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Obesity Epidemics: The Potential Role of Retailing Sector in Promoting Fruit and Vegetable Consumption

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Abstract

After a deep review of the main economic studies and applications about the emerging problem of obesity, this paper focuses on a particular aspect of the issue: the improvement of FRUIT AND VEGETABLE purchasing in retailing sector. First of all it has been analyzed the actual presence of strategies aimed at improving FRUIT AND VEGETABLE consumption in the main retailing companies operating in Italy. Then the study investigates the role of price in consumers' purchasing choices. High price elasticity of fruit and vegetable products could suggest the implementation of lower prices to consumers instead of implementing other policy interventions.

The methodology is based on qualitative and quantitative research methods. In particular, in depth interviews to retailing sector experts have been run to gather useful insights about retailers' management of FRUIT AND VEGETABLE department. Then quantitative analysis on IRI data about FRUIT AND VEGETABLE consumption in Italy has been conducted to evaluate the influence of price on consumers' attitude towards FRUIT AND VEGETABLE. The results obtained provide meaningful insights to formulate marketing strategies and policy interventions.

Keywords: *Obesity, Consumption, retailing sector*

1 Introduction

Obesity is defined as an excessively high amount of body fat in relation to lean body mass. Standards can be determined in several ways, notably by calculating population average or by mathematical formula known as "body mass index" (BMI), a simple index of weight-for-height: a person's weight (in kilos) divided by the square of the height in meters (kg/m^2). According to the WHO (2000), BMI provides "the most useful, albeit crude, population-level measure of obesity". A personal BMI of between 25 and 29.9 is considered overweight; obesity means a BMI of 30 and above; a personal BMI of less than 17 is considered underweight. BMI levels are useful predictor of risk for degenerative diseases (Lang and Heasman, 2004). Indeed, obesity has caused a dramatic increase in the prevalence of non-communicable diseases such as diabetes, cancer, hypertension, and heart disease; these obesity-related diseases are imposing huge costs on health. It is a multifactorial disease typical, but not exclusive, of wealthy societies. This multifactorial nature of obesity would require an interdisciplinary approach of study, taking into account economic theories, including health economics contribution, but also the food system organizations' insights. Indeed obesity epidemic has become a social issue because it involves, directly or indirectly, both food companies' strategies, and health and food policies.

However, a common theoretical framework to interpret the phenomenon is far to be shared. The first question to be answered is the following: “are consumers rational when choose what to eat?”. Classical economic theory consider consumer behaving in a rational way, while other theories consider consumers impulsive and subject to many external forces that influence their behaviour. Hence methodological schemes adopted to study obesity are different as a consequence of this initial assumption.

Furthermore food companies operate marketing strategies to promote consumption of fat food, trying to increase their profits by launching new tasty products. On the other hands consumers should choose products with aim of maximizing their own utility. Concerning consumers’ capacity of making healthy choices, “information asymmetry” represents an obstacle to informed choosing process and to transparent market transactions. So, how can policy maker intervene to drive food industry and consumers towards more sustainable consumption models?

2 Approach to Obesity Epidemic

In the last years many reports have been testifying to an extensive body of research and evidence from several resources around the world of the link between food availability, consumption styles and specific patterns of disease and illness. At the beginning of the 21st century, diet-related ill health is still an important issue in the policy agenda. In particular, the developed world nowadays must confront one of the most challenging food and health disasters ever to face human-kind: an epidemic of obesity (Lang and Heasman, 2004). It is currently estimated that mortality caused by lack of exercise and to caloric intake is second only to tobacco consumption in number of deaths that could be prevented by behavioral change (Philipson, 2001). Hence, addressing obesity is a priority on the policy agenda. Many factors have been suggested as causes of the “obesity epidemic”, including snack food, cars, television, fast food, computer use, vending machines, suburban housing developments, portion sizes and female participation in labor force (Sturm, 2008). According to Seiders and Petty (2004), of the many factors associated with rising obesity food industry marketing practices are among the most criticized and the view that the obesity epidemic is “environmental in origin” has been expressed in extensive media reports. Food industry defends its marketing practices arguing that consumers are responsible for their own lifestyle choices: there is a wide scientific consensus on the importance of diet and physical activity, and food products branded as unhealthy are facing increasing competition from products that are claimed to be healthy. However, due to the increased prevalence and costs associated with obesity, obesity prevention efforts must be a public health priority.

