VNIVERSITAT DE VALÈNCIA
Facultat de Farmàcia

RESCATE DE LA GASTRONOMÍA MEDITERRÁNEA EN RESTAURACIÓN. ESTILIZACIÓN DE CARTAS DIETÉTICAS

THE RESCUE OF THE MEDITERRANEAN GASTRONOMY IN CATERING. STYLIZATION OF THE MENUS

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CERTIFICAN QUE: la licenciada en "Nutrição y Ciências dos Alimentos" Dª Kamila A. Lessa Santos ha realizado, bajo su dirección y en los laboratorios del área, el trabajo que lleva por título: "Rescate de la Gastronomía Mediterránea en Restauración. Estilización de Cartas Dietéticas" para optar al Título de Doctora por la Universitat de Valencia.

Y para que así conste, expiden y firman el presente certificando en Burjassot (Valencia), 8 de enero de 2016.

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La doctoranda ha realizado una estancia para la mención internacional del título de Doctora en el Laboratory for Human Ingestive Behavoir at The Pennsylvania State University (2014) bajo la dirección de la Dra. Barbara J.Rolls.

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INDEX **Page**

INDEX OF TABLES /INDICE DE TABLAS 13
INDEX OF FIGURES/INDICE DE FIGURAS 15
INDEX OF ABBREVIATIONS/INDICE DE ABREVIACIONES 17
SUMMARY/RESUMEN 19
1. LITERATURE REVIEW/REVISIÓN BIBLIOGRÁFICA
1.1 Dieta Mediterránea 27
1.2 Transición Nutricional 31
1.3 Alimentación fuera del hogar 39
1.4 Alimentación fuera del hogar y Salud pública 48
1.4.1 Alimentación fuera del hogar: Alérgenos Alimentarios 57
2. OBJETIVES /OBJECTIVOS 63
3. WORK PLAN/PLAN DE TRABAJO 67
4. EXPERIMENTAL WORK /PARTE EXPERIMENTAL
4.1. Healthy food and food allergen knowledge, attitudes and practices practices: A pilot study of the general public and food handlers. 73
4.1.1. Introduction 73
4.1.2. Materials and methods 74
4.1.3. Results and discussion 76
4.1.3.1. Healthy food knowledge, attitudes and practices 76
4.1.3.2. Food allergen knowledge, attitudes and practices 84
4.1.4. Conclusions 91
4.2. Foods menus evaluation for most nutrition quality in restaurants and consumers perception of healthy menus 93
4.2.1. Introduction 93
4.2.2. Conceptual background 94
4.2.2.1. The restaurant select 94
4.2.2.2. Menu design 95

4.2.2.3. Nutritional composition of menus 97
4.2.2.4. Survey design 98
4.2.2.5. Study design 98
4.2.2.6. Statistical analysis 100
4.2.3. Results 100
4.2.3.1. Food menus evaluation 100
4.2.3.2. Nutritional improvements on the menus 105
4.2.3.3. Intrinsic properties: analysis and modifications of dishes 107
4.2.3.4. Nutritional composition analysis after the menus changes 110
4.2.3.5. Nutritional composition analysis of menus of combinations of dishes 115
4.2.3.6. Study of consumers perceptions of healthy menus at the restaurants 131
4.2.4. Discussion 132
4.2.5. Conclusions 134
4.3. Nutritional information at the restaurant 137
4.3.1. Introduction 137
4.3.2. Materials and methods 138
4.3.3. Results and discussion 139
4.3.4. New strategy of nutritional information at the restaurant 141
4.3.5. Conclusions 143
4.4. Chefs at the school 145
4.4.1. Introduction 145
4.4.2. Conceptual background 147
4.4.3. Study design 147
4.4.4. Conclusions 151
5. CONCLUSIONS/ CONCLUSIONES 155
6. REFERENCES/ BIBLIOGRAFÍA 161
7. ANNEX/ANEXOS 185

INDEX OF TABLES/ INDICE DE TABLAS

Page

Tabla 1. Evolución de la ingesta calórica, proteica y lipídica por persona y día en España. 34

Table 2. Cambios sufridos en la tecnología culinaria de la Dieta Mediterránea 36

Table 3. Distribución del gasto expresado en % (1987/2013) 40

Table 4. Recomendaciones dietéticas 44

Table 5. Porcentaje de energía que aportan los distintos grupos de alimentos a la dieta de los españoles 46

Table 6. Food science knowledge survey. 77

Table 7. Recipe modifications most likely to be used by food handlers and general public. 79

Table 8. Recipe modification of Moist rice 79

Table 9. . Characteristics of reduced-calorie menu items ranked as the most influential for success by food handlers in different positions 81

Table 10. Mean scores of food handlers and general public on attitude survey items 82

Table 11. The perception of general public and food handlers regarding food allergies 85

Table 12. The dishes of the restaurant 96

Table 13. Groups of dishes and ingredients used to starters 102

Table 14. Groups of dishes and ingredients used to desserts 103

Table 15. Groups of dishes and ingredients used to Main Courses 104

Table 16. Nutritional composition of the menu dishes before the menus changes 106

Table 17. Dietary evaluation of dishes compared to recommendations from Spanish population for lunchtime 111

Table 18. Nutritional composition of the menu dishes after changes 114

Table 19. Combinations of dishes 116

Table 20. Selection of dishes and menus proposed 128

Table 21. Questionnaire results before and after menu changes 132

Table 22. Description of the sensory education programme (Reverdy et al.,2008) 148

Table 23. The perception of children when they tried foods with lower energy dense and higher energy dense 149

INDEX OF FIGURES/ INDICE DE FIGURAS

Page

Figure 1. Tendencia del consumo de calorías promedio, según datos procedentes de las "hojas de balance alimentario" 33

Figure 2. Transición nutricional 38

Figure 3. Modelo del proceso de elección de los alimentos 50

Figure 4. Índices de sobrepesos pasados y futuros (previstos) en algunos países 54

Figure 5. Plan de trabajo/ work plan 68

Figure 6. The combination of menus 129

Figure 7. The opinions of consumers about food label information at the restaurant. 139

Figure 8. Virtual menu QR code 142

Figure 9. Tasting game 150

INDEX OF ABBREVIATIONS/ INDICE DE ABREVIATURAS

AECOSAN- Agencia Española de Consumo, Seguridad Alimentaria y Nutrición.

AGS o SFA- Ácidos Grasos Saturados

AGP o PUFA- Ácidos Grasos Polinsaturados

AGM o MUFA- Ácidos Grasos Monoinsaturados

ANOVA- Análisis de la Varianza

AVC- Accidente Cerebrovascular

CHO- Hidratos de Carbono

CIHEAM- Centre International de Hautes Études Agronomiques Méditerranéennes

DM- Dieta Mediterránea

EAACI- Academia Europea de Alergia e Inmunología Clínica

ED- Energy dense

EFSA- European Food Safety Authority

ENS- Encuesta Nacional de Salud

ENT- Enfermedades No Transmisibles

EVC- Enfermedad Vascular Cerebral

FAAN- Food Allergy and Anaphylaxis Network

FAO- Organización de las Naciones Unidas para la Agricultura y la Alimentación

FEHV- Federación Empesarial de Hostelería de Valencia

GET- Gasto Energético Total

IDEFICS- Identification and Prevention of Dietary and Lifestyle induced Health efectes in Children and Infants

ILSI- International Life Sciences Institute

IMC- Indice de Masa Coporal

IR o DRV- Dietary Reference Value

MAPA- Ministerio de Agricultura, Alimentación y Medio Ambiente

MS- Monosacáridos

OMS o WHO- Organización Mundial de Salud

PS- Polisacárideos

PTN- Proteína

QR- Quick Response

SEAIC- Sociedad Española de Alergología Clínica

SENC- Sociedad Española de Nutrición Comunitaria

TN- Transición Nutricional

UNSCN- United Nations Standing Committee on Nutrition

UNESCO- Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura

Resumen

En la actualidad existe una tendencia en restauración encaminada al rescate de platos tradicionales saludables, estilizados, que devuelva a cada país su identidad gastronómica y cultural. La cocina española y su tradicional Dieta Mediterránea ha recibido especial atención por ofrecer una dieta saludable con protección frente a enfermedades cardiovasculares, pero integrada en una sociedad occidental permeable a otras culturas y nuevos estilos de vida. Sometida a un progreso contínuo se ha ido modificando determinadas pautas alimentarias y hábitos nutricionales. Puede decirse que las nuevas tendencias en la restauración tienen su origen a partir del nuevo escenario epidemiológico de salud que vive el mundo, donde se presentan también las alergias alimentarias como un problema de salud pública, ya que afectan en Europa a más de 17 millones de personas. Por ello en este trabajo se propone evaluar nutricional y dietéticamente los platos ofertados en los restaurantes seleccionados, diseñar y planificar dietas, promoviendo los efectos de una cocina estilizada, que debe garantizar platos de exquisito sabor, adecuado en términos de aporte nutritivo y alérgenos alimentarios. También se exige a los menús más calidad que cantidad, las elaboraciones están dirigidas a ofertar "menús saludables" objetivando el rescate de la Dieta Mediterránea, garantizando la satisfacción y la salud de los clientes que visitan el restaurante. Para llevar a cabo el desarrollo de los mismos, se seleccionan quince restaurantes de la Comunidad Valencia realizando encuestas al personal de cocina, con el propósito de indagar el grado de conocimiento, actitudes y prácticas respecto de los preceptos sobre la alimentación saludable y libre de alérgenos alimentarios; las respuestas

muestran el insuficiente conocimiento por parte de los encuestados, pero un notable interés por ofrecer comida saludable. Se selecciona un restaurante que oferta platos tradicionales de la Dieta Mediterránea y que presenta el sello “Q” de calidad turística. Se procede a su estandarización, estilización, evaluación nutricional, se identifican las posibilidades de mejoras de los platos seleccionados para lograr su inserción en la comercialización y se recaban datos de la percepción espontánea de los consumidores, con el propósito de conocer el comportamiento del consumidor ante opciones saludables, reflexionando el direccionamiento de las políticas de salud pública ofertadas. Al final, se evaluán las posibles acciones de los chefs de cocina con el propósito de promover hábitos alimentarios más saludables, centrándose en la población infantil usuaria de la restauración colectiva, en concreto de los comedores escolares.

SUMMARY

Nowadays, there is a trend in catering that focuses on the rescue of healthy and stylish traditional dishes, which aims to restore each country's cultural and gastronomic identity. The Spanish cuisine and its traditional Mediterranean diet, which has received attention for offering, besides a healthy diet, body protection against cardiovascular diseases, but integrated in a Western society permeable to other cultures, and subjected to continuous progress and new lifestyles, has been modifying certain dietary patterns and nutritional habits. It could be said that new trends in catering has its origin in the new health epidemiological scenario experienced by the world, which also has allergens food as a public health problem, and solely in Europe 17 million people have sort of food allergy. For them, it is proposed a dietary evaluation of the menus offered by restaurants part of the study, design and planning therapeutic diets, promoting effects of a stylish kitchen, which should ensure great-tasting food, adequate in nutritional content and allergens, requires more quality than quantity of the menus, their preparations are intended to offer "healthy menus" aiming to rescue the Mediterranean diet, to ensure satisfaction and health of customers visiting the restaurant. To carry out their development, 15 restaurants in Valencia were selected in order to investigate the consumer behavior in front of healthy and food allergens options, considering the positioning of the knowledge and public health policies offered. The results reflect an insufficient knowledge by poll respondents, but the results also have shown that a large proportion is amenable to the idea of nutrition training. There was selected one restaurant to offer traditional dishes of the Mediterranean

diet and that has seal of “Q” quality. After, its standardization, stylization, dietary assessment and data collection from the spontaneous perception of consumers. The result was dietary assessment procedures, stylization of traditional dishes, the characterization of them, and dietary data was collected from spontaneous consumer choice and opportunities for improvements were identified in selected courses to ensure their inclusion in commercialization. At the end, there were evaluated possible actions of the chefs at school as the aim to promote health food habits for children.

Resumo

Na atualidade existe uma tendência em restauração coletiva encaminhada ao resgate de pratos tradicionais saudáveis, estilizados, que devolva a cada país sua identidade gastronômica e cultural. A cozinha espanhola e sua tradicional Dieta Mediterrânea recebem especial atenção por oferecer uma dieta saudável e proteção frente as doenças cardiovasculares, mas quando integrada a sociedade ocidental influenciada por outras culturas e novos estilos de vida, submetida em um processo continuo modifica determinadas pautas alimentares e hábitos nutricionais. Podemos dizer que as novas tendências na restauração coletiva têm sua origem a partir do novo cenário epidemiológico de saúde em que vive o mundo, onde também fazem parte as alergias alimentares como um problema de saúde publica, já que só na Europa mais de 17 milhões de pessoas estão afetadas por elas. Por eles que neste trabalho propomos avaliar dieteticamente os pratos oferecidos nos restaurantes selecionados, desenhar e planejar dietas e promover uma cozinha estilizada, que deve garantir pratos deliciosos, adequados em aporte nutritivo e alergias alimentares. Também é exigido mais qualidade que quantidade dos pratos, as elaboração são feitas visado a oferta de pratos "pratos saudáveis" de acordo com a Dieta Mediterrânea, garantido satisfação e saúde dos clientes que visitam o restaurante. Para desenvolver o proposto, foram selecionados 15 restaurantes de Valencia, realizando questionários com os trabalhadores de restaurantes com o objetivo de avaliar o grau de conhecimento, atitudes e praticas a respeito dos conceitos de alimentação saudável e livre em termos de alergias alimentares; as respostas mostraram insuficiente conhecimento pelos entrevistados, mas se destacar o

interesse por oferecer comida saudável. Foi selecionado um restaurante que oferece pratos tradicionais da Dieta Mediterrânea e que apresentava o selo "Q" de qualidade turística. Procede a estandarização, estilização, e avaliação nutricional, são identificadas as possibilidades de melhorias dos pratos selecionados para atingir a comercialização e são coletados os dados da percepção espontânea dos consumidores, com o propósito de conhecer o comportamento do consumidor frente as opções saudáveis, refletindo sobre o direcionamento das políticas publicas oferecidas. Ao final, são avaliadas as possíveis ações dos chefes de cozinha, com o objetivo de promover hábitos alimentares saudáveis, centrando-se nas crianças usuárias da restauração coletiva usuárias dos comedores escolares.

1. REVISIÓN BIBLIOGRÁFICA

LITERATURE REVIEW

1.1 Dieta Mediterránea

La alimentación mediterránea ha sido objeto de numerosos debates y estudios, centrados especialmente en la salud y la nutrición. Sin embargo, no podemos ignorar que también se están realizando estudios científicos sobre el comportamiento de los consumidores (Hoppert et al., 2012, 2014). Los consumidores en el momento de elegir los alimentos han aprendido que deben tener en cuenta los efectos para su salud, pero este proceso está restringido en gran parte a la búsqueda intencional y evaluación cognitiva de los atributos de los alimentos (Verbeke, 2006). El estudio de la Dieta Mediterránea (DM) debe, realizarse en el contexto de las grandes problemáticas que se plantean en los distintos países. Las estrategias para dar respuesta a los desafíos sanitarios y nutricionales no resultan comprensibles si no se tienen en cuenta también los aspectos históricos, sociales, económicos, de innovación o de intervención de las administraciones (Díaz-Ambrona y Mombiela, 2012).

Puesto que las cuestiones alimentarias son factores de presión (como las enfermedades crónicas relacionadas con la alimentación, el bienestar o los costos de la sanidad pública), el mundo está redescubriendo la importancia de la alimentación saludable. Ha habido numerosas llamadas para fomentar la elección de alimentos y dietas saludables (Dority et al., 2010; Flegal et al., 2010). Los gobiernos de diversos países han iniciado campañas para aumentar la conciencia sobre la salud en los consumidores; sin embargo, muchas de estas campañas no han logrando sus expectativas. Los consumidores se enfrentan a la creencia de que la alimentación saludable es menos sabrosa (ya que se considera sabrosa ligada a insalubre) (Raghunathan et al., 2006). Las campañas de promoción de salud fuerzan a

sólo una parte de esta relación inversa. Para resolver el conflicto y para mitigar este concepto, es fundamental proporcionar a los consumidores alimentos saludables y sabrosos. Este problema es considerado como uno de los pilares para mantener una dieta saludable a lo largo del tiempo y lograr cambios sostenibles y duraderos (Mai et al., 2014). En la región mediterránea, resulta necesario promover modelos de desarrollo más eficaces que vuelvan a integrar la tradicional DM, pues en esta región, en constante evolución, la alimentación es ámbito de importancia estratégica para la sociedad, la economía, la salud y las culturas (CIHEAM, 2008).

Helenos y latinos utilizan el trigo, los romanos la vid y el olivo, siendo símbolos de identidad de esas civilizaciones. A los que se unen las verduras, hortalizas y legumbres, frutas y frutos secos, algo de carne, leche y queso, así como los productos de la pesca (Giammellaro, 1996).

En la España musulmana se introdujeron gran variedad de plantas cultivadas en países del Oriente Próximo (cítricos, arroz, granada, nísperos, alcachofa, berenjena…) así como cabras y ovejas, que sirvieron para ampliar la oferta alimentaria y enriquecer la gastronomía (López Martínez, 1995).

La cocina andalusí se caracteriza por el uso de especias y de hierbas aromáticas que se convierten en su rasgo característico de la esencia y el aroma de su comida. La diferencia con otras civilizaciones, como los romanos, que utiliza las especias para ocultar que la comida no es sabrosa, en el Ándalus se utilizan para potencializar los sabores y hacer las comidas más sabrosas y más atractivas. Muchas de las especias proceden de China, Persia e India, y participan en el desarrollo de una exquisita gastronomía al mismo tiempo que sirve para impulsar la economía gracias al comercio con Europa y Norte de África. Entre otras muchas especias que llegaron a la

Península tenemos: mostaza, jengibre, canela, nuez moscada, azafrán, menta, lavanda, comino, orégano y perejil; destaca cilantro y comino (kammún), que son los más representativos y se recomiendan para aliviar dolores de estómago y ayudar en la digestión (Salas-Salvadó et al., 2006).

Con el descubrimiento de América, llegaron cereales, verduras, hortalizas, frutas y especias, que modificaron la alimentación en España, con la introducción de alimentos como patata, judía, tomate, pimiento, maíz y girasol, introduciendo también el pavo, pescados y mariscos; en el patrón alimentario, así como una gran incidencia en la agricultura, pues la mayor productividad de algunos, provocó el abandono de otros tradicionales (López, 2002).

Todos estos acontecimientos históricos influyen, entre otros sectores a la modificación del patrón alimentario y nos lleva a la DM tal como la conocemos.

La DM es un patrón alimentario que pertenece al ambito cultural, histórico, social, territorial y ambiental y está estrechamente relacionado con el estilo de vida de los pueblos del Mediterráneo en toda su historia.

«La DM es un conjunto de competencias, conocimientos, prácticas y tradiciones relacionadas con la alimentación humana, que van desde la tierra a la mesa, abarcando cultivos, cosechas y pesca, así como la conservación, transformación y preparación de los alimentos y, en particular, el consumo de estos. La DM está caracterizada por un modelo nutricional que ha permanecido constante a través del tiempo y del espacio, siendo sus ingredientes principales el aceite de oliva, los cereales, las frutas y verduras frescas o secas, una proporción moderada de carne, pescado y productos lácteos, y abundantes condimentos y especias, cuyo consumo en la mesa se

acompaña de vino o infusiones, respetando siempre las creencias de cada comunidad.» (UNESCO, 2010).

La DM, ofrece una cocina sencilla, imaginativa y rica en matices (color, textora, aroma y sabor). Pero sobre todo es una dieta saludable que preserva las tradiciones y las costumbres de los pueblos de la cuenca del Mediterráneo (Buono et al., 2002). La DM reconocida como un patrón de dieta saludable (Willett et al., 1995), se caracteriza por su perfil de ácidos grasos, con grandes cantidades de ácidos grasos monoinsaturados con el ácido oleico como mayoritario y bajo contenido en ácidos grasos saturados (Bos, 2010; Serra-Majem et al., 2009). Además, el consumo de una pequeña cantidad de hidratos de carbono (Serra-Majem et al., 2009), combinados con elevada ingesta de fibra dietética (Estruch et al., 2009) y antioxidantes (Visioli et al., 2001; Pisavos et al., 2005), se relaciona con efectos beneficiosos sobre la salud. Una mayor adherencia a la DM se ha relacionado con la menor incidencia o mortalidad por enfermedades cardiovasculares, ciertos tipos de cáncer, enfermedades neurodegenerativas (enfermedad de Parkinson y de Alzheimer) y diabetes tipo 2 (Sofi et al., 2010; Estruch et al., 2013; Altomare et al., 2013).

Las tendencias dietéticas actuales, con un mayor contenido calórico, hidratos de carbono refinados, ricas en carne y grasas saturadas junto con estilos de vida más sedentarios están impulsando las tasas de obesidad y aumentando la incidencia de diabetes tipo II, enfermedades coronarias y otras patologías crónicas que reducen las expectativas de vida (Swinburn et al., 2011; Popkim et al., 2012). Además estos cambios en la dieta pueden contribuir, en el año 2050, al aumento del 80% de emisiones de gases efecto invernadero por producción de alimentos (Tilman y Clark, 2014).

Por todo esto, la dieta en el mundo occidental, con un elevado consumo de productos de origen animal continúa estando en el punto de mira. Existe un creciente consenso entre la comunidad científica en su cambio. Numerosos estudios concluyen que los gobiernos que están considerando una actualización de las recomendaciones dietéticas para definir una dieta saludable y sostenible, deben incorporar la recomendación de reducir el consumo de carne y productos derivados e incorporar patrones alimentarios y estilos de vida mediterréneos (Burlingame y Dernini, 2011; Clonan y Holdworth, 2012; Drewnowski et al., 2015)

1.2 Transición nutricional

La transición nutricional consiste en un conjunto de cambios en los comportamientos alimentarios y estilos de vida, que se inicia en el siglo XIX simultáneamente al proceso de industrialización (Cussó y Garrabou, 2007). En España la transición nutricional tiene su apogeo en 1975 cuando comienza la etapa democrática, asociada a la mejora en las condiciones económicas y sanitarias (transición demográfica y transición epidemiológica) (Marrodán et al., 2012). Con la actual globalización de los mercados se tiende a seguir un modelo alimentario uniforme y universal, despreciando u olvidando lo propio o tradicional (Da Silva et al., 2009). Este cambio se caracteriza por la disminución en el consumo de alimentos ricos en hidratos de carbono complejos y fibra, aumento de los que contienen azúcares refinados, los lácteos y otros productos de origen animal, lo que implica un incremento de la ingesta de energía, proteínas de origen animal y grasas (abundantes en los productos cárnicos y en los procesados). (Garcia-Closas et al., 2005)

Los múltiples cambios producidos en las condiciones alimentarias y nutricionales de la mayoría de los países industrializados en los últimos 50 años, constituyen un proceso multifactorial (transición nutricional) que bien se traduce al principio en una alimentación completa y variada, pero finalmente desemboca en una dieta opulenta y de alto contenido calórico (Popkin, 2001; Popkin et al., 2012). En este contexto dietas "tradicionales" y frugales como la Dieta Mediterránea, son reemplazadas por dietas "modernas" y excesivas conocidas como "Western Diets" caracterizadas por una alta ingesta de sal, azúcares y grasas refinadas, alimentos procesados y productos de origen animal, especialmente carnes y lácteos (TERRAMED, 2012; Tilman y Clark, 2014).

