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Food healthy knowledge, attitudes and practices: Survey of the general public and food handlers<sup>☆</sup>

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## ABSTRACT

Modifying the energy content of foods, particularly foods eaten away from home, is important in addressing the obesity epidemic. Food handlers in the restaurant industry are uniquely placed to influence the provision of reduced-calorie foods, but little is known about their opinions on this issue. The objectives of the present study were to determine the general public and food handlers' knowledge and opinions, issues and barriers related to providing these items on the menu, and about the influence of the calorie content of restaurant items on customer intake. The food handlers surveyed had a significantly lower food science knowledge score than the general public. There was significant difference between the scores of food handlers and general public ( $t=3.5108$ ,  $df=177.743$ ,  $P\text{-value}=0.0005$ ). The majority of respondents ranked taste as the most influential factor in the success of reduced-calorie items ( $p < 0.0028$ ). The results of this survey indicate that opportunities exist for reducing the energy content of restaurant items. Ongoing collaboration is needed between food handlers and public health professionals to ensure that appealing reduced-calorie menu items are more widely available in restaurants and that research is directed towards effective ways to develop and promote these items.

## Introduction

Recent literature suggests that nutritional counseling should move from micro- and macronutrients into food-oriented education (Lichtenstein and Ludwig, 2010). Part of the proposed solution is supplementing standard knowledge counseling about healthy nutrition with skills like shopping, meal preparation and food storage (Soliah et al., 2012; Hartmann et al., 2013). Educational programs delivered by food handlers aimed at improving culinary skills have recently emerged as one way to improve adherence to nutritional guidelines (Reicks et al., 2014).

Over the past 30 years, food prepared away from home has become a regular part of most European's diets, and those who monitor food trends expect this to continue (Orfanos et al., 2009). Foods prepared away from home accounted for 33% of food spending (MAPA, 2012) and contributed 27% of caloric intake (Vandevijvere et al., 2009). The catering sector is therefore an important stakeholder in the provision of nutrition policies in Europe (Lachat et al., 2009). It is uniquely placed to be involved in the implementation of effective strategies aiming to promote healthier eating out, but little is known about their opinions on this issue. In order to support this objective, however, it is important to address the concerns and knowledge of food handlers

about providing such foods (Obbagy et al., 2011).

Finally, with direct reference to this study, do food handlers feel it is part of their role to help re-engineer the nation's diet? There has been much research regarding consumers' attitudes to various issues but as intimated by Condorsky and Helger (2010), there has been little research carried out regarding food handlers' attitudes. As they are directly involved in food preparation and provision and have been given responsibility to carry out these government inspired strategies it would seem appropriate to consider their attitudes, opinions and knowledge especially as they are also consumers (Middleton, 2000).

The objectives of the present study were to determine the general public and food handlers' knowledge, and opinions, issues and barriers related to providing these items on the menu healthy (low in fat and energy; reduce the amount of food protein and increase the intake of vegetable), and about the influence of the calorie content of restaurant on customer intake.

## Materials and methods

The surveys assessed the knowledge of healthy food in the general public and food handlers. The survey given to both groups was a modified a survey used in a previous similar study (Reichler and

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**Table 1**  
Food science knowledge survey.

Questions	Food handlers		General public		Correct response
	Correct %	Incorrect%	Correct %	Incorrect %	
1. There is more fiber in breads, rice, and vegetables than there is in meat, poultry, and eggs	87,8	12,2	85,2	14,7	C
2. Meat, fish, chicken, eggs, milk, legumes, grains, and vegetables contain protein	68,6	31,3	100	0	C
3. Prepackaged processed foods are a major source of salt in the Mediterranean diet	69,5	30,4	87,2	12,7	C
4. An orange contains more fiber than orange juice	58,5	41,4	88,3	11,6	C
5. Sugar contains many vitamins and minerals	46,3	53,6	29,4	70,5	I
6. The largest source of fat in the comes from animal foods	53,6	46,3	47,0	52,9	C
7. Milk, vegetables, grains, and fruits contain carbohydrates	60,9	39,0	74,5	25,5	C
8. To lower cholesterol in your blood, you only need to avoid foods that are high in cholesterol	17,0	82,9	12,7	87,2	I
9. Cooking at high temperatures diminishes the vitamins in foods	50,0	50,0	64,7	35,3	C
10.If a food is labeled “cholesterol free”, it must also be low in saturated fat	43,9	56,1	26,4	73,5	I
11.You can reduce the amount of fat in a recipe by substituting olive oil or corn oil for butter, lard or chicken fat	43,9	56,1	22,5	77,4	I
12.One tsp olive oil has about the same amount of calories as 1 tsp butter	29,2	70,7	20,5	79,4	C
13.Cholesterol is found only in animal products	40,2	59,7	32,3	67,6	C
<b>Correct answers (%)</b>	<b>59</b>		<b>72</b>		

<sup>a</sup>C=Correct/I=Incorrect \* tsp=teaspoon.