Finkelstein and others (2004) state that many governments are already heavily involved in correcting market failures related to food consumption, especially by providing information about risks related to healthy food consumption and regulating some aspects of the food supply chain. Given the current obesity epidemic, the question is whether additional government interventions are warranted. Sturm (2008) argues that as the focus of interventions to prevent obesity shifts away from traditional informational/educational to environmental and policy approaches, complementing a public health perspective with an economic perspective become

increasingly important. Obesity will definitely become a important factor in reshaping the future of food and beverages marketing throughout the industrialized marketing. (Lang and Heasman, 2004).

2.1 *Obesity as market failure*

According to the classic economic theory, if individuals were perfectly rational, if the production and consumption of goods imposed no costs on the others in society, if information were perfectly accurate and readily available, and if all markets were perfectly competitive then the operation of free markets would maximize social welfare. However when these strong assumptions are violated, economists recommend policy interventions to reduce the inefficiency loss caused by market failures. Importantly, without a market failure, there is no economic justification for government intervention (Cawley, 2004). So, market can fail. When a market fails, the equilibrium prices and quantities do not capture the total social costs and benefits. One of the causes of market failure is the presence of externalities. An externality occurs when a given transaction generates extra-costs to people and society not involved in the transaction. In studying diets, many economists assume that people in active exchange institutions like a market make decisions that maximize their utility (consumer sovereignty). Besides, people make decisions based on their perceptions of risks rather than the objective facts. Thus, people can make their own self-interested choices in which they balance their own private benefits with their own private costs. But if markets fail, current prices do not reflect social values associated with obesity and private health. If obesity generates health care costs which are paid by all taxpayers, this is a market failure. This is an externality. In fact, a person private decision to eat more, risking of becoming obese, on the basis of market prices is misled because he does not pay the full cost of his choice. (Mazzocchi *et al.*, 2009).

However, Mazzocchi *et al.* (2004) report that an alternative idea of an exogenous obesogenic environment is at the basis of biology driven theories which try to explain increase of obesity assuming that people cannot help but get fat. To this way of thinking the food industry is to blame for making unhealthy foods and persuading us to eat them; and government is to blame for subsidizing farmers to produce unhealthy industrialized foods. In contrast, an economic perspective makes this choice endogenous. Also Cawley (2004) argues that the fact that food industry sells a lot of high-fat foods is not evidence that industry is evil and is attempting to fatten people, but it is a reflection of consumer sentiment that high-fat foods are tasty. To the extent that consumers want to eat healthier foods, and weight less, private industry has a profit incentive to help them to do it. Thus Seiders and Petty (2004) state that since food marketers generally defend their offerings as being those desired by consumers in a free market, a critical question is if whether any market failure contributes to the obesity epidemic. They propose that the following kinds of market failures may explain why some consumers appear unable to make food choices that avoid obesity: the lack of disseminated information on the causes and consequences of obesity; the probabilistic and long-term nature of obesity-related harms; the lack of readily accessible and understandable nutrition information related to obesity; and the scarcity of alternative food choices for some consumers. However, when markets fail, economists and researchers argue that governmental intervention can rebalance private desires and social goals.

2.2 *The environmental approach*

Ecological approaches offer promising strategies for health behaviour change. Ecological approaches to behavior change posit that personal, social and environmental factors are all influential. Therefore, grocery stores and community settings where groups of people interact offer important potential for improving eating patterns (Glanz and Yaroch, 2004).

According to Story *et al.* (2008) food and eating environments likely contribute to the increasing epidemic of obesity and chronic diseases, over and above individual factors such as knowledge, skills and motivations. Policy interventions may be among the most effective strategies for creating population-wide improvements in eating. So, individual behaviour to make healthy choices can occur only in a supportive environment with accessible and affordable healthy food choices.

The presence of food stores and the availability of healthful products in those stores are important contributors to healthy eating patterns among neighborhood residents. Mortland *et al.* (2002) found that Fruit and Vegetable intake increased with each additional supermarket in a census tract. Powell and others (2007) point out that increased access to chain supermarkets is associated with lower adolescent BMI and that greater availability of convenience stores is associated with higher BMI and overweight. Cheadle and others (1991) found that the diets of neighborhood's residents were healthier when the supermarkets in the neighborhoods offered more healthful products.