Tillman y Clark (2014) valoran como dietas alternativas a las "Western Diet" podrían reducir las emisiones de gases efecto invernadero por producción de alimentos (proyectadas para 2050). Los resultados muestran que dietas, como la DM, pueden disminuir un 30% el aumento estimado de estos gases per cápita, por su menor consumo de carne y mayor de pescado, lo cual nos conduce a poder considerar la DM como un modelo de dieta sostenible.

Por otra parte, la globalización del sistema alimentario ha contribuido a la degradación ambiental y a la pérdida de biodiversidad al tiempo que reduce costos en dietas altas en energía pero pobres en variedad y/o nutrientes (Johnston et al., 2014). Las tendencias y patrones de producción y consumo de alimentos son una de las causas principales de presión sobre el medio ambiente pudiendo afectar negativamente a muchos niveles: cambio climático, biodiversidad, agua, tierra y energía (Reynolds et al., 2014).

Existe una estrecha relación entre los cambios dietéticos y la morbimortalidad, por lo que los fenómenos de transición nutricional y epidemiológica han de considerase conjuntamente. La FAO (Organización de las Naciones Unidas para la Agricultura y la Alimentación) en el año 2008 estimó la ingesta energética mundial en 2760 Kcal/persona/día. En la Figura 1 se muestra la tendencia de consumo de calorías promedio mundiales durante el periodo entre 1964 y 2000 y su proyección hasta el 2015, se observa un aumento de las calorías ingeridas en general (FAO, 2008).

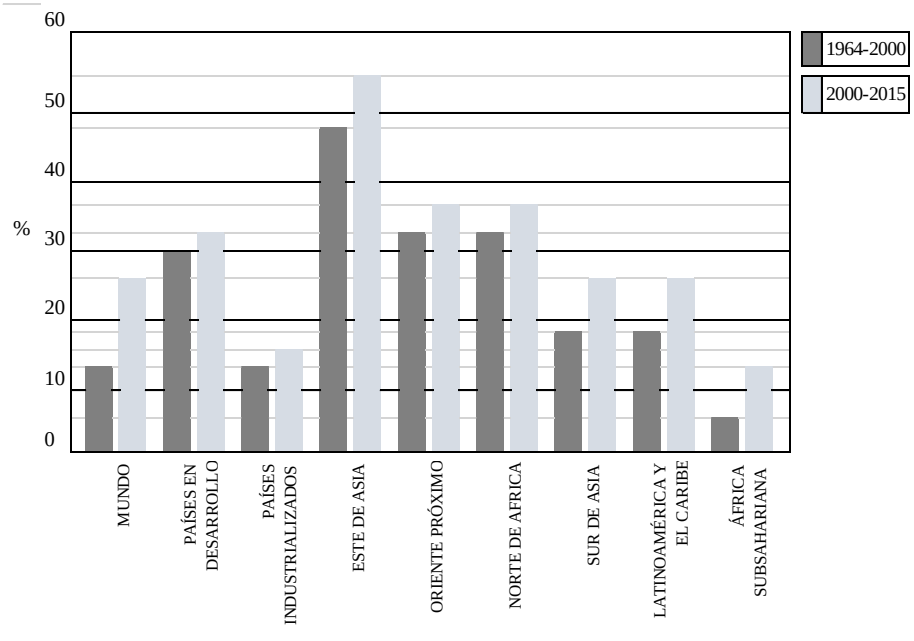


Figura. 1: Tendencia del consumo de calorías promedio, según datos procedentes de las "hojas de balance alimentario" (FAO, 2008)

En España la evolución del patrón alimentario (1964-2008) es similar, observando un aumento en la ingesta energètica diària, con poca variación entre los años 2000 y 2008, tampoco hay cambios significativos en la distribución de la energía entre los macronutrientes (Tabla 1). Se observa una clara estabilidad, lo que indica que aunque en los últimos años no ha habido un empeoramiento en la dieta consumida por los españoles, las campañas que se han realizado para mejorarlos no han surtido el efecto deseado. España entra en el siglo XXI aproximándose a una ingesta media de 3.500 kcal/día, valor muy superior a los requerimientos fisiológicos y por tanto el inicio de la obesidad y otros trastornos vinculados al desarrollo económico (Collantes, 2009), aunque los datos no son coincidentes con lo aportados por MAPA (2012).

Tabla 1. Evolución de la ingesta calórica, proteica y lipídica por persona y día en España (Ministerio de Agricultura, Alimentación y Medio Ambiente-MAPA, 2012).

Año	Energía (Kcal)	% Proteínas	% Grasas	% Hidratos de carbono
1964	3008	12	32	57
1981	2914	13	40	47
1991	2634	14	42	45
2000	2730	14	39	47
2006	2761	14	41	46
2008	2754	14	40	42

%, porcentaje respecto al valor energético total de la dieta.

El perfil calórico se corresponde con la modificación en el consumo de los distintos grupos de alimentos. Los cambios en la ingesta energètica y macronutrientes corresponde a la modificación de los hábitos alimentarios.

El consumo de cereales y derivados, azúcar, aceites y grasas y legumbres disminuye. Sin embargo, los alimentos ricos en proteínas de origen animal (huevos, carnes y derivados, pescado y mariscos, leche y productos lácteos) presentan su máximo consumo entre 1980 y 1990, decreciendo posteriormente, aunque no se alcanzan los valores observados en 1964, por lo que se aleja del patrón de DM (Calle et al., 2012). Por otra parte, destacar el descenso en el consumo de verduras, hortalizas y frutas. Este comportamiento está relacionado con la incidència de las patologías relacionadas con la alimentación que se hace más notable a partir de 1980.

La transición nutricional tendría muchas vertientes, pero son principalmente el aumento de los niveles de consumo alimentario, la estabilización y la regularización de las ingestas frente a la escasez de etapas anteriores; y en segundo lugar el aumento del grado de diversificación de las dietas, con la sustitución de cereales, patatas y legumbres por alimentos de origen animal, mayoritariamente carne, huevos y productos lácteos, de esta manera se finaliza con la monotonía de la dieta que conducía a carencias nutricionales.

La modificación de los gustos de los consumidores y del valor simbólico de determinados alimentos han sido factores importantes en los cambios nutricionales descritos.

La cronología de la transición nutricional es paralela al crecimiento económico, con una rápida recuperación del progreso en las décadas posteriores a 1950. A partir de 1960 se empieza a observar una evolución en la sociedad española (tanto política como econòmica) con una apertura hacia el exterior; además hay que añadir la modificación en la estructura familiar

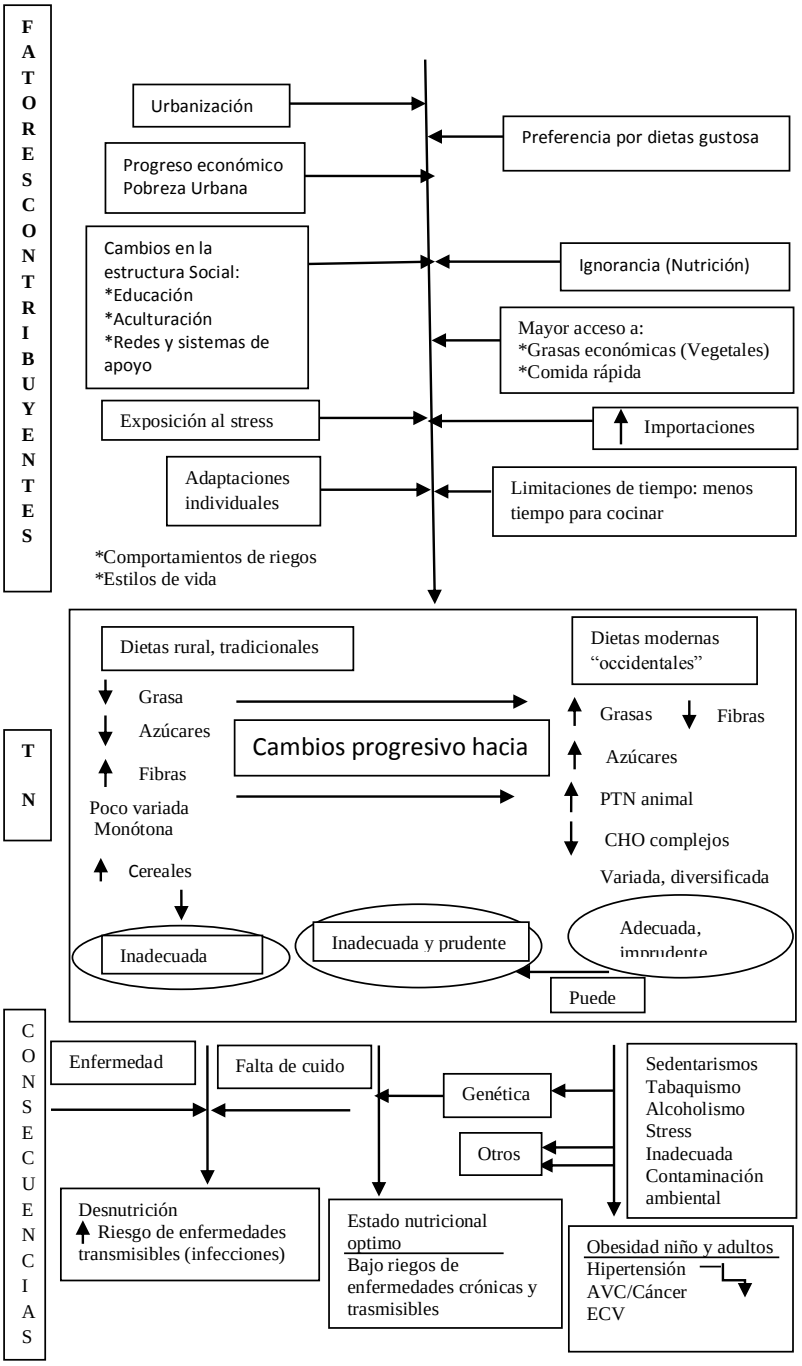
y del estilo de vida, hechos que condicionan la compra y la elaboración de los alimentos (Marrodán et al., 2012), consiguiendo vencer la escasez y la monotonía. En la Tabla 2 quedan reflejadas las principales diferencias, tanto en ingredientes como en preparación de los platos, antes y después de lo que hemos denominado transición nutricional. Esta diversificación de la dieta fue importante para el bienestar de la población española. De hecho, el desarrollo económico ha incorporado nuevos indicadores sociales relacionados con la alimentación (directos, como el consumo de calorías, o indirectos como la estatura y la tasa de mortalidad) (Collantes, 2009).

Tabla 2- Cambios sufridos en la tecnología culinaria de la Dieta Mediterránea

AYER	HOY
Los elementos del plato suelen estar mezclados, unidos por la cocción;	El elemento principal suele ser un trozo de carne o pescado, o huevos;
Desempeñan distintas funciones: las proteínas y las grasas animales a condimento.	El alimento secundario acostumbra a ser vegetales, sobre todo hortalizas o patatas. Los vegetales son la guarnición;
La salsa, el sabor del conjunto, procede de la mezcla de los sabores y todos los ingredientes. Pueden incorporar grasas animales y vegetales mezcladas, pero no son el elemento principal que acostumbra ser el agua y el espesado/ligazón se realiza habitualmente con quesos y huevos que se espesan por cocción;	El sabor del conjunto del plato lo proporciona una salsa preparada a parte, que suele contener una cantidad importante de grasas animales que derivan tanto de su composición como de sus elementos ligantes o espesantes;
El queso y los huevos se emplean con más frecuencia como condimentos que como alimentos en la cocina;	El queso normalmente se come como complemento separado del grueso de los platos al final de la comida o entre comidas;
Los productos se relacionan entre si por fusión, que propicia la mezcla de sus gustos y texturas;	Los productos se relacionan entre si por posición yuxta, o sea, por estar uno junto al otro o uno recubierto por otro en el mismo plato;

En torno al concepto de transición nutricional se presentan dos perspectivas, la lucha contra la escasez y los desafíos sociales planteados por la abundancia en la etapa del desarrollo. En este contexto, la alimentación fuera del hogar parecía tomar la forma de un "bien del consumidor" ligado a la sociedad del consumo.

Todos estos cambios que engloban la "transición nutricional" han conducido a que el patrón alimentario en España se aleje de la DM con unas claras repercusiones sobre la salud. Este proceso se muestra detalladamente en la Figura 2. (Vorster et al., 1999).



TN – Transición Nutricional; AVC- Accidente Cerebrovascular; EVC- Enfermedad Vascular Cerebral; PTN- Proteínas; CHO- Hidratos de Carbono.

Figura 2. Transición nutricional (Vorster et al, 1999).

1.3 Alimentación fuera del hogar

Se entiende como restauración la preparación, comercial o no, de alimentos destinados a ser consumidos por grupos numerosos de personas. La alimentación colectiva comprende todas las variedades fuera de la comida familiar (Cevera et al., 1999). La necesitad de comer fuera de casa, especialmente al mediodía, es un hecho asociado al estilo de vida actual, sobre todo en el medio urbano de los países industrializados. En Gran Bretaña en los últimos años, el 70% del gasto económico corresponde al consumo de alimentos en los bares, restaurantes y comida para llevar; 2.197 adultos británicos, entre 16 - 64 años de edad consumen el 21% de su comidas fuera del hogar, lo cual corresponde al 27% del consumo diario de energía (Kearney, 2001); más del 35% de los belgas consumen más del 25% de energía fuera del hogar (Vandevijvere, 2009); en Canadá 17,7 millones de personas (aproximadamente la mitad de la población) visitan 80.800 restaurante (Sualakamala y Huffman, 2010). Estas cifras están todavía lejos de las que se observan en Estados Unidos, ya que en 1994 se destinaba al consumo en el hogar tan sólo el 47% del gasto alimentario total y las estadísticas de la National Restaurant Association en el año 2010 indican que diariamente, en los Estados Unidos más de 130 millones de personas son usuarias de los servicios de restauración. Además, el 44% de los adultos en los Estados Unidos dicen que los restaurantes son una parte esencial de su estilo de vida. (National Restaurant Association, 2011). Según Euromonitor Internacional, España es el mayor consumidor del mercado de servicios de alimentación en la Unión Europea, en términos de volumen de ventas y tiene uno de los mayores números de puntos de venta per capita del mundo (Nestlé, 2006).

La distribución del gasto total en España entre hogares, hostelería y restauración e instituciones sigue un desplazamiento ligero, pero continúo desde los hogares hacia la hostelería y restauración, representando una tercera parte del gasto total de alimentación (MAPA, 2014). (Véase Tabla 3)

Tabla 3. Distribución del gasto expresado en % (1987/2013) (Ministerio de Agricultura, Alimentación y Medio Ambiente-MAPA, 2014)

Año	Hogares	Extradoméstica	Total
1987	78,4	21,6	100
1988	77,6	22,4	100
1989	76,2	23,8	100
1990	74,4	25,5	100
1991	73,9	26,1	100
1992	75,1	24,9	100
1993	76,3	23,7	100
1994	76,0	24,0	100
1995	74,3	25,7	100
1996	73,4	26,6	100
1997	73,0	27,0	100
1998	71,7	28,3	100
1999	71,7	28,3	100
2000	71,8	28,2	100
2001	72,8	27,2	100
2002	73,2	26,8	100
2003	73,1	27,0	100
2004	72,5	27,5	100
2005	72,2	27,8	100
2006	72,5	27,5	100
2009	69,2	30,8	100
2013	72,3	27,7	100

* Informe del consumo de Alimentación en España 2014.

Los organismos sanitarios reconocen la influencia creciente de la restauración colectiva sobre la salud y el estado nutricional de la población. Este tema resulta de especial interés para los profesionales de la alimentación y nutrición, por las consecuencias que pueda tener, especialmente para aquellas personas denominadas por algunos autores "comensales cautivos", es decir, aquellos que, por alguna razón (estudios, trabajo, salud, edad), deben utilizar casi obligatoriamente estos servicios (Sala y Montañes, 1999).

Una de las recomendaciones que la OMS (1992) hace a los gobiernos es establecer políticas que, por un lado, evalúen el papel positivo de la restauración colectiva desde el punto de vista de la salud nutricional de la población y, por otro, analicen la adecuación nutricional a la situación actual.

Cuando se hace referencia a la calidad de un plato cocinado elaborado por una empresa de restauración colectiva, hay que considerar aspectos nutricionales, organolépticos y sanitarios. Por consiguiente, se puede hablar de diversos tipos de calidades (Serra-Majem y Bartrina, 2006):

- Calidad nutritiva: viene determinada por el aporte de nutrientes a la dieta. Se evalúa en función de unos principios dietéticos establecidos.
- Calidad organoléptica: responde a los atributos que se perciben por los sentidos de la vista, el olfato, el gusto, el tacto, y el oído. Se valora mediante las pruebas de análisis sensorial
- Calidad higiénico-sanitaria: hace referencia a la ausencia de sustancias potencialmente tóxicas y de microorganismos patógenos.

También debe asegurar que la carga microbiana responde a los niveles

legalmente admitidos, tanto para los alterantes como para los potencialmente patógenos.

La administración pública pone especial interés en controlar los aspectos higiénicos implicados en el ámbito de la restauración colectiva, pero hasta épocas relativamente recientes no ha planteado un manifiesto interés, por los aspectos nutricionales y sociales implicados en los servicios de la restauración y su repercusión sobre diversos grupos de población o colectividades. Puede decirse que las nuevas tendencias en la restauración, tienen su origen a partir del nuevo escenario epidemiológico de salud que vive el mundo con una pandemia de obesidad y enfermedades mórbidas presentes en la mayoría de los países (OMS/FAO, 2003).

El peso específico de este tipo de alimentación en el conjunto de la dieta de la población es cada vez mayor; de ello la importancia creciente de cuidar su valor nutritivo. Entre las atribuciones de los profesionales de alimentación y nutrición está la educación nutricional a individuos sanos o enfermos en instituciones públicas o privadas, y entre varios recursos está elaborar el mayor número de comidas adecuadas nutricionalmente (Abreu et al., 2013).

Para alcanzar mejor calidad de vida se imponen los principios de una alimentación saludable, de ahí que, lo más apropiado sea cumplir con una dieta recomendable o correcta, que además es aquella que debe tenerse en cuenta en cualquier régimen alimentario, que se obtiene al menor costo posible y que debe cumplir con los siguientes requisitos (Bilbao, 2004):

• **Completa:** Es la que contiene todos los nutrientes. Se recomienda siempre que proceda, incluir en cada comida alimentos de todos los grupos básicos que estén contemplados en las guías alimentarias de cada país.

- **Equilibrada:** Aquella en que los nutrientes guardan las proporciones apropiadas entre ellos para una nutrición adecuada.
- **Inocua:** Es la dieta cuyo consumo habitual no implica riesgos para la salud, en el sentido de estar exenta de microorganismos patógenos, toxinas y contaminantes.
- **Suficiente:** Aquella dieta que tiene la cantidad de alimentos que un individuo debe consumir para cubrir sus necesidades de nutrientes de tal manera que sea capaz de mantener su peso (para los adultos) y desarrollarse a la velocidad adecuada (en el caso de los niños).
- **Variada:** Aquella que incluye diferentes alimentos en cada comida, considerándose variada también el hecho de que un mismo alimento sea preparado de diversas formas a través de distintas técnicas culinarias.
- **Adecuada:** Que contemple el estado fisiológico del individuo para el que está concebida.

Las recomendaciones dietéticas propuesta para una alimentación saludable se pueden ver en la tabla 4, donde se presentan las formulas dietéticas planteadas para un varón y una mujer adultos con actividad física ligera, que se encuentran en normopeso, estimando un gasto energético diario de 3.000 y 2.300 kcal/dia, respectivamente (SENC, 2011).

Tabla 4. Recomendaciones dietéticas

<table>
<tr><th colspan="2">Fórmulas dietéticas</th></tr>
<tr><td>Cuantitativas</td><td>Aspectos cualitativos</td></tr>
<tr><td>Valor energético [1]
Normocalóricas
Hombres: 3.000Kcal
Mujeres: 2.300Kcal
Proteínas 10- 15%</td><td rowspan="5">El que corresponda para conseguir mantener un peso saludable (IMC 18,5-25)</td></tr>
<tr><td>Grasas 30-35%</td><td rowspan="2">Limitar las grasas de origen animal.
AGS- 7-8%
AGM- 15-20%
AGP- 7-8%</td></tr>
<tr><td>Colesterol < 250 mg</td></tr>
<tr><td>Carbohidratos 55-60%</td><td rowspan="2">Carbohidratos
MS< 10%
PS < 50%</td></tr>
<tr><td>Fibra>25g</td></tr>
<tr><td colspan="2">Vitaminas: Valores normales de las recomendaciones nutricionales (IR o DRV)</td></tr>
<tr><td colspan="2">Agua 1,5- 2 litros</td></tr>
</table>

1 Calculado mediante ecuaciones SENC, 2011
2 Cuando la principal fuente de grasa es el aceite de oliva
AGS= Ácidos Grasos Saturados; AGM= Ácidos Grasos Monoinsaturados; AGP=Ácidos Grasos Polinsaturados
MS= Monosacáridos, PS= Polisacáridos
IR o DRV= Dietary reference value

El valor nutritivo de los alimentos proporcionados por la restauración colectiva puede diferir de las comidas elaboradas en casa, debido a que la preparación, el almacenamiento y los métodos de cocinado son diferentes y también debido a elección y composición de los ingredientes y suministro disponibles. Estos aspectos pueden ocasionar diferencias importantes en el contenido de nutrientes. (British Nutrition Foundation, 1987)

En las décadas posteriores a los años 70 del siglo XX, se ha visto el inicio de una epidemia de obesidad en los Estados Unidos, es probable que múltiples factores que resultan de un balance energético positivo contribuyan a estas tendencias. Una de las hipótesis es la ingesta de energía creciente debido al aumento en la frecuencia de comer fuera del hogar, al menos una o más veces a la semana, y tres o más veces por semana. En 1999-2000, comer fuera del hogar, más de 3 veces a la semana, aumentó siendo un 40% más alto que en 1987 (Biing-Hwan 2012). En España, el peso y el aumento del sobrepeso/obesidad, se relacionan con aquellos consumidores que comen dos o más veces por semana fuera del hogar, en los que se observó una mayor ganancia de peso (+129g/ año, P< 0. 001) y riesgo de aumentar 2 kg o más por año que los que comen en casa. Entre los participantes del estudio que tenían un IMC de 25 kg/m^2, se observaron 855 nuevos casos de sobrepeso/obesidad (Bes-Rastrollo et al., 2009).

En la valoración nutricional de la dieta española (Calle et al., 2012), según el panel de consumo alimentario, el comer fuera del hogar hace que se desarrollen malos hábitos alimentarios en la población, con un incremento del consumo de alimentos ricos en aceites y grasas, salsas y condimentos, alimentos precocinados y consumo de bebidas alcohólicas, así como un descenso de cereales, frutas y legumbres (Véase Tabla 5).

