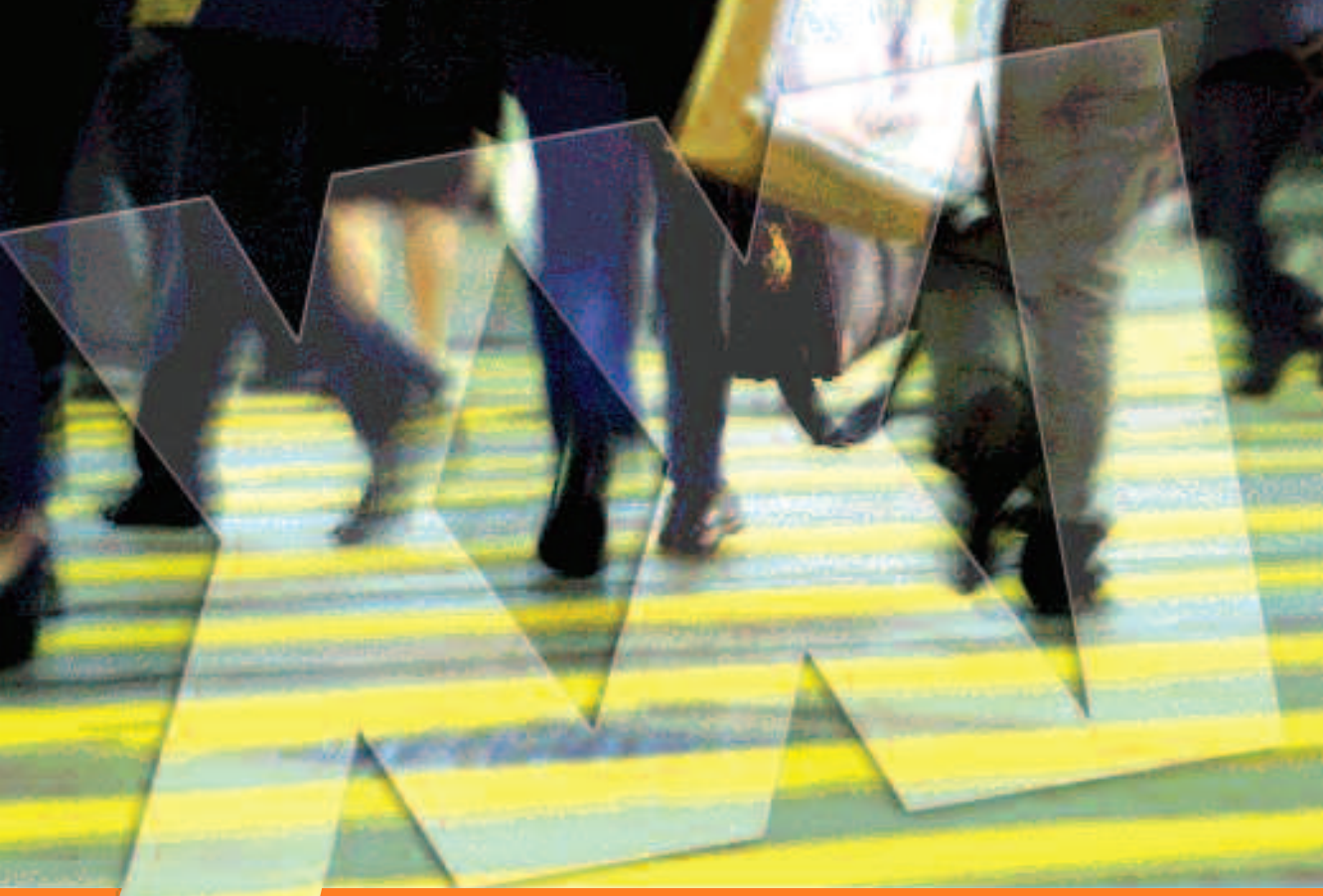

"Hot topics" in nutrition and public health

"Hot topics" en nutrición y salud pública en el siglo XXI

INSTITUTO TOMÁS PASCUAL
para la nutrición y la salud

CEU
Universidad San Pablo

"Hot topics" in nutrition and public health

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ÍNDICE

PROLOGUE

Dear reader,

It is a pleasure to introduce you to this "Hot Topics in Nutrition and Public health in the 21st century", where experts analise different topics of importance and debate about Nutrition and its influence on public health.

The different chapters in this book review the hottest topics in nutrition and public health, presenting new approaches in public health such as "omic" sciences, to progress through diverse issues on education, nutrition, obesity, food outside home, physical activity and, once again the Mediterranean Diet.

Since time immemorial, we know how important a proper diet is and how it affects our health. Back then, Hipocrates already knew that correct or incorrect diets have an influence in preventing or contracting diseases. To modern time the main interest of Nutrition science has been focused on the abolition of diseases caused by incorrect diets deficient in one or various micronutrients or just poor diets not unable to meet the requirements of energy and macronutrients necessary for the correct development, growth and maintenance of the human vital functions and daily activity. Some examples, among others, are diseases such as Beri-beri, Scurvy, Pellagra, Rickets, Kwashiorkor, Marasmus, congenital malformations due to deficiency in some vitamins intake, etc.

The development of Epidemiology as a science and the application of statistical tools allowed identifying the relationships among diet and risk factors for disease and in consequence the development of Preventive Medicine and Public Health Programs. Currently, epidemiological studies have clearly established a direct relationship between the "abundance and opulence" diets typical of developed countries and the emergence and continued growth in these countries of obesity related diseases which were formerly not considered; the WHO declared obesity as the epidemic of the 21st century.

Life expectancy, in Spain as in most countries, is increasing while birth rate is decreasing. Therefore population is shifting towards a progressive and apparently unstoppable aging. This leads to an increase of chronic and degenerative diseases, many of them related to diet, that should be prevented through sound habits and early education.

Nutrition education is an essential part of any Public Health Policy. The Dietary Guidelines and Nutrition Goals provide evidence-based nutrition information and advice and they serve as the basis for nutrition education programs of wide impact.

As a counterbalance, "omics" sciences teach us that individuals are not all equals and, depending on their genetic background, may respond differently to general recommendations; this fact giving cause to what we know today as customized diets. As this knowledge is just flourishing we expect a very promising and fascinating future for personal nutrition.

Recently, UNESCO declared Mediterranean Diet as an Intangible Heritage of Humanity because it promotes healthy eating patterns having an impact in reducing the risk of cardiovascular and other degenerative diseases. A new publication with a self-explained tittle "Can Mediterranean diet be possible in the XXI century?" summarizes the proceedings of two workshops recently promoted by the Chair Tomas Pascual Sanz - Universidad San Pablo CEU.

We are sure you will enjoy the reading of this book that intends to bring light and knowledge to this relevant issue: how to address nutrition and public health concerns in the XXI century.

Thank you.

D. Ricardo Martí Fluxá
President of the Instituto Tomás Pascual Sanz
para la nutrición y la salud.

PRÓLOGO

Querido lector,

Bienvenidos a la lectura de este libro titulado *Hot Topics en nutrición y salud pública en el siglo XXI* donde se analizan temas de capital importancia y debate en la nutrición y su influencia sobre la Salud Pública.

El libro que tiene en sus manos realiza un análisis de los temas más candentes en la nutrición y la salud pública, haciendo un recorrido que estudiará enfoques novedosos sobre la salud pública tales como las ciencias ómicas, la educación, las alegaciones nutricionales, la obesidad, la alimentación fuera del hogar, la actividad física y, de nuevo, la Dieta Mediterránea.

Desde la Antigüedad se tiene conocimiento de la influencia de la alimentación en el mantenimiento de la salud de los individuos. Ya Hipócrates sabía que una dieta incorrecta influía de manera decisiva en la aparición de enfermedades así como en su prevención. Hasta la época moderna el interés prioritario de la ciencia de la nutrición y de la alimentación se orientó hacia la supresión de las enfermedades carenciales provocadas por la falta de uno o varios nutrientes necesarios para un correcto desarrollo, crecimiento y mantenimiento de las funciones vitales y actividad cotidiana de los individuos. Eran el caso, entre otras enfermedades, del beri-beri, el escorbuto, la pelagra, el raquitismo, el kwashiorkor, el marasmo, malformaciones congénitas debidas a déficit de vitaminas, etc.

Con el desarrollo de la epidemiología y los estudios estadísticos de poblaciones se empezaron a conocer las relaciones que existían entre las dietas y el estado nutricional y sanitario de las poblaciones en las diferentes áreas geográficas. Actualmente estos estudios epidemiológicos han establecido claramente una relación directa entre las dietas llamadas "de la opulencia o abundancia" de los países desarrollados con la aparición y continuo crecimiento de enfermedades que hasta ahora no se consideraban importantes, como la obesidad, y todas las enfermedades que lleva asociadas y que la OMS declaró de epidemia del siglo XXI.

La esperanza de vida de nuestro entorno, en particular en España, ha aumentado espectacularmente, mientras que la tasa de natalidad se ha reducido considerablemente, de manera que la estructura de la población española está cambiando hacia un progresivo e imparable envejecimiento. Ello conlleva un aumento de las enfermedades de tipo crónico y degenerativo, muchas de ellas relacionadas con la dieta. En este sentido las investigaciones sugieren que la alimentación y nutrición pueden contribuir a prevenir las discapacidades y las enfermedades asociadas al envejecimiento poblacional.

No debemos olvidar que entre todas las estrategias de política de Salud Pública, la educación nutricional es esencial. La población debe ser capaz de comprender de manera sencilla las guías y

objetivos nutricionales y poder incorporarlos a su vida cotidiana. La educación nutricional correcta desde el comienzo de la vida es fundamental para inclinar la balanza hacia los hábitos positivos.

La aparición de las ciencias ómicas inicia una nueva era en la que debe tenerse en cuenta que los individuos responden de forma diferente a esas recomendaciones dependiendo de su dotación genética y de los diferentes polimorfismos existentes, dando lugar a lo que hoy se conoce como dietas personalizadas que, aunque están en sus fases más prematuras, auguran un futuro ciertamente fascinante para la ciencia de la nutrición.

Hemos asistido recientemente a la declaración por la UNESCO de la Dieta Mediterránea como Patrimonio Inmaterial de la Humanidad como una dieta que promociona un patrón alimentario y estilo de vida saludables tanto en la promoción de la salud como en la reducción del riesgo de aparición de enfermedades cardiovasculares, crónicas y degenerativas. La Cátedra Tomás Pascual Sanz–Universidad CEU San Pablo celebró dos jornadas consecutivas sobre Dieta Mediterránea, con gran éxito de asistencia, en las que se estudió la Dieta Mediterránea, nuestra dieta ancestral, desde diversos enfoques y cuyas conclusiones acaban de ver la luz en una publicación titulada *"¿Es posible la dieta mediterránea en el siglo XXI?*

Estamos seguros de que su lectura no les defraudará, aportando luz y conocimiento sobre este importante título que nos ocupa, *la nutrición y la salud pública en el siglo XXI*.

Muchas gracias.

D. Ricardo Martí Fluxá
Presidente del Instituto Tomás Pascual Sanz
para la nutrición y la salud.

PROLOGUE

As the Rector of the Universidad San Pablo CEU it is for me a great honor and satisfaction to write the foreword to this book, which includes a significant contribution to the culture of public health, understood as a social effort to prevent disease and improve the quality of life of people. An effort in which nutrition plays a vital role.

As it is clear in this work, nutrition is a complex science that studies, among other many issues, the relationship between diet and health at the population level, as well as the development of nutritional interventions at the community level, in order to improve the health of the population.

On the other hand, public health presents different perspectives which should be addressed on nutrition research. This is something that we strive to make from the Universidad CEU San Pablo, as is reflected in this work coordinated by, doctors Gregorio Varela Moreiras and Ángela García González, from our University, who I congratulate on the organization of the Meeting from which out came the following texts, as well as for having achieved the participation of the most important specialists on each of the selected topics.

On this regard, this new book represents a route that allows us to both enjoy and learn, under different nutrition approaches: from the so-called "omics" sciences, in public health and nutrition, to the importance of physical activity, not only for the promotion of health but also in relation to the prevention of the most frequent diseases nowadays. It also presents an update on the "map of obesity" and its constraints, in addition to raise answers to the big question of whether a healthy diet can also be sustainable. In the same way, the reader will find updated information other topical issues: the current concept of "Mediterranean diet"; the vision of the binomial nutrition and health in Europe's regions, or the strengths and weaknesses in nutrition education on public health, as well as a revision of the so-called “nutritional claims”, a topic of great interest to all consumers.

Ultimately, the authors manage to immerse ourselves in different aspects of nutrition and public health, propose us solutions to solve problems, and allow us a certain degree of optimism for improving health and quality of life for collectives.

We want also to thank the members of the Institute Tomás Pascual Sanz, for their constant support and confidence in our Institution, through the Tomás Pascual Sanz Chair in Nutrition and Health, established in the Faculty of Pharmacy, and who we already consider part of the “family” of the Universidad CEU San Pablo. Such acknowledgments must be extended too to all the authors, who so brilliantly contributed to this book.

In short, I believe that the work, the reader has in his hands, will contribute significantly to deep in a field that certainly requires a scientific debate, as the one exemplary reproduced in these pages.

D. Juan Carlos Domínguez Nafría

Rector of the Universidad CEU San Pablo. Madrid, Spain

PRÓLOGO

Como Rector de la Universidad San Pablo CEU supone una gran satisfacción escribir el prólogo de este libro, que recoge una significativa aportación a la cultura de la salud pública, entendida como esfuerzo social para prevenir la enfermedad y mejorar la calidad de vida de las personas. Esfuerzo en el que la nutrición desempeña un papel fundamental.