2.3 *Public intervention in the Food Chain*

Historically, central focuses of government policy have been agriculture and the facilitation of agribusiness; but today, in the newly evolved food economy, farming is no longer the driver it was. Agribusiness, adding value to raw food, has become more powerful. The consumption end of the supply chain, namely retailing, food service and branded food manufacturers, increasingly dictates the terms and conditions of the consumer food market competition. (Lang and Heasman, 2004). Due to the increased prevalence and costs associated with the obesity epidemic, preventive efforts have become a public health priority. Therefore, governments are called to curb epidemic, usually relying on a series of targeted regulations, taxes, and at either community or individual level to limit people exposure to substances or behaviours known to promote the epidemic (Finkelstein *et al.*, 2004). Economics can help decide whether an intervention is appropriate in principle, determine the data that should be collected for late evaluation, predict the outcome of the intervention, evaluate it ex-ante against accepted criteria and evaluate it ex-post against the same criteria. In this context, Mazzocchi and others (2009) define two broad areas of obesity policy intervention as *information measures* and *market interventions measures*.

According to the authors, nutrition information, education and social marketing constitute the largest portion of the budget for controlling obesity. However, economists have sustained that more direct measures could have larger impact on behaviour and health, and address the externalities caused by obese people.

Nevertheless, many different kinds of political interventions along the food supply chain have been considered and analyzed (i.e. taxes/subsidies on the consumption, tax

on food manufacturers' use of unhealthy ingredients, etc.), and all of them are addressed to consumers and to producers, either farmers or manufacturers. None of them is directed to retailers. There is a scarcity of food policy theories related to the power of retailers' strategies in influencing consumers' behavior and their role in guarantee healthy food availability. Consequently, market intervention measures addressed to retailing sector have not been specifically elaborated and evaluated.

2.4 FRUIT AND VEGETABLE against obesity

There is a wide body of evidence recognizing FRUIT AND VEGETABLE as essential elements for a healthy balanced diet (FAO/WHO, 2004). In the last years many scientific studies have demonstrated that a diet rich in FRUIT AND VEGETABLE consumption reduces the risks of some kind of cancer (Lee *et al.*, 2006), reduces mortality related to heart diseases (Feldesein and Tucker, 2007), helps preventing diabetes (Hodge *et al.*, 2007) and it is fundamental for weight management (Bazzano, 2006).

Many National governments have launched information campaigns with aim of make people aware about the benefits of a diet rich in FRUIT AND VEGETABLE, and in order to improve food habits. One of the most famous campaign about FRUIT AND VEGETABLE is "5 a day", an international initiative which promote the consumption of at least 5 portions of FRUIT AND VEGETABLE a day. Recently also in Italy social marketing campaigns have been launched to increase people sensitiveness about risks linked to unhealthy diets (i.e. *Frutta nelle Scuole e Guadagnare in Salute*). These campaigns are political instruments classified by Mazzocchi *et al.* (2009) as "information measures", which effectiveness is still highly debated (Gordon *et al.*, 2006; Seiders e Petty, 2004; Murphy, 2002). An extensive body of research demonstrates that even though risks are well known (as in the smoking, or obesity, case), institutional campaigns are not sufficient to obtain behavioral changes (Rindfleisch and Crockett, 1999). To make more effective policy interventions aiming at improving FRUIT AND VEGETABLE consumption it is necessary to identify the factors that mainly influence consumers' behaviour. Brug *et al.* (1995) classified some aspects to be related with FRUIT AND VEGETABLE consumption (such as taste, health, social pressure, barriers, physical or economic availability, etc.) and state that the leading factor for FRUIT AND VEGETABLE consumption is hedonisms. Surely also supply chain operators' strategies influence consumers' choices, particularly retailers' activities which involve the consumers directly.

In the following sections it will be described retailers' policies in FRUIT AND VEGETABLE department and it will be analyzed what role they can have in promoting FRUIT AND VEGETABLE consumption.