Tabla 5. Porcentaje de energía que aportan los distintos grupos de alimentos a la dieta de los españoles. (Ministerio de Agricultura, Alimentación y Medio Ambiente- MAPA, 2012)

Grupo de alimentos	% energía			
	Global	Hogares	Hosteleria	Instituciones
Cereales y derivados	23,2	27,3	14,6	23,4
Aceites y grasas	15,3	13,7	16,6	15,5
Carnes y productos cárnicos	11,8	13,8	9,6	10,7
Leche y derivados	11,2	11,7	8,2	9,0
Precocinados	6,1	4,3	11,9	7,0
Frutas	5,6	5,7	2,8	8,2
Bebidas alcohólicas	4,9	2,2	12,8	0,7
Verduras y hortalizas	4,8	5,0	4,4	11,0
Azúcares y dulces	3,8	5,2	3,0	3,3
Bebidas sin alcohol	3,6	2,6	4,1	1,6
Salsas y condimentos	3,1	1,8	6,3	2,6
Pescados y mariscos	2,7	2,8	2,7	2,9
Huevos	1,5	1,5	1,3	1,5
Legumbres	1,4	1,5	0,7	2,1
Aperitivos	0,9	0,7	0,8	0,3

Según datos del panel de consumo alimentario (MAPA, 2012) casi una tercera parte del gasto total en alimentación de los españoles se realiza fuera del hogar, como término medio, los españoles consumen algún producto fuera de su domicilio algo más de tres veces por semana. La comida del mediodía supone 3 de cada 10 visitas a los estabelecimientos y casi la mitad del presupuesto fuera del hogar.

En general, el gasto extradoméstico está vinculado con la actividad diaria, los ciudadanos entre 18 y 44 años suelen acudir a los establecimientos a

diario a consecuencia de la vida laboral; el motivo principal es el trabajar lejos de casa.

Este consumo alimentario fuera de los hogares repercute en muchas ocasiones de forma negativa a la dieta del consumidor, ya que este tiende a identificar inicialmente por platos completos, no los ingredientes, como la sal, el aceite o la mantequilla. Además el consumidor no conoce la cantidad o peso de cada uno de los productos utilizados en la elaboración, el plato llega transformado y en muchas ocasiones junto con otras preparaciones. Todo ello dificulta que el consumidor pueda controlar todo aquello que ingiere y puede ajustar la ingesta energética e incluso de nutrientes en las tomas (MAPA, 2012).

Sin embargo, Anderson y Matsa (2011) sostienen que este nivel de preocupación sobre la repercurción del consumo fuera del hogar es exagerada, ya que los individuos pueden compensar la mayor ingesta calórica e ingerir menos calorías en una comida posterior. Guthrie et al. (2002), sugirieren que una de las principales preocupaciones del consumo de alimentos fuera de hogar es el potencial consumo excesivo. El tamaño de las raciones de los alimentos en Estados Unidos y Reino Unido han aumentado a lo largo de los años (Nielsen y Popkin, 2003; Rolls et al., 2007) algunos estudios relatan que la disponibilidad de raciones más grandes aumenta significativamente el consumo de alimentos y de la energía diaria ingerida, además el mayor tamaño de la ración, aumenta significativamente el nivel de hambre y la cantidad de comida necesaria para crear la sensación de saciedad (Rolls et al., 2006; Kelly et al., 2009). Rolls et al. (2007) muestran que los efectos del tamaño de la ración pueden persistir durante varios días, de hecho, hay estudios experimentales que observan estos

efectos hasta en 11 días. Un estudio realizado por Jeffery et al. (2007) concluye que el consumo medio de energía aumenta significativamente cuando los participantes se les ofrece raciones mayores, durante la hora del almuerzo, comiendo lo que estaba delante de ellos, independientemente de su nivel de hambre. La exposición prolongada al exceso de ingesta energética diaria, por el consumo de grandes raciones en las comidas, a menudo da lugar a aumento de peso.

Investigar los efectos del consumo regular y a largo plazo del consumo de energía en la alimentación fuera del hogar es necesario, así como la calidad de la dieta y el tamaño de la ración, los datos sugieren que su asociación con una mayor ingesta calórica y baja calidad de la dieta merece atención en salud pública.

1.4 Alimentación fuera del hogar y salud pública

Históricamente la salud pública se define como la ciencia y el arte de prevenir enfermedades, prolongar la vida y fomentar la salud y la eficiencia mediante un esfuerzo comunitario, organizando estas prestaciones de tal forma que permitan que todos los ciudadanos vean cumplido el derecho que por nacimiento tienen a la salud y la longevidad (Winslow, 1920).

El objetivo tradicional de la salud pública es la **prevención primaria** (fomento de la salud), estrategia para la prevención de las enfermedades que se dirige en general a personas sanas para reducir la probabilidad de que presenten una enfermedad o discapacidad; en contraposición con la **prevención secundaria** (reducción de riesgo), estrategia para la prevención de las enfermedades que se centra en la detección, el diagnóstico y la intervención en las primeras fases del proceso de la enfermedad para reducir

al mínimo los efectos perjudiciales incapacitantes; y la **prevención terciaria** (tratamiento y rehabilitación), rehabilitación de una persona hasta obtener una función óptima mediante la corrección o la mejoría del efecto de la salud o de la discapacidad por una enfermedad; puede incluir tratamiento médico (Egan, 1994).

La práctica ha demostrado que restringir la educación alimentaria a transmitir información sobre en qué consiste una dieta nutritiva y equilibrada no conduce necesariamente a un mejor estado de salud y nutrición, ya que es posible que los grupos objetivo no sean capaces de poner en práctica los conocimientos adquiridos (Yach, 2011). Se ha considerado que el consumidor es un ser racional que toma sus decisiones a través de la maximización de su beneficio, sujeto a restricciones económicas, pero sus decisiones no son 100% racionales al estar influenciadas por las negociaciones de valores y estrategias. Las negociaciones de valor incluyen la percepción sensorial, calidad, motivación, emociones, aprendizaje, procesamiento de la información, cultura, patrones sociales, salud y nutrición (Falk et al., 1996; Furst et al., 1996; Varela, 2009; Sualakamala et al., 2010). (Véase Figura 3)

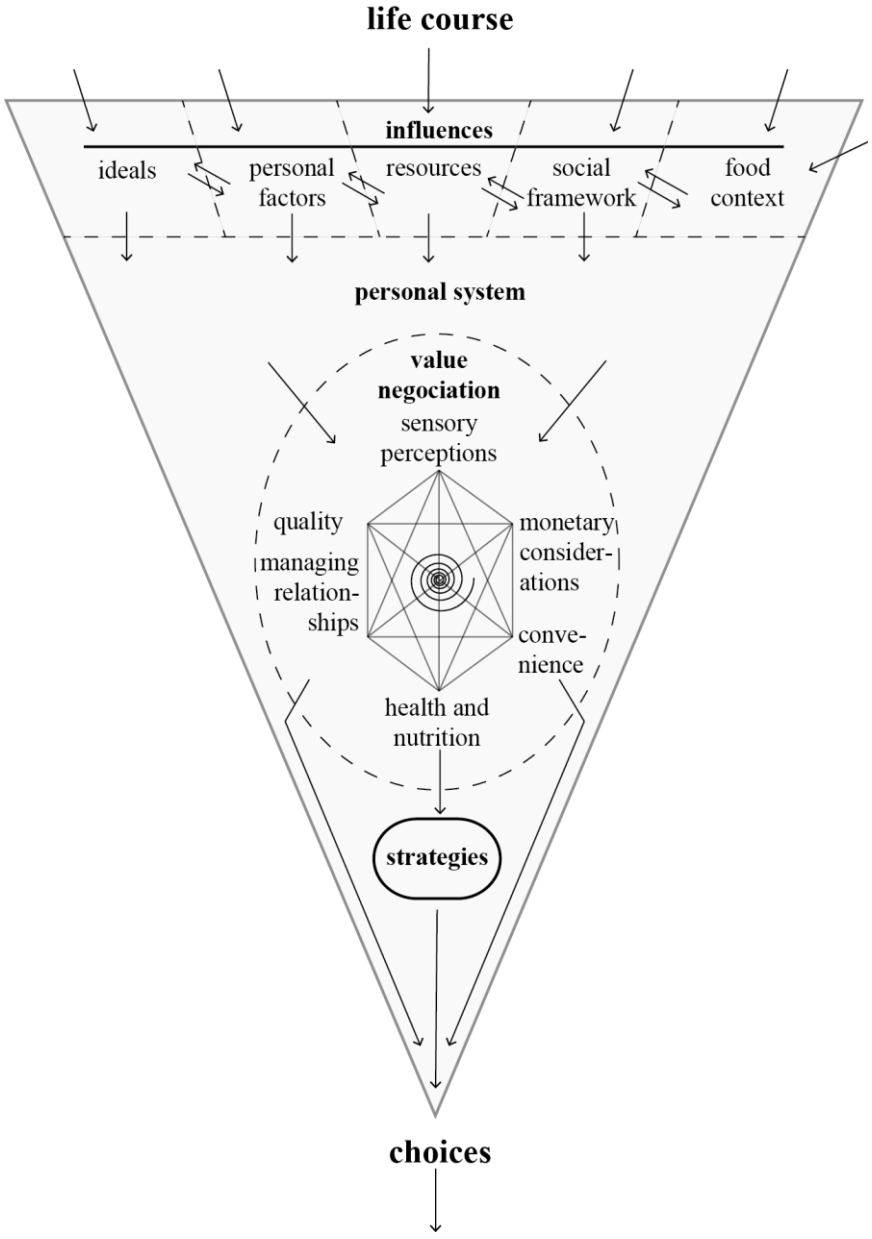


Figura 3.Modelo del proceso de elección de los alimentos (Sualakamala et al., 2010)

A menudo es difícil cumplir con todos los factores de negociación enumerados, los consumidores optan subconscientemente por cambiar los valores de las negociones unas por otras. En todas las opciones para la elección de alimentos utilizan el proceso de negociación de valores y las estrategias necesarias para aplicar las decisiones.

La percepción sensorial suele ser el factor más importante en la selección, mientras que los beneficios nutricionales siguen siendo una preocupación secundaria (Shannon et al., 2002; Goldner et al., 2013). Los consumidores a menudo tienen una percepción negativa sobre el sabor de los alimentos saludables. Por ejemplo, los consumidores más jóvenes tienen una percepción negativa sobre el sabor de los alimentos bajos en grasa (Shannon et al., 2002), asumiendo desde niños que los alimentos que son sanos no tienen buen sabor (Sualakamala et al., 2010).

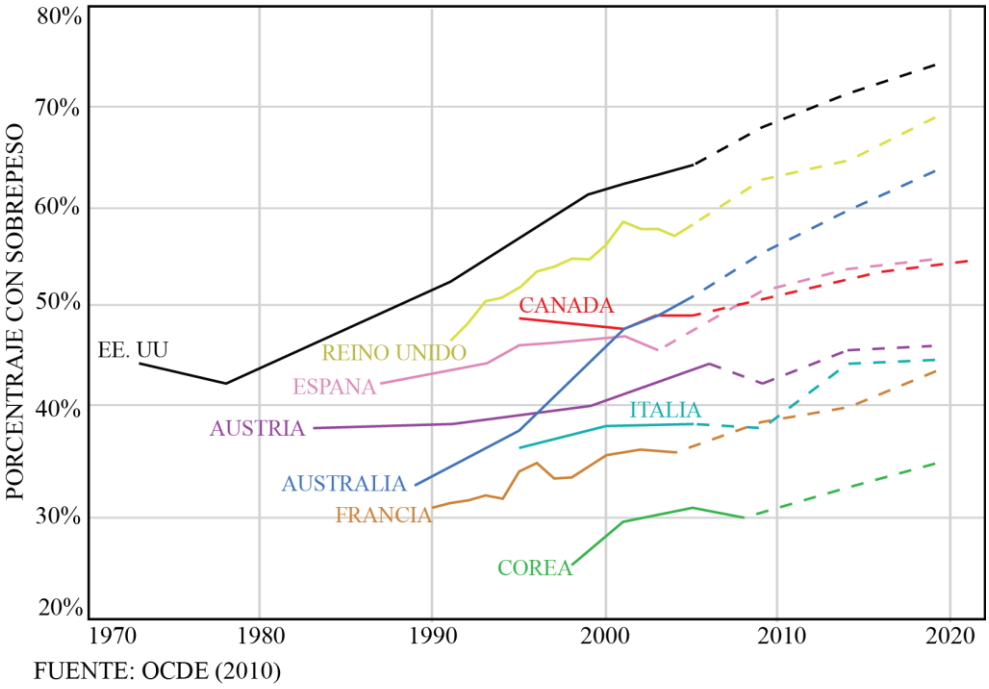
Las estrategias concebidas para superar los obstáculos que se interponen en el camino de los programas de información y educación sobre alimentación y nutrición, siguen evolucionando y dan forma a lo que puede convertirse en los «nuevos» enfoques de los programas de educación alimentaria y nutricional del siglo XXI. Uno de los desafíos que supone una amenaza real es el peligro de alteración irremediable del sistema alimentario y de la biodiversidad local, con el ritmo rápido de la vida moderna que socava la cohesión familiar, conlleva una pérdida paulatina de la apreciación de lo propio, las costumbres y prácticas tradicionales, y su eventual desaparición, todo lo cual interrumpe la continuidad en la «memoria» de nuestro patrimonio alimentario mediterráneo (Padilla, 2010). Las metodologías actuales de educación alimentaria ponen de manifiesto la aparición de una

serie de enfoques innovadores, de nuevos agentes y nuevos dominios para la intervención. Todos ellos han contribuido a una educación alimentaria «en proceso» (Satter, 2007). A continuación se presenta un conjunto de directrices para aumentar el alcance de la educación alimentaria, y que deberán ser adaptadas a los contextos locales en el ámbito de la DM (Satter, 2007) :

- Prestar la atención debida a los marcos legales, prescriptivos y reguladores y a las medidas de apoyo en el dominio público, que crean un entorno que permite la puesta en prácticas de los conocimientos de la educación alimentaria.
- Aprender de los casos de algunas comunidades mediterráneas que han tenido éxito a la hora de conservar sus costumbres de alimentación.
- Apoyar los esfuerzos para trasladar el patrimonio alimentario mediterráneo a patrones de consumo de alimentos compatibles con la vida moderna.
- Utilizar el arte culinario para adaptar las recetas tradicionales a las demandas del consumidor moderno.
- Crear mecanismos de participación en el diseño de los programas de educación alimentaria a ella dirigidos, siempre que sea posible.
- Utilizar los resultados de la vigilancia y evaluación de las intervenciones en materia de educación alimentaria como guía para reprogramarlos y mejorar su impacto.
- Identificar y superar las barreras, por triviales que puedan parecer, que dificultan la aplicación práctica de las enseñanzas de la educación alimentaria.

- Establecer normas para trabajar con el sector privado y la industria alimentaria como socios y aliados (UNSCN, 2007)
- Reforzar y potenciar el papel de la familia y de la escuela en la educación alimentaria.
- Mejorar el nivel de formación en salud y nutrición. Esta sigue siendo la medida más importante contra la Enfermedades No Transmisibles (ENT).

Existe un preocupante aumento en las últimas décadas del número de casos de ENT relacionadas con la dieta y el estilo de vida, en particular la obesidad que se ha convertido en un problema poblacional (Figura 4) y que indica un desequilibrio sistemático entre el patrón típico de los flujos metabólicos diarios de energía y el balance energético (Doucet y Tremblay, 1997). El verdadero desafío al que se enfrentan los programas de control de ENT es ser capaces de estimular una respuesta multisectorial y de diseñar programas de promoción de la nutrición y la salud para ser implementados, no sólo por los educadores nutricionales sino también por parte de los sectores relacionados.



FUENTE: OCDE (2010)

Figura 4 - Índices de sobrepeso pasados y futuros (previstos) en algunos países

En la actualidad existe una tendencia en restauración encaminada al rescate de platos tradicionales saludables, estilizados, que devuelvan a cada país su identidad gastronómica y cultural. Una premisa importante en las nuevas tendencias de la restauración a nivel de salud pública, es garantizar un servicio de excelencia, considerando también las exigencias de alimentos saludables por parte de los clientes, así como lograr el bienestar y la seguridad de las ofertas culinarias (Faure, 2009).

Los programas de educación alimentaria preservan la transmisión de generación en generación de la tradición culinaria y la memoria del sabor de las comidas y productos locales, lo cual también permite lograr un desarrollo sostenible que tiene como objetivo global satisfacer las

necesidades del presente sin comprometer por ello la capacidad de las generaciones futuras. Bajo este marco los sistemas alimentarios constituyen una esfera prioritaria de interés, siendo política central de muchos gobiernos (ONU, 2010; FAO, 2013).

Las directrices y programas de educación alimentaria se basan en el consumo de productos locales y les promocionan tomando como referencia la DM. Los nutricionistas y expertos en el arte culinario adaptan las comidas tradicionales, volviéndolas aceptables para el consumidor moderno. Las soluciones de la comunidad para promover una educación alimentaria y un estilo de vida saludable son sostenibles (IDEFICS, 2011). Los programas de educación alimentaria se cimentan sobre la experiencia positiva de las comunidades que han mantenido a lo largo del tiempo sus sistemas alimentarios, costumbres y estilos de vida basados en la Dieta Mediterránea.

Las acciones que ha desarrollado la restauración, en torno al cambio que debe tener la alimentación en este sector, comenzó en Francia en el año 2006, donde se lanzó el programa "Alimentación & Equilibrio" dirigido a los restaurantes, de manera que estos identificasen los platos equilibrados de sus cartas con pegatinas "Gustino" (mascota que representa el programa), una manera de ayudar a los consumidores a comer de forma más equilibrada fuera del hogar (ACCOR Services, 2005). En el año 2008, Accor Services lanzó la campaña "Gustino", para promover una alimentación saludable en los casi 26.000 restaurantes de menús asociados al "Ticket Restaurant" en toda España (Martínez, 2008). A la larga estas modificaciones llevan consigo un retorno de hábitos en el consumo de alimentos tradicionales, pues para que se adquiera la condición de restaurante saludable "Gustino", se deben cumplir características de la cocina mediterránea tradicinal.

En continuidad a políticas públicas, direccionadas a enfermedades cardiovasculares, la Conselleria de Sanitat, a través de la Dirección General de Salud Pública, en el ámbito de la alimentación como medio de alcanzar y mantener la salud, en el año de 2006 puso en marcha el Plan de Prevención de Enfermedades Cardiovasculares de la Comunidad Valenciana, el cual expone una correcta política de salud, definiendo las prioridades, las líneas de actuación y los objetivos de la misma. Todo ello enmarcado en dos grandes vertientes: la dirigida a la población adulta y la que centra su atención en la población infantil y adolescente.

Los hosteleros y sus restaurantes tienen la obligación de dar bien de comer a sus clientes y de preocuparse por su salud. Teniendo en cuenta que los nuevos hábitos sociales hacen que las personas coman fuera de sus casas de manera habitual, destaca la preocupación por ofertar una carta no solo en la variedad y el atractivo sensorial, sino también ofreciendo al cliente una variedad de platos nutricionalmente equilibrados.

Es por ello que surge en este sector el término de una "cocina estilizada", orientada a la oferta de un producto cada vez más saludable, con una decoración sutil y que reúna todas las cualidades gastronómicas de manera que se logre su máxima aceptación (Senarega, 2005). Un aspecto importante en la nueva restauración para garantizar un servicio de excelencia es la preocupación por la salud, el bienestar y la seguridad de los clientes, de ahí que es un eslabón fundamental el logro de una cocina estilizada. La cocina estilizada debe garantizar platos de exquisito sabor, adecuada higiene y aporte nutritivo. Exige más calidad que cantidad y una diversidad de menús. Sus elaboraciones están dirigidas hacia una ligereza en el plato, perfeccionando los diseños en sus presentaciones, ofertando "menús

saludables" cuyos ingredientes son más sanos. Para ello la estilización de los platos se basa en la disminución de los contenidos en grasas y azúcares, mayor aporte de fibra dietética, aporte de proteína animal y vegetal; utilizando técnicas de cocción que preserven los componentes nutritivos de los alimentos; logrando combinaciones que aporten sabores, colores y texturas más apetecibles y que realcen los valores dietéticos. Todo lo anterior confirma la necesidad de brindar ofertas en correspondencia con los principios de la cocina estilizada, para garantizar la satisfacción de los clientes que visitan los restaurantes, de ahí que el estudio dietético de los menús ofertados permite valorar la posibilidad de cambios hacia una alimentación más saludable (Carbajal, 2002).

1.4.1. Alimentación fuera del hogar: Alérgenos alimentarios.

La Academia Europea de Alergia e Inmunología Clínica (EAACI) define la alergia a los alimentos como un trastorno en el que una pequeña cantidad de alimento induce una reacción inmunológica (Alvarado y Pérez, 2006). Los síntomas pueden ser graves y muchas reacciones pueden ocurrir en minutos, aunque podrían tardar muchas horas antes que aparezcan (Food Safety Authority of Ireland, 2009). De manera similar a los trastornos alimentarios, las alergias a los alimentos se consideran un problema de salud pública, considerando que el 2% de la población adulta mundial muestra hipersensibilidad a los alimentos y casi 1% de los nacidos vivos sufre de alergias (Jackson, 2003). En Europa, los casos de alergias alimentarias afectan a más de 17 millones de personas. En España no disponemos aún de datos actuales de prevalencia en la población general, pero la alergia a los alimentos está creciendo, ya que se ha duplicado el número de diagnósticos

en poco más de una década, pasando de una prevalencia de 3,6% en 1992 al 7,4% en 2005, de acuerdo a los resultados de los estudios epidemiológicos realizados por la Sociedad Española de Alergología e Inmunología Clínica (SEAIC, 2012). A diferencia de las intolerancias a los alimentos que involucra a las enzimas digestivas y puede resultar en dolor abdominal, gases e hinchazón, las severas reacciones causadas por alergias a los alimentos son responsables de alrededor de 30.000 casos de emergencia médica y 150-200 muertes por año en los Estados Unidos (Hunter, 2007 ; Weiss y Munoz-Furlong, 2008).

Uno de los aspectos más desafiantes de una dieta libre de alérgenos es comer alimentos fuera del hogar, sobre todo en los restaurantes (Lee y Newman, 2003; Cranney, et al., 2007). La Comisión Europea ha reconocido que siete de cada diez reacciones alérgicas graves ocurren cuando la gente come fuera del hogar y puso en vigor el Reglamento UE 1169/2011, aplicable en toda la Unión Europea, que obliga a suministrar en los establecimientos de hostelería la información de los platos con alérgenos para que cualquier ciudadano sepa qué puede comer o qué no puede comer, en igualdad de condiciones que otro y sin tener que identificarse ni pedir trato especial. Se trata así de garantizar la ausencia de alérgenos en determinados platos para que se puedan consumir sin riesgo.