Como se pone de manifiesto en este trabajo, la Nutrición es una ciencia compleja que estudia, entre otros muchos objetos, la relación entre dieta y salud a nivel poblacional, así como el desarrollo de intervenciones nutricionales a nivel comunitario, con el objeto de mejorar el estado de salud de la población.

Por otra parte, la salud pública presenta diferentes perspectivas desde las que la nutrición debe abordarse en la investigación universitaria. Algo que nos esforzamos en realizar desde la Universidad CEU San Pablo, tal y como refleja este trabajo coordinado por los profesores de nuestra Universidad, los doctores D. Gregorio Varela Moreiras y D.ª Ángela García González, a los que felicito por la organización de la Jornada de la que son resultado los textos que pueden leerse a continuación, así como por haber logrado la participación de los más grandes especialistas para tratar cada uno de los temas seleccionados.

De esta forma, el libro supone un recorrido que nos permite disfrutar y aprender bajo las diferentes perspectivas de la nutrición: desde lo que suponen las llamadas ciencias "ómicas" en salud pública y nutrición, hasta la importancia de la actividad física, no sólo para la promoción de la salud, sino también en lo que respecta a la prevención de las enfermedades más frecuentes en la actualidad.

Igualmente se presenta una actualización del "mapa de la obesidad" y sus condicionantes. Además de plantear respuestas a la gran pregunta de si la dieta saludable puede ser también una dieta sostenible.

De la misma forma, el lector se encontrará con otros temas de máxima actualidad: el concepto actual de "Dieta Mediterránea"; la visión de cómo se encuentra el binomio nutrición y salud en las regiones de Europa, o la educación en nutrición y salud pública, considerando sus fortalezas y debilidades, así como la revisión de las denominadas alegaciones nutricionales, de gran interés para todos los consumidores.

En definitiva, los autores logran sumergirnos en diferentes aspectos de la nutrición y la salud pública, nos proponen soluciones para resolver problemas y nos permiten un cierto grado de optimismo para mejorar la salud y calidad de vida colectiva.

Nuestro mayor agradecimiento por ello también a los miembros del Instituto Tomás Pascual Sanz, por su constante apoyo y confianza en nuestra Institución, a través de la Cátedra establecida en

la Facultad de Farmacia, y a quienes consideramos ya también familia de la Universidad CEU San Pablo.

Tales agradecimientos deben hacerse extensivos igualmente a todos los autores, que tan brillantemente han contribuido a que fructifique el presente libro.

En definitiva, considero que esta obra que el lector tiene entre sus manos, contribuirá de manera significativa a profundizar sobre una materia que sin duda exige de un debate científico, como el que ejemplarmente se reproduce en estas páginas.

D. Juan Carlos Domínguez Nafría
Rector de la Universidad CEU San Pablo. Madrid, España.

INTRODUCTION

An initial statement from the admired Prof. José María Bengoa "the concepts for nutrition, malnutrition or whatever related, are different depending on the targeted profesional. In fact, differences between physicians, agronomists, or even politicians may be very important". A well-known principle in epidemiology affirms that a first analysis for a problem in public health must include "what" to solve and "who" are the targeted subjects. Public Health and Nutrition are clearly interrelated and needs of a multidisciplinary approach. In fact, this have been the main reason and goal of the present book.

Fortunately, there are not at present severe undernutrition problems in Spain, but only those that occur after several pathological conditions or forms of eating orders may be of concern. On the contrary, malnutrition in our world of developed countries is more used now in terms of chronic degenerative diseases such as diabetes, cardiovascular diseases, certain types of cancer or neurodegenerative pathologies. Without any doubt, our main goal at present and future.

It has been estimated that worldwide, 400 mill of people are obese while more than 900 million suffer of undernutrition. Approximately, 95% of heart attacks are attributable to modifiable risk factors as smoking, diet or lack of physical activity; about 20% of cancers may be due to a poor diet. In fact, inadequate diets are responsible of a 13% of all deaths in Europe and of an at least 8% of the European sanitary cost. Someone said that if the 19th century will go down, in the history of health, as the one that managed to overcome transmissible diseases with the discovery of the asepsis, and the subsequent of antibiotics, and the 20th century will be remembered as the one in which the technical advances helped us to extend life expectancy and combat the consequences of degenerative diseases, the 21st century should be the one when heal will change to prevention. The 21st Century should be therefore the so-called *Century of Public Health*.

Health efforts should therefore focus on prevention and to succeed in prevention we must be able to change our habits; we have to adapt our energy intake to our actual needs; select food that will provide us the necessary nutrients, in adequate quantities, and we must undertake physical activity on a regular basis. Unfortunately, doing all this is something we easily forget or perhaps many of us have never learned how to do it, although nutrition and public health experts insist on reminding us of the consequences of our wrong behaviors and the importance of changing them.

Scientific evidence shows it is essential for us to convey to the Governments, responsible for the well-being of citizens, that it is precisely in these difficult times we are living, when the actions in public health are more important than ever; clearly because a healthy population is more productive and because a healthy population spends less on health resources. We have to convince our politicians that it costs less to build a track bike than a Unit of Coronary Care, only to mention economic and no human costs and well beings.

Whit this idea on mind, on December 14, 2010, a group of experts in the field of nutrition and public health, met in our University in Madrid to share with us and the large audience that attend the event, their knowledge and experiences. Their speeches are embodied in this book.

And it is not insignificant, or accident, that a book dedicated to actions at the population level begins with something so individually as genetics. Only if we study the causes of the different responses to a same dietary or nutrition intervention, we will be able to understand the success or failure of the actions token at the population level. José María Ordovás helps us to travel through the recent world of nutrigenomics.

In the following two chapters Maira Bes-Rastrollo and Joao Breda and collaborators, present an interesting update on the map of obesity in the world, and particularly in Europe, its causes and consequences. Obesity has become the third leading cause of death in developed countries, but is not only a problem in "rich" countries, since in the so-called transition and even developing countries it is not surprising to see how obesity and malnutrition coexist side by side, even within the same family. Changes in diet and the lack of physical activity have much to do with this scenario. The *World Health Organization*, in an attempt to bring solution to this serious challenge of global health, has already undertaken numerous intervention programs that are discussed in the Chapter 3 of this volume.

Ibrahim Elmadfa, reminds us, in chapter 4, that the magnitude of overweight epidemics should not make us underestimate other prevalent pathologies in Europe . The data showed herein from the *European Nutrition and Health Report 2009* is an update the main health problems in our continent and their relation with food habits, and potential consequences. So, to obesity, we must add diabetes, hyperlipidemias and some cancers, all of them diseases linked to bad food habits and their different patterns along Europe. In relation to this, lower consumption of fruits and vegetables in the North countries respect to the southern ones, where there is a lack of ingestion of whole cereals and milk are discussed, but also the reasons to explain why our diet is deficient in vitamin D and folic acid all around Europe.

With regard to food patterns, Antonia Trichopoulou and collaborators show us, in Chapter 5, how eating out from home is very common among Europeans, introducing what the characteristics of these intakes are, and how they vary from one country to another. They end pointing out the importance of improving the composition of the food offered in collective catering establishments. On the other hand, Lluis Serra reminds us the characteristics of the Mediterranean Diet, its role in prevention of the degenerative diseases, but also its value as representative of a millennial cultural heritage, that we must preserve and promote from different areas of the political, economic, as well as health agenda; furthermore, when it has been recently considered as Intangible Heritage of Humanity by the UNESCO.

As Barrie Margetts explains in chapter 8, a public health approach based on prevention is the only sustainable long term way to reduce the burden of nutrition related public health problems. An individual treatment model will never be sufficient. Prevention involves education and although the

populations more receptive to that are, undoubtedly, the children and young people, they should not be the only target group for our actions; in fact, it is never too late to change habits. A correct education should be taught by well trained professionals, aware of the true significance of the problem, with sufficient knowledge to address the difficulties posed by changing behaviours. The training of these professionals is a challenge to the educational institutions, nowadays.

One of the main tools for the information and education of consumers are nutrition labels. Learning how to critically read labels helps to do an appropriate selection of the components of our diet. Labels ought to be truthful and informative. The European Food Safety Authority (EFSA), is responsible for developing and implementing regulatory standards to ensure that nutrition claims that appear on the labeling of marketed food, are based on scientific evidence. Yolanda Sánz, explains in Chapter 6 the functioning of the Agency and the basis of these regulations.

We could not finish a book on public health and nutrition without a "special guest": physical activity. Intake and physical activity go hand in hand, because to talk of energy intake without talking about energy expenditure, does not make any sense. Sedentary lifestyle is considered a risk factor for which prevalence has been increasing in recent years. Pekka Oja and collaborators put the final snap to this meeting reminding us of the scientific evidence to recommend the practice of moderately intense physical exercise for an hour a day for children and for 75 minutes per day for adults. That, along with changes in some dietary habits, should be the objective of intervention for the Health Promotion Programs.

W hope that this book meets the expectations of the reader. Ours, were fulfilled the day in which the authors thereof agreed to share with us and you, their time and expertise. None of that would have been possible without the help of the people from the Instituto Tomás Pascual Sanz Foundation, to whom we will always be thankfully for all the support they keep given us in our effort for learning and disseminate , two targets we have been sharing from quite a long time.

No so much to say, we only want to remind you some wise words from Mark Twain:" Be careful about reading health books. You may die of a misprint." We can assure you we have made our best to avoid this.

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INTRODUCCIÓN

Afirmaba el admirado y añorado Prof. José María Bengoa que "los términos nutrición, desnutrición, malnutrición o cualquiera de sus derivados, adquieren significados distintos en función de la perspectiva del profesional que lo estudie. Las diferencias entre médicos, agrónomos, economistas, clínicos o políticos pueden llegar a ser importantes". Un principio epidemiológico clásico indica que, en el análisis de un problema de salud, la primera cuestión que debe plantearse es la de definir «qué» o «cuál» es el sujeto de análisis. Si el objetivo no está claro, ¿de qué nos sirve hablar de cuántos, dónde, quiénes, por qué, y cómo? El carácter multidisciplinario del problema alimentario-nutricional exige, por tanto, enfoques procedentes de distintas disciplinas, aun cuando sea la salud pública la disciplina mayormente responsable. Y ese ha sido, precisamente, el objetivo que nos hemos planteado los coordinadores del presente libro.

Afortunadamente, en la actualidad la desnutrición en España en sus formas graves ha dejado de ser un problema real de salud pública. Únicamente existen casos de malnutrición secundaria provocados por procesos patológicos graves o derivados de determinados trastornos de la conducta alimentaria. Ahora, al menos en el ámbito privilegiado en el que sin duda nos ha tocado vivir, lo que realmente preocupa a los profesionales son los desequilibrios alimentarios y el papel que desempeñan en el desarrollo de enfermedades crónicas degenerativas como la diabetes, la obesidad, las enfermedades cardiovasculares, las neurodegenerativas o ciertas formas de cáncer. Todo lo anterior, un reto para el presente y el futuro.

Se ha estimado que unos 400 millones de personas en el mundo padecen obesidad y más de 900 millones desnutrición. Los infartos de miocardio se deben en el 95% de los casos a factores de riesgo prevenibles como el tabaquismo, la obesidad o la falta de ejercicio físico; un 20% de los cánceres tiene como causa una inadecuada alimentación. Las enfermedades derivadas de una mala alimentación son responsables del 13% de la mortalidad general en Europa y cuestan a los países al menos un 8% de su presupuesto destinado a la sanidad. Alguien dijo que si el siglo XIX pasara a la historia de la salud como aquel en el que se consiguieron vencer las enfermedades transmisibles con el descubrimiento de la asepsia y el posterior de los antibióticos, el siglo XX será recordado como aquel en el que los avances técnicos nos ayudaron a prolongar la esperanza de vida y luchar contra las consecuencias de las enfermedades crónico-degenerativas, mientras que el siglo XXI debería ser aquel en el que dejemos de *curar y consigamos prevenir*. Por ello, el siglo XXI debería ser el siglo de la Salud Pública.

Los esfuerzos de la Sanidad deberían, por lo tanto, centrarse en prevenir a través de la promoción de la salud, y en este campo la importancia de una buena alimentación es crucial. Prevenir es algo que sólo conseguiremos cambiando nuestros hábitos; adaptando nuestra ingesta calórica a nuestras verdaderas necesidades; realizando una elección de alimentos que nos aporte los nutrientes

necesarios en la cantidades suficientes y realizando actividad física con regularidad. Lamentablemente, hacer todo eso es algo que se nos olvida con facilidad o, quizás, muchos de nosotros nunca hemos sabido cómo hacerlo a pesar de que los expertos en nutrición y salud pública, *se empeñan* en recordarnos las consecuencias de nuestros comportamientos y la importancia de cambiarlos.

La evidencia científica nos demuestra que es fundamental que consigamos trasmitir a los gobiernos, encargados del bienestar de los ciudadanos, que es precisamente en estos tiempos difíciles, en los que la actuación en salud pública es más importante que nunca, que una población sana es más productiva, que una población sana gasta menos en recursos sanitarios o que cuesta menos construir un carril bici que una Unidad de Cuidados Coronarios, por hablar únicamente del daño material y no del personal. Basándonos en esta necesidad, el día 14 de diciembre de 2010, un grupo de expertos a nivel mundial en el campo de la Nutrición y la Salud Pública se reunieron en Madrid para compartir con nosotros y el numeroso público que se acercó al evento, sus conocimientos y experiencias. Sus ponencias quedan plasmadas en el presente libro.