3 Retailing Sector Role in Promoting FRUIT AND VEGETABLE Consumption

Today, the main drivers of the food supply chain are the powerful forces of manufacturers, traders and retailers, which operate in the market with the main aim of capturing consumer needs. Indeed, the food system has shifted 180 degrees from being producer driven to being consumer driven. The power in the system is at the retail end because retailers receive the information about consumers' preferences

first. This information gives them the power to compete with other retailers, to negotiate with vendors and to respond to consumers. As retailers have grown in size and control an increasing proportion of floor-space, shelf space and ultimately sales they used their scale to exert coercive or reward power to take advantage of excess capacity in the manufacturing sector. The willingness of manufacturers to comply with retailers' demands is justified by the need to maintain manufacturing scale economies, cover fixed costs and to utilize full production capacity (Burt, 2000). Potentially, retailers' category management policy can filter supply by leaving out products not consistent with retailers' nutritional standards required.

Also FRUIT AND VEGETABLE department is strongly influenced by retailing companies' strategies that at the top of the supply chains establish contractual conditions with farmers, while at the bottom operate marketing promotional activities and information campaign to modify consumers' behaviour.

3.1 Survey Methodology

There are no studies that analyze how the GDO is reacting to the emergence of "obesity". Actually, this study tries to investigate the role of retailing companies in informing consumers about the importance of FRUIT AND VEGETABLE for the prevention of serious diseases, in particular obesity. The quality research method of the present research was based on eight "in-depth interviews", directed to category managers and buyers of FRUIT AND VEGETABLE sector selected from leader companies in Italian distribution industry. At the same time, a quantitative approach based on data from scanner of supermarket chains has been dealt to evaluate the influence of the key variables determining both the strategies concerning distribution companies and the consumers' purchasing decisions.

3.1.1 The in-depth interviews

One of the main purposes of the survey is to bring out the context where operators of retail FRUIT AND VEGETABLE sector have to make choices and implement different business strategies. Through "semi-structured questions", in-depth interviews enabled to analyze some action fields, at political level too, to improve the FRUIT AND VEGETABLE supply and make it more attractive to consumers. The interviews were conducted between January and August 2011. All the interviewees of the retail produce sector showed a keen awareness of healthy subjects and of obesity's emergency that concerns most of Western countries. They acknowledge the fundamental role of FRUIT AND VEGETABLE to reduce the risk of chronic diseases related to improper diet, and support the strategic importance of the horticultural sector. All the respondents agree that is necessary to invest more in this area because FRUIT AND VEGETABLE provide all the nutritional and healthy values to be promoted against obesity. Accordingly, some respondents argue that an increasing attention by managers of distribution companies and a closer collaboration with public institutions would be desirable. Seasonality and territory are considered as key factors on the differentiation of FRUIT AND VEGETABLE. However, even if there are companies that actually have been developing campaigns in order to educate their customers to recognize the true seasonality of FRUIT AND VEGETABLE, many companies take advantage of seasonality only for commercial purposes: indeed, seasonal FRUIT AND VEGETABLE usually have best organoleptic qualities and their abundance makes

possible to set lower prices. The indication of the production site is a further instrument to differentiate fresh products. All respondents support the validity of marketing efforts aimed at the seasonal and territory exploitation, but no one reckons that the sale of imported and no-seasonal FRUIT AND VEGETABLE could be given up. Therefore, some of them argue that FRUIT AND VEGETABLE sector would require more expertise: actually, in many stores often the staff is not really keen on FRUIT AND VEGETABLE and able to educate the customer about the characteristics and the values of fresh products.

One of the main issues raised in the FRUIT AND VEGETABLE sector is the lack of brand easily recognizable by the consumer. With few exceptions, there are no really strong production companies, so FRUIT AND VEGETABLE are associated with distribution, which turns out to be the only responsible for the quality and the price of the product to the consumer. This aspect is seen by the stakeholders both as a limitation and an opportunity. While the lack of lobbies essentially makes the FRUIT AND VEGETABLE sector weak and segmented, on the other hand the distribution companies would be able to implement effective marketing strategies to enhance the industry as they are substantially free from pressures by large food companies. According to two of the respondents, FRUIT AND VEGETABLE are not the subject of great investments because they represent an area out of the political interests that usually move large private brands. Meanwhile, the tendency of many processed food companies to appropriate the positive image of FRUIT AND VEGETABLE for promoting their products (i.e. one respondent cites as example the nutritional advice on the back of packages of cookies, which suggests to have breakfast with biscuits and fruit), or making them more healthy for the consumer, is strongly criticized. During the interviews was also examined the issue of packaged FRUIT AND VEGETABLE products. All respondents said that this kind of products should be considered as a distinct category, which differs completely from fresh products. In this case, production requires very high investments and depends on industrial logics. Differently from FRUIT AND VEGETABLE sector, where sales are decreasing, consumption of packaged products has constantly increased till a steady state on the past two years. These products have higher prices than fresh ones, ensuring high margins to the industry, and allowing the consumer to save time on meal preparation. Moreover, the interviews underline that, due to very strong consumers eating habits and traditions, packaged fruits hardly stand out this specific market.