La calidad de vida se ha descrito con perspectivas relacionadas con la salud incluyendo el ámbito social, emocional y bienestar físico (Lohiniemi et al., 1998). Comer es algo más que fisiológico. Es un vehículo para satisfacer las necesidades sociales y emocionales de los individuos y de la familia. Los aspectos sociales de la comida son una prioridad para algunos, y un medio para reunir y conectar con la familia y amigos. Si las limitaciones de la dieta,

de alguna manera afecta la capacidad de salir a cenar y a los viajes, afecta su cotidiano y su bienestar social (Green et al., 2001).

2. OBJETIVOS

OBJECTIVES

2. OBJETIVOS

En este contexto se establece el objetivo general de este trabajo que es promover la salud a través de la cocina saludable en los restaurantes, en el marco de la Dieta Mediterránea, con la estilización de la carta dietética y evaluar la aceptabilidad de los platos estilizados.

Para alcanzar este objetivo general se platean los siguientes objetivos específicos:

- Determinar el conocimiento, actitudes y prácticas respecto de los preceptos sobre la alimentación saludable y libre de alérgenos alimentarios del personal de cocina y del público en general (consumidor).
- Demostrar a través de la intervención en el restaurante que la combinación de sabor y salud es un binomio que se puede conseguir.
- Evaluar el impacto de los menús saludables en restauración colectiva y la aceptabilidad de los consumidores.

3. PLAN DE TRABAJO

WORK PLAN

PLAN DE TRABAJO

Para la consecución de los objetivos del estudio se propone el siguiente **plan de trabajo:**

1. Evaluar a través de cuestionarios los conocimientos, actitudes y prácticas del personal de cocina y del público en general respecto de los principios de la alimentación saludable y alérgenos alimentarios.
2. Evaluación dietético-nutricional de los platos ofertados por el restaurante seleccionado que ofrezca platos tradicionales de la Dieta Meditarránea
3. Desarrollo de los estímulos intrínsecos y extrínsecos de los platos seleccionados y evaluación dietético-nutricional de los mismos después de la estilización
4. Combinación de platos para la elaboración de menús saludables y evaluación nutricional de las combinaciones.
5. Evaluar la aceptabilidad de los consumidores antes y después de la estilización de los platos.
6. Evaluar nuevos caminos de actuación de los cocineros en la preparación de platos para la alimentación saludable en niños en edad escolar.

En la figura 5 se muestra el esquema del plan de trabajo que permite desarrollar el objetivo propuesto.

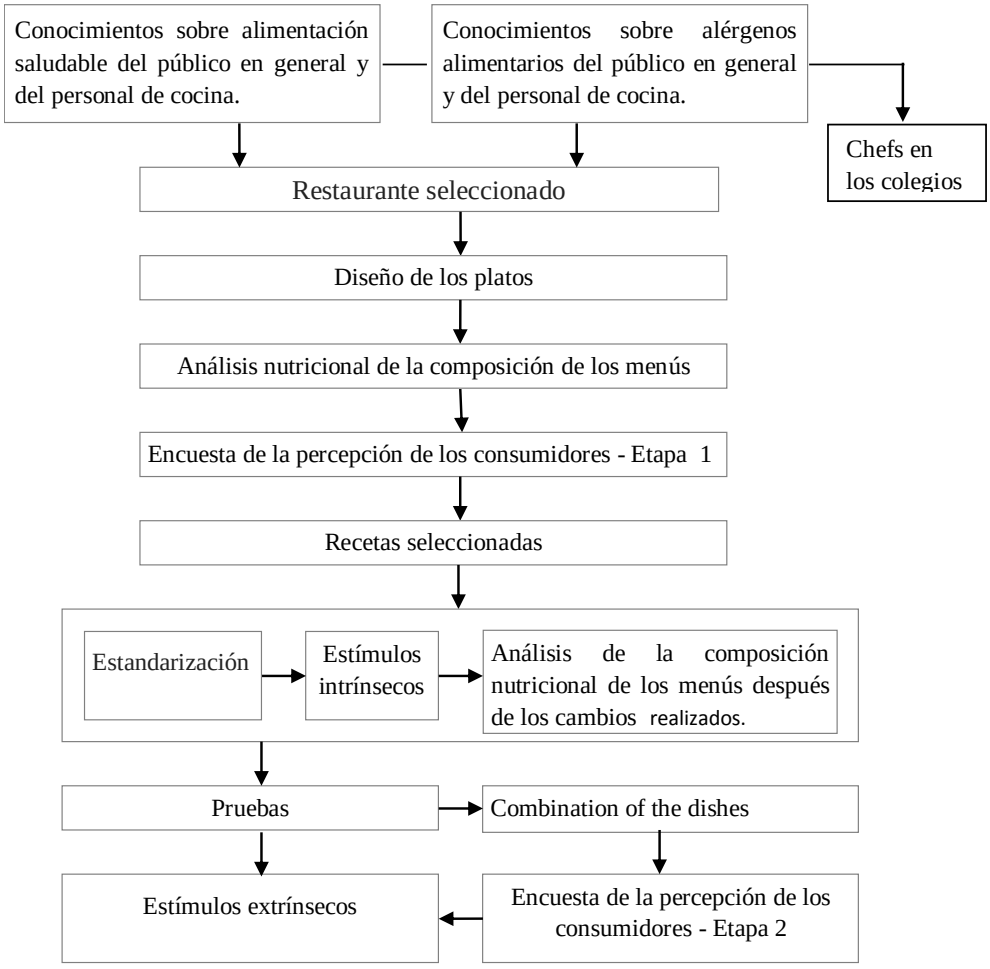


Figura 5. Plan de trabajo

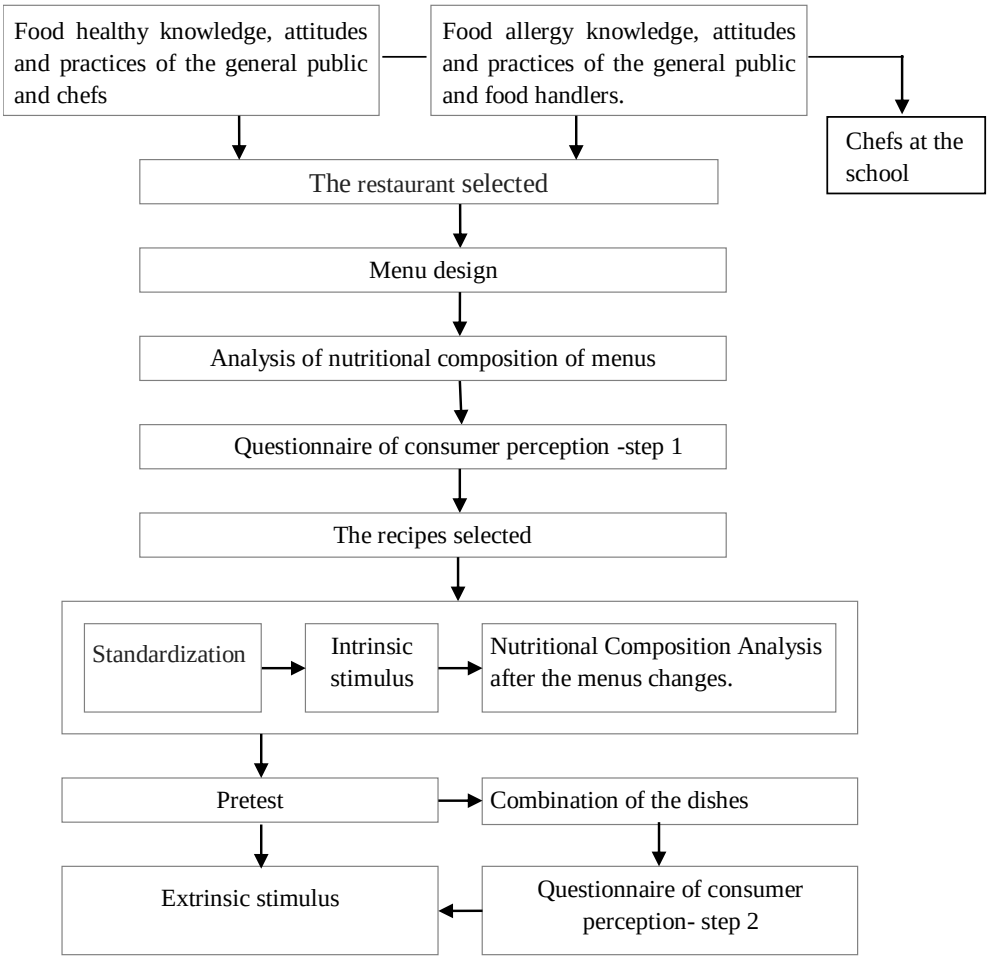


Figura 5. Work plan.

4. PARTE EXPERIMENTAL

EXPERIMENTAL SECTION

4.1. Healthy food and food allergen knowledge, attitudes and practices: A pilot study of the general public and food handlers.

4.1.1 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).

Modification 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 (Larchat et al., 2010), 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).

Other of the most challenging aspects of foods away from the home is eating allergen free diet, particularly in restaurants (Lee and Newman, 2003 and Cranney et al., 2007). The European Commission recognizes that seven of ten allergic reactions serious occur when people eat away from home (Sociedad Española de Alergología e Inmunología Clínica-SEAIC, 2012).

However, a survey of 100 restaurant managers, chefs and servers, found that only 42% had received any food allergy training (Ahuja and Sicherer, 2007).

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 Corney et al. (1998), 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).

4.1.2. Materials and methods

The surveys assessed the knowledge of healthy food and food allergens in the general public and food handlers. The survey given for both group was a modified a survey used in a previous similar study (Reichler and Dalton, 1998; Ajala et al., 2010) and assessed awareness of healthy food and food allergens, attitudes, knowledge, and practices. The first step of the questionnaire was comprised of 19 questions that included measured chef's attitude toward nutrition in general, toward the importance of healthful food preparation practices, and toward to (SENC, 2011; EFSA, 2009; FAO/WHO, 2008**)**. The second step of questionnaire was comprised of 10 questions that included general strategies and specific methods for reducing allergy crises, training, safety in food preparation and knowledge on food allergens.

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: lunch and dinner. 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 and food allergens. 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 and food allergy knowledge,

attitudes and practices. Questionnaires were hand coded and data was analyzed using Statistical Package for Social Sciences (SPSS) version 19.0.

4.1.3. Results and discussion

4.1.3.1. Healthy food knowledge, attitudes and practices.

The results of food science knowledge questions it is presents in table 6.

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 fat in a recipe by substituting olive oil or corn oil for butter, lard or chicken fat".

Table 6. Food science knowledge survey.

Questions	Food handlers		General public		Correct response
	True %	False %	True %	False %	
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	T
2. Meat, fish, chicken, eggs, milk, legumes, grains, and vegetables contain protein	68,6	31,3	100	0	T
3. Prepackaged processed foods are a major source of salt in the Mediterranean diet	69,5	30,4	87,2	12,7	T
4. An orange contains more fiber than orange juice	58,5	41,4	88,3	11,6	T
5. Sugar contains many vitamins and minerals	46,3	53,6	29,4	70,5	F
6. The largest source of fat in the comes from animal foods	53,6	46,3	47,0	52,9	T
7. Milk, vegetables, grains, and fruits contain carbohydrates	60,9	39,0	74,5	25,5	T
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	F
9. Cooking at high temperatures diminishes the vitamins in foods	50,0	50,0	64,7	35,3	T
10. If a food is labeled “cholesterol free”, it must also be low in saturated fat	43,9	56,1	26,4	73,5	F
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	F
12. One tsp olive oil has about the same amount of calories as 1 tsp butter	29,2	70,7	20,5	79,4	T
13. Cholesterol is found only in animal products	40,2	59,7	32,3	67,6	T

[a] T =True / F= False * tsp= teaspoon

The chefs surveyed 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-value = 0.0005). Significantly, the chefs' ability to construct nutritionally sound menus and indeed cook healthily is brought into question.

In each section of the survey were considerably lower or less positive than the general public, indicating room for improvement in food science knowledge, food preparation practices, and attitude toward nutrition and healthful food preparation practices. A major topic requiring clarification among food handlers and general public is practical information about amounts and types of fats in food and the role of fat in the body and in healthful diets. The comparison figures in the American study (Reicher and Dalton, 1998), conducted in New York (United States) related the same mistake save some exception.

Table 7 present mean scores on use of food preparation practices. Of the healthful food preparation practices analyzed, the general public select adding fruits and vegetables, on the other hand, the food handlers were most likely to reduce portion size to menu items.

Table 7. 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

n: number of responses

In contrast, when both groups were asked to choose a recipe manipulation to reduce the calories in a specific menu items (moist rice), food handlers were more likely to select strategies for reducing energy density than for reducing portion size (Table 8). A significantly greater proportion of both group reported that they would prepare healthier dish of moist rice adding vegetables strategy that reduces energy density.

Table 8- 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

* Frequencies do not sum to the total number of respondents because some respondents do not answer the question.

The current confusion and mistrust about the issue of health and food and the constantly changing dietary advice highlighted by a number of

researchers manifests itself in this study whereby food handlers appear to have adopted their own ways of developing healthy menus based upon their own experiences and perceived knowledge (Backett and Davison, 1992; Backett et al., 1994). Most of the food handlers reported in this study were more likely to select methods that reduced energy density, decrease the calorie content of specific recipes rather than choosing to reduce portion size. Many food handlers, however, seemed to be unfamiliar with the concept of energy density as expressed by "reducing calories per bite", since a relatively small proportion identified this as a general strategy for reducing calories. Food handlers also seemed less aware of the role of water-rich ingredients such as fruit and vegetables in reducing energy density. Incorporating more nutrition education in culinary training could provide a greater understanding of the conceptual basis for recipe modifications used in creating reduced-calorie menu items. On the other hand, general public reported were more likely to select methods that reduced energy density on both case reported more coherence between the concept about energy dense and portion size.

Among several characteristics of reduced-calorie foods that may affect their success on a restaurant menu, a majority of respondents for both group (55,0% and 44,1% for food handlers and general public, respectively) ranked taste as the most important factor (Table 9). The next most common factors were food health promotion and good value, with significantly fewer respondents selecting the characteristics of portion size. Only 16,9% of respondents believe that none of options may affect their success on a restaurant menu.

Table 9. Characteristics of reduced-calorie menu items ranked as the most influential for success by food handlers in different positions.

Characteristic	Food handlers		General public	
	(n)	**(%)**		**(n)**
1. Taste	44	55,0	45	44,1
2. Portion size	3	3,7	6	1,9
3. Promotes good health	19	23,7	27	26,4
4. Price	13	16,2	8	7,8
5. None	1	1,2	16	15,7

n: number of responses

Food handlers and general public may have been reluctant to change higher-calorie items because of concerns about adverse effects on palatability, and thus potential risks to profits (Economos et al., 2009). The consumers have learnt that they should take into account the effects for their health when choosing foods, but this process is largely restricted to the intentional search for and cognitive evaluation of food attributes. When it comes to sensory evaluation as a major driver of the actual purchase decision, many consumers are not ready to compromise (e.g., functional foods) (Verbeke, 2006). Eating habits are difficult to change because of a key goal conflict with which many consumers are faced: the belief that healthy food is less tasty (so called unhealthy=tasty intuition) (Raghunathan et al., 2006). Health communication tackles only one part of this inverse relationship. To resolve the conflict and to mitigate this widespread unhealthy=tasty intuition, it is of pivotal importance to provide consumers with healthier and tastier food. This problem is considered a cornerstone to maintain a healthy diet over time and to achieve sustainable and lasting changes. It is likely that the primary concerns of food handlers at management levels were related to the

factors they believe will increase sales or profit (Glanz et al., 2007). Thus, it will be increasingly important that food handlers in these influential positions stay informed of customer changes in health-related attitudes toward foods eaten away from home.

Table 10 presents mean scores on attitudes toward nutrition and the obstacles in healthy food preparation. Attitude toward the importance of knowledge about nutritional information for food handlers was very positive and similar for both groups.

Table 10. Mean scores of food handlers and general public on attitude survey items.

Questions	**Food handlers**		**General public**	
	Yes (%)	No (%)	Yes (%)	No (%)
Is it important the food handlers knows the nutritional information of the dishes?	76,8	23,2	93,2	6,8
Do the food handlers are responsible for the nutritional content of the food they prepare?	71,4	28,6	79,4	20,6

n: number of responses

Responses to the question if food handlers are responsible for their customers' health in relation to healthy eating gave an insight into the ways in which food handlers and general public view their role and responsibilities. The general public surveyed had a significantly positive result 93,2% believe it is important the food handlers knows the nutritional information of the dishes and 79,4% believe the food handlers are responsible for their customer's health in relation to healthy eating. A substantial proportion of

chefs (71,4%) felt a responsibility towards their customers and 76,8% believe it is important the food handlers know the nutritional information of the dishes. The illustrated the positive predisposition held by chefs and general public towards healthy eating.

Similar studies have been identified in the American study, conducted in U.S. culinary meetings and public in 2011 (Obbagy et al., 2011), as well as in Scottish, the study conducted in Edinburgh (United Kingdom) (Middleton, 2000), and the study of thirty-eight participants from sixteen European countries reflecting a broad multi-stakeholder panel on eating out in Europe (Lachat, 2010). The chefs respondents identified the main barriers to including reduced-calorie items on the menu as low consumer demand, the need for staff skills and training, and high ingredient cost. These results further highlight the importance of continuing innovation in culinary practice, emphasizing skills needed to create reduced-calorie dishes that promote health while ensuring that costs are controlled and taste and acceptability are not compromised.

Results have shown that a large proportion are amenable to the idea of nutrition training, and indeed the positive attitudes and practice exhibited could conceivably be viewed as a spring board for nutrition education. According to Glanz et al. (1992), the context of the information is of paramount importance to the success of the education. It is therefore posited that the provision of short courses which are an important feature of the Food Safety approaches, and which have successfully raised awareness and understanding of the principles of food hygiene equally could be applied to

nutrition and healthy eating, whilst dissemination of ideas amongst peers could be used as a vehicle to promote good practice.

4.1.3.2. Food allergen knowledge, attitudes and practices.

Table 11 shows the results. Although the chefs perceived that they had a good knowledge of food allergens, as indicated by the results, they possess no much more knowledge than the average general public (t= -1.9707, df= 169.9, *P*= 0.050). The chefs' ability to construct free-allergens menus and indeed cook safe is brought into question.

In our study 56,4% and 67,1% of general population and food handlers respectively, related had some knowledge of food allergens. However, comparing with the answers the question 1, 51,2% of food handlers had not plan to produce safe food in terms of allergens, which their knowledge may reflect their remembering on some part of good hygienic practices training. Of the general public interview, 73,3% answered had some plan to produce safe food in terms of allergens, although it could be questioned where they believed they had gained this knowledge.

In the 5th question, the knowledge of food handlers and general public if the amounts of a food know to contain an allergen may lead or not to food allergies was evaluated. Among food handlers the rate of “no” answers was 82,9%, while among general public the rate of “no” answers was 83,2% if someone presenting allergic reactions could or not consume small amounts of to carry allergenic compounds. Whether the client have a food intolerance, an IgE-mediated food allergy or celiac disease, diagnosed

individuals will need to avoid consuming foods which may trigger symptoms. For the most sensitive people, this will even include traces of the allergen which may be found in other dishes or products and, in some cases, other forms of contact, e.g. via the skin or by inhalation (Gowland, 2015).

Table 11. The perception of general public and food handlers regarding food allergies.

Questions		Food handlers		General public	
		Yes (%)	No (%)	Yes (%)	No (%)
1.	Is there any plan to produce safe food in terms of allergens?	51,2	48,8	73,3	26,7
2.	Are you cooking for food allergy patients?	36,6	63,4	37,6	63,0
3.	Do you have any knowledge about food allergen?	62,2	37,8	56,4	43,6
4.	Do you think that the meals produced at the restaurant are safe in terms of food allergies?	32,9	67,1	0	100
5.	Individuals with food allergies can safely consume the foods that cause the allergies if only a small amount is consumed?	17,1	82,9	16,8	83,2
6.	Can high temperature (deep-frying, cooking) destroy food allergens?	9,7	90,3	22,8	77,2
7.	If someone has an allergic reaction, is it correct to offer water in order to ‘‘dilute” the allergen and stop the reaction?	17,1	82,9	6,9	93,1
8.	If you efficiently clean the kitchen appliances where an allergenic food was prepared, will it be enough to eliminate the allergen?	42,7	57,3	39,6	60,4
9.	If you remove allergenic food items (such as walnuts) from a finished dish, will it prevent the client from having an allergic reaction?	25,6	74,4	20,8	79,2
10.	Are you used to checking the label of food products to find out whether it has any ingredient that may cause food allergy?	53,6	46,3	29,7	73,3

The dietary habits of a region and the methods used to prepare the foods play an important role in the predominance of food allergies in many countries around the world. Most reactions are caused by food ingestion, but the steam and smoke originated from the cooking process may contain allergens which can be inhaled (Weiss and Munoz-Furlong, 2008). The cooking process may reduce the allergenicity of certain proteins in the food, but heating can increase the allergenicity of other proteins by inducing covalent changes that lead to the production of new antigens or improve the stability of existing ones (Mansueto et al., 2006). In the present study, most of food handlers (90,3%) and general public (77,2%) agreed that high temperatures might not be sufficient to destroy the allergen (P=0,014).

Of the food handlers and general public interviewed, 82,9% and 93,1% answered that they did not know if it was the right thing to offer water to someone suffering from an allergic reaction with the purpose of "diluting" the allergen and stopping the crisis. However, when we asked the managers about equipped to handle food allergy emergencies including the used of self-injectable epinephrine all reported had no knowledge about it. Previous research has shown that food handlers lacking in knowledge about food allergies were more likely to handle food allergy emergencies or to address the needs of allergic customers inappropriately (Madsen et al., 2010) and including not carrying self-injectable epinephrine (Greenhawt et al., 2009 and Rolison and Scherman, 2002). Weiss and Munoz-Furlong (2008) many foodservice establishments were ill-equipped to handle food allergy emergencies (Choi and Rajagopal, 2013).