No es nimio, ni casualidad, que un libro dedicado a hablar de la actuación a nivel poblacional comience con algo tan individual como la genética. Sólo comprendiendo las causas de las diferentes respuestas, a una misma intervención dietético-nutricional, podremos entender el éxito o el fracaso de las actuaciones a nivel poblacional.

Maira Bes Rastrollo y João Breda y sus colaboradores, nos presentan en los dos siguientes capítulos una interesante actualización sobre el mapa de la obesidad en el mundo, y en particular en Europa, sus causas y consecuencias. La obesidad se ha convertido en la tercera causa de muerte en los países desarrollados, pero no es únicamente un problema de países ricos; en los países en vías de desarrollo no es extraño ver cómo obesidad y desnutrición conviven codo con codo, incluso en el mismo ámbito familiar. Los cambios en la dieta y la sedentarización tienen mucho que ver con este panorama. La Organización Mundial de la Salud ha emprendido ya numerosos programas de intervención que se comentan en la capítulo 3 de este volumen, para intentar poner solución a este grave problema de salud de carácter mundial. El equipo de Ibrahim Elmadfa nos muestra en el capítulo 4 que la intensidad de la pandemia de sobrepeso no debe hacernos perder de vista otros problemas de salud de gran prevalencia en Europa; los datos aquí recogidos, procedentes del *European Nutrition and Health Report del año 2009*, aportan información sobre los principales problemas de salud en nuestro continente y su relación con los hábitos dietéticos. Así, a la obesidad debemos sumar problemas como la diabetes, hiperlipemias, diversos tipos de cáncer o los derivados de la hipertensión, todos ellos ligados de una u otra manera a dietas desequilibradas y a sus diferentes patrones en las distintas regiones europeas, con un consumo superior de frutas y verduras en el sur, una mayor ingesta de productos lácteos y cereales integrales en los países del norte y una dieta deficitaria en vitamina D y ácido fólico en toda Europa, en general.

Con respecto a los patrones alimentarios, Antonia Trichopoulou y colaboradores, nos muestran, en el capítulo 5, cómo el hábito de comer fuera de casa es cada vez más común entre los europeos,

cuáles son las características de estas ingestas y cómo varían de un país a otro, señalando la importancia de mejorar la composición de la comida ofertada en los establecimientos de restauración colectiva. Por su parte, Lluis Serra nos recuerda las características de la Dieta Mediterránea, su papel en la prevención en las patologías crónico-degenerativas y su valor como representante de un legado cultural milenario sin precedentes que debemos preservar y promover desde distintos ámbitos de la agenda política y económica, además de sanitaria, y que ha conseguido recientemente ser considerada como Patrimonio Inmaterial de la Humanidad.

Como indica Barrie M. Margetts en el capítulo 8, sólo una aproximación desde el punto de vista de la salud pública será capaz de disminuir el peso de una incorrecta alimentación sobre los principales problemas de salud más frecuentes en nuestro medio, el tratamiento individual no es suficiente. Debemos prevenir y no tratar, y prevenir implica educar, y aunque las poblaciones más receptivas a ese verbo son, sin duda, los niños y jóvenes, no pueden ni deben ser nuestro único objetivo, "nunca es tarde para cambiar de hábitos". Una correcta educación debe ser impartida por profesionales bien entrenados, conscientes de la verdadera importancia del problema, con los conocimientos suficientes para encarar las dificultades que supone el cambio de hábitos de las personas. Entrenar a estos profesionales es un reto para las instituciones educativas en sus diferentes niveles.

Una de las principales herramientas para la información y, por ende, educación de los consumidores, son las etiquetas nutricionales. Aprender a leer las etiquetas ayuda a la selección adecuada de los componentes de nuestra dieta. Para que estas sean veraces e informativas, la *European Food Safety Authority (EFSA)* se encarga de elaborar y aplicar las normas regulativas que aseguran que las alegaciones nutricionales que se proclaman y aparecen en el etiquetado de los alimentos comercializados, estén basados en evidencias científicas. Yolanda Sanz nos explica en el capítulo 6 el funcionamiento de la Agencia y las bases de dicha regulación.

Por último, no podríamos acabar un libro sobre salud pública y nutrición sin hablar de una *invitada especial*, la Actividad Física. Ingesta y actividad física van de la mano, porque hablar de ingreso sin hablar de gasto pierde todo su sentido y porque el sedentarismo es otro de los factores de riesgo cuya prevalencia ha ido en aumento en los últimos años. Pekka Oja y colaboradores, ponen así el broche final a este encuentro, recordándonos que las evidencias científicas hacen recomendable la práctica de ejercicio físico moderado intenso durante una hora al día para los niños y durante 75 minutos al día para los adultos. Lo que, junto con los cambios en la alimentación, debe ser el objetivo de los programas de intervención para la promoción de la salud.

Esperamos sinceramente que este libro cumpla las expectativas del lector. Las nuestras se cumplieron el día en que los autores del mismo se prestaron a compartir con nosotros y con ustedes su tiempo y sus conocimientos, todo lo cual no hubiera sido posible sin la colaboración de las personas del Instituto Tomás Pascual Sanz y, más específicamente, a través de la Cátedra Extraordinaria que desde hace ya más de diez años se encuentra implantada en nuestra

Universidad. Para ellos no hay suficientes palabras de agradecimiento por su apoyo incansable en este nuestro empeño de aprender y difundir; dos objetivos que compartimos desde hace ya varios años.

Por nuestra parte, sólo recordar las sabias palabras de Mark Twain: "tenga cuidado cuando lea libros relacionados con la salud, podría morir de una errata de imprenta". Créannos cuando afirmamos que hemos puesto todo nuestro empeño en que esto no suceda.

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The "OMICS" in public health nutrition

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Abstract

Traditional public health nutrition interventions and recommendations generally rely on the notion of the "greatest food for the greatest number of the population. However, past and current global dietary guidelines have been based for the most part in observational epidemiological evidence and have not considered the dramatic differences in the individual's response to changes in nutrient intake. These differences in response may greatly affect the efficacy of these recommendations at the individual level. With the arrival of nutrigenomics and nutrigenetics principles based on the development of "OMIC" technologies (i.e., genomics, epigenomics, transcriptomics, proteomics and metabolomics), the focus moves to the "greatest food for each individual," thinking that additive benefit from each individual success will result in a healthier population. The current scientific knowledge supports that diet can be tailored to specific genotypes to achieve the greatest benefit in disease prevention and therapy. However, this is a young science and it is not known yet whether this new technology-driven individualized recommendations will have the acceptance and the anticipated public health impact. Moreover, health professionals need to be educated in the proper use of the information emerging from these new approaches and its transmission to the individuals.

Key words

Nutrigenomics, disease prevention, public health nutrition, dietary recommendations; human genome.

Introduction

The main contribution of nutrition research to public health consists of defining optimal dietary recommendations aimed to prevent disease and to promote optimal health. For this purpose, and based on the best scientific evidence available at each time in history, several dietary guidelines have been implemented to improve the health of the general population and of those at high risk for specific diseases [i.e., cardiovascular disease (CVD), cancer, hypertension, and diabetes]. However, past and current dietary guidelines have been based for the most part in observational epidemiological evidence and have not considered the dramatic differences in the individual's response to changes in nutrient intake. These differences in response may greatly affect the efficacy of these recommendations at the individual level.

The mechanisms responsible for the interindividual differences in response to intervention, and particularly dietary response, are far from being fully understood. Nevertheless, although the presence of a genetic component has been proposed for several decades, only recently researchers began examining these nutrient-gene interactions at the molecular level. So far, the results of studies aimed to elucidate nutrient-gene interactions for common diseases have been controversial and inconclusive. Despite that, it is becoming evident, that most common diseases are triggered because of interactions between specific genes and environmental factors. These interactions are dynamic, beginning at conception and continuing through adulthood.

The concept of "environment" is complex and broad and it has been frequently associated with toxic exposures, education, and socioeconomic status. However, food intake is a key environmental factor to which we are all continuously exposed and a major regulator of gene expression during one's life span.

The prominent role of diet in the etiology of disease was recognized first from a number of nutritional deficiencies and later on from monogenic diseases. Then the concept was extended to include multifactorial disorders (i.e., the Diet-Heat Hypothesis). Further progress in this area relies on the identification of the plethora of genes involved in the development of complex diseases and the elucidation of the impact of their variation on health and disease risk. This knowledge has been facilitated by all the OMICS technologies (genomics, epigenomics, transcriptomics, proteomics and metabolomics) and information (bioinformatics) generated around the Human Genome Project. In addition to increasing our ability for early detection of disease risk, the OMICS are paving the way for more comprehensive exploration of gene-nutrient or gene-diet interactions. However, before moving forward and entering into further discussion about this important topic, it may be appropriate to define some of the major methodological players.

Genomics

Genomics is the most developed and best known of all the OMIC techniques. The progress of genomics fostered by the Human Genome Project has been spectacular. In just one decade, we have gone from having a rough draft of the Human Genome to being close to achieving the "$1,000 Genome." The ability to conduct genome wide association studies using denser and denser gene arrays has made feasible to conduct genomic analysis in hundreds of thousands of individuals and the identification of hundreds of new loci associated with most common genetic disorders. Moreover, this plethora of genetic and phenotypic data in very large cohorts has made possible to go beyond association studies and begin the exploration of gene by environment interactions.

Epigenomics

Epigenetics refers to the processes that regulate how and when certain genes are turned on and off, while epigenomics pertains to analysis of epigenetic changes in a cell or entire organism. Epigenetic processes have a strong influence on normal growth and development, and this process is deregulated in diseases such as cancer. Diet on its own or by interaction with other environmental factors can

cause epigenetic changes that may turn certain genes on or off. Epigenetic silencing of genes that would normally protect against a disease, as a result, could make people more susceptible to developing that disease later in life. The epigenome which is heritable and modifiable by diet is the global epigenetic pattern determined by global and gene-specific DNA methylation, histone modifications and chromatin-associated proteins which control gene expression.

Transcriptomics

Transcriptomics allow the simultaneous measurement of thousands of RNA transcripts from a biological sample based on microarray technology and quantitative real time PCR. Using this technology we are able to evaluate the interactions between diet and genes measured as changes in genetic expression.

Proteomics

Proteomics is dedicated to describing the entire set of proteins and their modifications within cells, tissues, and organisms. Unlike the human genome, which is, for the most part, fixed and steady throughout the human body and the lifespan, the human proteome is far more complex and dynamic, varying over time and among cells. It is the proteins themselves and their modifications that produce their biochemical, physiological, and structural functions in tissues and cells. Several technologies, such as mass spectrometry, are being used to detect, identify, and quantify thousands of proteins in a biological sample. Proteomics are considered as one of the most challenging within the field of omics, mostly because of the analytical challenges posed by the chemical, physical and structural diversity of the proteins unlike the relatively simplicity of DNA and RNA molecules. The use of proteomics for biomarker identification and validation was thought to revolutionize clinical diagnostics. However, this expectation has not been achieved due to several challenges ranging from appropriate platforms to study design and even to regulatory oversight. Nonetheless, significant progress has been made, and diagnostic products based on the simultaneous measurement of multiple proteins are beginning to emerge. In addition, this field has the potential to produce cutting-edge breakthroughs for the field of nutrition science. Proteomics can bring up many of the molecular mechanisms resulting from dietary interventions in a comprehensive fashion, something impossible with traditional piece-meal biochemical methods. Related to proteomics, is the secretome that describes the global study of proteins that are secreted by a cell, tissue, or organism at any given time or under certain conditions. During cellular posttranslational modification, proteins become chemically modified, which plays a key role in product secretion. Furthermore, posttranslational modification also influences protein biological and physiological functions such as cell signaling, cell recognition, and cell protection.

Metabolomics

Metabolomics includes the measurement of small molecules in biological fluids, tissues, and cells using spectroscopic analytical platforms. This approach can identify the complexities of metabolic regulation far better than measurements of single biomarkers using classical biochemical methods.

The metabolome has some of the complexities of the proteome, including the fact that, unlike the genome, the metabolome is different for each cell and body fluid and changes with time, notably in response to food intake. However, in general, the metabolic homeostasis imposes that the key metabolites are maintained within relatively narrow ranges of variability facilitating the dynamic range of their measurement. Metabolomics is emerging as an informative tool to reveal the complex metabolic effects of dietary factors and to understand the interindividual variability in response to diet and drugs. Application of metabolomics to the clinical practice and epidemiological studies will require the identification of the key informative molecules of the metabolome to be used accurately and cheaply in the population.

Bioinformatics

Bioinformatics or computational biology is the application of computer science and information technology to the biological and medical fields. This definition and scope is very broad, reflecting the novelty of this area. Informatics deals with algorithms, databases and information systems, web technologies, artificial intelligence, software engineering, data mining, image processing, modeling and simulation, and statistics, for generating new knowledge of biology and medicine, and harnessing the huge amount of information generated by the OMICS and already present in the literature and different public data bases. A bioinformatician needs to have a basic and general sense of the ideas and approaches of science, biology, medicine and engineering and should work in close collaborations with experts in the relevant areas of biological research.

