GENERAL INTRODUCTION

In this thesis the feasibility and effectiveness of environmental interventions targeted at portion size are evaluated. The General introduction (Chapter 1) describes agricultural, organizational and political factors that explain the tremendous increase in food production and availability that has taken place in the decades after WWII.

By increasing portion sizes of high caloric foods and drinks the food industry has contributed to the accelerating food intake. Large portion sizes are being made attractive by employing value size pricing (i.e. employing a lower price per unit for large portions compared to small portions). Studies have demonstrated that large portion sizes generally increase the total daily amounts of foods and drinks that are consumed, and people do not tend to compensate over time for the increased food intake. As a result of the growing portion sizes, many people experience “portion distortion” (i.e. perceiving larger quantities than recommended by dietary guidelines as appropriate amounts to eat at a single occasion).

In the past decades the number of people who suffer from overweight has grown and resulted in a major public health problem. A growing apprehension has evolved for the impact of the “obesogenic” environment that promotes excessive food intake and discourages physical activity. In addition to educating individuals about the importance of healthy eating, it is therefore highly important to diminish the degree to which the environment is obesogenic. Large portion sizes are an important characteristic of the obesogenic food environment, and this thesis describes the development and evaluation of environmental interventions targeted at portion size.

MAIN FINDINGS

Part I of this thesis examines the field of (environmental) interventions targeted at portion size and discusses their feasibility. In Chapter 2 it is observed that few experimental studies into the effects of interventions targeted at portion size have been done so far. Subsequently, possibilities for interventions are identified and a framework for portion size interventions is presented. According to the framework, environmental
interventions can be situated in the physical environment (e.g. providing a larger variety of smaller portion sizes, portion size labeling), the economic environment (e.g. removing value size pricing by employing “proportional pricing”), the political environment (e.g. regulations with respect to more consistent and realistic serving sizes), and the socio-cultural environment (e.g. educating restaurant chef’s aiming to change their attitudes and skills with respect to portion sizes).

In Chapter 3 a qualitative study assessing consumers’ attitudes towards environmental interventions targeted at portion size is described. Eight focus group discussions with 49 participants were conducted. The results indicated that consumers had most favorable attitudes towards a large variety of portion sizes, pricing strategies, and portion size labeling. However, it should be noted that the participants mentioned that labeling should not have a paternalistic tone and pricing strategies were not considered attractive for large household purchases.

Chapter 4 presents the results of a qualitative study in which 22 point-of-purchase representatives were interviewed. The representatives saw their responsibility mainly in terms of offering healthy options and providing consumers with information. All representatives indicated that in the end, food intake is an individual responsibility. With respect to interventions targeted at portion size, the representatives had most favorable attitudes towards offering a larger variety of portion sizes and portion size labeling. Pricing strategies were generally perceived as risky; however worksite cafeteria managers seemed open towards proportional pricing.

In Part II the impact of portion size labeling on (intended) choice and consumption behavior is described. Chapter 5 presents the results of a study in which two labeling formats (presented through photographs) were compared to a control condition. The first labeling format designated a standard portion size of a certain product to consume at a single occasion, the second format referred to small, medium and large sizes that were in agreement with nutritional guidelines (which is generally not the case in the fast-food setting in which this labeling format is common). The labeling formats were tested in two size ranges (3 vs. 5 size options). The outcome
variable was participants’ soft drink size choices. The results indicated that when 5 size options were offered, participants were more likely to select one of the largest sizes then when 3 options were available. Furthermore, the labeling format on which reference portion sizes were indicated seemed most effective in stimulating consumers to select smaller sizes. This study relied on the self-reported intended behavior of consumers who completed questionnaires.

Chapter 6 describes a field study into the effectiveness of portion size labeling on soft drinks in a cinema. The labels were displayed above the counter and consisted of information with respect to the number of portions and calories per soft drink cup size. Portion size labeling did not have significant effects of labeling on choice or consumption behavior. An explanation for this finding might be that the group of participants consisted predominantly of middle-aged women that did not have a habit of drinking soft drinks. Labeling might therefore have been less relevant for them.