It can be seen in the 8th question, 60,4% of the general public do not believe that the appropriate hygiene of appliances used in the meals would be an effective measure to eliminate traces of allergenic foods that could interfere in the health of another client in the preparation of a different food. Among food handlers, a rate of 57,3% do not believe that cleaning would be an effective measure to eliminate allergens from kitchen appliances. Regarding the 9th question, 25,6% and 20,8% of general public and food handlers respectively, believed that removing food items that cause allergy from a finished dish would prevent the allergic client from having any kind of reaction. This result is of great concern, foodservice employees might cause cross-contact, which could cause serious harm to food allergy sufferers (Mandabach et al., 2005). Thus, foodservice operations should educate employees about the eight allergens that (peanuts, tree nuts, milk, eggs, fish, shellfish, soy, and wheat) that account for 90% of all food-based allergic reactions (FAAN, 2010). However, foodservice employees should also be made aware that food allergies are not limited to the top eight allergens and customers may have allergies to any food item, thus all allergy requests should also be handled with the same amount of caution. Additionally, respondents had the lowest rating on food allergy practice related to cross-contact. Cross-contact is the accidental contact between allergen and non-allergen foods, which may occur at any stage of the production and storage process (after the products are packed). This usually happens with the transfer of allergenic proteins when the food is processed or handled, especially when multiple ingredients or food items are produced on the same production line as other items that are non-allergenic or that contain another type of allergenic protein (Jackson et al., 2008). Cleaning of

equipments and appliances contacting foods is an important route of food contamination with allergens. In the food industry, bad formulation, inappropriate hygiene and cross-contamination with dust or parts of allergens (fragments of peanuts, for example) left in the processing system are potential means for an allergen to contaminate an unrelated product. In this case, in order to guarantee the safety of processes, it is necessary to identify the potential points of contamination and establish a prevention system (Deibel et al., 1997). Thus, the use of equipment to produce food requires well-defined and consistent cleaning techniques, especially if the same equipment is used to prepare several types of product, furthermore Ahuja and Sicherer (2006), found that foodservice employees confused cross-contamination with cross-contact. Cross-contact is the accidental contact between allergen and non-allergen foods, while cross-contamination is the contact between raw and cooked foods, the latter relates to microbial contamination (ServSafe, 2012). Therefore, catering services should clearly define the Good Manufacturing Practices to their employees. However, patrons with food allergies should also alert foodservice staff about their food allergies when dining at foodservice establishments and share the responsibility of preventing incidences of food allergies.

A total of 46,35% of food handlers and 73,30% of general public did not have the habit of reading food labels to check whether there was any ingredient that might cause a food allergy. This is alarming and highlights the need for periodic training practices. Food labeling is an important support for consumers, providing them with the opportunity of knowing the product composition, safely ingesting nutrients and energy, as well as

obtaining important information concerning the maintenance of their health (Gowland, 2015). In the case of allergens, it is essential that labels contain accurate information, even if the presence of traces or the remote risks of traces result in reduced consumption of the products (Jackson, 2003). A study performed with allergic volunteers and parents of allergic children in Greece and the Netherlands in order to verify their behavior towards labeling when shopping for food, concluded that the labeling standards were highly unsatisfying. In general, the participants complained about the complexity of the information, its position on the label, its format and packaging changes, amongst others (Voordouw et al., 2009).

The 4 th question (Table 11), the most of food handlers (67,1%) answered that they disagree the meals produced in their restaurants are safe in terms of food allergies. The lack of confidence in handling a situation could also be because respondents had never received training specific to food allergies (Weiss and Munoz-Furlong, 2008; Ajala et al., 2010). These results are consistent with previous research (Youn and Sneed, 2003), found that employees with food safety certification had more confidence in implementing food safety programs in their workplace than those employees that did not have certification. In the European Union Code 1169/2011-R.D. 852/2004 coming into force 13th of December 2014, it is mandatory that internal training and organizing training courses, necessary to implement the new process food labeling and customer information in the field of food allergens. This study was done before the Food Information for Consumers Regulation (1169/2011) was fully implemented, and does not measure the impact of the Regulation in the restaurants services, but draws

attention to the points must take account. However, there are also a number in barriers to implementing food allergy training such as cost of training employees, high turnover, time restrictions, language problems, and employees' apathy toward food allergies (Abbot et al., 2007). Furthermore (Lee, 2003), highlights the need for providing training at regular intervals to reinforce food safety concepts, provide updated information and increasing confidence among staff members. Training may be provided either formally (classroom) and informally (info sheets, flyers posted in preparation and service areas) that reinforces training concepts. Chapman et al. (2010) found that posting of food safety info sheets in prominent locations within a foodservice establishment positively influenced food safety behaviors.

Among general public, a value of 100% answered that they disagree the meals produced in restaurants are safe in terms of food allergies. When we compared with similar study by Karajeh, et al. (2005) from an British population when questioned about their frequency of eating food not prepared at home, celiac disease patients were less likely to eat take away food or dine at a friends' house, when compared to the general public. In the meantime those patients with celiac disease are comfortable dining out if they frequent the same restaurant. This may allow them to become familiar with that chef and be reassured that this establishment will provide a gluten-free meal. It is important for food suppliers to understand who is buying food for people with celiac disease, food intolerances and allergies and what they need. This can be achieved by maintaining close links with relevant consumer/patient groups and also keeping up to date with scientific, clinical, social and other consumer research and with relevant legislation, industry

standards and voluntary guidance. Early work to reduce risks and improve food allergen avoidance for consumers began in the UK in the mid-1990s and involved producers, manufacturers, retailers, caterers, regulators, scientists and consumers supported by expert allergy clinicians. From the start it was recognized that improved allergen management and accessible consumer information depend on the engagement and understanding of key people throughout the food supply chain (Gowland, 2015).

There are several limitations of our study. It was conducted in Valencia where the demand for free food allergy, and awareness, may be different to other areas of Spain. This information would have proved helpful in determining whether restaurant avoidance was widespread throughout the country. The food handlers and general public that completed the survey may not have been representative of food handlers and general public throughout Spain due to the nature of recruitment. A larger study of face-to-face or telephone interviews of chefs and general public nationwide would be beneficial.

4.1.4. Conclusions

This study provided information about food healthy and food allergy knowledge, attitudes, practices, training received, and perceived training needs of food handlers and general public. Although this study has illustrated the positive predisposition held by food handlers and general public towards healthy eating and food allergen free, it is evident that a more pragmatic planning approach needs to be taken on a wider context to

ensure the successful implementation of healthy eating principles and allergen free menus. Even though the survey showed that food handlers and general public had some knowledge on the issues, they possess no much more than the average general public.

Educating food handlers about a food allergens and healthy food may alleviate the obesity and social restrictions on allergic people and, restaurants should work toward providing not only food safety training as it relates to preventing microbial contamination but also provide training specific to food allergies and healthy food. The results of this survey support the need for ongoing collaboration between food handlers and public health professionals to ensure that appealing reduced-calorie menu items and free allergen menu are more widely available in restaurants and that research is directed towards understanding the most effective ways to develop and promote customers well-being.

4.2. Foods menus evaluation for most nutrition quality in restaurants and consumers perception of healthy menus.

4.2.1. Introduction

To improve food-away-from-home nutritional quality, not only must healthy food options be available but consumers must respond by making those choices. This is difficult because consumers hold a universal belief that healthy foods are less tasty. Many different approaches have been used to study contextual influences on food acceptability, intake and choice behavior, such as laboratory and field experiments, different kinds of surveys, dietary recall, observations, depth interviews and interventions (Jaege and Rose, 2008). It is known that food choice and acceptability are primarily based on whether sensory properties are liked or disliked. Nutritional benefits remain as a secondary concern (Verbeke, 2006; Chung and Vickers, 2007; Goldner et al., 2013). Consumers often have negative perceptions of the taste of healthy food items. For example, young consumers particularly have negative perceptions about the taste of lower fat food items (Shannon et al., 2002). Unfortunately, food away-from-home is generally energy dense and high in total and saturated fat (Wootan and Osborn, 2006; Allder, 2008; Rosenheck, 2008; Smith et al., 2009), proteins and sugar, while they are lower in vitamins, carbohydrates and fibre content. These nutrients also play an important role in the sensory perception of many foods and greatly contribute to food hedonics, which can partly explain why consumption is often over the recommended limits (Deglaire et al., 2012).

Science-based cooking is closely associated with the design of stimulating

and novel dishes that make guests feel an explosion of sensations. Chefs are expected to use high quality foods and thorough preparation techniques. But food science is not only texture and technology; it is also nutrition and health. From a nutritional point of view, science-based cooking may contribute to providing certain nutrients and other food components, which could confer healthy aspects to the dishes and menus. Chefs may then also consider nutritional aspects when designing dishes and menus (Navarro et al., 2012).

The sound traditions of the Mediterranean cuisine we have used for some time in a wide variety of tasty gastronomic choices, from inviting colors and strong scents and absolutely in line with health. (Altomare et al., 2013)

4.2.2 Conceptual background

4.2.2.1 The restaurant select

The restaurant located in Valencia-Spain was selected for offering traditional Spanish dishes; it also has the "Q" touristic quality certification for the Spanish Institute for Quality Tourism (www.icte.es). This Spanish Institute of Quality Certification was specially created for tourism businesses. It is an agency, which is private, independent, non-profit making and recognized throughout the national level. The following services were provided by that establishment: lunch and dinner.

The restaurant offers dishes that were classified as appetizers, salads, fish, meats, desserts and menu of combination dishes, available for both lunch as for dinner. Each of one the menus of combination dishes from this

restaurant offer five starters and five main courses (the client has to choose from five different options for each course), dessert (two choices). The clients was comprised of consumers captive or not and tourists.

4.2.2.2. Menu design

Dishes design was made by the working team (headoffice, chefs and kitchen helpers) of the selected restaurant. A nutritionist was responsible for the 4 6 analyses of the dishes designed by them (Table 12). After the nutritional composition analysis, the nutritionist proposed improvements focused on: selected ingredients, cooking methods or portion sizes were done in order to improve the nutritional profiles of those plates. Any of these improvements had been set with the manager's agreement in order not affect the quality of the menu and service.

Table 12. The dishes of the restaurant

Starters	Vichysoisse	Tuna belly's salad	Mix of cheese	Squid
	Salmon 's salad	Garden salad	Charcuterie iberian	Scallops
	Vegetable mix	Little burgues	Santoña anchovy	Crispy shrimp duo
	Puff–pastry' s struffed	Stuffed peppers	Octopus	Burgos black pudding
	Moorish brochette of chicken	Octopus salad	Prawns	Mix of mushrooms and ham
	Avocado salad	Warm salad of spinach and goat cheese	Surprises	Foie grass
Main courses	Valetian Paella	Moist rice of rabbit	Tuna	Iberian pork
	Marinere rice	Moist rice of octopus	Cod	Beef tenderloin steaks
	Black moist rice	Vegetables paella	Seasonal fish	----
	Paella with pork ribs	Moist rice of cod	Angus steak	----
	Dry fideua of duck	Seafood peeled fideua	Magret of duck	-----
Dessert	Navel orange	Biscuit pudding	Chocolate mousse	----
	Orange caprice	Kiwi's carpaccio	----	----

The aim of the nutritional composition analysis was the development of menus of combinations of dishes (1 starter+1 main course+ 1 dessert). The menus of combinations of dishes are important because the nutritionist have opportunity to offer a complete menu as well as show to consumers the best combinations. In general, all the menus offered around 30-35% of energy needed for a day. This information was very useful to understand the real impact of each menu on the global diet. The selection of the final recipes for menus of combination of dishes was made based on diner demands, restaurant's cost, sensory preferences and precepts of the Mediterranean Diet.

4.2.2.3. Nutritional composition of menus

Calculated nutritional values of the menus were obtained from the ingredients used and the total weight of the final product. Energy, macronutrient and micronutrient contents were calculated separately for each dish and for each menu combination of dishes (1 starter + 1 main course + 1 dessert) using the software DIAL 2.12 (Alce Ingeniería, Madrid,Spain) according to the USDA National Nutrient Database (http://ndb.nal.usda.gov/) and the Dietary Guideline of Spanish population (SENC, 2011; EFSA, 2009; FAO/WHO, 2008**)** using recommended nutrient intakes as standard references.

Its note, the evaluated of menus of combination of dishes (1 starter + 1 main course + 1 dessert) was considered as a unique dish.

4.2.2.4. Survey design

Customers were invited to answer the survey after they finished their lunches, before and after changes of the menu. The questionnaire applied was that used for the "Q" touristic quality certification developed by the Spanish Institute for Quality Tourism (www.icte.es) (Annex 1). This Institute, a private agency, independent, non profit making and recognized throughout the national level, was specially created for tourism businesses. The questions help the restaurant improve its service. Core aspects of the questionnaire include: (1) product quality, (2) presentation of the dishes, (3) portion size, (4) variety of the menu, and (5) value for money.

4.2.2.5. Study Design

The study was performed from February 2012 to January 2013. A total amount of 300 random consumers were surveyed. First part of the study was carried out from February to May 2012. In this period of time, 105 participants answered the evaluation questionnaire before any menu changed (step 1). Then, the second part of the study was conducted from August 2012 to January 2013, where 195 customers answered the questionnaire after the menu had been modified (step 2).The same questionnaires were given to the consumers to check if the changes of the dishes affect the quality of dishes.

In order to make proposed modifications acceptable by consumers, it is necessary that the quality of menus (sensorial attributes, portion size, quality

of the raw materials, etc.) must not be affected and also the product demand should not decrease.

When evaluating food products, several processes come into play. As reasoned above, consumer's food decision making is primarily guided by two distinct processes, namely, sensory sensation (e.g., product tastiness) and visual perception (e.g., considerations about product healthiness from labelling) (Mai et al., 2014). To account for these distinct processes, we applied the holistic approach suggested by Hoppert et al. (2012) who have shown that these processes can counteract one another. For that reason, this study examined the conflicting perceptions of food properties without the knowledge of the consumers. Recipe and menu changes are not given to them. To assess whether the manipulation of the stylized dishes was successful, a sensory pre-test with 15 restaurant employees was conducted. The goal of the pre-test was to examine the discriminate validity of the three items in which changes had been applied (presentation of the dish, taste and portion size) and the impact on consumer's preferences was assessed by two different groups (1 group before and 1 group after de changes) because the interest of the restaurants is that more of their clients evaluated their dishes.

The overall-study is specifically focused to improve healthy cuisine in restaurants and to determinate the acceptability of healthier menus. It is noteworthy to mention that other factors have to be modeled when targeting other stages of food consumption process (e.g., product quality, presentation of the dishes, portion size, variety of the menu and value for money).

4.2.2.6. Statistical Analyses

Frequency analysis was used to study the ingredients and the types of courses. In order to determine differences, the theoretical dietary intakes and the caloric distributions of menus were compared against recommended values by the t-test. The intake of each menu were divided by the recommended nutrient intake to determine the percentage daily value. Results were considered to be significant when the observed significance levels were $P<0,05$.

Data of the survey of consumer's perception of healthy menus were divided in two different groups: in step 1, participants answered the questionnaire before the menus changed and in step 2, participants answered the questionnaire after the menu changed. Data was analyzed with Statgraphics XV version 15.2.06 (STSC, Rockville, USA). ANOVA with LSD post-hoc analysis was used to compare if there are any differences between results derived from the completed questionnaire at Step 1 and 2.

4.2.3. Results

4.2.3.1. Foods menus evaluation

Local or regional products are attractive to consumers. The Spanish study, conducted by Ministry of Agriculture, Food and Environment of Spain-MAPA (2012) showed that 50.8% of respondents are willing to pay more for natural foods (no additives). In addition, recent concerns about quality and food safety have stimulated demand for locally grown and organically

produced food. This is reflected by the number of gourmet restaurants serving dishes based on these products (Devaux et al., 2009). In this study the ingredients were locally produced, or acquired in a local market (lemons, apples, grapes, pineapples, oranges, tangerines, strawberries, pears, carrots, pumpkins, peppers, onions, tomatoes, meat, fish, chicken, eggs, cumin, pepper, lettuce, green onions, radishes, chard, celery, parsley).

Regarding this topic, the restaurant 25% of the starters (Table 13) are salads (salmon's salad, tuna belly's salad, garden salad, octopus salad, avocado salad, warm salad of spinach and goat cheese), 20,8% of vegetables are freshly made roasted vegetables (vegetables mix, stuffed peppers, squid with vegetables, vichysoisse, moorish brochette of chicken), and offered seasonal fruits of desserts (Tabla 14).

Table 13. Groups of dishes and ingredients used to starters

Name of the dishes	Ingredients
Vichysoisse	Leeks, onion , potato, apple, olive oil, white pepper, natural yogurt
Salmon ‘s salad	Salmon, goat cheese, tomato, sea’ s small sticks, mustard, cherry tomato, lettuce, garlic, honey, vinegar, olive oil
Vegetable mix	Eggplants, onion, tomatoes, red paprika, garlic to the oven with Extra virgin olive oil with tunafish, black olives and crumbled cod emulsion
Puff–pastry’ s struffed	Puff–pastry’ s struffed, bacon, olive oil, leek, peppershrimps, mushrooms and leek with foie.
Moorish brochette of chicken	Moorish brochette of chicken with "tabulate" salad (onion, cucumber, red peppers, green peppers, tomatoes, couscous, mint, olive oil)
Tuna belly’s salad	Patê tuna belly, piquillo’s peper and caspers salad (lettuce, tomato, garlic, olive oil,)
Garden salad	Garden salad(lettuce, onion, tomato, beet, egg and pickles
Little burgues	Beef meat, egg yolks, olive oil, pepper round pan, onion, olive oil, sugar, vinegar)
Stuffed peppers	Duck and mushrooms stuffed peppers with onions, leeks, mushrooms duck, cream
Octopus salad	Octopus salad, sean’s small sticks and shrimps with quince, lettuce, olive oil and honey
Mix of cheese	Mix of Spanish cheese
Charcuterie iberian	Pork loin, chorizo sausage and Iberian ham with pan and tomatoes
Santoña anchovy	Anchovy, bread and tomato
Octopus	Octopus, potatoes and paprika
Prawns	Prawns, garlic and pepper sauce
Squid	Squid with vegetables (cauliflower, broccoli and carrots)
Scallops	Scallops, bacon and cream of peas
Crispy shrimp duo	Breaded of shrimp
Burgos black pudding	Smoked or dried meat, pepper and egg yolk
Mix of mushrooms and ham	Mushrooms, ham and artichoke
Avocado salad	Lettuce, tomatoes, onions and shrimp
Warm salad of spinach and goat cheese	Lettuce, spinach and goat cheese
Surprises	Cheese, shrimp,leek, mango and source bittersweet
Foie grass	Foie grass and special bread

Table 14. Groups of dishes and ingredients used to desserts

Name of the dishes	Ingredients
Navel orange	Orange, cinnamon
Orange caprice	Orange, sugar,cream,toasted almonds
Biscuit pudding	Flour, sugar, milk, eggs, cookie
Kiwi's carpaccio	Kiwi's carpaccio with dehydrated yogurt
Chocolate mousse	Eggs, chocolate,sugar, coffee,cream

The main dish is a variety of rice and fideua (a type of pasta) (Valetian Paella, Marinere rice, Black moist rice, Paella with pork ribs, Dry fideua of duck, Moist rice of rabbit, Moist rice of octopus, Vegetables paella, Moist rice of cod, Seafood peeled fideua). The method of preparation took into account the traditional Mediterranean Diet, the ingredients often being mixed together in the cooking process, fusing them together, which facilitates the mixture of tastes and textures. A detailed composition of natural ingredients used for the different restaurant dishes are shown in Table 15.

Table 15. Groups of dishes and ingredients used to Main Courses

Name of the dishes	Ingredients
Valetian Paella	Rabbit, chicken, garrofón, green bean,chicken soup, dye, rice, sprig of rosemary, olive oil
Marinere rice	Marinere rice with broth (shrimps, king prawns, sea crabs, cuttlefish, olive oil, garlic.
Black moist rice	Black moist rice of cuttlefish, little green beans, olive oil, fish stock, garlic and squid ink
Paella with pork ribs	Rice, olive oil, pork rib, red pepper, green pepper, cauliflower, crushed tomatoes
Dry fideua of duck	Fideua, duck, mushrooms, tomato, olive oil, garlic
Moist rice of rabbit	Rabbit, peeled artichokes, snails chicken soup, rice, sprig of thyme, olive oil
Moist rice of octopus	Rice of little octopus, green beans, olive oil, tomato
Vegetables paella	Rice, mixof flat green beans, red pepper, onion, artichokes, tomatoes, sweet paprika, garlic, olive oil
Moist rice of cod	cod, cauliflower, chickpeas, tomatoes, rice, fish stock, salt, olive oil, paprika
Seafood peeled fideua	rice with broth (shrimps, king prawns, sea crabs, cuttlefish, octopus, olive oil, garlic, tomato)
Tuna	Tuna, confit potatoes, peppers and greew sauce
Cod	Cod, roasted peppers, garlic, viscain sauce
Seasonal fish	Sea bass, mix of vegetables (Eggplants, onion, tomatoes, red paprika, garlic to the oven with Extra virgin olive oil with tunafish, black olives and crumbled cod emulsion)
Angus steak	Angus steak, potatoes and sauce picon (spicy pepper sauce)
Magret of duck	Magret of duck, pear, caramelized pineapple and sauce of raspberry and cinnamon.
Iberian pork	Iberian pork with creamy of idiazabal cheese, chips and coulis of Oporto.
Beef tenderloin steaks	Beef tenderloin steaks, mushrooms confit, potatoes and sauce of foie grass

Health benefits of the Mediterranean Diet have precipitated studies on the effects of its various components. Olive oil plays an important role as the primary source of fat intake. The Mediterranean Diet is high in monounsaturated fatty acids (MUFA), specifically oleic acid, and low in saturated fatty acids. Studies affirm that dietary cis-MUFA have a greater

antiatherosclerotic affect of polyunsaturated fatty acids (PUFA) on cardiovascular risk factors (Bos et al., 2010). The restaurant which participated in this study ensures that it only uses olive oil in its dishes.

The selection of recipes for the preparation of the menus were made according to customer demand, preferences, and they are in line with the decision of UNESCO (November 16, 2010), that approved the registration of the Mediterranean Diet in the list of Intangible Cultural Heritage of Humanity, summarizing it as follows: "the Mediterranean Diet is a set of skills, knowledge, practices and traditions associated with human food, from the earth to the table, covering crops, crops and fishing as well as the preservation, processing and preparation of food and in particular, the consumption of these. The Mediterranean Diet is characterized by a nutritional model that has remained constant through time and space, its main ingredients being olive oil, cereals, fruits and vegetables, fresh or dried, a moderate proportion of meat, fish and dairy, and abundant condiments and spices, whose consumption in the table is accompanied by wine or infusions, always respecting beliefs of each community" (UNESCO, 2010).

4.2.3.2 Nutritional improvements on the menus

In the experiment, nutritional improvements were focused on: portion size, total fat content, protein content and salt amounts (regular vs. reduced). Any of these improvements had been set with the manager's agreement in order not affect the quality of the menu and service. Some dishes are not

being available to change for the large changes generated by taste or at cost or at texture; for example, chocolate mousse changes introduce an unpleasant taste and texture. The solution proposed one of the offered desserts on the menu is seasonal fruit. Further investigations are necessary to improve more dishes. Consequently, only 11 dishes could be changed among the total of 46 courses available in the restaurant. (Valencian "paella", marinere rice, black moist rice, "paella" with pork ribs, dry "fideua" of duck, most rice of rabbit, most rice of cod, seafood peeled "fideua", puff pastry, beef tenderloin steaks and octopus). The nutritional compositions of the menu dishes before changes are shown in Table 16.