Omics at work: gene by diet interactions

The concept of gene-diet interaction describes the modulation of the effect of a dietary component on a specific phenotype (plasma lipid concentrations, obesity, glucemia, etc.) by a genetic polymorphism. Alternatively, this notion refers to the dietary modification of the effect of a genetic variant on a phenotypic trait. In terms of gene-diet interactions for common, multifactorial diseases, the fastest development has been in the area of CVD risk, which has easily measurable risk factors (i.e., plasma cholesterol concentrations, blood pressure). Some examples of the preliminary gene-diet interactions on lipid metabolism have been the subject of several reviews. The potential benefits of channeling the power of genomics for dietary prevention of disease are immense and this approach is considered by many as the future of nutritional research in the upcoming years. This will be possible thanks to those new OMICS technologies described above and that need to be applied extensively in nutritional sciences. All these techniques and the information they generate must be combined to understand both the influence of specific nutrients and whole dietary patterns on the metabolic behavior of cells, organs, and the whole organism under the umbrella of systems biology or functional genomics. The development of systems biology transformed the concept of gene-nutrient interaction from the traditional reductionism approach of studying the effect of a nutrient over a specific metabolic event into a holistic one, in which a significant fraction of all

regulated genes and metabolites can be quantified concurrently. These ambitious goals can be achieved if we have: (a) knowledge of the parts that enter the equation (nutrients, dietary patterns, biomarkers); (b) adequate experimental design and statistical methods; (c) tools to study and visualize complex interactions; (d) computer power to integrate information, and (e) interdisciplinary approaches and large consortia.

Consequently, the nutrition field has introduced the new term of "nutritional genomics" or "nutrigenomics" that represents the application of systems biology in nutritional research, promoting an increased understanding of (a) how nutrition influences metabolic pathways and homeostatic control, (b) how this regulation is altered in the early phase of a diet-related disease, and (c) to what extent individual sensitizing genotypes contribute to such disease.

Nutritional genomics studies the functional interaction of food and its components with the genome at the molecular, cellular, and systemic level; the goal is to use diet to prevent or treat disease. In nutritional genomics, two terms are used: nutrigenomics and nutrigenetics. Nutrigenetics examines the effect of genetic variation on the interaction between diet and disease. This includes identifying and characterizing gene variants associated or responsible for differential responses to nutrients. The goal of nutrigenetics is to generate recommendations regarding the risks and benefits of specific diets or dietary components to the individual. It has been also termed "personalized nutrition" or "individualized nutrition." Nutrigenomics focuses on the effect of nutrients on the genome, proteome, and metabolome.

The fundamental hypotheses underpinning the science of nutrigenetics and nutrigenomics are the following:

- Nutrition may exert its impact on health outcomes by directly affecting expression of genes in critical metabolic pathways and/or indirectly by affecting the incidence of genetic mutation at the base sequence or chromosomal level which in turn causes alterations in gene dosage and gene expression.
- The health effects of nutrients and nutriomes (nutrient combinations) depend on inherited genetic variants that alter the uptake and metabolism of nutrients and/or the molecular interaction of enzymes with their nutrient cofactor and hence the activity of biochemical reactions.
- Better health outcomes can be achieved if nutritional requirements are customized for each individual taking into consideration both his/her inherited and acquired genetic characteristics depending on life stage, dietary preferences and health status.

In human studies, the various 'omic' technologies need to be considered alongside data collected on nutritional, lifestyle, and clinical, physiological, demographic and environmental factors. There is growing interest in understanding the role of gut microflora and the interactions that arise between the microbiome and host genome, which adds a further layer of complexity to the data being collected as well as how they are analyzed. A systems biology approach with bioinformatics is usually needed to manage and interpret the large and complex datasets that can be generated.

The application of nutrigenomics: understanding interindividual differences in response to diet

The different response to diet depending on the particular characteristics of an individual is not a new observation but has already been widely observed and documented for decades.

Already in the classical experiments of Keys and Grande, examining the effects of diet in plasma concentrations of cholesterol, these investigators stressed the dramatic differences between individuals, concluding that it was the "intrinsic characteristics" of the individual that motivated the different lipid responses to the same dietary intervention. Having admitted that each individual may respond differently to the same diet, it becomes crucial to identify the factors defining such differential response. Among the many potential factors, genetic variability could play a significant role. Accordingly, studies have been undertaken to determine whether genetic variants, mainly single-nucleotide polymorphisms (SNP), can explain those differences. These gene-diet modulations may also help to explain the different phenotypes observed for a given genotype, such as those observed in some monogenic forms of CVD. Thus, the same gene variant may be associated with wide spectrum of clinical manifestations, ranging from no symptoms at all to severe CVD. Therefore, in addition to potential epistasis, other non-genetic factors (among which we emphasize diet) may be important in modifying the clinical phenotype, either by exacerbating or protecting against the diseased phenotype.

Nutritional genomics, as we know it nowadays, begun in the 1990s. The main goal was to gain knowledge about the interaction between dietary factors and the genome that modulate phenotypic expression. This knowledge could explain the genetic basis for the interindividual response to diet and the reasons for the different clinical phenotypes observed for the same genetic variant. This discipline has been gathering momentum for the last two decades to become a significant player in cardiovascular research as well as other disease areas. Research into nutritional genomics is a leading subject in numerous calls for national and international projects, and relevant research networks, such as the Nutrigenomics Organization, have been launched. The Nutrigenomics Organization is a European-funded Network of Excellence, the full title of which is "The European Nutrigenomics Organization: linking genomics, nutrition and health research," which is carrying out cutting-edge research into all the "omics" related to nutrition and health as well as into the ethical aspects derived. In the rise of nutritional genomics, it is also important to stress the creation of numerous research institutes in various countries dedicated to this new discipline. For example, in Spain, the Instituto Madrileno de Estudios Avanzados (IMDEA) en Alimentacion was borne having nutrigenomics as its main objective to translate Nutrition Research into translational applications and knowledge for public health and the Food industry. In the USA, other examples are: The Cornell Institute for Nutritional Genomics at Cornell University, Ithaca, NY; the Center of Excellence in Nutritional Genomics, CA which is funded by an award from the National Center for Minority Health and Health Disparities; or the recently launched Salk Center for Nutritional Genomics in La Jolla, Calif. Besides these institutes, programs or laboratories devoted to research into nutritional genomics

have been created in most nutrition research centers. As investment and scientific training in this discipline has increased, so too has the number of scientific publications centered on that field and in an exponential way. Nonetheless and despite the huge promises made in numerous articles on this subject, we need to underscore that nutritional genomics is a discipline still in its infancy, and more progress needs to be done before practical tools can be developed for the prevention and treatment of CVD.

Global versus personalized recommendations: potential caveats of nutrigenomics

As previously indicated, traditional public health nutrition interventions and recommendations generally rely on the notion of the "greatest food for the greatest number of the population, with the arrival of nutrigenomics and nutrigenetics principles, the focus moves to the "greatest food for each individual," thinking that additive benefit from each individual success will result in a healthier population. However, it is not known yet whether this new technology-driven individualized recommendations will have the acceptance and the anticipated public health impact.

The first assumption is that healthy life equates to a life free of disease, and that specific foods and nutrients play a crucial role in generating that healthy state. In this model, health and disease are the extremes of a continuum. Unhealthy dietary habits cause metabolic stress that brings unbalance to the body moving the individual from the healthy status into a grey area that could be interpreted as a preclinical disease state. If the stress remains, the individual keeps moving into darker gray areas until the damage is irreversible and pathological state cannot be avoided by healthy eating but rather with pharmaceutical approaches or clinical interventions. This "nutricentric" paradigm of health and disease almost assumes that healthy life can mostly be achieved through nutrition. Two alternative scenarios are proposed in the literature. The first one assumes that the individual is incapable by him or herself of making the right choices and requires that the whole food environment must be changed so the individual does not have the temptation to deviate from the healthy nutritional path. This model releases the individual from his/her responsibility and places the burden on the food industry that must deliver only healthy foods, even though they may maintain the allure of the unhealthy ones, and solid nutritional recommendations. The personalized model poses the burden on the individual who becomes empowered to lead a healthy life through nutrigenomics. However, this also means that a significant portion of the daily activities may be spent worrying about maintaining health through optimal nutrition at all times.

A major problem with these scenarios is that they tend oversimplify the concept of human eating, becoming a chemical and mechanical process similar to feeding media to cells cultured on a petri dish. However, for humans, food and eating have much more meaning than the nutrients present in foods. Food and eating are intrinsic parts of the cultures and have very strong psychological effect and social meaning. Therefore, we cannot consider health as merely the absence of disease, but rather the total

physical, psychological and emotional wellbeing of individuals. Some of that wellbeing comes from the ancestral habits and foods associated with different cultures, regions ethnicities and religions. Therefore, some concern has been raised warning that the application of Nutrigenomics without taking into cultural considerations may compromise the feeling of well-being.

Moreover, this focus on risks may create a lifelong anxiety about the link between food and disease to the point of creating feelings of guilt if an individual fails to meet either the public or the personal 'health standards'. This could end up removing the traditional good feelings associated with food and eating. Finally, the continuous focus on future risks may absorb the pleasures and concerns of the present. Over interpreting the predictive value of genomic information may induce to wrongly believe that randomness is not part of our fate.

In practice, we still need to demonstrate whether personal risk information will trigger changes towards a healthier diet considering that most people tend to connect healthy eating with eating less and with less pleasurable food. Therefore, we need evidence-based data to ensure that the knowledge generated by nutrigenetic science is properly implemented and scrutinized. Furthermore, as nutrition becomes increasingly integrated with preventive medicine, it is essential that dieticians and medical practitioners as well as geneticists are properly educated in the field of nutrigenetics/nutrigenomics. so that their principles and

Finally, it is essential to prove the initial hypothesis that individual approaches can improve public health better than global recommendations, and this benefit is available to the entire population and not only restricted to those with higher socioeconomic status and education

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Mapping the obesity: problems and solutions

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Abstract

Obesity is an important Public Health problem leading to a real pandemia not only in the developed world but also in developing countries.

The prevalence of obesity has rapidly increased in the last decades. Currently more than half of Spanish adults are overweight or obese. In addition, Spain is one of the countries with the highest prevalence of childhood obesity.

In the last term, obesity is the consequence of a long-term and sustained energy imbalance. Therefore, those lifestyles contributing to an increase in energy intake such as an increase in portion size and those contributing to a decrease in energy expenditure such as an increase in sedentary lifestyle may play a role in the development of obesity.

A high body mass index is a major risk factor for total mortality and several chronic diseases such as type 2 diabetes, cardiovascular disease, metabolic syndrome, hypertension, sleep apnea, arthrosis, and some types of cancer.

To prevent obesity a multisectorial approach including individual's decisions, education, family, schools, policy makers, governments, industry and local community is needed to achieve the following goal: the healthiest choices should be the easiest ones.

Introduction

Obesity represents one of the main public health problems of the XXI century. The latest projections of the World Health Organization (World Health Organization, 2006) indicated that globally in 2005: 1.6 billion adults suffered overweight and at least 400 million adults were obese. In addition, at least 20 million children under the age of 5 were overweight. Moreover the third cause of death among middle and high income countries (Venkat Narayan KM, et al. 2010) was overweight and obesity. And even in the low income countries overweight and obesity are a problem. In these countries, obesity is commonly on the rise particularly in urban settings. Many of these countries are now facing a double burden of disease, where problems from infection diseases and undernutrition coexist side by side with overweight and obesity in the same country (Kappor SK & Anand K, 2002).

Epidemiology of obesity

According to one of the latest published data from the Organization for Economic Cooperation and Development (OECD) (Franco S, 2010) the USA is the leading country in the pandemic of obesity. Using the same methodology, the prevalence of obesity has increased year by year in the USA. Currently, approximately more than two thirds of American adults suffer overweight and obesity.

In Europe, according to the last publication from the European Regional Office of WHO, the east countries and the United Kingdom presented the highest prevalence of overweight and obesity (Branca F, et al. 2007).

In Spain, based on self-reported data from the National Health Survey, the prevalence of obesity has increased year by year (Gutiérrez-Fisac JL, et al. 2005). Not only obesity but also morbid obese has increased over time (Basterra-Gortari FJ, et al. 2011). Moreover, the young population has experienced the highest increase in the prevalence of obesity (Basterra-Gortari FJ, et al. 2007), trend in parallel with a decrease in the adherence to a Mediterranean dietary pattern. The work from the Spanish Society for the Study of Obesity (SEEDO) is the main study based on measured data. It was conducted in the nineties, including random population between 25 and 60 years old from 8 Autonomous Communities. The results showed that almost 60% of men and 50% of women were overweight or obese (Aranceta J, et al 2003). The last Spanish data came from the self-reported European Health Survey. The preliminary results showed that more than 50% of adult Spaniards (≥18 years) suffered overweight or obesity.

It should be remembered that childhood obesity is an important health problem in Spain. Spain is the third country of the OECD members with the highest prevalence of overweight children just following United States and Scotland. Results from the enKid study showed that prevalence of overweight in 2002 among adolescents were more than twice the prevalence of overweight in 1985 (Serra-Majem L, et al. 2003).

Potential causes of obesity

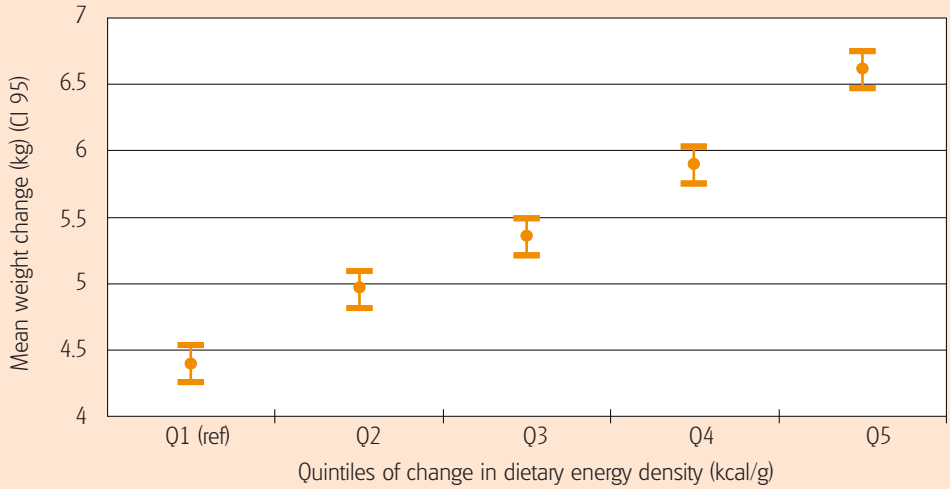
The causes of obesity are complex. However, the thermodynamics law is simple. In the last term, obesity is the consequence of a long-term and sustained energy imbalance when energy intake exceeds energy expenditure. Therefore, the main causes of obesity are those lifestyles related to this energy imbalance.