**Table 2**  
Recipe modifications most likely to be used by food handlers and general public.

Recipe modification	Food handlers		General public	
	(n)	(%)	(n)	(%)
1. Reduce fat	33	41,2	11	10,8
2. Reduce portion size	38	47,5	8	7,8
3. Add fruits or vegetables	8	10,0	74	72,5
4. Reduce carbohydrates	0	0	9	8,8
5. Add fiber	1	1,2	0	0
6. Reduce protein	0	0	0	0
<b>Total answers</b>	<b>80</b>	<b>100</b>	<b>102</b>	<b>100</b>

n: number of responses.

**Table 3**  
Recipe modification of moist rice.

Recipe modification of Moist rice	Food handlers		General public	
	(n)	(%)	(n)	(%)
Portion size	2	8,7	0	0
Energy dense	21	91,3	56	100

n: number of responses.

Number of responses (n) do not sum to the total number of respondents because some respondents do not answer the question.

Dalton, 1998) and assessed awareness of healthy food, knowledge, and opinions. The questionnaire was comprised of 13 questions (Table 1) to assess the knowledge about nutrition in general, and 6 questions (Table 2) about changes to the recipes that would make (food handlers and general public) to healthier dishes (reduce fat, reduce portion size, add fruits and vegetables,...). Finally are being asked to indicate that they would take to reduce the calories of a recipe (moist rice), change the serving size or reduce the energy density (Table 3). The concept of menu health is based at the premises indicated by agencies international (Aranceta and Serra Majem, 2011; EFSA, 2009; FAO/WHO, 2008).

The initial survey was conducted in 15 restaurants in downtown of Valencia (Spain) and representing a total of 80 food handlers including cooks, kitchen assistants, and service assistance. Each food unit had at least four food handlers and at most eight. The following services were provided by these establishments: the prix-fixe multi-course menu changes daily, and showcases local ingredients. The supervisors of each unit were first contacted, and their authorization requested in order to

conduct the survey. After obtaining the authorization, each unit was visited and the food handlers informed about the reason to conduct the survey and how they should proceed when they received the questionnaires. It was explained that they did not need to reveal their identity. After completing the questionnaires, the food handlers were supposed to mail them back to the addressee.

The same questionnaire used for the food handlers was given to the general public, and assessed awareness of healthy food. The general public was recruited at the restaurants selected for this pilot study by face-to-face interviews and representing a total of 102 people.

A convenience sample was presented to 182 food handlers and general public. Convenience sampling occurs when members of the respondent population are chosen based on their relative ease of access, in this case those food handlers and general public present at the restaurants and willing to complete a survey (García-García et al., 2013).

Comparisons between food handlers and the general public were performed using the analysis of variance (ANOVA) and independent t-test were used to examine significant differences in food healthy knowledge, attitudes and practices. Questionnaires were hand coded and data was analyzed using Statistical Package for Social Sciences (SPSS) version 19.0.

## Results and discussion

The result of the surveys (% of correct answers) show that the food handlers had a significantly lower food science knowledge score (59%) than the general public (72%). There was significant difference between the scores of food handlers and general public ( $t=3.5108$ ,  $df=177.743$ ,  $P\text{-value}=0.0005$ ). Significantly, the food handlers' ability to construct nutritionally sound menus and indeed cook healthily is brought into question.

The questions most often answered correctly related to food sources of protein and salt and more than half of the respondents correctly responded to questions concerning the nutrient composition of food, and how cooking affects the nutrient content of foods. Questions most often answered incorrectly related to cholesterol and fat. The question least often answered correctly by both groups was, “One that 1 tsp (teaspoon) olive oil has about the same number of kilocalories as 1 tsp butter” and “Cholesterol is found only in animal products”. The questions most often answered incorrectly by food handlers were, “An orange contains more fiber than orange juice”; “Sugar contains many vitamins and minerals”; “Cooking at high temperatures diminishes the vitamins in food”; “If a food labeled “cholesterol free”, it must also be low in saturated fat” and “You can reduce the amount of

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