Table 16. Nutritional composition of the menu dishes before the menus changes

Dishes	**Before changes**		
	Energy (kcal)	**Fat** (g)	**Protein** (g)
Valetian Paella	873	38,9	31,0
Marinere rice	734	23,7	14,0
Black moist rice	583	32,4	12,3
Paella with pork ribs	617	45,7	17,1
Dry fideua of duck	626	26,9	20,4
Moist rice of rabbit	646	30,3	25,4
Most rice of cod	683	23,5	22,9
Seafood peeled fideua	614	23,6	16,1
Beef tenderloin steaks	571	40,6	39,5
Puff pastry	467	42,7	8,9
Octopus	280	7,1	25,4

4.2.3.3. Intrinsic properties: analysis and modifications of dishes

The dish of Valencian Paella was the only recipe that had 40 ml of added fat (olive oil). In agreement with the nutritionist, specific improvements were decided regarding the method of cooking. Usually, meat and vegetables used in this recipe are fried twice. As chef explained, this method is employed with the aim of reducing the time of cooking when customers order their meal. In this sense, proposed changes were as follows. First, the meat was baked (placed) into the oven (precooking), avoiding additional fats, and later, it was fried at the time of order. Regarding vegetables, they have an important impact on the paella's flavor, so they are fried just once at the time of order. The fact of frying meat and vegetables only once leads to the preparation of healthier food, decreasing the fat content added due to the olive oil about 10 ml and not increasing the waiting time for customers.

Another recipe that was also high in fat content was "Puff pastry" because it contains bacon, butter and olive oil. Some tests were carried out in order to analyze if butter could be removed from the recipe so that the total fat content was reduced. With the chef's approval, this change entailed a substantial improvement in the nutritional profile of the recipe. In addition, for octopus's dishes changes potatoes candied for mashed potatoes.

In general, all dishes of the restaurant do not contain high cholesterol; we have to emphasize the beef tenderloin steaks with foie grass, after the chef´s approval, we can change foie grass for source of foie grass.

Salt should be one of the most restrictive ingredients used for cooking, because of its implication in cardiovascular and renal diseases. Natural salt contained in food, in addition to salt added as a condiment, may easily cause the reach of the maximum quantity of recommended salt (6 g/day) by the EFSA (2009). At first it was agreed with the chef to add 4g of salt to the main courses. However, quantifying the amount of salt added in the preparation of dishes is difficult. Chefs often add salt to the food during cooking process, and then they make adjustments to define the final flavor. As a result, total salt added is not known. It is necessary to make a chemical evaluation to ensure the effective implementation of the changes.

Factors in an eating environment can directly influence food intake and can lead to overeating and increased risks of obesity (Drewnowski, 2004; Hill and Peters, 1998; Swinburn et al., 2011). Identify how the proximity of foods in a competitive food environment (i.e., an environment in which more than one food is made available at one time) influences food choice and energy intake (Privitera & Zuraikat, 2014). The hypothesis that making a less healthily food more proximate can increase intake of that food, even if a more preferred and more healthily food is also available but less proximate, was used in the restaurant, salt shakers and oil bottles are not placed on the table of diners (the oil bottles provided have a small nozzle or they use a spray nozzle). This makes it easier to prevent abuse of salt or oil.

The dishes of Valencian paella and Beef tenderloin steaks provided high protein content due to the quantities of meat included on the recipe. There is no scientific evidence to show that diets high in protein are an asset

to the strength or health of people, or could be advantageous since initially they cause an increase in lean body mass and immune function. However, there are adverse consequences. Recent studies highlight the amino acid overload toxicity, assuming a stressful stimulus for the kidney, affecting its excretory function. Moreover, the excessive consumption of animal protein is associated with a high intake of saturated fats which is an important risk factor for the origin of atherosclerotic diseases (Bielsaki, 2005; Friedman, 2004; Hubbard et al., 1994). The styling on the size of portions is more difficult in dishes containing meat, due to the high palatability of it. In controlled feeding studies, participants rarely reported noticing decreases in energy density of 20 to 30%, although decreases in portion size of 25 to 40% tended to be recognized (Rolls et al., 2004, 2006). In these cases, for Beef tenderloin steaks the strategy adapted in this study was to reduce the meat content by 25% and for Valencian paella the strategy adapted in this study was to reduce the meat content by 25% as well as also chop the meat in order to make this reduction imperceptible by consumers. Nutritional intervention resulted in a reduction of portion sizes by 25% from the original size to the nutritional improved serving size. This change made possible to reduce the total protein amount by 16.7% in the recipes of Valencian paella.

In addition, with the different changes applied, menus included more healthy claims such as introduction of some culinary herbs, more cereals, tubers and vegetables.

4.2.3.4. Nutritional composition analysis after the menus changes.

In general, all the menus offered around a 30-35% of energy needed for a day. Table 17 express the dietary evaluation of all dishes compared to recommendations from Spanish population (SENC, 2011; EFSA, 2009; FAO/WHO, 2008**)** after styling of the dishes.

Table 17. Dietary evaluation of dishes compared to recommendations from Spanish population for lunchtime (SENC, 20 11; EFSA, 2009; FAO/WHO, 2008**)**

	Calories (kcal)	**PTN (g)**	**CHO (g)**	**Fat (g)**	**SFA**	**PUFA**	**MUFA**	**Fiber (g)**	**Na (mg)**	**Cholesterol (mg)**
Recommendations from Spanish	**3.000 kcal Lunch: 30-35%**	**10-15 %VCT**	**50 –60 %VCT**	**< 30-35 %VCT**	**< 7-8 %VCT**	**5 %VCT**	**20 %VCT**	**>30 g/day**	**< 2.000 mg/day**	**< 300 mg/day**
Vichysoisse	158 (5,2)	4,4	19,3	5,8	2,4	0,81	1,09	2,5	1561	12
Mix of cheese	203 (6,7)	13,7	0,29	16,4	9,6	1,5	4,3	0	336	39,3
Mix of Iberian ham	127 (4,2)	10,8	0,24	9,2	3,2	0,93	4,7	0	512	12,0
Santoña anchovy	75,8 (2,5)	5,2	1,5	5,4	1,1	0,87	3,1	0,3	487	14,7
Octopus	231 (7,7)	25,2	25,6	5,2	0,48	0,8	0,4	4,1	630	56,9
Prawns	87,8 (2,9)	5,4	0,98	5,2	0,77	0,47	3,7	0,26	454	38,9
Squid with vegetables	400 (13,3)	26,4	27,2	17,2	4,9	3,5	20,7	15,6	188	4,9
Scallops	94,3 (3,1)	4,6	6,5	5,5	1,0	0,51	3,7	0,16	178	5,0
Crispy shrimp duo	90,6 (3,0)	9,1	1,5	5,3	0,8	0,5	3,7	0,27	208	66,6
Black pudding	385 (12,8)	10,5	25,2	26,3	12,0	1,5	8,2	2,9	1042	97,1
Mix of mushrooms and ham	104 (3,4)	6,1	2,3	7,5	1,3	1,1	4,7	1,6	904	0
Avocado salad	219 (7,3)	6,2	6,3	17,5	1,8	1,6	11,5	6,0	1221	25,9
Warm salad of spinach and goat cheese	472 (15,7)	28,1	0,19	39,7	25,4	2,4	10,6	0,55	804	100
Surprises	320 (10,6)	5,3	9,3	29,0	7,7	2,0	17,8	0,28	125	35,9
Foie grass	315 (10,5)	6,3	16,8	24,4	4,8	2,6	14,2	1,4	389	51,1
Salmon ‘s salad	196 (6,5)	8,4	5,9	15,1	2,7	7,2	4,19	3,0	1236	22,1
Vegetable mix	331 (11,0)	12,4	22,7	18,2	2,8	7,5	4,3	7.3	829	4,2
Puff–pastry’ s struffed	421 (14,0)	9,0	11,0	37,8	10,5	0,3	3,8	2,8	1571	152

( ) % of recommendations

Table 17. Continuous.

	Calories (kcal)	PTN (g)	CHO (g)	Fat (g)	SFA	PUFA	MUFA	Fiber (g)	Na (mg)	Cholesterol (mg)
Recommendations from Spanish	**3.000 kcal Lunch: 30-35%**	**10-15 %VCT**	**50 –60 %VCT**	**< 30-35 %VCT**	**< 7-8 %VCT**	**5 %VCT**	**20 %VCT**	**>30 g/day**	**< 2.000 mg/day**	**< 300 mg/day**
Moorish brochette of chicken	187 (6,2)	9,2	20,7	7,0	1,9	1,6	2,68	1,8	266	27,9
Tuna belly's salad	111 (3,7)	4,39	19,29	5,79	1,8	3,23	1,43	1,2	47	4,0
Garden salad	81 (2,7)	2,91	3,28	5,91	3,47	0,21	1,55	1,3	119	17
Little burgues	321 (10,7)	15,0	36,82	11.8	3,56	1,005	3,405	0,7	30	534
Stuffed peppers	109 (3,6)	4,49	3,77	2,95	0,58	0,8	1,742	3,4	597	48
Octopus salad	172 (5,7)	10,19	12,21	8,69	1,5	1,21	7,17	2.9	232	52
Marinere rice	527 (17,3)	10,7	62,1	20,0	1,5	1,4	6,2	2,3	2197	85,4
Black moist rice	551 (18,3)	11,9	63,0	27,1	3,2	2,3	14,9	2,6	2057	30,4
Paella with pork ribs	397 (13,2)	12,4	3,1	36,5	6,4	1,4	7,6	0,9	2457	52,8
Dry fideua of duck	536 (17,8)	16,3	54,8	19,8	2,4	1,6	7,0	6,3	1644	20,4
Valetian Paella	607 (20,2)	25,8	69,6	26,5	2,4	1,9	8	7,4	1674	53,9
Moist rice of rabbit	530 (17,6)	21,3	68,1	20,7	2,1	1,7	6,1	6,6	448	40,2
Moist rice of octopus	558 (18,6)	11,4	63,6	22,2	4,1	2,7	20	2,2	1731	13,3
Vegetables paella	326 (10,8)	7,5	50,89	8,41	3,17	3,45	1,63	2,62	229	41
Most rice of cod	417 (13,9)	14,0	68,8	18,78	1,3	1,3	5,4	3,1	446	14,7
Seafood peeled fideua	588 (19,6)	13,96	83,39	19,6	1,9	1,47	6,8	1,7	1335	237
Tuna	446 (14,8)	19,1	10,4	35,9	6,8	5,6	19,6	2,3	1204	38,4
Cod	387 (12,9)	30,8	4,9	26,8	4,0	3,1	17,8	1,7	251	56,9
Seasonal fish	134 (4,4)	14,9	10,8	2,6	0,67	0,75	0,76	3,8	188	18,0
Angus steak	556 (18,5)	58,6	12,6	29,6	9,5	2,5	14,4	2,7	1496	219

( ) % of recommendations

Table 17. Continuous.

	Calories (kcal)	PTN (g)	CHO (g)	Fat (g)	SFA	PUFA	MUFA	Fiber (g)	Na (mg)	Cholesterol (mg)
Recommendations from Spanish	**3.000 kcal Lunch: 30-35%**	**10-15 %VCT**	**50 –60 %VCT**	**< 30-35 %VCT**	**< 7-8 %VCT**	**5 %VCT**	**20 %VCT**	**>30 g/day**	**< 2.000 mg/day**	**< 300 mg/day**
Magret of duck	351 (11,7)	11,6	34,2	17,7	4,5	2,1	10,1	4,3	1192	45,1
Iberian pork	431 (14,3)	22,9	7,9	34	15,3	2,5	14,9	0,5	1380	93,5
Beef tenderloin steaks	381 (12,7)	30,2	34,9	29,6	7,1	20,3	2,9	1,8	533	134
Orange caprice	116 (3,8)	1,2	14,6	5,6	4,0	0	0	2,56	5,7	14,7
Biscuit pudding	317 (10,5)	8,99	32,87	16,38	4,7	2,41	10,3	0,3	281	31,0
Kiwi's carpaccio	87.5 (2,9)	2,6	14,7	1,6	0,69	0,34	0,39	1,8	27,9	2,0
Navel Orange	84,7 (2,8)	1,4	16,5	0,38	0,024	0,043	0,042	3,1	2,7	0
Chocolate mousse	403 (13,4)	3,3	20,4	34,1	20,2	1,1	9,6	0,7	44,3	94,4

( ) % of recommendations

The nutritional balance was appropriate for after the menus changes with some exclusions; it is important to highlight that menus were not fully balanced because of their lack of carbohydrates. On the other hand, this restaurants was able to reduce fat in 18,4% of main course (P > 0,0460) and for Valentian paella to reduce fat by 31,8% with 30,4 % total reduction of energy (Table 18).

Table 18. Nutritional composition of the menu dishes after changes

	After changes		
	Energy (kcal)	**Fat** (g)	**Protein** (g)
Valetian Paella	607 (30,4)	26,5 (31,8)	25,8 (16,7)
Marinere rice	527 (28,2)	20,0 (15,6)	10,7 (23,5)
Black moist rice	551 (5,5)	27,1 (16,3)	11,9 (3,2)
Paella with pork ribs	397 (35,6)	36,5 (20,1)	12,4 (27,5)
Dry fideua of duck	536 (17,9)	19,8 (26,4)	16,3 (20,0)
Moist rice of rabbit	530 (38,9)	20,7 (31,7)	21,3 (16,1)
Most rice of cod	417 (4,2)	18,7 (21,0)	14,0 (38,8)
Seafood peeled fideua	588 (4,2)	19,6 (17,0)	14,1 (12,4)
Beef tenderloin steaks	381 (33,3)	34,9 (14,0)	30,2 (23,5)
Puff pastry	421 (9,8)	37,8 (11,5)	8,90(0)
Octopus	231 (17,5)	5,2 (26,8)	25,2 (0,8)

(): % of reduction after the menus changes

4.2.3.5. Nutritional composition analysis of menus of combinations of dishes.

Of the 46 dishes analyzed, 26 dishes were selected for the development of four menus of combination of dishes. The selection of the final recipes for menus of combination of dishes was made based on diner demands, restaurant's cost, sensory preferences and precepts of the Mediterranean Diet. The dishes were analyzed for nutritional composition including 11 starters, 10 main courses and 5 desserts, with a total of 26 different dishes and 153 combinations (Table 19).

Table 19. Combinations of dishes.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
1.Vichysoisse+Valetian Paella+Navel orange	850	25.9	106	15.8	32.5	4.6	53.9	3238
2.Vichysoisse+Marinere rice+Navel orange	770	21.8	98.2	11	29.8	5.3	85.4	3761
3.Vichysoisse+Black moist rice+Navel orange	795	16.6	99.1	12.1	34.2	5.4	30.4	3621
4.Vichysoisse + Dry fideua of duck+ Navel orange	779	23.0	90.8	14.9	32.7	4.4	20.4	3208
5.Vichysoisse+Paella with pork ribs+Navel orange	640	18.9	39.2	11.6	42.7	3.0	52.8	4021
6. Salmon ‘s salad+Valetian Paella+Navel orange	888	30.0	92.1	11.6	41.8	3.2	75.9	2913
7 .Salmon ‘s salad+Marinere rice+Navel orange	808	25.8	84.6	6.7	39.2	3.5	107	3435
8 .Salmon ‘s salad+Black moist rice+Navel orange	832	20.7	85.5	7.9	43.5	7.9	3.7	3684
9. Salmon ‘s salad+Dry fideua of duck+ Navel orange	817	27.0	17.2	10.7	42.0	3.2	42.4	2883
10.Salmon ‘s salad+Paella with pork ribs+ Navel orange	677	23.0	25.6	7.4	52.0	2.5	74.8	3696
11.Vegetable mix+Valetian Paella +Navel orange	1127	45.7	99.3	17.8	56.8	4.9	69.0	2038
12.Vegetable mix+Marinere rice+Navel orange	1047	41.5	91.8	13	54.2	5.4	101	2560
13.Vegetable mix+Black moist rice+Navel orange	1071	36.4	92.7	14.1	58.5	5.4	45.5	2421
14.Vegetable mix+Dry fideua of duck+Navel orange	1056	42.8	84.5	17.0	57.0	4.8	35.5	2008
15.Vegetable mix+Paella with pork ribs+Navel orange	916	38.7	32.8	13.6	67	3.6	67.9	2821
16. Puff–pastry’ s struffed+Valetian Paella+Navel orange	1112	30.5	97.1	11.9	64.4	2.6	206	3248
17. Puff–pastry’ s struffed+Marinere rice+Navel orange	1032	26.4	89.6	7.1	61.8	2.8	237	3771
18. Puff–pastry’ s struffed+Black moist rice+Navel orange	1057	21.2	90.5	8,9	66.1	2.9	182	3631

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
19.Puff–pastry' s struffed+ Dry fideua of duck+ Navel orange	1041	27.6	82.3	11.1	64.6	2.6	172	3218
20.Puff–pastry' s struffed+Paella with pork ribs+Navel orange	902	23.5	30.6	7.7	74.6	2.3	205	4031
21. Moorish brochette of chicken+Valetian Paella+Navel orange	879	30.8	107	12.7	33.7	4.2	81.7	1943
22. Moorish brochette of chicken+ Marinere rice+Navel orange	799	26.6	99.4	7.9	31	4.9	113	2465
23.Moorish brochette of chicken+Black moist rice+Navel orange	823	21.5	100	9	21.5	5	58.3	2326
24.Moorish brochette of chicken+ Dry fideua of duck+ Navel orange	808	27.9	92	11.9	33.9	4.1	48.2	1913
25.Moorish brochette of chicken+ Paella with pork ribs+Navel orange	669	23.8	40.4	8.5	43.9	2.9	80.7	2726
26.Vichysoisse+Valetian Paella+Orange caprice	882	25.7	104	12.4	37.7	3.3	68.6	3241
27.Vichysoisse+Marinere rice+ Orange caprice	802	21.5	96.3	7.6	35.1	3.6	100	3764
28.Vichysoisse+ Black moist rice+Orange caprice	807	32.9	119	8.8	16.8	2.1	179	2735
29.Vichysoisse+ Dry fideua of duck+Orange caprice	811	22.7	88.9	11.5	37.9	3.2	35.1	3211
30.Vichysoisse+ Paella with pork ribs+ Orange caprice	671	18.7	37.3	8.2	47.9	2.5	67.5	4024
31.Salmon 's salad +Valetian Paella+Orange caprice	919	29,7	90,2	8,2	47	2,7	90,6	2916

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
32.Salmon ‘s salad + Marinere rice+ Orange caprice	839	25,5	82,7	7,7	44,4	2,8	122	3438
33.Salmon ‘s salad + Black moist rice+Orange caprice	863	20,4	83,5	4,5	48,7	3,0	67,2	3687
34.Salmon ‘s salad +Dry fideua of duck+Orange caprice	848	26,8	75,3	7,3	7,3	2,7	57,1	2885
35. Salmon ‘s salad + Paella with pork ribs+ Orange caprice	708	22,7	23,7	4,0	57,2	2,3	89,5	3699
36. Vegetable mix+Valetian Paella+Orange caprice	1158	45,4	97,4	14,5	62,0	4,0	83,7	2041
37. Vegetable mix+ Marinere rice+ Orange caprice	1078	41,3	89,9	9,6	59,4	4,2	145	2563
38. Vegetable mix+ Black moist rice+Orange caprice	1104	36,1	90,8	10,8	63,7	4,3	60,2	2812
39.Vegetable mix+ Dry fideua of duck+Orange caprice	1087	42,5	82,6	13,6	62,2	3,7	50,2	2041
40.Vegetable mix+Paella with pork ribs+Orange caprice	948	38,4	30,9	10,2	72,2	3,1	82,6	2824
41.Puff–pastry’ s struffed +Valetian Paella+Orange caprice	1141	30,3	95,2	8,5	69,6	2,4	220	3251
42. Puff–pastry’ s struffed+Marinere rice+Orange caprice	1064	26,1	87,7	3,7	67,0	2,4	252	3774
43. Puff–pastry’ s struffed+Black moist rice+Orange caprice	1088	21,0	88,6	4,8	71,3	2,6	331	4023
44. Puff–pastry’ s struffed+ Dry fideua of duck+Orange caprice	1073	27,3	80,4	7,7	69,9	2,3	187	3221

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
45.Puff–pastry' s struffed+Paella with pork ribs+Orange caprice	933	23,3	28,7	4,3	79,8	2,1	219	4034
46. Moorish brochette of chicken+Valetian Paella+Orange caprice	911	30,5	105	9,3	38,9	3,2	96,4	1946
47. Moorish brochette of chicken+Marinere rice+Orange caprice	831	26,4	97,5	4,5	36,2	3,5	128	2468
48. Moorish brochette of chicken+Black moist rice+Orange caprice	855	21,2	98,4	5,6	40,6	3,7	73,0	2717
49.Moorish brochette of chicken+Dry fideua of duck+Orange caprice	840	27,6	90,1	8,5	39,1	3,1	62,9	1916
50. Moorish brochette of chicken+Paella with pork ribs+Orange caprice	700	23,3	38,5	5,1	49,1	2,4	95,4	2729
51.Tuna belly's salad+Valetian Paella+Biscuit pudding	894	30,5	91,3	8,4	43,6	3,6	136	1878
52.Tuna belly's salad+Black moist rice+Biscuit pudding	839	21,2	84,7	4,7	45,3	2,8	113	2649
53.Tuna belly's salad+Dry fideua of duck+Biscuit pudding	823	27,6	76,4	7,6	43,8	3,5	103	1848
54.Tuna belly's salad+ Moist rice of cod+Biscuit pudding	804	24,8	87,5	3,7	38,9	3,8	176	1850
55.Garden salad+ Moist rice of rabbit+ Biscuit pudding	629	17,0	54,6	4,1	37,3	3,7	106	1781
56. Garden salad+ Valetian Paella+Biscuit pudding	808	28,6	91,9	8,6	34,5	3,3	221	1883
57. Garden salad+ Black moist rice+Biscuit pudding	1041	43,9	107	6,3	44,7	3,3	422	3915

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
58. Garden salad+ Dry fideua of duck+Biscuit pudding	737	25,6	77,1	7,7		3,3	187	1853
59. Garden salad+ Moist rice of cod+Biscuit pudding	718	22,8	88,2	3,8	29,8	3,6	261	1855
60.Garden salad+ Moist rice of rabbit+ Biscuit pudding	543	15,1	55,3	4,3	28,3	3,4	191	1786
61. Vegetable mix+Valetian Paella+ Biscuit pudding	1162	48,1	101	13,7	60,1	4,3	129	2131
62.Vegetable mix+Black moist rice+Biscuit pudding	1106	38,8	94,2	10,0	61,8	4,7	106	2902
63.Vegetable mix+Dry fideua of duck+Biscuit pudding	1091	45,2	86,0	12,9	4,2	4,2	95,6	2100
64. Vegetable mix+ Moist rice of cod+Biscuit pudding	1072	42,4	97,1	9,0	55,4	4,5	169	2103
65.Vegetable mix+ Moist rice of rabbit+ Biscuit pudding	897	34,7	64,2	9,4	53,8	4,4	99,2	2034
66. Little burgues+Valetian Paella+ Biscuit pudding	1048	31,2	107	7,8	53,5	2,9	162	2186
67. Little burgues+Black moist rice+Biscuit pudding	993	21,9	100	4,1	55,3	3,2	139	2957
68. Little burgues+Dry fideua of duck+Biscuit pudding	977	28,3	92,1	6,9	53,8	2,8	129	2156
69.Little burgues+Moist rice of cod+Biscuit pudding	958	25,5	103	3,0	48,8	2,9	203	2158

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
70. Little burgues+ Moist rice of rabbit+ Biscuit pudding	783	17,8	70,3	3,5	47,3	2,8	133	2090
71. Stuffed peppers+ Valetian Paella+ Biscuit pudding	1050	38,4	101	9,0	52,8	2,2	225	2051
72. Stuffed peppers+ Black moist rice+Biscuit pudding	993	21,9	100	4,1	55,3	3,2	139	2957
73. Stuffed peppers+ Moist rice of rabbit+ Biscuit pudding	784	25,0	64,5	4,7	46,6	2,1	195	1955
74.Stuffed peppers+ Dry fideua of duck+Biscuit pudding	979	35,5	86,2	8,1	53,1	2,2	192	2021
75.Stuffed peppers+ Moist rice of cod+Biscuit pudding	960	32,7	97,3	4,2	48,1	2,2	265	2023
76.Tuna belly's salad+ Valetian Paella+Orange caprice	891	27,8	87,9	9,2	45,5	3,3	90,7	1788
77.Tuna belly's salad+Black moist rice+Orange caprice	835	18,5	81,3	5,5	47,2	3,7	67,2	2171
78.Tuna belly's salad+Dry fideua of duck+Orange caprice	820	24,9	73,0	8,3	45,7	3,2	57,2	1758
79.Tuna belly's salad+Moist rice of cod+ Orange caprice	801	22,1	84,1	4,4	40,8	3,5	131	1760
80. Tuna belly's salad+ Moist rice of rabbit+ Orange caprice	629	14,4	51,2	4,9	39,2	3,3	60,8	1692
81.Garden salad+ Valetian Paella+Orange caprice	804	25,9	88,5	9,3	36,5	3,0	176	1793
82. Garden salad+ Black moist rice+Orange caprice	749	16,6	81,6	5,6	38,2	3,5	152	2176

Table 19. Continous.