Although there are certain genes related to obesity in animals and humans, their population attributable risk fraction is very low. In addition, the increase in the prevalence of obesity has been too fast to be explained by changes in genes, change that is produced far slower. It is true, that genes influence the susceptibility to obesity and modify the effect of some environmental factors creating gen-environment interactions. However, the effects of environmental factors –diet and lifestyles– are the main responsible causes for the development of obesity.

In Spain, data from the National Health Survey showed an increase in the intake of calories, number of hours of TV watching per day, as well as, an increase in the number of cars per 10,000 habitants across last decades (Gutiérrez-Fisac JL, et al. 2006). Those lifestyles contributing to an increase in energy intake such as an increase in portion size and those lifestyles contributing to a decrease in energy expenditure, such as an increase in sedentary habits, play a role in the development of obesity. For example the dramatic increase in the serving size of drinks from 6.5 ounces 20 years ago to 20 ounces today is responsible of an extra 165 calories intake per drink.

The adoption of a Westernized dietary pattern poor in fiber and high in energy density (calories per gram of food) (Bes-Rastrollo M, et al. 2008) (figure 1) and therefore, a decrease in the adherence to a Mediterranean dietary pattern rich in fruits, vegetables, legumes and olive oil has been a main factor for the development of obesity in Spain (Bes-Rastrollo M, et al. 2006). In the same way, it is not possible to exempt the soft drink consumption from the responsibility to obesity development because it represents the main source of sugars added to diet (the quantity of sugar in a can of soft drink (330 ml) is equivalent to seven lumps of sugar). These kinds of drinks represent an additional extra intake of calories without any nutritional value and their liquid carbohydrates have poor energy compensation (Malik V, et al. 2006).

Figure 1. Dietary energy density and weight gain
Nurses' Health Study II (n = 50,026 women)



Adapted from Bes-Rastrollo M, et al. Am J Clin Nutr 2008; 88:769-77.

Lifestyle changes with the incorporation of women into the labour force and the subsequent lack of food preparation from raw ingredients at home with more consumption of precooked meals, snacking between meals and more numbers of meals out of home have also been suggested as potential risk factors for obesity (Bes-Rastrollo, et al. 2010).

There is controversy about fat intake as a risk factor for obesity. The biggest randomized nutritional trial: the Women's Health Initiative Dietary Modification Trial that compared a low-fat diet with a control diet in 48,835 postmenopausical women for more than seven years, found in a first analysis that weight differences between groups were not significant at the end of the study. Recently they clarified a potential beneficial effect in the corporal composition among women in the low-fat group, although these changes were of very low magnitude (Carty CL, et al. 2010). What it is globally accepted is that a high consumption of fiber, fruits, vegetables or whole cereals when replaced other foods (red meats, fast food, industrial pastries) are inversely associated with the developing of obesity (Buijsse B, et al 2009; Du H, et al. 2010).

Skipping breakfast and decreased sleeping hours also have been suggested as risk factors for the developing of obesity (SzajewskaH & Ruszcynski M, 2010, Marin-Guerrero, et al. 2010). By contrast, maternal breastfeeding is associated with a lower risk of childhood obesity (Stuebe A, 2010).

Consequences of obesity

Overweight/obesity leads to serious health consequences. A high BMI is a major risk factor for total mortality, even when the existence of potential bias from latent disease inclusion with lower BMI and confounding by smoking may alter the results to the null point, it has been seen that obesity does decrease life expectancy. Raised BMI is a major risk factor for chronic disease such as cardiovascular disease, metabolic syndrome, hypertension, type 2 diabetes, sleep apnea, some kind of cancers, arthritis and infertility.

In the USA, obesity is the second preventable cause of death after smoking. The life expectancy of an obese can decrease between 2-5 years and an adult aged 20-30 years with a BMI>45 kg/m^2 can lost 13 years of life. In fact, it has been estimated in the USA that the beneficial effect of decreasing smoking consumption on life expectancy has been exceeded by the unhealthy effects of obesity contributing to decrease life expectancy in the next years (Stewart ST, et al. 2009).

According to WHO European Regional Office, obesity is approximately responsible of 80% of cases of type 2 diabetes mellitus, 35% of cases of coronary heart disease and 55% of cases of hypertension in the European region (www.euro.who.int/obesity).

Obesity is the main risk factor for type 2 diabetes with relative risks above 30 in some studies (Wild SH & Byrne CD, 2006). Very few times epidemiology has found relative risks of such magnitude.

In 1983 the Framingham cohort after a follow-up of 26 years showed that obesity was an independent risk factor of cardiovascular disease (Hubert HB, et al. 1983). In addition, this cohort observed that obesity was responsible for 40-70% of hypertensions.

It is suggested that a good protection against colon rectal cancer is to maintain a normal and stable weight and avoid an increase in waist circumference (Pischon T, et al. 2006). Obesity is also an established risk factor for breast cancer in postmenopausical women and for other cancers such

as esophagus (adenocarcinoma), endometrial cancer, cancer of pancreas and probably a risk factor for gallbladder cancer according to the report of World Cancer Research Fun / American Institute for Cancer Research.

Those subjects with a BMI higher than 30 kg/m^2 have also a higher risk to develop arthritis (Anderson JJ & Felson DT, 1988).

Being obese during pregnancy also has been associated with higher risks to develop preeclampsia, neural tube defects, gestational diabetes and caesarean (Bolumar F, et al. 2000).

Obese subjects also present more biliary pathology (Tsai CJ, et al 2004; Tsai CJ, et al. 2006) and more respiratory health problems including sleep apnea (Shan N & Roux F, 2009).

Prevention of obesity

To prevent obesity a multisectorial approach is needed. At individual level we should avoid energy imbalance reducing the intake of calories and increasing physical activity in our daily life.

One of the main messages to the population to prevent the development of obesity is very simple. An editorial in the New England Journal of Medicine (Katan MB, 2009) postulated that the best diets to lose weight are those diets with better compliance. Therefore, our intention is to change behavioural factors with the main objective to eat less. At this point, translating into Spanish we should wonder: "¿Cómo como?" (¿How can I eat less?). There are different options to decrease energy intake through your diet:

- Reduce your portions size.
- Consume a low-energy dense dietary pattern (rich in fruits, vegetables, and legumes).
- Consume whole grain cereals.
- Consume less sweets and commercial pastries.
- Select lean meat and low-fat dairy products.
- Reduce your consumption of fried and processed food.
- Drink water instead of soft drinks.

You can implement: "One tip for every day of the week" message.

All these healthy behaviours are not just, a matter of the poor decisions individuals make, rather, the environment in which people live determines behavioural choices.

Parents need to be aware of their fundamental role in altering their home microenvironment. Schools have the responsibility to provide healthy food choices and adequate time spent in physical activity. And policy makers have the responsibility to create a policy environment which encourages physical activity and discourages poor dietary practices. One recent editorial in Lancet (Anonymous, 2010) provided several suggestions for policy makers such as ban junk food adverti-

sing during children's television programmes, tax unhealthy food, and ban junk-food vending machines in schools. In the context of policy, we have also to point out that the cost of a healthy diet may be a problem. In the Spanish SUN cohort, those participants who spent more money in food were those with the highest adherence to a Mediterranean dietary pattern and the lowest to the Western dietary pattern (López CN, et al. 2009). Governments need to make healthier food more accessible and affordable.

We should not forget that the industrial giants selling food and drinks, cars, and screen-based entertainments are powerful key players in the battle against obesity. There are good examples of self-regulations from the industry like the reformulation of bread to reduce the amount of salt, approach promoted by the NAOS strategy from the Spanish Ministry of Health. However, at this point we should not forget the potential presence of industry's conflicts of interest. As an example, the scientific systematic reviews or meta-analyses sponsored by industry were almost four times more likely to conclude a non-association conclusion between soft drinks consumption and weight gain (Bes-Rastrollo M & Martínez-González MA, 2009).

Another level to take into account in the prevention of obesity is the involvement of the local community. It is needed to educate city councils on the benefits of incorporating health considerations in their development plans.

Finally all the multisectorial approaches should achieve one goal: the healthiest choices should be the healthiest ones. However, these words must come into actions and everyone can play a role in the prevention of obesity. Remember: from your position help yourself and the community to avoid the development of obesity and all related-obesity chronic disease.

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Nutrition and obesity in WHO European region

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Abstract

A large amount of evidence indicates that a healthy diet can protect the human body against certain types of ill-health conditions, in particular noncommunicable diseases. Almost 60% of the disease burden in Europe is caused by the seven risk factors including high blood cholesterol, low fruit and vegetable intake, overweight and physical inactivity. The growing intake of foods rich in salt, added sugars and saturated and trans fatty acids leads to unbalanced diets with a high energy density. Obesity is already responsible for up to 8% of health costs and up to 13% of deaths in some parts of the Region; and current trends suggest that average levels of body mass index will continue to increase in almost all countries. Levels of physical inactivity are rising in many countries with major implications for the prevalence of noncommunicable diseases and the general health of the population. Decreasing levels of physical activity are clearly linked to the increasing rates of overweight and obesity. WHO has been monitoring the policy development at national level of the 53 WHO European Member States in the European Region.

Opting for a balanced, adequate and varied diet is an important step towards health and well-being. Proper nutrition and food habits that integrate culture and tradition can add years to life, but especially a better quality of life in later life through the reduction of risk of many chronic conditions related to poor nutrition. Healthy diets can also contribute to an adequate body weight. The proportion of foods in the European diet which are rich in salt, added sugars and saturated and trans fatty acids is increasing. This creates an unbalanced intake of energy and combined with larger portion sizes, contributes to the burden of disease which is attributable to nutritional factors. Improving nutrition will help this situation and will result in a longer, happier and healthy life.

A large amount of evidence indicates that a healthy diet can protect the human body against certain types of ill-health conditions, in particular noncommunicable diseases. Excessive sugar, salt and fat intake, low fruit and vegetable intake and the obesity that results all contribute to a large proportion of noncommunicable diseases, including cardiovascular diseases, cancer and diabetes. These factors not only shorten life expectancy, but also harm the quality of life. No country in the WHO European Region is exempt from the serious consequences of poor nutrition, while the lower socio-economic groups suffer more. Developing nations already prioritize access to food, to protect vulnerable populations, however by no means nutrition and food security is absolutely guaranteed in the whole of the Region.

Almost 60% of the disease burden in Europe is caused by the seven risk factors including high blood cholesterol, low fruit and vegetable intake, overweight and physical inactivity. Healthy nutrition can help reduce this burden. However, across the Region, the growing intake of foods rich in salt, added sugars and saturated and trans fatty acids leads to unbalanced diets with a high energy density. In some situations, micronutrient deficiencies and moderate malnutrition can threaten child health. Obesity is already responsible for up to 8% of health costs and up to 13% of deaths in some parts of the Region; and current trends suggest that average levels of body mass index will continue to increase in almost all countries. Adults are not only becoming heavier, but they are passing the problem on to the next generation: children with two obese parents are more than six times as likely to become obese than children with non-obese parents. It is estimated that in some countries of the WHO European Region one in four school-age children is currently overweight or obese. Obesity- and overweight-related diseases are becoming more common in poorer countries and populations. People with lower incomes tend to consume more fat, meat and sugar, while those with higher incomes consume more fruit and vegetables. No country in the European Region is exempt from the serious consequences of poor nutrition, but lower socio-economic groups are the hardest hit. While developing nations already prioritize access to food, to protect vulnerable populations, governments must also ensure nutrition security.

Physical inactivity has been identified as the fourth leading risk factor for global mortality and accounts for around 1 million deaths in the European Region per year. Levels of physical inactivity are rising in many countries with major implications for the prevalence of noncommunicable diseases and the general health of the population. Decreasing levels of physical activity are clearly linked to the increasing rates of overweight and obesity. Physical inactivity is furthermore estimated to be linked with approximately 21-25% of the breast and colon cancer burden, 27% of diabetes and approximately 30% of the ischemic heart disease burden.

WHO Leadership in tackling obesity

In response to the emerging challenge of the obesity epidemic, the WHO Regional Office for Europe organized the WHO European Ministerial Conference on Counteracting Obesity, which took place in Turkey on November 2006. In Istanbul, the Region's Member States approved the European Charter on Counteracting Obesity which lists guiding principles and clear action areas. Action should span government sectors, be international and involve multiple stakeholders. WHO's role is to provide policy advice based on evidence, to disseminate examples of best practice, to promote political commitment and to lead international action. Member States reviewed and evaluated the First Action Plan for Food and Nutrition Policy in the WHO European Region, 2000-2005, including the increasing problems of obesity and other diet-related noncommunicable diseases, and have adopted a second plan adoption in late 2007. The First Action Plan for Food and Nutrition Policy, WHO European Region, 2000-2005 was remarkable because it attempted to provide an integrated approach to policy by embracing concerns for noncommunicable diseases, including obesity, and food

supply issues such as sustainable food production, as well as the more traditional problems of undernutrition and food safety. A WHO Regional Office for Europe publication supported the Action Plan by highlighting the wide disparities between countries in the Region, the rapidly changing priorities and the need to move from an old health promotion model of setting targets and providing educational messages to a new model focusing on ensuring adequate access to and societal facilitation of health promoting foods, with implications for production and marketing.

