, Warwick University, Coventry, UK.

Salois, M.J., Tiffin, R., 2010. The health effects of a fiscal food policy. Paper presented at: 115th Joint European Association of Agricultural Economists/Agricultural & Applied Economics Association Seminar, September 15-17, Freising-Weihenstephan, Germany.

Schanzenbach, D.W., 2009. Do School Lunches Contribute to Childhood Obesity? Journal of Human Resources 44(3), 684-709.

Scharff, R.L., 2009. Obesity and Hyperbolic Discounting: Evidence and Implications. Journal of Consumer Policy 32(1), 3-21.

Schroeter, C., Lusk, J., Tyner, W., 2008. Determining the impact of food price and income changes on body weight. Journal of Health Economics 27(1), 45-68.

Seeyave, D.M., Coleman, S., Appugliese, D., Corwyn, R.F., Bradley, R.H., Davidson, N.S., Kaciroti, N., Lumeng, J.C., 2009. Ability to Delay Gratification at Age 4 Years and Risk of Overweight at Age 11 Years. Arch Pediatr Adolesc Med 163(4), 303-308.

Shapiro, J.M., 2005. Is there a daily discount rate? Evidence from the food stamp nutrition cycle. Journal of Public Economics 89(2-3), 303-325.

Singer, M.R., Moore, L.L., Garrahie, E.J., Ellison, R.C., 1995. The tracking of nutrient intake in young children: the Framingham Children's Study. American Journal of Public Health 85(12), 1673-1677.

Smed, S., 2012. Financial penalties on foods: the fat tax in Denmark. Nutrition Bulletin 37(2), 142–147.

Smed, S., Robertson, A., 2012. Are taxes on fatty foods having their desired effects on health? BMJ 345:e6885.

Smith, P.K., Bogin, B., Bishai, D., 2005. Are time preference and body mass index associated? Evidence from the National Longitudinal Survey of Youth. Economics and Human Biology 3(2), 259-270.

Smith, T., Lin, B.-H., Lee, J.-Y., 2010. Taxing Caloric Sweetened Beverages: Potential Effects on Beverage Consumption, Calorie Intake, and Obesity. Economic Research Report 100, United States Department of Agriculture, Economic Research Service.

Smith, V.L., 2008. Experimental methods in economics. In: S.N. Durlauf, L.E. Blume (Eds.). The New Palgrave Dictionary of Economics, Second Edition. Palgrave Macmillan.

Stafford, N., 2012. Denmark cancels "fat tax" and shelves "sugar tax" because of threat of job losses. BMJ 345:e7889.

Story, M., French, S., 2004. Food Advertising and Marketing Directed at Children and Adolescents in the US. International Journal of Behavioral Nutrition and Physical Activity 1, 3.

Strauss, R.S., 2000. Childhood Obesity and Self-Esteem. Pediatrics 105(1), e15-e20.

Strazdins, L., Korda, R.J., Lim, L.Y., Broom, D.H., D'Souza, R.M., 2004. Around-the-clock: Parent work schedules and children's well-being in a 24-h economy. Social Science and Medicine 59(7), 1517-1527.

Sturm, R., Datar, A., 2005. Body mass index in elementary school children, metropolitan area food prices and food outlet density. Public Health 119(12), 1059-1068.

Sturm, R., Datar, A., 2011. Regional price differences and food consumption frequency among elementary school children. Public Health 125(3), 136-141.

Stutts, M.A., Zank, G.M., Smith, K.H., Williams, S.A., 2011. Nutrition Information and Children's Fast Food Menu Choices. Journal of Consumer Affairs 45(1), 52–86.

Tadelis, S., Zettelmeyer, F., 2011. Information Disclosure as a Matching Mechanism: Theory and Evidence from a Field Experiment. Working papers SSRN: http://ssrn.com/abstract=1872465.

Tan, C.C., Holub, S.C., 2011. Children's Self-Regulation in Eating: Associations with Inhibitory Control and Parents' Feeding Behavior. Journal of Pediatric Psychology 36(3), 340-345.

Thaler, R., 1981. Some empirical evidence on dynamic inconsistency. Economics Letters 8(3), 201-207.

The European Food Information Council (EUFIC), 2005. The Determinants of Food Choice. EUFIC Review 04/2005, EUFIC.

Thompson, S., Corwin, S., Sargent, R., 1997. Ideal body size beliefs and weight concerns of fourth-grade children. International Journal of Eating Disorders. 21(3), 279-284.

Thow, A., Jan, S., Leeder, S., Swinburn, B., 2010. The effect of fiscal policy on diet, obesity and chronic disease: a systematic review. Bulletin of the World Health Organization 88(8), 609-614.

Train, K., 2003. Discrete Choice Methods with Simulation Cambridge: Cambridge University Press.