3.1.2 The price role in the purchasing decisions

Based on the results of the quality survey, the study investigates the role of the price, an important variable that influences FRUIT AND VEGETABLE demand. New trends in consumption are generally defined by two categories of variables that describe their characteristics: socio-economic variables (employment and social status, demographic background, etc.) and socio-cultural variables. Between these two categories came a renewed focus on the price variable, even though no longer considered in a detached and predominant way with respect to the other components involved in the choice process. Nevertheless price is a key driver within a system of variables, which still play a vital role in the purchase and consumption decision (Fabris, 1995). Indeed, price leverage represents a fundamental tool for market penetration, especially in retailing sector (Costabile, 1992). Based on these assumptions, the retail scanner data are analyzed to determine the volume trend and estimate the elasticity of demand for

FRUIT AND VEGETABLE, which is critical to outline recent incentive policies (or taxation) dependent on the level of price sensitivity of consumers.

The industry data, provided by *SymphonyIRI*, refer to a total of 24 monthly observations (from October 2008 to August 2010) of sales in volume and value of FRUIT AND VEGETABLE products, though different format of shops in Italy.

The sample of retail outlets has been extrapolated with stratification method, considering the retail distribution points of all companies, regardless of the surface. The availability of scanner data increases the understanding of consumer demand, particularly for food (Capps and Love, 2002). Cotterill *et al.* (1994) argued that these data permit a better understanding of demand dynamics and they are fundamental tool to operate accurate marketing strategies.

The analysis model used is the Almost Ideal Demand System (Deaton A. and J. Muellbauer, 1980_a and 1980_b), while the software applied to processed the data is the Time Series Processor (TSP) (Dell'Amico and Toth, 2000). The four market segments considered are: variable weight fruits, variable weight vegetables, packaged FRUIT AND VEGETABLE (respectively equations 1, 2, 3 and 4). Even though there are four categories of products, in order to avoid collinearity additional restrictions impose to reduce the equations number to three. However, restrictions about homogeneity makes possible to obtain indirectly the parameters of the fourth equation (Cappuccio and Orsi, 1991). Leaving aside the procedural steps (Pieroni, 2000; Torrisi, 2006; Diotallevi, 2010), the following equations have been elaborated:

$$\begin{aligned}
 \text{Eq. 1} \quad & \text{eq}_1, w_1 = a_1 + a_{11} * \text{pi}_1 + a_{12} * \text{pi}_2 + a_{13} * \text{pi}_3 + (-a_{11} - a_{12} - a_{13}) * \text{pi}_4 + b_1 * y; \\
 & \text{eq}_2, w_2 = a_2 + a_{12} * \text{pi}_1 + a_{22} * \text{pi}_2 + a_{23} * \text{pi}_3 + (-a_{12} - a_{22} - a_{23}) * \text{pi}_4 + b_2 * y; \\
 & \text{eq}_3, w_3 = a_3 + a_{13} * \text{pi}_1 + a_{23} * \text{pi}_2 + a_{33} * \text{pi}_3 + (-a_{13} - a_{23} - a_{33}) * \text{pi}_4 + b_3 * y;
 \end{aligned}$$

Where w_1 is the market share of each category analyzed, a_1 represents the intercept, a_{11} represents the price of the category "1" respect to market share in the same category, pi_1 is the logarithm of the price "1", a_{12} is the parameter of value "2" than the market share of the category "1", pi_2 represents the logarithm of the price "2", a_{13} is the parameter value "3" than the market share of the category "1", pi_3 represents the logarithm of price "3", $(-a_{11} - a_{12} - a_{13}) * \text{pi}_4$ is the fourth parameter is obtained, b_1 is a parameter of the equation, y represents the logarithm of the ratio between index and Stone. From the results it is possible to formulate some observations (Tab.1).