In the European Region, the Second Action Plan for Food and Nutrition Policy placed nutrition on governments' agendas. WHO is now committed proposing further detailed action in support of this public health priority. The Regional Office designed subsequent activities to help implement the policies outlined in the Action Plan and particularly to ensure that Member States consider tackling obesity through policies in many sectors, including education, transport, social security, agriculture, media and finance. The action plan aims to (i) reduce the prevalence of diet-related non-communicable diseases, (ii) reverse the obesity trend in children and adolescents; (iii) reduce the prevalence of micronutrient deficiencies, and (iv) reduce the incidence of food borne diseases.

Although most of the WHO Member States have government-approved policies on nutrition and food safety, the burden of disease associated with inadequate nutrition continues to grow, particularly as a result of the obesity epidemic. The Action Plan calls on Member States to develop and implement food and nutrition policies. As a result of this call, a monitoring mechanism by the WHO Office has been set up to help countries evaluate their progress with regards to their commitment to the WHO Second Action Plan. The Action Plan aims to harmonize activities and to promote synergy in the use of resources at regional level, and it can be adapted by Member States according to their specific needs, resources, cultural context and policy developments on a voluntary basis. The Action Plan presents goals and targets for the various health challenges being faced and identifies six areas where integrated action can be taken in individual Member States and at regional level-related NCDs.

The European Action Plan for Food and Nutrition Policy aims to achieve the following health goals:

- to reduce the prevalence of diet-related NCDs
- to reverse the obesity trend in children and adolescents
- to reduce the prevalence of micronutrient deficiencies
- to reduce the incidence of foodborne diseases.

Nutrition, food safety and food security goals should be established to achieve these health goals. Population nutrition goals should be adopted in line with FAO/WHO recommendations:

- < 10% of daily energy intake from saturated fatty acids
- < 1% of daily energy intake from trans fatty acids
- < 10% of daily energy intake from free sugars
- ≥ 400 g fruits and vegetables a day
- < 5 g a day of salt.

In addition, at least 50% of infants should be exclusively breastfed for the first six months of life and continuously breastfed until at least 12 months.

WHO has been monitoring the policy development at national level of the 53 WHO European Member States in the European Region. It should be stated that at the national level, nutrition policy is at different stages of development. Some countries are in the beginning stage of the process, with the focus on specific risk factors, while others take a more comprehensive approach, spreading obesity prevention across several public health strategies. A WHO survey on food and nutrition policies in 2006, revealed that 48 countries in the WHO European Region have national policies.

After the Istanbul Conference and the adoption of the Charter by the Member States, WHO European Office and the European Commission, decided to join hands in a three-year collaborative project, which began in January 2008 (2007WH002) under the title "Monitoring progress on improving nutrition and physical activity and preventing obesity in the European Union (EU)". As a result of that project, a joint monitoring system has been set up whereby the WHO managed to collect and analyse data from nutrition policies across the WHO European Region. One of the outcomes was to evaluate the progress made by the WHO European Region Member States in developing food and nutrition promotion policies and legislation. In the framework of this project, policy documents were defined as set of statements or commitments to pursue courses of action aimed at achieving defined goals of public or private institutions. A total of 34 countries (of which 22 were EU Member States) responded. A total of 114 policy or legislative documents were identified as relevant for inclusion, meaning that the focus was on food, nutrition and/or obesity.

Most countries in the EU have developed food and nutrition action plans or public health strategies dealing with obesity risk factors. Country policies recognize the importance of an environmental approach to improving health, the need to act at the national, regional, community and individual levels, and the need to involve stakeholders in implementing policy. The majority of the identified policy documents concern food and nutrition, however, the main focus of these documents is not necessarily nutrition only, but can also refer to cardiovascular disease prevention, public health, sustainable development or environmental health. Obesity prevention can be tackled within a specific obesity action plan or as part of a nutrition action plan or a public health strategy. Most policies identify stakeholders, and measures to involve stakeholders include creating partnerships, networks or platforms or achieving commitment through signed agreements. Most countries have an institutional structure, such as a food and nutrition council or an institute for public health, with various responsibilities ranging from technical support to advising, planning and implementing strategies.

Schools are the settings where most interventions or implementation of the listed policy documents take place, many countries aim at improving school food in canteens or through catering, as in the case of Hungary and the Netherlands, with its national school canteen programme and Estonia, where free school meals will be provided to schoolchildren up to the ninth grade and in vocational schools. Vending machines are a controversial issue in national policies, which aim either to

eliminate them or to optimize their content. Some policy documents consider capacity-building, including the need to train health workers, teachers in food and nutrition promotion, child-care workers and other deliverers of health promotion strategies and also to provide training for the inspection of services, such as schools and child-care centres, where health policies are required to be implemented. Ireland suggests that education and training programmes for health professionals in the appropriate and sensitive management of overweight and obesity should be developed. There are several examples of policies at the local level. Belgium and the United Kingdom, for instance, have regional policies in addition to national strategies.

Several countries such as Hungary, Sweden, Finland, France, Slovenia, Denmark and Romania use or are considering fiscal measures, such as taxing unhealthy foods and providing incentives to encourage the supply and consumption of healthy foods. In several countries, a dialogue has begun with the food industry on a revision of food product resulting in reformulation.

WHO in the forefront of obesity surveillance-European Childhood Obesity Surveillance Initiative (COSI)

Member States recognized therefore the need for standardized and harmonized surveillance systems on which to base policy development on obesity within the European Region. In response to this need, the WHO Regional Office for Europe established a childhood obesity surveillance system in seventeen countries in the Region. The system aims to measure routinely trends in overweight and obesity in primary school children (6-9 years), in order to gain a correct understanding of the scope of the problem in this population group and to allow inter-country comparisons within the Region. The first data collection took place during the school year 2007/2008, with 13 countries participating table 1 presents the proportion of overweight and obese boys and girls which was found during the first COSI data round.

Table 1. WHO European Childhood Obesity Surveillance Initiative-First round 2007/2008. Proportion of children classified to be overweight and obese, by age and country

AGE GROUP, COUNTRY[a]	PREVALENCE[b]			
	OVERWEIGHT[c] BMI/A >+ 1SD		OBESITY[c] BMI/A >+ 2SDS	
	Boys % (95% CI)	Girls % (95% CI)	Boys % (95% CI)	Girls % (95% CI)
6 year				
BEL	18.4 (17.9–18.9)	17.8 (17.3–18.3)	5.8 (5.5–6.1)	5.4 (5.1–5.7)
MAT	34.0 (31.2–36.9)	29.2 (26.5–32.0)	14.6 (12.6–16.9)	11.8 (9.9–13.9)
SVN	27.2 (25.0–29.4)	23.0 (20.9–25.1)	11.4 (9.8–13.0)	8.3 (7.0–9.7)

Continues

Table 1. Continuation

AGE GROUP, COUNTRY[a]	PREVALENCE[b] OVERWEIGHT[c] BMI/A >+ 1SD		OBESITY[c] BMI/A >+ 2SDS	
	Boys % (95% CI)	Girls % (95% CI)	Boys % (95% CI)	Girls % (95% CI)
7 year				
BEL	22.6 (21.6–23.5)	23.5 (22.5–24.6)	9.0 (8.3–9.6)	7.9 (7.2–8.6)
BUL	28.2 (25.7–30.8)	27.8 (25.3–30.4)	12.6 (10.8–14.6)	12.0 (10.2–14.0)
CZH	20.9 (16.9–24.8)	20.0 (16.2–23.8)	9.9 (6.9–12.8)	5.9 (3.7–8.2)
IRE	31.4 (28.8–34.0)	28.8 (26.2–31.3)	7.9 (6.4–9.4)	8.3 (6.7–9.9)
LVA	24.0 (22.0–26.2)	18.9 (17.0–20.9)	8.6 (7.3–10.1)	4.6 (3.6–5.8)
LTU	25.9 (23.8–28.0)	21.8 (19.8–23.8)	9.7 (8.4–11.2)	7.3 (6.1–8.6)
POR	40.7 (37.6–43.9)	36.1 (33.0–39.3)	16.5 (14.2–19.1)	12.5 (10.4–14.8)
SVN	32.1 (30.2–34.0)	27.1 (25.3–29.0)	15.3 (13.9–16.8)	9.5 (8.3–10.7)
SWE	23.3 (20.4–26.5)	22.0 (19.0–25.2)	6.8 (5.1–8.8)	5.0 (3.6–6.9)
8 year				
BEL	21.5 (21.0–22.0)	22.2 (21.7–22.8)	8.0 (7.6–8.3)	6.1 (5.8–6.5)
ITA	48.8 (46.8–50.8)	42.2 (40.2–44.2)	26.1 (24.4–27.9)	17.3 (15.7–18.8)
NOR	23.0 (20.9–25.3)	23.0 (20.8–25.3)	7.4 (6.1–8.9)	6.1 (4.9–7.5)
SVN	35.5 (33.4–37.6)	31.2 (29.2–33.3)	16.1 (14.5–17.7)	10.7 (9.4–12.2)
SWE	26.3 (23.8–29.0)	23.5 (21.0–26.2)	9.7 (9.1–11.6)	6.8 (5.3–8.4)
9 year				
BEL	27.0 (26.1–27.9)	26.6 (25.7–27.6)	10.7 (10.0–11.3)	8.9 (8.2–9.4)
ITA	47.3 (44.7–49.9)	40.1 (37.4–42.7)	26.1 (24.4–27.9)	15.8 (13.9–17.8)

BMI, body mass index; BMI/A, BMI-for-age; SD, standard deviation.

a. BEL, Belgium; BUL, Bulgaria; CZH, Czech Republic; IRE, Ireland; ITA, Italy; LVA, Latvia; LTU, Lithuania; MAT, Malta; NOR, Norway; POR, Portugal; SVN, Slovenia; SWE, Sweden.

b. Prevalence estimates were based on the 2007 WHO recommended growth reference for school-age children and adolescents and extreme values were excluded (BMI/A values <-5 or +>5SDs) (7).

c. Body weight was adjusted for clothes worn when measured.

Future needs and progress for the WHO European Region

As stated before, obesity is one of the greatest public health challenges of the 21st century. Both societies and governments need to act to curb the epidemic. National policies should encourage and provide opportunities for greater physical activity, and improve the availability and accessibility

of healthy foods. They should also encourage the involvement of different government sectors, civil society, the private sector and other stakeholders. A population-oriented approach is required that strikes a "better balance between individual and population-wide approaches and between education-based and multi-sectoral and environmental interventions. It is also evidenced that people of low socioeconomic status, particularly children are more likely to suffer from the dual burden of poor nutrition and obesity. Major socioeconomic inequality in obesity has been reported in many countries of the WHO European Region, but very little has been done to tackle this specifically.

The focus for the future should be placed upon developing, implementing, monitoring and evaluation the proposed policies and actions with a clear focus on the policy framework as suggested by WHO Guidance, adapted in the country's context. Over the recent years, more and more nutrition and physical activity policies have been developed but much more analysis is needed on the implementation of the developed policies. Targeted actions should be in line with the suggested policies and implemented in the way it has been outlined in its original theoretical framework. Reporting on failures or non-compliance of proposed priority actions should be encouraged in order to ensure the true façade is addressed and the action is in line with the population's need and requirements as suggested by its national and international policy framework. Clear coordination mechanism should be established at national but also at international level to ensure cross sectoral collaboration is translated into practice and guidance can come from different fields such as the inclusion of different departmental efforts all leaded by the same goal, less diet related noncommunicable diseases all over the WHO European Region.

The WHO Regional Office for Europe will continue to work towards an increase in health-enhancing physical activity and the promotion of healthy diets to prevent obesity and noncommunicable diseases across the European Region with an approach consisting of the following activities:

- Coordinated regional and national action to support the implementation of effective policies to address the burden of noncommunicable diseases linked with diet and physical activity, using evidence-based approaches. These policies include:
  - adoption of population-based salt reduction strategies;
  - elimination of trans fat from the diet keeping appropriate balance in fat sources;
  - promotion of active transport.
- Monitoring of progress on improving physical activity and prevention of obesity in the WHO European Region through refinement and expansion of the existing information system.
- Support to Member States in addressing obesity, diet and physical activity by assisting in the development, implementation and evaluation of national intersectoral plans with a focus on health inequalities and the social determinants of health.
- Support in capacity building to address obesity in the health system, namely through workforce development interventions in particular within primary health care.

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Regional aspects of the nutrition and health in Europe

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Abstract

With the increasing burden of non-communicable diseases, nutrition and lifestyle are in the focus of public health. Data on these determinants are needed to establish programmes to improve health at the population level. The European Nutrition and Health Report 2009 provides an overview of the nutrition and health situation in 24 countries of the European Union and Norway compiled from various data sources.

Consumption of foods showed some regional trends inasmuch as for fruit and vegetable, it was highest in the South and the Central-Eastern parts of Europe. Highest amounts of milk products were consumed in the North and of meat and meat products in the Central-Eastern region.

Intake of fat and saturated fatty acids was generally too high. The Southern countries showed a more favourable pattern, but a very high total fat intake. In turn, carbohydrate intake, especially of complex ones, was below or at the lower end of the recommended range and dietary fibre supply was largely inadequate. Across age groups and regions, folic acid, vitamin D (except for the Scandinavian countries), calcium, and, in women, iron emerged as deficient nutrients, while sodium intake was excessive.