Combination of dishes	**Energy** Kcal	**Protein** (g)	**CHO** (g)	**Fiber** (g)	**Fat** (g)	**(M+P)/S**	**Cholesterol** (mg)	**Na** (mg)
83. Garden salad+ Dry fideua of duck+Orange caprice	733	23,0	73,7	8,4	36,7	3,0	142	1763
84.Garden salad+ Moist rice of cod+ Orange caprice	714	20,2	84,4	4,5	31,7	3,2	216	1765
85.Garden salad+ Moist rice of rabbit+ Orange caprice	539	12,5	51,9	5,0	30,2	3,0	146	1697
86.Vegetable mix+ Moist rice of cod+ Orange caprice	1068	39,7	93,7	9,7	57,3	4,2	424	2013
87.Vegetable mix+Moist rice of rabbit+ Orange caprice	893	32,0	60,8	10,2	55,7	4,0	53,8	1945
88.Little burgues+Valetian Paella+ Orange caprice	1045	28,5	104	8,5	55,4	2,7	117	2096
89.Little burgues+Black moist rice+Orange caprice	989	19,2	96,9	4,8	57,2	3,0	93,6	2479
90.Little burgues+Dry fideua of duck+Orange caprice	974	25,6	88,7	7,6	55,7	83,5	2,7	83,5
91.Little burgues+Moist rice of cod+ Orange caprice	955	22,8	99,6	3,7	50,7	2,8	157	2069
92. Little burgues+Moist rice of rabbit+ Orange caprice	779	15,1	66,9	4,2	49,2	2,7	87,1	2000
93. Stuffed peppers+Valetian Paella+ Orange caprice	832	25,1	89,3	8,9	42,7	3,1	77,9	1946
94.Stuffed peppers+ Black moist rice+Orange caprice	776	15,8	82,6	5,2	41,4	3,6	54,5	2329
95.Stuffed peppers+ Dry fideua of duck+Orange caprice	761	22,2	74,4	8,1	39,9	3,1	44,4	1916

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
96.Stuffed peppers+ Moist rice of cod+ Orange caprice	74,2	19,4	85,5	4,2	34,9	3,3	118	1918
97.Stuffed peppers+ Moist rice of rabbit+ Orange caprice	567	11,7	52,6	4,7	33,4	3,1	48	1850
98. Octopus salad +Valetian Paella+ Orange caprice	834	25,2	88,8	8,5	40,0	3,2	76,5	1941
99.Octopus salad + Dry fideua of duck+Orange caprice	763	22,3	73,9	7,6	40,2	3,1	43,0	1911
100.Octopus salad + Seafood peeled fideua+Orange caprice	764	22,2	73,1	6,4	41,4	3,1	91,5	2056
101. Octopus salad +Vegetables paella+Orange caprice	785	16,5	82,7	4,8	41,9	3,7	35,9	1997
102. Octopus salad + Moist rice of rabbit+ Orange caprice	596	11,8	52,1	4,2	33,7	3,2	46,6	1844
103.Octopus salad +Valetian Paella+Biscuit pudding	1120	27,3	94,6	7,4	68,5	1,3	156	1979
104.Octopus salad+Seafood peeled fideua+Biscuit pudding	1051	24,3	78,9	5,2	69,6	1,3	171	1095
105.Octopus salad+ Dry fideua of duck+ Biscuit pudding	1049	24,4	79,8	6,5	68,8	1,3	123	1949
106.Octopus salad+Moist rice of octopus+Biscuit pudding	1071	16,6	88,6	3,6	70,5	1,5	146	2036
107.Octopus salad+Moist rice of rabbit+Biscuit pudding	855	13,9	58,0	3,1	62,3	1,2	255	1832

Table 19. Continous.

Combination of dishes	**Energy** Kcal	**Protein** (g)	**CHO** (g)	**Fiber** (g)	**Fat** (g)	**(M+P)/S**	**Cholesterol** (mg)	**Na** (mg)
108.Garden salad+ Valetian Paella+Biscuit pudding	1091	28,0	94,3	8,2	65,0	1,3	255	1832
109.Garden salad+Dry fideua of duck+Biscuit pudding	1020	25,1	79,5	7,3	65,2	1,3	222	1802
110.Garden salad+ Seafood peeled fideua+Biscuit pudding	1021	25,0	78,6	6,0	66,1	1,3	270	1947
111.Garden salad+ Moist rice of octopus+Biscuit pudding	1041	19,3	88,3	4,4	66,9	1,4	215	1888
112.Garden salad+ Moist rice of rabbit+Biscuit pudding	825	14,6	57,7	3,9	58,7	1,2	1735	225
113.Vegetable mix+Valetian Paella+Biscuit pudding	1445	47,5	103	13,3	90,5	1,9	163	2079
114.Vegetable mix+Dry fideua of duck+Biscuit pudding	1374	44,6	88,4	12,4	90,8	1,9	130	2049
115.Vegetable mix+Seafood peeled fideua+Biscuit pudding	1375	44,5	87,5	11,2	91,6	1,8	178	2195
116.Vegetable mix+Moist rice of octopus+Biscuit pudding	1395	38,8	97,2	9,6	92,4	2,0	123	2136
117.Vegetable mix+Moist rice of rabbit+Biscuit pudding	1179	34,1	66,6	9,0	84,3	1,8	134	1983
118. Little burgues+Valetian Paella+Biscuit pudding	1331	30,6	109	7,4	84,0	1,5	197	2135
119.Little burgues+Dry fideua of duck+Biscuit pudding	1260	27,7	94,5	6,5	84,2	1,5	163	2105

Table 19. Continous.

Combination of dishes	**Energy** Kcal	**Protein** (g)	**CHO** (g)	**Fiber** (g)	**Fat** (g)	**(M+P)/S**	**Cholesterol** (mg)	**Na** (mg)
120. Little burgues+Seafood peeled fideua+Biscuit pudding	1261	27,6	93,7	5,2	85,1	1,4	212	2251
121.Little burgues+ Moist rice of octopus+Biscuit pudding	1286	21,9	103	3,6	85,9	1,6	156	2192
122.Little burgues+Moist rice of rabbit+Biscuit pudding	1066	17,2	72,7	3,1	77,7	1,4	167	2039
123.Stuffed peppers+Valetian Paella+Biscuit pudding	1119	27,2	95,1	7,8	68,2	1,4	158	1985
124.Stuffed peppers+Dry fideua of duck+Biscuit pudding	1048	24,3	80,2	6,9	68,4	1,4	124	1954
125.Stuffed peppers+ Seafood peeled fideua+Biscuit pudding	1049	24,2	79,4	5,7	69,3	1,4	173	2100
126.Stuffed peppers+ Moist rice of octopus+Biscuit pudding	1069	18,5	89,0	4,1	70,1	1,5	117	2041
127. Stuffed peppers+Moist rice of rabbit+Biscuit pudding	853	13,8	58,4	3,5	61,9	1,3	128	1888
128. Garden salad+ Seafood peeled fideua+ Orange caprice	735	22,8	72,8	7,2	37,5	2,91	191	1909
129.Garden salad+ Moist rice of octopus + Orange caprice	755	17,2	82,5	5,6	38,4	3,5	135	1850
130.Vegetable mix+ Seafood peeled fideua + Orange caprice	1375	44,5	87,5	11,2	91,6	1,8	178	2195
131.Vegetable mix+ Moist rice of octopus + Orange caprice	1109	36,7	91,4	10,7	63,9	4,4	43,1	2097

Table 19. Continous.

Combination of dishes	**Energy** Kcal	**Protein** (g)	**CHO** (g)	**Fiber** (g)	**Fat** (g)	**(M+P)/S**	**Cholesterol** (mg)	**Na** (mg)
132.Little burgues+Seafood peeled fideua +Orange caprice	975	25,3	87,9	6,4	56,5	2,7	132	2212
133.Little burgues+Moist rice of octopus+ Orange caprice	995	19,8	97,5	4,8	57,4	3,0	76,4	2153
134.Stuffed peppers+Seafood peeled fideua +Orange caprice	763	22,0	73,6	6,8	40,7	3,0	92,8	2062
135.Stuffed peppers+ Moist rice of octopus +Orange caprice	783	16,4	83,2	5,2	41,6	3,6	37,3	2003
136.Vichysoisse +Vegetables paella+ Orange caprice	778	27,0	82,2	4,6	36,8	3,4	52,2	370
137.Vichysoisse+Vegetables paella+ Biscuit pudding	1064	29,1	88,0	3,4	65,3	1,3	132	490
138.Vegetable mix+ Vegetables paella+ Orange caprice	1102	47,2	90,8	10,5	58,8	4,1	59,4	451
139.Vegetable mix+Vegetables paella+ Biscuit pudding	1388	49,3	96,6	9,5	87,3		139	489
140.Little burgues+Vegetables paella+ Orange caprice	988	30,3	97,0	4,6	52,2	2,7	92,8	518
141. Little burgues+Vegetables paella+ Biscuit pudding	1275	32,4	103	3,4	80,8	1,4	172	556
142.Stuffed peppers+Vegetables paella+ Orange caprice	776	26,9	82,6	5,0	36,5	3,3	53,8	375
143.Stuffed peppers+Vegetables paella+Biscuit pudding	1062	29,0	88,5	5,8	65,0	1,3	133	414

Table 19. Continous.

Combination of dishes	Energy Kcal	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	(M+P)/S	Cholesterol (mg)	Na (mg)
144. Moorish brochette of chicken +Valetian Paella+ Kiwi's carpaccio	864	33,3	88,4	8,2	40,1	2,3	84,3	2062
145.Moorish brochette of chicken+Dry fideua of duck+ Kiwi's carpaccio	793	30,4	73,6	7,3	40,3	2,3	50,8	2032
146.Moorish brochette of chicken+Black moist rice+ Kiwi's carpaccio	809	24,0	81,8	4,5	41,8	2,7	60,9	2445
147. Moorish brochette of chicken+ Moist rice of rabbit + Kiwi's carpaccio	808	35,1	81,8	4,3	36,9	2,3	60,0	491
148. Moorish brochette of chicken+Vegetables paella+ Kiwi's carpaccio	599	19,9	51,8	3,9	33,8	2,2	54,4	1965
149. Moorish brochette of chicken+ Valetian Paella+Biscuit pudding	1151	35,5	94,3	7,1	68,6	1,2	164	2100
150. Moorish brochette of chicken+ Dry fideua of duck+Biscuit pudding	1080	32,5	79,4	6,2	68,9	1,2	131	2070
151. Moorish brochette of chicken+ Black moist rice+ Biscuit pudding	1095	26,2	87,6	3,4	70,4	1,3	141	2483
152.Moorish brochette of chicken+ Moist rice of rabbit +Biscuit pudding	1095	37,2	87,6	3,1	65,4	1,2	140	530
153. Moorish brochette of chicken+ Vegetables paella + Biscuit pudding	885	22,0	57,6	2,8	62,4	1,1	134	2004

M: MUFA; P: PUFA; S: SFA

The menus of combinations of dishes are important because the nutritionist have opportunity to offer a complete menu as well as show to consumers the best combinations (Table 20 and Figure 6).

Table 20. Selection of dishes and menus proposed

	Menu 1	**Menu 2**	**Menu 3**	**Menu 4**
Starters	Vichysoisse	Tuna belly's salad	Mix salad	Octopus salad
	Vegetables mix	Garden salad	Garden salad	Warm pumpkin cream
	Puff-pastry's stuffed	Vegetables mix	Vegetables mix	Moorish brochette of chicken
	Salmon's salad	Little burger	Little burger	Stuffed pepers
	Moorish brochette of chicken	Stuffed pepers	Stuffed pepers	Little burger
Main courses	Valentian paella	Valentian paella	Valentian paella	Valentian paella
	Mariniere rice	Black moist rice	Dry fideua of duck	Moist riceof cod
	Black moist rice	Dry fideua of duck	Seafood peeled fideua	Moist rice of octopus
	Dry fideua of duck	Vegetables paella	Moits valencian rice of monkfish	Black moist rice
	Paella with pork ribs	Moist rice of rabbit	Moist rice of rabbit	Dry fideua of duck
Dessert	Navel orange	Chocolate mousse	Kiwi's carpaccio	Navel orange
	Orange caprice	Orange caprice	Biscuit pudding	Biscuit pudding

Figure 6. The combinations of menus

The following highlights the most important aspects of the selection.

Fat

Combinations with Puff pastry's struffed and chocolate mousse are the dishes with more energy, fat and saturated fat, exceeding the recommendations even after the stylization of the dishes. As fat provides more calories per gram than any other nutrients, these dishes, which are high in fat, contribute more importantly to calories intake. Here it should be noted the lipid profile combinations, taking into account a high proportion of saturated fatty acids, are one of the most important risk factors for cardiovascular disease and obesity. For all stylized dishes the amount of fat was reduced and the fat profile improved, although the total fat remains high.

Sugar

Sugar content in the menus of combinations with chocolate mousse was highest, this dessert is rich in sugar, cream and butter, and contains 24.9g of sugar added. However, biscuit pudding, was the dessert with the second highest 11.3 g of sugar added. There is striking and highly relevant difference between of menus of combinations of dishes.

Fiber

Regarding the total dietary fiber, it was remarkable that there were large differences among dishes. The highest fiber content was present in the menu Vegetables mix+ Valentian paella+ Navel orange of 17.8g and for 23% of menus it was nearly 70% of total dietary fiber, which is positive. The general population does not consume the daily recommended amount of

fiber (25g), and the use of cellulose and other fibers in the design of restaurant dishes would help to reach this recommendation.

Portion sizes

Nutritional intervention resulted in a reduction of portion size by 25% from the original. This change made possible to reduce fat content by 21.7% and the total protein amount by 16.6% in the menus. Guthrie et al (2002) suggested that one of the main concerns with food eaten away from home was the potential for overconsumption. Portion sizes of food in the United States and United Kingdom have increased over the years (Church, 2008; Rolls et al., 2007) reported that larger serving sizes led to significantly increased consumption of food and daily energy intake as the larger serving size significantly increased the level of hunger and the amount of food needed to create satiety (Rolls et al., 2006; Kelly et al., 2009). Rolls et al (2007) shows that the effects of portion size can persist for several days. Indeed, there are experimental studies of this nature observing effects at 2, 4 and 11 days. A study by Jeffery et al (2007) found that average energy intake significantly increased when participants were offered larger portion sized meals during lunchtime. Diners ate what was before them regardless of their hunger level. Long exposure to excess daily energy intake from the consumption of larger portion sized meals will often lead to weight increase.

4.2.3.6 Study of consumers perceptions of healthy menus at the restaurant

In table 21 shows the scores obtained on each of the questions made to evaluate the perception of customers before and after the changes. The

analysis of variance (ANOVA) indicated that customers perceive only significant changes ($P < 0.05$) in the portion size, a minor punctuation after the intervention. Therefore, results showed that the menu changes did not affect consumer´s general perception of food quality.

Table 21. Questionnaire results before and after menu changes

Question	Average±SD	
	Before	After
Product quality	8,90±1,23[a]	8,75±1,14[a]
Meal presentation	9,10±1,02[a]	8,94±1,02[a]
Portion size	9,09±1,12[a]	8,63±1,41[b]
Variety of the menu	8,29±1,42[a]	8,27±1,34[a]
Value for money	8,41±1,40[a]	8,39±1,32[a]

SD: standard deviation
a-b Different letters in the same row indicate a significant difference in function of the factors analyzed ($p<0.05$).

4.2.4 Discussions

Since nutrition-related diseases such as obesity have increased in the last decade, numerous campaigns to stimulate healthier eating habits have been done. So far, a reverse in the obesity epidemic has not been achieved because many of these approaches are rather one-sided, focusing on raising consumer's health consciousness alone (Marteau et al., 2012; Webb and Sheeran, 2006). One of the biggest drawbacks is that the choice of different kinds of food is made without taken into account their healthiness. Selection of food is usually defined by sensorial features. Consumers

have a perception that healthier food implies that this meal will be less tasty. The market share of consumers who are willing to compromise on immediate sensory experience for future health benefits is declining and the readiness to compromise is low, particularly for the less health-conscious consumers (Verbeke, 2006). By shifting the perspective, we aim to resolve the conflict between healthiness and tastiness, which is at the heart of the obesity dilemma. As a result, the purpose of this study was to offer new strategies to make healthy food more attractive to consumers. The application of scientific knowledge in cooking methods, contributes to improve the nutritional profiles of menus without changes in quality appreciation.

This increases consumer's readiness to choose the healthier variant may be a good way to target high-risk groups that cannot be reached with campaigns that attempt to raise health orientation via education or appeals. This kind of approaches is what some authors name "culinary nutrition" (Condrasky and Helger, 2010), where nutrition and issues related to food taste and preparation occur side-by-side (Caraher et al., 2013). Cooks could implement this knowledge in the design of new dishes in order to balance the menus in terms of nutritional and health properties. As gastronomy is intensely related to social interactions, it is extremely interesting to analyze their implications on one of the major current concerns of society: health (Navarro et al., 2012).

In the literature review, survey participants identified the main barriers to including reduced-calorie items on the menu as low consumer demand, the need for staff skills and training, and high ingredient cost. Similar concerns have been identified in interviews with senior executives at

leading U.S restaurant chains (Sualakamala and Huffman, 2010; Glaz et al., 2007) and in Europe (Lachat et al., 2010). As demonstrated in previous studies (Obbagy et al., 2011), the restaurants which were more familiar with the calorie content of their menus had more confidence in the success of altering high-calorie items. These results further highlight the importance of continuing innovation in culinary practice, emphasizing skills needed to create reduced-calorie dishes that promote health while ensuring that costs are controlled and taste and acceptability are not compromised. Future evaluation of restaurant initiatives in schools should take this factor into account (Corney et al., 1998).

There has been little research carried out regarding chefs' attitudes. As they are directly involve in food preparation and provision of ingredients, it would seem appropriate to consider their attitudes and opinions, especially as they are also consumers (Middleton, 2000).

4.2.5 Conclusions

Several trends became apparent in the retrospective analysis of this project. Overall, this study gives promising evidence for menus when reducing health-related food constituents can be replaced to some extent by another health food attributes. Our findings reveal important contingencies by which educate chefs and to empower and motivate them to think about healthily food as a creative endeavor. Consequently, food producers who aim to enhance their healthier variants of a food product are well advised to account trends by “stylized kitchen” for optimize their food products accordingly.

This study supports the need for ongoing collaboration between chefs and public health professionals to ensure that appealing healthily menu items are more widely available in restaurants and that research is directed towards understanding the most effective ways to develop and promote these items.

4.3. Nutritional information at the restaurant

4.3.1. Introduction

Food consumed away-from-the-home provides an increasing of population diets globally and retain more healthier options and nutrition information at restaurants is one potential strategy available to improve population health (Chand et al., 2011). It is uniquely placed to be involved in the implementation of effective strategies aiming to promote healthier eating out.

However, findings from international empirical research regarding the effectiveness of nutrition information to help consumers make healthier food purchases are mixed. While there is empirical evidence of favorable effects of calorie information on consumer`s food choices in some studies (Burton et al., 2006; Chu et al., 2009; Pulos and Leng., 2010, Roberto et al., 2010, Tandon et al., 2010 and Chand et al., 2012), other studies found no significant difference in consumers' calorie intakes between situations with and without calorie information (Harnack et al., 2008; Elbel et al., 2009; Dumanovsky et al., 2011; Finkelstein et al., 2011; Tandon et al., 2011; Peggy et al., 2012).

An important one is penetrating new marketing options. The effective participation of the catering sector in healthy eating out strategies may promote a trust with policy makers as well as provide a memorandum of understanding and stimulate proactive attitudes within the sector. The opportunity of letting businesses tune in to customer demands may be of a

particularly advantage. Working towards healthier eating out may also educate, empower and motivate catering staff, which would, in turn, be an important asset for the sector.

In this context, the present study investigated whether for the consumers it would be important to mention the nutritional value of the dishes in the menu and whether it's a good idea that restaurants strive to offer healthy cuisine.

4.3.2. Materials and methods

Between February 2012 and January 2013, we surveyed 300 customers of a restaurant in downtown Valencia (Spain). The questions help the restaurant improve its service. Core aspects of the questionnaire include: whether it would be important to mention the nutritional value of the dishes in the menu and whether it's a good idea that restaurants strive to offer healthy cuisine (Annex 1).

Data of the survey of whether for the consumers it would be important to mention the nutritional value of the dishes in the menu and whether it's a good idea that restaurants strive to offer healthy cuisine were divided in two different groups: in group 1- whether for the consumers it would be important to mention the nutritional value of the dishes in the menu and in group 2- participants answered whether it's a good idea that restaurants strive to offer healthy cuisine. Data was analyzed with Statgraphics XV version 15.2.06 (STSC, Rockville, USA). ANOVA with LSD post-hoc

analysis was used to compare if there are any differences between results derived from the answers of the questions at group 1 and 2.

4.3.3. Results and discussions

The results showed that consumers, despite verbalizing health concerns, they have no interest in nutritional information of dishes; they have different attitudes about food-away-from, considering it a "special treat", compared with food prepared at home. The first question of the analysis revealed a significant and negative effect of self-efficacy on nutritional information acceptance 62 % reported that they were not likely to use food label information in restaurants if it were available, most notably concerning complaints: I'm here to enjoy great food and it is irrelevant for me nutritional information of dishes. While the effect of interest in healthy menu acceptance (question 2) as 82 % (Figure 7).