As outlined in Chapter 7, a second field study into the effectiveness of portion size labeling was conducted in a cinema. In this study three formats of popcorn portion size labeling were compared to each other and to a control condition. The first labeling format outlined the number of calories per popcorn container and equated this to the number of bicycle minutes that were necessary to burn the calories (i.e. Calories and Bicycle labeling). The second labeling format was identical to the current labeling in the cinema (i.e. Normal, Large, Extra large labeling). However, for the purpose of this study the size that was normally labeled as “normal” was shifted to large. The third labeling advised on the number of persons that could share one popcorn container (i.e. Portions per Container labeling). In the control condition, no display with portion size labeling was available. The labeling formats were tested on four subsequent Saturday evenings. The study results showed that the Portions per Container labeling was associated with the lowest number of calories per popcorn purchase compared to the other conditions. Due to logistical problems, no data could be collected with respect to the Normal, Large, Extra large labeling.
Part III of this thesis consists of three studies into the introduction of a larger variety of portion sizes and proportional pricing. In Chapter 8 a study among fast-food restaurant and worksite cafeteria visitors is described. Participants were asked to select a portion size of soft drink, chicken nuggets and a hot meal. Depending on the study condition, either value size pricing or proportional pricing was employed. The results showed that among overweight or obese visitors to fast-food restaurants, proportional pricing reduced the likelihood that they would select large soft drink sizes, and increased the likelihood that they would choose small-sized portions of chicken nugget. This study relied on the self-reported intended behavior of consumers who completed questionnaires.

Chapter 9 presents the results of a longitudinal randomized controlled trial that was conducted in 26 worksite cafeterias. The aim was to assess the impact of introducing a small meal in addition to the existing size (vs. no introduction of a small meal) and proportional pricing (vs. value size pricing) on consumer behavior. The results showed that after the introduction of small meals, a small group of worksite cafeteria visitors replaced their large meals with small meals, but that proportional pricing had no effect. Furthermore, the sales figures of fried snacks did not increase, suggesting that consumers did not compensate for their small meals by purchasing more snacks. On the other hand, based on consumer data, there were some indications of compensatory food intake: participants who chose a small meal in the worksite cafeteria reported, amongst other things, having larger meals than usual at home. Finally, the small meal attracted a relevant target group, as small meal purchases were positively related to being female and to BMI (the latter was borderline significant).

In addition to evaluating the effect of introducing smaller meals and proportional pricing in worksite cafeterias, a process evaluation is described in Chapter 10. The process evaluation consisted of structured observations, interviews with the worksite cafeteria managers, and consumer data. The results showed that offering a small meal, in addition to the existing size meal, as well as proportional pricing were generally
implemented as prescribed by the protocol. The interventions were also considered promising in terms of continued use.

**GENERAL DISCUSSION**

Chapter 11 starts with summarizing the main study findings. From Part I of this thesis it can be concluded that offering a larger variety of portion sizes and portion size labeling were the most feasible interventions to implement. In settings such as worksite cafeterias, a proportional pricing strategy was considered to be feasible as well.

The studies that are described in Part II separately did not provide unambiguous conclusions with respect to the impact of portion size labeling. Combined, however, the studies suggested that a labeling format, in which a reference portion size (or the number of portions per unit) is indicated, was the most effective format for helping consumers to select smaller sizes of high caloric snacks and drinks. It should, nevertheless, be mentioned that the effects of changing the preferences to smaller portions are expected, at most, to be modest.

From Part III of this thesis it can be concluded that the introduction of a smaller portion size for meals in worksite cafeterias in addition to the existing size appears to be a sustainable intervention that will help a reasonable and relevant proportion of guests to replace their large meal with a small meal. However, it should be mentioned that there is a risk of compensatory food intake among these people.

**Suggestions for further research**

Following from the study results, it is concluded that communicating interventions targeted at portion size to the consumers is an important yet complicated matter. A number of possibilities regarding such communication are described. Subsequently, strategies are described that might help making consumers more susceptible to environmental interventions (e.g. changing consumption habits by disrupting unhealthy habitual behavior or invoking different social norms). Another issue that is discussed is how target group characteristics and contextual factors are related to the impact of
interventions targeted at portion size. Finally, it is emphasized that interventions should both focus on the food environment, as well as train people to deal with a “super-sized” food environment.

**Practice recommendations**

In the first place, issues about individual, corporate and governmental responsibilities with respect to healthy eating are described, and the term “paternalization paradox” is introduced. The paternalization paradox refers to the observation that consumers do not seem to consider restrictions to their freedom stemming from commercial parties (as opposed to governmental interventions) as paternalistic.

Information provision and therefore portion size labeling seems to be a widely endorsed intervention strategy. However, communication with respect to (reference) portions sizes is currently ambiguous and therefore often not helping consumers in making informed choices. Another problem is that the information provided is often not in line with nutritional guidelines. Regulations are therefore advocated that enforce clear and realistic norms with respect to reference portion sizes and their communication and labeling.

A last issue that is discussed is that an approach that has been coined “libertarian paternalism” could enhance the effectiveness of the environmental interventions that were evaluated in this thesis without overly paternalizing consumers.