Table 1.
Parameter analysis

	Parameter Estimate	Standard Error	t-statistic	P-value
HE11	-0,767100	0,139686	-5,491590	[,000]
HE12	0,480105	0,121492	3,951750	[,000]
HE13	0,011503	0,175890	0,654017	[,513]
HE14	0,499901	0,987600	5,061770	[,000]
HE22	0,455622	0,279825	1,628240	[,103]
HE23	-0,013876	0,037622	-0,368824	[,712]
HE24	-1,092940	0,174329	-6,269420	[,000]
HE33	-8,751600	18,972300	-0,461282	[,645]
HE34	0,031590	0,472151	0,066906	[,947]
HE44	-0,851509	0,313919	-2,712510	[,007]

Source: our elaborations from *SimphonyIRI* data, 2011.

In general, the almost concavity of the demand function is respected because the matrix of compensated elasticity, being proportional to the Hessian matrix, is semi-defined negative (the HE22 is positive but considering not significant the relative P value). The FRUIT AND VEGETABLE sector appears to be relatively sensitive to price changes. It is worth to be underlined that, except for the category “2” (vegetables vw), all the categories have a relatively elastic demand.

Analyzing the cross-elasticity, only the category “1” (fruit vw) shows a good degree of substitutability with other categories, while in other cases there is a complementary factor which makes the products not replaceable with the others.

Finally the price factor continues to play an important role in the FRUIT AND VEGETABLE sector, but it has to be considered in a broader frameworks together with other factors, all determining the decision-making process of consumers.

Moreover, the significance level of some categories is not satisfactory, so a different data aggregation rationale is suggested. FRUIT AND VEGETABLE sector is very complex and difficult to interpret, but it is recommended to implement a model to investigate the effects of promotional activities and to introduce fundamental parameters of the market, such as seasonality.

4 Conclusions and Recommendations

The phenomenon of obesity continues to increase and significantly influences both the policies of national governments and the competitive strategies of major food companies. The scientific and academic world recognize the importance of FRUIT AND VEGETABLE in the prevention of chronic diseases, and both economic and political actors identify in FRUIT AND VEGETABLE a strategic sector for fighting this modern epidemic. The study puts in evidence, however, the structural weaknesses of the sector that hinder the implementation of specific synergies between the retail companies and institutions, aimed at raising awareness of consumers towards healthier lifestyles. The sector requires more investment targeting to consumer

education, respecting the profit logics of distribution companies involved, and taking into account that price of FRUIT AND VEGETABLE is still an important leverage determining the final purchase decision, even if it is not the only one. Thus, policy intervention should focus on the control of consumer prices through the application of incentives along the supply chain.

From the qualitative and quantitative analysis it is arguable that the segment of fresh vegetables is less sensitive to price changes than other categories studied (although the empirical data should be further verified). Probably this result is due to a different cultural approach of the consumer: while vegetables have a more deeply rooted role in food habits of Italian people, fruit is often purchased on impulse, recognizing to this category of products a hedonistic value. The analysis of cross-elasticity confirms the interviews findings: fresh FRUIT AND VEGETABLE and packaged FRUIT AND VEGETABLE are two distinct sectors. In general, price sensitiveness is higher for packaged FRUIT AND VEGETABLE consumers. Packaged FRUIT AND VEGETABLE sector shows high potential for future developments, and it could become the driver for policies promoting FRUIT AND VEGETABLE consumption.

Bibliography

- Bazzano, L. (2006). The high cost of not consuming fruits and vegetables, *Journal of American Dietetic Association*, **106**.
- Brug, J., Debie, S., Van Assema, P., and Weijts W. (1995). Psychological determinants of Fruit and Vegetable consumption among adults: Results of focus group interviews, *Food Quality and Preferences*, **6**.
- Burt, S. (2000). The strategic role of retail brands in British grocery retailing, *European Journal of Marketing*, Vol. **34**, n.8.
- Capps, O.J., Love, H.A. (2002). Econometric considerations in the use of electronic scanner data to conduct consumer demand analysis, *American Journal of Agricultural Economics*, **84**, n. 3.
- Cawley, F. (2004). An economic framework for understanding physical activity and eating behaviours, *American Journal of Preventive Medicine*, Vol. **27**.
- Cheadle, A., et al. (1991). Community-level comparisons between the grocery store environment and individual dietary practices, *Preventive Medicine*, Vol. **20**.
- Costabile, M. (1992). Prezzo e consumatore. Il ruolo del prezzo nel processo d'acquisto, Egea, Milan.
- Deaton, A., Muellbauer, J. (1980a). An Almost Ideal Demand System, *American Economic Review*, **70**.
- Deaton, A., Muellbauer, J. (1980b). Economics and Consumer Behaviour, Cambridge University Press, Cambridge.
- Dell'Amico, M., Toth, P. (2000). Algorithms and codes for dense assignment problems: the state of the art, *Discrete Applied Mathematics*, **100**.
- Diotallevi, F. (2010). L'analisi della domanda degli oli extravergine d'oliva in Italia. Un'applicazione del modello AIDS, PhD Thesis on, Department of Economics and Food Sciences, University of Perugia, Perugia.