Trogdon, J.G., Finkelstein, E.A., Hylands, T., Dellea, P.S., Kamal-Bahl, S.J., 2008. Indirect costs of obesity: a review of the current literature. Obesity Reviews 9(5), 489-500.

Troiano, R.P., Briefel, R.R., Carroll, M.D., Bialostosky, K., 2000. Energy and fat intakes of children and adolescents in the United States: data from the National Health and Nutrition Examination Surveys. The American Journal of Clinical Nutrition 72(5), 1343-1353.

Variyam, J.N., Shim, Y., Blaylock, J., 2001. Consumer misperceptions of diet quality. Journal of Nutrition Education 33(6), 314-321.

Veugelers, P.J., Fitzgerald, A.L., 2005. Effectiveness of School Programs in Preventing Childhood Obesity: A Multilevel Comparison. American Journal of Public Health 95(3), 432-435.

von Hinke Kessler Scholder, S., 2008. Maternal employment and overweight children: does timing matter? Health Economics 17(8), 889-906.

Wansink, B., 2004. Environmental factors that increase the food intake and consumption volume of unknowing consumers. Annual Review of Nutrition 24, 455-479.

Waterlander, W., de Haas, W., van Amstel, I., Schuit, A., Twisk, J., Visser, M., Seidell, J., Steenhuis, I., 2010. Energy density, energy costs and income - how are they related? Public Health Nutrition 13(10), 1599-1608.

Waterlander, W., Steenhuis, I., De Boer, M., Schuit, A., Seidel, K.D., 2012a. Introducing taxes, subsidies or both: The effects of various food pricing strategies in a web-based supermarket randomized trial. Preventive Medicine 54(5), 323–330.

Waterlander, W., Steenhuis, I., de Boer, M., Schuit, A., Seidell, J., 2012b. The effects of a 25% discount on fruits and vegetables: results of a randomized trial in a three-dimensional web-based supermarket. International Journal of Behavioral Nutrition and Physical Activity 9(11).

Wendt, M., Todd, J.E., 2010. Do low prices for sugar-sweetened beverages increase children's weight? Paper presented at: Selected poster at the AAEA, CAES, & WAEA joint Annual Meeting, Denver, Colo, July 25-27.

WHO, 1995. Physical Status: The use and interpretation of anthropometry. Technical Report Series No. 854, Geneva.

WHO, 2000. Obesity: preventing and managing the global epidemic.

WHO, Geneva,15–17 December 2009. Population-based prevention strategies for childhood obesity, Geneva.

Williams, J., Wake, M., Hesketh, K., Maher, E., Waters, E., 2005. Health-related quality of life of overweight and obese children. The Journal of The American Medical Association 293(1), 70-76.

Wooten, M.G., 2003. Pestering Parents: How Food Companies Market Obesity to Children. Social Policy Report 20(2), 3-17.

Yen, I.H., Kaplan, G.A., 1998. Poverty area residence and changes in physical activity level: evidence from the Alameda County Study. American Journal of Public Health 88(11), 1709–1712.

You, W., Davis, G.C., 2010. Household Food Expenditures, Parental Time Allocation, and Childhood Overweight: An Integrated Two-Stage Collective Model with an Empirical Application and Test. American Journal of Agricultural Economics 92(3), 859-872.

You, W., Nayga, R.M.J., 2005. Household Fast Food Expenditures and Children's Television Viewing: Can They Really Significantly Influence Children's Dietary Quality? Journal of Agricultural and Resource Economics 30(02), 302-314.

Young, L., Nestle, M., 2002. The Contribution of Expanding Portion Sizes to the US Obesity Epidemic. American Journal of Public Health 92, 246-249.

Zagorsky, J.L., 2005. Health and wealth: The late-20th century obesity epidemic in the U.S. Economics & Human Biology 3(2), 296-313.

Zanella, G., 2004. Social Interactions and Economic Behavior, Department of Economics, University of Siena.

Zhang, Q., Chen, Z., Diawara, N., Wang, Y., 2011. Prices of Unhealthy Foods, Food Stamp Program Participation, and Body Weight Status Among U.S. Low-Income Women. Journal of Family and Economic Issues 32, 245-256.

Zhang, Q., Wang, Y., 2004. Socioeconomic inequality of obesity in the United States: do gender, age, and ethnicity matter? Social Science & Medicine 58(6), 1171-1180.

Zhao, Z., Kaestner, R., 2010. Effects of urban sprawl on obesity. Journal of Health Economics 29(6), 779-787.

Zhu, A., 2007. The Effect of Maternal Employment on the Likelihood of a Child Being Overweight. 2007-17, School of Economics, The University of New South Wales.

Zizza, C., Siega-Riz, A.M., Popkin, B.M., 2001. Significant increase in young adults' snacking between 1977-1978 and 1994-1996 represents a cause for concern. Preventive Medicine 32(4), 303-310.

INDEX