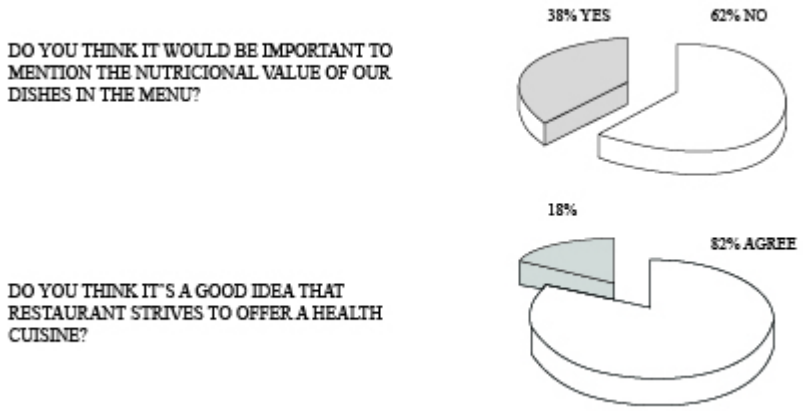


Figure 7. The opinions of consumers about food label information at the restaurant.

While it is always better for consumers to have access to more, rather than less, information, these preliminary results indicate that public health efforts to control obesity perhaps should focus on an education campaign designed to teach appropriate calorie intake values and food label reading skills to the general public without affect the restaurant's business. These pilot data suggest advocating for greater labeling of restaurant food may not be particularly effective in combating the obesity epidemic if people are not looking at existing food labels and are not able to use this information for nutrition planning. Krukowski, et al (2006) suggested, that the public education campaigns focused on calorie requirements may need to precede restaurant labeling, and perhaps other possibilities in labeling formats should be considered (eg, defining foods as "low," "moderate," and "high" calorie). Likewise, the participants identified a threat in the use of logos, labels and similar visual signs that could facilitate customers in identifying enterprises offering healthy options. The threat was not particularly related to the presence of a sign, but rather to the lack thereof, which could create unjustified negative perceptions. Foods, menu choices and/or caterers not displaying logos or labels for any number of reasons could be erroneously perceived as inappropriate for these healthy eating options (Lachat et.al, 2010). In addition, some companies may find the idea of adding nutritional content to their menus a time consuming process that results in redesigning the menu's layout

The public health efforts needs to be enlarge to focus public education campaigns on calorie requirements for new strategies for the relationship between chefs and nutritionists. The intervention as it currently exists is

akin to what (Condrasky and Helger, 2010) call “culinary nutrition” where nutrition and issues related to food taste and preparation occur side-by-side (Caraher et al., 2012). In accordance with the suggested for the restaurant evaluated used in this chapter is detailed in the chapter 2. In addition, the results of the Californian study yielded evidence for the effectiveness of providing nutrition information come Californian restaurants were particularly likely to reformulation items high in calories, fat, or sodium in response to the establishment of a State of a menu labeling law. (Robert Wood Johnson Foundation, 2011).

4.3.4. New strategy of nutritional information at the restaurant

The consumers were not likely to use food label information in restaurants. The strategy chosen has started with working team from the restaurant considering the creation of a virtual menu (QR codes). The QR codes are a way that restaurant owners can satisfy consumer’s needs while maximizing menu space. A QR or Quick Response code is similar to the USB barcodes that accompany every purchase made in stores. These codes, however, are two-dimensional and are in the shape of a square. Easily readable by smartphones that contain a camera, the QR code can connect a consumer to a website or provide text information. A QR code enabled menu can take the patron to an online site that explains the full nutritional content, ingredients, and whether an item contains any known food allergens within seconds. This provides many benefits for restaurants as well as clients. The restaurant

can save on printing costs and the redesign of their menu and the client has easy access to the information needed if they so wish.

A nutritionist was responsible for the selection of the healthier combination of dishes designed by the restaurant (Annex 4). We used the logo in the menus introducing the message of the best combinations of the dishes. The menu provides daily nutritional information of all dishes of the restaurant, make-up of carbohydrates, fat, and protein and any added ingredients that might be associated with food allergies. Additionally, pictures of the dishes, preparation, nutritional options that can match with other dishes in the menus and videos of our chefs preparing it. (Figure 8)

Figure 8. Virtual menu QR code.

The operation is simple; you only need an app in your smartphone that can read QR codes available at the menus. After focusing in the codes, they will find in the restaurant's menu (http://www.lalolarestaurante.com/presentamos-nuestra-nueva-carta-con-realidad-aumentada/)and(http://www.youtube.com/watch?v=fTutUZ07iU0). Furthermore, the work team from the restaurant is prepared to help

customers if they have any questions on using the app. In this sense, the clients can choose which dish seems to look better and which best fits the nutritional needs.

4.3.5. Conclusions

Dietetics professionals and the working team of the restaurant have a clear role to play in educating the public about the principles of energy balance. This information should include calorie intake guidelines, as well as how to use available information on food labels or other nutritional information in other forms (eg, virtual menus) to facilitate energy balance and prevent obesity.

4.4. Chefs at the school

4.4.1. Introduction

Schools can be viewed as a captive environment where public health interventions can reach the greatest number of students, especially to improve dietary patterns (Khan et al., 2009). School meal participants consume up to 47% of their daily energy at school (Briefel et al., 2009) School meal programs can influence students' dietary habits and impact their diet quality; Although school meals typically strive to meet the guidelines for recommended nutrient content nutritional requirements, they often exceed the recommended 10% of energy from saturated fats (Martin et al., 2010 and Crepinsek et al., 2009). Diets rich in whole grains, unsaturated fats, fruits, and vegetables, and low in sugar, sodium, saturated fats, and trans fats can have several health benefits, including decreased risk of overweight and diabetes and lower blood pressure (Esmaillzadeh et al., 2007; Schulze et al., 2006; Fung et al., 2004).

However, foodservice directors are often concerned that offering healthier options will decrease the palatability of the meal and reduce participation. Flavor preferences established early in life track into later childhood (Mennella et al., 2004). The information concerning children's use of their senses of taste and smell, and learning their preferences, is still rather scarce (Mustonen et al., 2008). It is, however, well known that children under five years base their food preferences in sweet and salty flavours and to dislike bitter and sour tastes (Scaglioni et al., 2008). A common belief is that children are more sensitive to smell and taste stimuli than adults, although

researchers have not been able to show any difference in sensitivity (Guinard, 2001). The belief may be a misconception due to children's tendency not to accept new or unfamiliar foods, called neophobia. Neophobia is defined as the reluctance to taste or try new foods (Cooke, 2007). At the same time it leads humans to choose the familiar and safe food instead of new and unfamiliar potentially harmful food. Neophobia appears in all age groups, but the strength of neophobia varies between individuals (Pliner and Salvy, 2006). In children, strong neophobia is probably due to the lack of earlier experiences on different foods (Birch, 1999), There is increasing evidence that the sensory properties of the food can influence the neophobic food response. (Addessi et al., 2005; Reverdy et al., 2008).

Therefore, it is important to invent and develop new ways to encourage children to try different foods and pay attention to the quality of foods. Condrasky et al. (2010) and Caraher (2013), suggested the interaction between professional chefs, schools, educators, nutritionists and food service workers in the classroom and cafeteria to introduce menu changes that will hopefully lead to improved student health in both the short and long run. In the cafeteria, chefs, using ingredients found in school kitchens, work alongside nutritionists to create or reinvent existing dishes. These professional chefs and nutritionists are also encouraged to interact with the children in the classroom by teaching them about nutrition and food preparation. The hope is that this interaction will increase selection of healthy foods, and increase the percentage of these foods consumed (rather than thrown away), either because chef designed foods provide increased availability of highly nutritious foods, because the foods designed by chefs

are more appealing, or due to the education and instruction provided by the chef.

4.4.2. Conceptual background

In France, Puisais and Pierre (1987) developed and described ‘‘taste lessons” (Classes du goût). This education program for school children has been used in several European countries, e.g. in Sweden (Hagman and Algotson, 2000) and Finland (Mustonen et al., 2008). In Spain this education program from school is used in ALICIA Foundation. ALICIA, is a research centre devoted to technological innovation in cuisine, to the improvement of eating habits and to the evaluation of the food and gastronomic heritage. This is a centre with a social vocation, open to everyone to promote healthy eating. The program aims to teach young children to become well-informed consumers with awareness of the quality and differentiation of foods through their smells, textures and tastes. Children’s awareness is developed by awakening their interest and curiosity towards foods by exercising their senses.

4.4.3. Study design

The education programme for the preschool children's groups between 5 and 12 years old consisted of one and a half hours of class on the foundation. These lessons were adapted from ‘‘Les classes du goût’’ (Puisais and Pierre, 1987). Table 22 gives an overview of the main characteristics of these lessons.

Table 22. Description of the sensory education programme (Reverdy et al.,2008)

Title and aim of the session	Organization of the session
Lesson 1 "The five senses"	
This Session evokes the pupil's understanding of the way in which one makes contact with foods	The teacher proposes a tasting procedure in three steps (before, during and after) that uses the five senses to describe a food. This session allows children to enrich their vocabulary on what they feel sensorially emotionally
Lesson 2 "Taste"	
This session lets the pupils discover the basic tastes (sweet, salty, sour, bitter and umami) and other mouth sensations (prickling, burning, astringency)	The teacher proposes varied tasting to the pupils to let them discover their own taste perception and let them find out that they give answers that are both similar to those of others, but still very personal
Lesson 3 "vision"	
This session lets the pupils understand how vision creates expectations that allow them to anticipate food tasting	Tasting making use of colorants can show how vision perception creates expectations capable of modifying other perceptions
Lesson 4 "Olfaction"	
This session shows the pupils how difficult it is to recognize odours	Odours bottles (more or less familiar odours, fruity odours…) are presented to evoke the pupil's memories and lead to identification
Lesson 5 "Touch and Hearing"	
This session aims at enrichment of the vocabulary for touch and to show how touch and hearing complements each other	Samples of different material (silk, wool, velvet…) are presented to the pupils. Foods of different hardness, crispness and crumbliness are tasted
Lesson 6 "Aroma"	
This session show how aromas in the mouth are perceived by retro-nasal olfaction and how a food when eaten cold or warm gives off different aromas	Different very aromatic foods are tasted and the teacher explains how one can get rid of the aromatic sensations by using the ortho- or retro-nasal way
Lesson 7 "Flavour"	
This session provides the possibility to study the sensation of session 2, 4 and 6 simultaneously	The pupils learn to identify these different sensations when they are simultaneously presented in the complex foods, as well as to identify their development over time
Lesson 8 "Preparation of a dish"	
In this session, with the help of a professional, the pupils prepared a recipe for food	This cooking workshop takes place with a professional
Lesson 9 "Food preferences"	
The pupils are asked to try their preferences and to stimulate their curiosity for new foods	The children participated of tasting game. The aim of this game was evaluate the perception of children when they tried foods with lower energy dense and higher energy dense

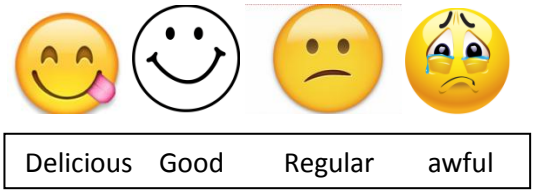
In several parts of this programme, the willingness to taste novel foods is encouraged. In fact, during lesson 9, the children participated of tasting game. The aim of this game was evaluate the perception of children when they tried foods with lower energy dense and higher energy dense (Table 23). Children's perception of foods was measured using a scale where 1 – Delicious, 2 – Good, 3 –Regular 4– awful (Figura 9).

Table 23. The perception of children when they tried foods with lower energy dense and higher energy dense

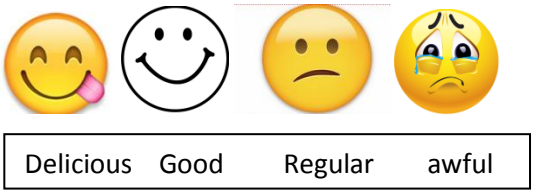
Foods	**Lower-ED***	**Higher-ED***
Milk	1% Milk (0,42Kcal/g)	Whole Milk (0,61 Kcal/g)
Orange Juice	Diluted Juice	Regular Juice
Mac & cheese	Light version	Regular version
Broccoli	Broccoli	Broccoli with butter
Chicken	Cooked roast chicken	Fried chicken

*ED- Energy dense

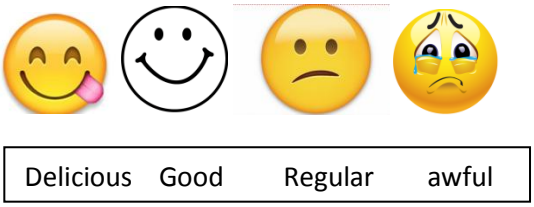
Milk



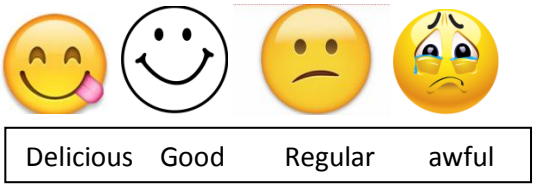
Orange Juice



Mac & cheese



Broccoli



Chicken

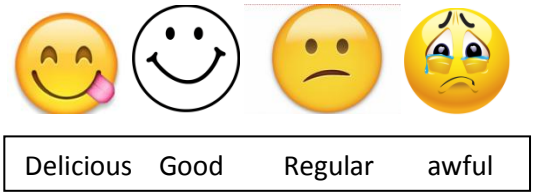


Figure 9. Tasting game

4.4.4. Conclusions

The enhancements in school menu dietary quality and palatability can be achieved using a chef-based model. Because providing healthier school meals can improve students' diet quality and possibly overall dietary habits, this can have important health implications for children. The sensory education has potential in activating children's chemosensory awareness and improving their attention towards foods. the sensory education appealed both to children, nutritionists and chefs, It provided a positive and enjoyable way of highlighting food-related sensory issues in the school, as seen in focus group interviews of children and parents (Salo, 2007), and teachers (Huotilainen, 2005). The improved skills and interest in food and eating broadens the perspectives to foods and eating and provides tools in coping with food choices. At its best, sensory education encourages children to try different foods and pay attention to food quality, which may lead to more healthy and balanced eating habits.

5. CONCLUSIONES

CONCLUSIONS

CONCLUSIONES

La revisión bibliográfica efectuada y los resultados obtenidos permiten establecer las siguientes conclusiones:

1. La encuesta realizada muestra que el personal de cocina tiene prácticamente los mismos conocimientos, sobre la alimentación saludable y una dieta libre de alérgenos alimentarios, que los consumidores.
2. Entre las características de los alimentos, reducidos en calorías, que pueden afectar a su éxito en un menú de un restaurante, la mayoría de los encuestados de ambos grupos (55% del personal de cocina y 44% de los consumidores) indican el sabor como el más importante, seguido de aspectos saludables o promoción de salud.
3. El 46% del personal de cocina y el 73% de los consumidores declaran que no tienen costumbre de leer el etiquetado de los alimentos para comprobar la presencia o no de alérgenos.
4. Basándonos en el tamaño de la ración, contenido en grasa y proteínas de los 46 platos valorados nutricionalmente de la carta dietética, únicamente se pueden modificar 11, ya que algunos platos no se pueden estilizar porque varía el sabor, la textura o el coste económico.
5. Con la estilización de los platos se consiguen reducciones entre 4,2-38,9% de la energía. También se consiguen disminuir el contenido de grasa entre 11,5-31,8% y entre 0,8-38,8% para la proteínas.
6. De los 46 platos analizados, fueron seleccionados 26 para proponer cuatro menús, basados en la demanda, costes, preferencias

sensoriales y preceptos de la Dieta Mediterránea. Esto nos da la oportunidad de ofrecer menús saludables.

7. Los resultados mostraron que los consumidores, a pesar de verbalizar la preocupación por la salud, no tienen interés en obtener información nutricional de los platos de los restaurantes por tener diferentes actitudes sobre la comida fuera del hogar.
8. Las mejoras en la calidad del menú escolar y su palatabilidad se puede lograr con la intervención de los cocineros. La educación sensorial estimula a los niños a probar diferentes alimentos y prestar atención a la calidad de los mismos para conseguir hábitos alimentarios más saludables.

Los resultados apoyan la necesita de la colaboración continua entre el personal de cocina y los profesionales de la salud para asegurar la presencia en los restaurantes de atractivos menús bajos en calorías y libre de alérgenos.

CONCLUSIONS

The literature review and the results obtained render it possible to establish the conclusions:

1. The survey showed that although the chefs perceived that they had a good knowledge of healthy food and food allergens, as indicated by the results, they possess no much more knowledge than the average general public.
2. Among several characteristics of reduced-calorie foods that may affect their success on a restaurant menu, a majority of respondents for both group (55,0% and 44,1% for food handlers and general public, respectively) ranked taste as the most important factor. The next most common factors were food health promotion and good value.
3. A total of 46% of food handlers and 73% of general public did not have the habit of reading food labels to check whether there was any ingredient that might cause a food allergy.
4. The nutritional improvements were focused on portion size, total fat content and protein content. Some dishes are not being available to change for the large changes generated by taste or at cost or at texture, consequently, only 11 dishes could be changed among the total of 46 courses available in the restaurant.
5. Reduction between 4,2 – 38,9% of energy, 11,5 – 31,8% of fat and 0,8 – 38,8% of protein are reached with stylization of the dishes.
6. Of the 46 dishes analyzed, 26 dishes were selected for the development of four menus of combination of dishes. The selection

of the final recipes for menus of combination of dishes was made based on diner demands, restaurant's cost, sensory preferences and precepts of the Mediterranean Diet. This gives us the opportunity to offer healthy menus.

7. The results showed that consumers, despite verbalizing health concerns, they have no interest in nutritional information of dishes; they have different attitudes about food-away-from, considering it a "special treat", compared with food prepared at home.
8. The enhancements in school menu dietary quality and palatability can be achieved using a chef-based model. The sensory education encourages children to try different foods and pay attention to food quality, which may lead to more healthy and balanced eating habits.

This study supports the need for ongoing collaboration between chefs and public health professionals to ensure that appealing healthily menu items are more widely available in restaurants.

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ANEXO

ANNEX

Annex 1. Questionnaire

Questionnaire

Help us improve.

Implementation of the "Q" Touristic Quality Certification

Daily set menu service.

(Please rate from 1 to 10)

- Service received: Friendly treatment, professionalism… 1 2 3 4 5 6 7 8 9 10
- Service received: Staff image 1 2 3 4 5 6 7 8 9 10
- Pace of service (slow, adequate, fast) 1 2 3 4 5 6 7 8 9 10
- Product Quality 1 2 3 4 5 6 7 8 9 10
- Presentation of the dishes 1 2 3 4 5 6 7 8 9 10
- Variety of the set menu 1 2 3 4 5 6 7 8 9 10
- Value for money 1 2 3 4 5 6 7 8 9 10
- Do you think it´s a good idea that Lalola restaurant strives to offer a heart-healthy cuisine?
- Do you think it would be important to mention the nutritional value of our dishes in the menu?
- How did you hear about us?
- Suggestions:
- If you wish to receive updates about our activities and gastronomical offers, please write your email:

Annex 2. Informes nutricionales

VNIVERSITAT DE VALÈNCIA
Facultat de Farmàcia

DEPARTAMENT DE MEDICINA PREVENTIVA I SALUT PÚBLICA, CIÈNCIES DE L'ALIMENTACIÓ, TOXICOLOGIA I MEDICINA LEGAL
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46100 Burjassot - València - Spain

Telf. 96 354 49 59
Fax 96 354 49 54
E-mail: dep.medicina.preventiva@uv.es

Ana Frigola Cánoves y María José Esteve Más, Profesores Titulares de Universidad del Área de Nutrición y Bromatología de la Universitat de València y la doctoranda Kamila Araújo Lessa Santos.

Han realizado el estudio nutricional del menú ofrecido al mediodía por el restaurante Lalola, por lo que emiten el siguiente informe.

Informe nutricional del menú ofrecido al mediodía.

1) Entrantes:

- **Vichysoisse con Brunoise de manzana y crujiente de puerro**, puede combinarse con cualquier principal y postre tanto para hombres como para mujeres.

- **Ensalada de salmón, queso de cabra, tomate, palitos de mar y vinagreta de mostaza**, puede combinarse con cualquier plato principal y con el postre de Naranja Navel Preparada tanto para hombres como para mujeres. Sin embargo la combinación es excesiva para las mujeres cuando el postre es Capricho de Naranja, pero los hombres pueden también elegir esta opción.

- **Escalibada de verduras, mojama, bacalao desmigado y emulsión de aceituna negras,** puede combinarse con cualquier plato principal y con ambos postres en el caso de los hombres. Sin embargo para las mujeres solo podían tomar como plato principal Arroz Caldoso Marinero o Paella de Costilla de Cerdo y como postre únicamente Naranja Navel.

- **Hojaldre relleno de bacon, gambas, setas y puerro con salsa de foie,** puede combinarse con Paella de Costilla de Cerdo y con ambos postre únicamente en el caso de los hombres. Ninguna otra combinación eligiendo hojaldre como entrante es nutricionalmente saludable ni para hombres ni para mujeres.

- **Pincho moruno de ave con ensalada tabule a la menta,** no puede combinarse con la Paella Valenciana de Pollo y Conejo y con ningún postre de los ofrecidos en el caso de mujeres. Cualquier otra combinación que se haga con los platos principales y postres ofrecidos sería saludable tanto para hombres como para mujeres.

Burjassot, 12 de marzo de 2013

Fdo.: Ana Frigola Cánoves

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Ana Frigola Cánoves y Maria José Esteve Más, Profesores Titulares de Universidad del Área de Nutrición y Bromatología de la Universitat de València y la doctoranda Kamila Araújo Lessa Santos.

Han realizado el estudio nutricional del menú ofrecido al mediodía por el restaurante Lalola, por lo que emiten el siguiente informe.

Informe nutricional del menú ofrecido al mediodía.

Todas las combinaciones de los platos ofrecidos en el menú mediodía por el restaurante con el postre **Mousse de chocolate no** están de acuerdo con las recomendaciones saludables para hombres y mujeres.

Las combinaciones con el postre **Capricho de Naranja** están de acuerdo con las recomendaciones para los hombres. Para las mujeres las combinaciones con el mismo postre **no** están de acuerdo con las recomendaciones cuanto combinadas con los entrantes **Escalibada de Verduras con emulsión de anchoas y Hamburguesitas de Ternera caseras con cebolla caramelizada y bacon**.

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Han realizado el estudio nutricional del menú ofrecido al mediodía por el restaurante Lalola, por lo que emiten el siguiente informe.

Informe nutricional del menú ofrecido al mediodía.

Todas las combinaciones de los platos ofrecidos en el menú mediodía por el restaurante están de acuerdo con las recomendaciones saludables para hombres.

Para mujeres las combinaciones de los entrantes **Escalibada de Verduras con emulsión de anchoas y Hamburguesitas de Ternera caseras con cebolla caramelizada y bacon** no son recomendables para mujeres con cualquier combinación.

Burjassot, 11 de abril de 2013

Fdo.: Ana Frigola Cánoves

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