- Fabris, G. (1995). *Consumatore & mercato. Le nuove regole*, Sperling & Kupfer, Milan.
- FAO/OMS (2004). *Fruit and Vegetables for health, report finale workshop FAO/OMS, 1-3 settembre 2004, Kobe*.
- Feldeisen, S.E., Tucker, K.L. (2007). Nutritional strategies in the prevention and treatment of metabolic syndrome, *Applied Physiology, Nutrition, and Metabolism*, Vol. **32**.
- Finkelstein, E., et al. (2004). Pros and Cons of proposed interventions to promote healthy eating, *American Journal of Preventive Medicine*, Vol. **27**.
- Glenz, K., Yaroch, A.L. (2004). Strategies for increasing Fruit and Vegetable intake in grocery stores and communities: Policy, pricing, and environmental change, *Preventive Medicine*, Vol. **39**.
- Gordon, R., et al. (2006). The effectiveness of social marketing interventions for health improvement: What's the evidence?, *Public Health*, Vol. **120**.
- Hodge, A.M., et al. (2007). Dietary pattern and diabetes incidence in the Melbourne Collaborative Cohort Study, *American Journal of Epidemiology*, Vol. **165**.
- Lang, T., Heasman, M. (2004). *Food Wars*, Earthscan, London.
- Lee, J.E., et al. (2006). Intakes of fruits, vegetables, vitamin A, C, and E, and carotenoids and risk of renal cell cancer. *Cancer, Epidemiology Biomarkers and Prevention*, Vol. **15**.
- Mazzocchi, M., Traill, W.B., and Shorgren, J.F. (2009). *Fat Economics*, Oxford University Press, New York.
- Mortland, K., Wing, S., and Diex, Roux A. (2002). The contextual effect of the local food environment on residents' diets: the Atherosclerosis Risk in the Communities study, *American Journal of Public Health*, Vol. **92**.
- Murphy, P. (2002). Ethics in Social Marketing, *Journal of Public Policy & Marketing*, Vol. **21**.
- Philipson, T. (2001). The world-wide growth in obesity: An economic research agenda, *Health Economics*, Vol. **10**.
- Pieroni, L. (2000). *La dinamica dei consumi alimentari: analisi descrittiva, statica comparata e cointegrazione*, PhD Thesis, Istituto Universitario Navale, Napoli.
- Powell, L.M., et al. (2007). Associations between access to food stores and adolescent Body Mass Index, *American Journal of Preventive Medicine*, Vol. **33** (4S).
- Rindfleisch, A., Crockett, D.X. (1999). Cigarette smoking and perceived risk: A multidimensional investigation, *Journal of Public Policy and Marketing*, Vol. **18**.
- Seiders, K., Petty, R.D. (2004). Obesity and the role of food marketing: A policy analysis of issue and remedies. *Journal of Public Policy and Marketing*, Vol. **23**.
- Story, M., et al. (2008). Creating healthy food and eating environments: Policy and environmental approaches, *Annual Review of Public Health*, Vol. **29**.
- Sturm, R. (2008). Stemming the global obesity economics: What can we learn from data about social and economic Trends?, *Public Health*, Vol. **122**.
- Torrisi, F., Stefani, G., and Serghieri C. (2006). Use of scanner data to analyze the table wine demand in the major retailing trade, *Agribusiness*, **22**, n. 3.
- Traill, W.B. (2009). "Politiche pubbliche per ridurre l'incidenza dell'obesità: la prospettiva economica". *Agriregionieuropa*, n. **19**.

World Health Organization (2000). "Obesity: Preventing and Managing the Global Epidemic", WHO Technical Report Series, 894, Geneva.