Among health indicators, overweight and obesity showed an overall high prevalence ranging from 31-73% in women and 42-83% in men. Obesity was also very frequent (7-36% in women; 6-29% in men). Despite marked differences between countries, no regional trend could be discerned. In turn, physical activity level showed a north-south downward gradient.

Further harmonization of data and possibly information on nutritional status could improve future reports.

In recent times, lifestyle and nutrition become ever more important determinants of health and wellbeing and even mortality. Indeed, non-communicable diseases (NCDs), particularly of the cardio-vascular system as well as cancer, are the leading death causes worldwide, and in most cases, they are caused by unhealthy lifestyle and nutrition. These factors are, therefore, in the focus of public health as preventive measures can be most effective if implemented early enough. However, to set up programmes to improve the diet and health behaviour of a population, information about specific issues within this target group are needed. While in Europe many countries

have been publishing health and nutrition reports on a regular base for a more or less long period, a comprehensive collection of data for the whole region is of interest not least in light of interventions at European level. Providing such a collection was a major aim of the European Nutrition and Health Report 2009, the second of this kind. With ten new states having joined the European Union since the publishing of the previous report in 2004, the amount of data increased markedly, making it possible to look at regional differences. Besides food supply and consumption, energy and nutrient intakes were estimated for different population groups and health indicators such as prevalence of overweight and obesity and NCDs (diabetes, cancer), mortality rates and causes, smoking behaviour, alcohol consumption, blood lipids, physical activity level, and breast feeding were collected.

Participating countries

A total of twenty-five countries, twenty-four members of the European Union as well as Norway, took part in the European Nutrition and Health Report 2009, a European Commission-funded project coordinated by the Institute of Nutritional Sciences at the University of Vienna, Austria. Availability of data differed between the participants. To look for regional differences, the countries were grouped in four regions: the North consisted of the Scandinavian countries Finland, Norway, and Sweden, Denmark, and the Baltic States Estonia, Latvia, and Lithuania; the West comprised Belgium-Luxembourg, France, Ireland, the Netherlands and the UK; Austria, the Czech Republic, Germany, Hungary, Poland, Slovenia, and Romania constituted the Central-Eastern region, Cyprus, Greece, Italy, Portugal, and Spain the South.

Origins of data on food consumption and nutrient intake

A number of different databases were used for the various subject areas of the report. The Food Balance Sheets of the United Nations Food and Agriculture Organization (FAO) show trends in food consumption of a large number of countries worldwide on a yearly base since 1961. The data are well comparable being based on harmonized agricultural statistics. However, they do not give a detailed view of the diet of various population groups as only the overall consumption of foods is recorded. Furthermore, losses from spoilage and refuse can only be estimated.

More detailed information comes from dietary intake surveys using dietary records or recalls. These were available for adults in sixteen countries from the EFSA Concise Food Consumption Database, a compilation of data on food intake aiming at making these latter more comparable although this is impeded by different methods for data collection.

Dietary surveys in the participating countries provided data on energy and nutrient intake for different age groups. It was tried to make these latter as homogeneous as possible, but some differences remained. Varying methods also caused a certain disparity.

Food supply, availability, and consumption in Europe

The FBS allow an estimation of the contribution of the various macronutrients to energy intake. Since the early 1960s, there has been a decline in the proportion of carbohydrates and a rise for fat supply (53% and 35% in 2003 vs. 58% and 30% in 1961 from carbohydrates and fat, respectively). In turn, protein supply remained stable at 12% of energy.

Most notable over the past four decades is the marked increase in the supply of poultry meat. Rises, albeit to a much lesser extent, were also seen for pork and red meat overall, vegetable oil and oil crops, fruit and vegetable, fish and seafood as well as milk products and eggs. In turn, there was a decrease for cereals, potatoes and pulses. Nevertheless, the energy supply from plant and animal foods remained quite constant, with the former contributing 72 and 70% of total energy intake in 1961 and 2003, respectively. There were, however, marked regional differences inasmuch as a sharp increase in the proportion of animal products was seen in the countries of Southern Europe, Cyprus, Greece, Italy, Portugal, and Spain as well as in Romania. Moreover, no data from 1961 were available from the Czech Republic, Slovenia, and the Baltic States.

Regional differences could also be observed for the supply of some food groups. Thus, milk supply was highest in the northern countries that, together with the South, also showed the highest levels for fish and seafood. The South was leading in the provision of vegetables, oils and oil crops. Fruit supply was highest in the West, that of cereals and potatoes in the Central-Eastern region. No marked difference was seen for meat.

Some of these patterns were mirrored in the food consumption from dietary surveys. Milk was by far most consumed in the North, fish and seafood in the South and North, fruit and vegetables in the South. However, fruit and vegetable consumption was also high in the Central-Eastern region. Indeed, of the four countries reaching the recommended consumption level of 400 g fruit and vegetables per day, three were from this region (Austria, Germany and Poland). Overall, fruit and vegetable should be increased in most countries. Central and eastern countries also showed the highest consumption levels of cereals, potatoes and starchy roots as well as meat and meat products. Notable was the high consumption of tap water in the North.

Energy and nutrient intake in European countries

Data on energy and nutrient intake were obtained from dietary surveys in the participating countries. Comparability is, however, limited due to differences in the methods employed and the age groups included.

In children, energy intake varied widely between countries. However, no large difference was seen between the regions except for children aged 7 to 9 years, in whose it was markedly higher in the South compared to the other regions. Fat intake was generally high, exceeding the recommendation by the WHO of less than 30% of total energy intake and, in some countries,

even beyond the higher recommendation of the German speaking countries (D-A-CH reference values) of 30-35% of total energy. Countries of the South did also not reach the recommendations for carbohydrate intake (> 50% of energy). Sucrose intake was too high in all countries in which it was assessed. Recommended intake of dietary fibre (> 25 g/d) was only met by older children in Germany (boys aged 12 to 14 and girls of 12 years) and Portugal (13 years). However, there is so far no consent about recommendations concerning dietary fibre intake for younger children for whom lower amounts might be appropriate.

Fat intake was characterised by a high contribution of saturated fatty acids mostly exceeding the recommended maximum of 10% of energy. Only the South showed a tendency to slightly lower levels. Nevertheless, although no large differences between regions were observed, the macronutrient pattern tended to be less favourable in southern countries.

In European children, micronutrient intake was critical for vitamin D and folate as well as vitamin A in some countries. Recommended folate intake was only met by Portuguese 10-14 year-olds, whereas the recommended level of 5 µg vitamin D/d was only reached in Scandinavian countries. Among minerals, intake recommendations for calcium were not met in all countries. Data on iodine intake were available for some participants only. It was particularly low in the central-eastern region. Iron intake was insufficient in girls aged 10 to 14 years and in some countries, also in boys of this age. Generally, intake levels were less well met by older children. In turn, sodium intake was too high in all countries.

In adults, energy intake was mostly below the recommended levels. Carbohydrate intake did also not reach the recommendation of 50-75% of total energy in the majority of countries. Women were more likely to meet it than men. Dietary fibre intake was rather low, with only German, Norwegian and Polish men reaching the recommended minimum of 25 g/d. In turn, fat intake was too high, particularly that of saturated fatty acids. Again, a more favourable fatty acid pattern was observed in the South, although carbohydrate intake was particularly low in this region and total fat intake showed the widest variability with the lowest and highest levels. Sucrose intake was also highest in this region, however exceeding the recommended maximum in all regions.

As in children, vitamin D and folate intakes were generally insufficient. For the former, recommendations were again only met by Scandinavians, and by Estonian men for the latter. Vitamin A intake was also below the reference level in some countries. The same was true for vitamin C. In most countries, calcium intake was below the D-A-CH recommendation of 1.000 mg except in Scandinavia that also show high milk consumption. Data on iodine intake was again sparse and low levels were found in central-eastern countries and Lithuania. Recommended iron intake was not achieved by women in most countries.

In elderly, energy and macronutrient intake showed the same patterns as in younger adults with a wide variation in the former and a high contribution of fat above 30% of energy in all countries but Portugal and Norway (women). Highest fat intakes were found in the Central-East and the South,

although the latter showed a high variation with both, the highest and the lowest levels. Intake of saturated fatty acids was lower in the South, and only in Portuguese of both sexes and in Italian women saturated fatty acids supplied less than 10% of total energy. In turn, with the exception of Norwegians, Polish as well as Irish and Finnish women, participants did not meet the recommended minimum of 50% energy from carbohydrates. It was particularly low in the South. In some countries, sucrose intake was excessive (up to 16.8% of energy in Spanish men and 18.5% in Spanish women). Dietary fibre recommendation was again met by German and Portuguese men.

As in younger adults and children, vitamin D intake was only sufficient in Scandinavians, while for folate it was insufficient in all countries. In half of the countries, vitamin C was also below the recommended level; especially men were concerned.

Calcium intake did not meet the D-A-CH reference value of 1.000 mg/d except in men from Finland, Sweden and the Netherlands, while the lower recommendation of 800 mg from Eurodiet was better reached. Nevertheless, calcium can be considered a critical nutrient in the elderly. Germans and Polish women also showed low iodine intakes. Women in some countries had marginal supplies of iron. In turn, sodium intake was too high.

A regional difference was mainly apparent for vitamin D whose intake was higher in the North.

Overall, intake is too high for fat and particularly saturated fatty acids as well as sodium and too low for carbohydrates, especially complex ones, and dietary fibre. Critical micronutrients are folic acid, vitamin D, calcium, iron in women, and at least in some countries, iodine.

Besides food consumption and nutrient intake, information on a number of health indicators in the participating countries was gathered:

Physical activity

Information on physical activity was gained from different European surveys on health status such as, among others, the Eurobarometer Studies.

A marked regional difference was observed for frequency of physical activity that showed a north-to-south downward trend. Thus, 91.9% of Finnish and 90.3% of Swedish adults practiced leisure time physical activity compared to only 60.4% in Greece and 40.7% in Portugal. Moreover, less than 15% of respondents from the Scandinavian region stated never exercising during one week compared to 60% in Hungary and 66% in Portugal. Concerning activity intensity (expressed as multiple of the resting metabolic rate), no clear regional pattern could be discerned. Highest levels were reported from the Netherlands, Germany, and Luxembourg, lowest from Northern Ireland, Sweden, and France. Among children aged 11 to 15 years, percentages of those indicating that they had at least 1 h of moderate-to-vigorous physical activity per day were higher for boys than girls in all countries. These numbers showed a decline with increasing age amounting to an average of 26% in 11-year-olds, but only 16% in 15-year-olds.

Overweight and obesity

Overweight and especially obesity are causes for many non-communicable diseases. Following the worldwide trend of increasing prevalence, excessive body weight is a common health problem in Europe. At the lower end, 31% of adult women and 42% of men in the participating countries had a BMI above 25 kg/m^2 with prevalence rising up to 73 and 83%, respectively, at the upper end. Obesity prevalence ranged from 7 to 36% in women and 6 to 29% in men. Of note, lower values were all self-reported. Highest levels of overweight and obesity were found in men and women in Greece, the Czech Republic, Romania, Cyprus, the United Kingdom, and Ireland (only men). In turn, lowest levels were reported from Norway, the Netherlands, Poland, and Belgium, as well as Austria and Denmark for women. Mean BMI values were accordingly high and mostly above the optimal population range of 21-23 kg/m^2 recommended by the WHO (22.9 to 28.6 in women; 24.9 to 28.6 in men, lowest levels self-reported). No regional differences could be discerned.

In elderly above 65 years, overweight and obesity were even more frequent with a prevalence of up to 92% in Austrian men and 89% in Greek women. Lowest prevalence levels were also higher than in younger adults (57% in Belgian, Dutch, and Norwegian men, and 47% in Danish and Irish women). Classification was however done using the WHO cut-off values of ≥ 25 kg/m2 for overweight and ≥ 30 kg/m2 for obesity. As for elderly a somewhat higher BMI appears more favourable to overall health, a BMI of 24-29 has been proposed by the National Research Council of the USA as reference for this population group.

In European elderly, mean BMI (kg/m^2) ranged from 24.7 to 30.6 in women and 25.1 to 29.6 in men again with lower values from self-reported data. Despite the high prevalence of overweight found with the WHO cut-offs, these values apart from those for Greek women (30.6 kg/m^2) are still within the age-specific NRC reference range. As for younger subjects, no marked regional differences were seen.

Excessive body weight was also common in children: Among those aged 4-6 years, up to 27% of girls and 24% of boys were concerned. Prevalence increased to 35% of girls and 36% of boys in 7 to 9 year-olds, and to 36% of girls and 34% of boys in 10 to 14 year-olds. A gender-specific difference as seen in adults became apparent in 15 to 18 year-old adolescents with 20% of girls and 33% of boys being overweight or obese. Obesity was less common than in adults, but still reached up to 18% and 17% in 10-14 year-old British boys and girls, respectively. Self-reported data were also lower in children, and again, no regional trends could be observed.

Smoking patterns and alcohol consumption

Smoking behaviour was recorded in 15 to 17 countries (depending on the age group). More smokers were reported among men than women in most countries with the exception of Swedish aged 19-64 years, Danish 19-41-year-old and Austrian elderly. Greek men aged 19-41 years showed the

highest proportion of smokers (57.8%) and highest numbers among women were also found in Greeks of this age (42.3%). Lowest levels in younger adults (< 65 years) were seen in Italy. Rates of current smokers declined markedly with age except in Denmark where numbers remained approximately stable, especially in men. In turn, the number of ex-smokers increased with age in men, but remained low in elderly women in all countries but Denmark and Sweden.

Fourteen participating countries provided data on alcohol consumption. Generally, the amount of alcohol consumed met the recommendation of less than 10 g/d for women and less than 20 g/d for men. Exceptions were seen in Danish women and men in whom it reached 12.9 and 25.5 g/d (19-64 year-olds) and 14 and 28.6 g/d (> 65 year-olds), respectively, in Dutch women aged 50-64 who on average consumed 10 g/d, in Irish male adults (18-64 years) with 22.9 g/d, and in Portuguese men ≥ 18 years (31.8 g/d). These latter showed the highest consumption. Among women, it was lowest in the Baltic States, Spain, and Greek elderly, among men, in Norway and Spain.

Blood lipids

Data on blood lipids were provided by eight participating countries for 19 to 64-year-old adults and by six countries for elderly above 65 years. The reference level for total cholesterol of 5.0 mmol/l was exceeded in almost all countries and collectives. Only British adults aged 19-34 years and Greek women aged 19-64 years had lower levels (4.9 mmol/l for both). The reference level for LDL cholesterol (< 3 mmol/l) was not met by any country. In turn, references for HDL cholesterol (> 1.2 mmol/l in women and > 1.0 mmol/l in men) were met by all. In Romanian women, triglyceride levels were just above the reference (< 1.7 mmol/l), in men Romanians, Lithuanians, and Portuguese exceeded this level. Men had higher atherogenic quotients, expressed as total cholesterol divided by HDL cholesterol, than women, but it was within the reference range of 3-5 in all countries.

Morbidity and mortality

Data on mortality were taken from the WHO's European Regional Office's Health-for-All database. This database provided rates of total mortality as well as from cardiovascular diseases (CVD) and neoplasms from 2007 for ten of the participating countries: Austria, the Czech Republic, Finland, Greece, Latvia, Lithuania, the Netherlands, Romania, Slovenia and the United Kingdom. In all countries, most deaths occurred from CVD. Highest numbers for total and CVD deaths were found in Latvia, Lithuania, and Romania for both sexes. In men, Lithuania and Latvia together with Slovenia also presented with the highest rates of death from neoplasms while in women, death cases by these causes were most frequent in the Czech Republic, the UK and the Netherlands. The lowest total death rates were seen in the Netherlands, Austria, and Finland for

women, and in Austria, the United Kingdom, and the Netherlands for men. Death rates from CVD in women were lowest in Finland, the UK, and the Netherlands, and in Greece, Austria, and the Netherlands in men. Austria, Greece and Finland also showed the lowest death rates from neoplasms in both sexes. For all causes, death rates were markedly higher (up to twice) in men than in women.

Data on the incidence of malignant neoplasms (MN) in 24 of the participating countries was obtained for 2002 from the GLOBOCAN database compiled by the International Agency for Research on Cancer (IARC). Highest incidence of MN of all sites was seen in Denmark for women and in Italy for men, lowest in Romania for both sexes. Concerning specific sites, stomach cancer incidence was highest in Estonia and Portugal for women and men, respectively, and lowest in Denmark for both sexes. Most new cases of colon and rectum neoplasms were reported from Germany in women and from the Czech Republic in men, lowest values in both sexes were found in Romania. Lung neoplasms occurred most frequently in Danish women and Hungarian men, Spain and Sweden had the lowest rates in women and men, respectively. Breast and prostate cancer incidences were highest in Swedish women and men, respectively, and lowest in Lithuanian women and Romanian men.

With a mean prevalence of 6.3% (for type I and type II) in 25 European countries, diabetes mellitus can be considered a common disease. The highest level of 8.9% was found in Cyprus, the lowest in the UK and Norway with 2.9 and 3.6%, respectively. Prevalence in the other countries fell in one of two blocks with respective means of 7.7 and 5.5. The former comprised countries of central-eastern Europe and the Baltic region, the latter the Western, Southern and Northern countries.

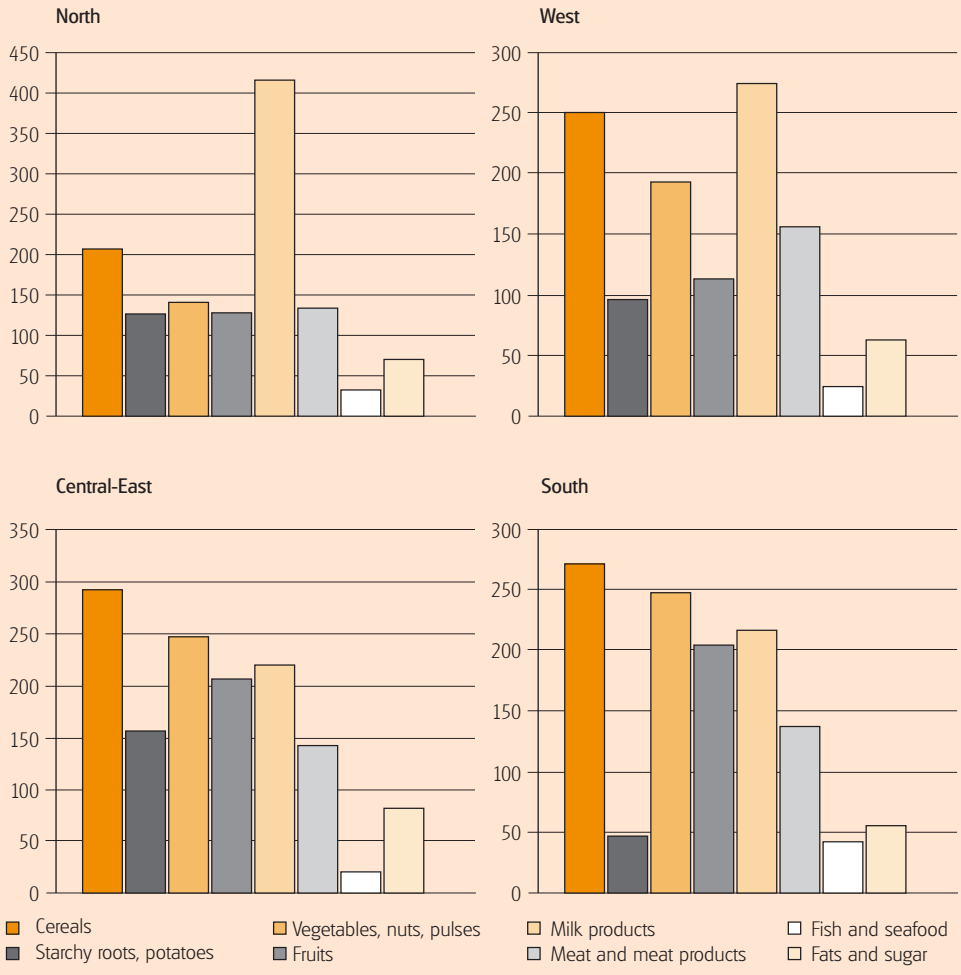
Breast feeding

Rates of breast feeding were highest in the Northern region: initiation after birth in Scandinavian and Baltic countries was nearly 100%, at 6 months, 60-80% of Scandinavian children were breastfed. Norway and Finland also had the highest rates at 12 months. In turn, initiation was lowest in Ireland and lowest rates at 6 months were reported from the UK, Belgium, and Portugal.

Conclusion

A collection of data from a multitude of very different sources, the European Nutrition and Health Report 2009 was meant to provide an overview of different health and nutrition indicators. It reveals major nutrition and health trends and indicates general shortcomings in certain food groups and nutrient supply. Future reports might be improved by a further harmonisation of the available data and the collection of data on nutritional status.

Figure 1. Average consumption (g/capita/day) of various food groups by region based on data from the EFSA Concise Food Consumption Database. North: Denmark, Estonia, Finland, Norway, and Sweden; West: Belgium, France, Ireland, the Netherlands, and the UK; Central-East: Austria, Czech Republic, Germany, Hungary, Poland; South: Italy



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Eating out in Europe

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Abstract

Eating out including the consumption of foods and beverages at canteens, cafeterias, fast food or traditional sit-down family restaurants is becoming increasingly popular. According to studies, mostly undertaken in the USA, eating out in general and eating at fast food restaurants in particular was implicated in the current obesity epidemic and was associated with lower overall diet quality in children, adolescents and adults. In Europe national and international studies addressing this issue are relatively few and are reviewed in this chapter. European studies suggest that there is considerable room for improvement in terms of meals offered, choices made and governmental policies and measures addressing the eating out component of the daily diet. The findings of a review on food and nutrition-related policy documents in 53 WHO European member states are summarized and European projects focusing on eating out are listed. Among these research activities, the HECTOR project on habits, determinants and recommendations for consumers and the European catering sector is described in terms of objectives, methods, results and deliverables.

Key words

Eating out, diet, food caterers, HECTOR, Europe

Contemporary lifestyle has contributed to an increase in food consumption away from home in many places in Europe and beyond. Indeed, food is now readily available in great variety for people to eat beyond their dining rooms. A quick casual meal taken on the run, a midmorning coffee break, lunch from the work canteen, snacks at the bar, take-away or home-delivery products or formal restaurant dining are common scenes in Western world. Several societal and cultural changes, including urbanisation and industrialisation, more affluent societies, an increasing desire to try new or different foods, changes in the family structure and women's increasing participation in the labour market have favoured this increase in out of home eating. Eating out has either been defined to include food items prepared at locations out of home, irrespective of place of consumption or alternatively, food items consumed at locations out of home, irrespective of place of preparation. Comparative studies are usually limited by the variety of "eating out" definitions used.

In industrialized countries, eating out in general and eating at fast food restaurants in particular has been associated with body fatness, weight gain, overweight or obesity and lower overall diet quality in children, adolescents and adults. Food choices when eating out have also been reported of

containing more of the nutrients that are usually over-consumed (i.e. saturated fat) and less of the nutrients that are under-consumed (i.e. calcium, fiber and iron).

The eating out dietary patterns

Although eating out is becoming increasingly important on a global scale, relatively few studies describing dietary patterns out of home can be found in the literature and most of them have been carried out in the USA. In Europe, there are very few national studies reporting food choices when eating out. Kearney and colleagues (2001) used data from the dietary and nutritional survey of British adults collected in late 1980s to compare patterns of energy and nutrient intakes in and out of home. Results showed that 29% of all meals were consumed out of home contributing to 27% of food energy and 45% of alcohol energy. Those eating less of their foods out of home obtained a lower proportion of their food energy from fat and protein and a higher proportion from carbohydrates.

In a study conducted in Finland examining the correlation between lunch at staff canteen and dietary intakes, Roos and colleagues (2004) reported that having lunch at the staff canteen was positively associated with diet quality and increased consumption of vegetables and fish. Participants who chose to have lunch at the work canteen were mostly of higher educational background, women with pre-school children and men with body mass index (BMI) in the normal range. In a study conducted by O'Dwyer and colleagues (2005) in a random sample of 958 Irish adults, food intake data were collected using a 7-day food diary and participants were asked to record the location where the food was prepared in each occasion. The contribution of fat to energy was above recommendations in all cases, reaching almost 45% in the takeaway sector. Schröder and colleagues (2007) used cross-sectional data collected in 1999-2000 among 3.054 adult residents in northeast Spain and assessed dietary intakes using a food frequency questionnaire that included four typical fast food items. Results showed that fast food consumption was associated with higher energy intakes, poor diet quality and higher BMI.

Nonetheless, relatively few of the available European national studies allow direct comparisons at an international level due to several methodological differences. In a large international study of out of home dietary patterns conducted by Orfanos and colleagues (2007; 2009), 34.270 adults from ten European countries provided a 24-hour dietary recall through a highly standardised protocol. Even though measurements refer to a single day and reflect modestly overall patterns, there was evidence that the fraction of energy intake during eating out was generally higher in northern Europe and generally lower in southern Europe. Food groups frequently eaten out of home were coffee/tea/waters and sweets. The authors further considered as substantial out of home eaters individuals receiving at least 25% of their daily energy intake through eating out, under the reasonable assumption that those consuming a small fraction of their daily food out of home in a particular day were less likely to be frequent and/or substantial out of home eaters than those who reported consuming a relatively large fraction. More men than women were substantial out of

home eaters. They also found that among both genders young age, sedentary lifestyle and increased energy intake were positive predictors of the probability of substantially eating out. Substantial out of home eating was less frequent among the less educated, during winter and during the weekends in central and northern Europe, but not in the South. With respect to energy and nutrient intakes, the investigators reported that among women, eating out contributed more to total fat intake than to intakes of protein and carbohydrates. Among both genders and particularly in southern Europe, eating out contributed more to sugar and starch intakes and less to fibre intake. The composition of diet, in terms of both macro-and micro-nutrient intakes at home was different from that of diet consumed out of home in southern countries, but was relatively similar in the north. Vandevjvere and colleagues (2009) applied the same definition of substantial eating out and analysed dietary data collected from a representative sample of the Belgian population aged 15 years and over. About 35% of the population was identified as substantial out of home eaters, who reported higher energy intake and density of the total diet and higher consumption of most food groups, except for fruit and vegetables, as compared to the non-substantial out of home eaters.

Eating out and weight gain

Among cultural and behavioral factors implicated in the current obesity epidemic, eating out has received increasing attention. There are several publications on eating out and obesity that make use of cross-sectional and longitudinal data. Results, however, have been inconsistent, probably because of different eating out definitions used and variable study design and aims. Some studies assessed associations of eating out with energy and fat intake; others with BMI or body weight; and still others with the risk of being or becoming obese.

Naska and colleagues (2011) have published the analysis of data collected among more than 24,000 men and women aged 35-74 years in ten European countries in order to examine, cross-sectionally, the associations of eating at restaurants and similar establishments or eating at work with BMI and to evaluate prospectively associations between eating at restaurants with weight gain. Among the advantages of this study were the coverage of several countries with standardized data collection and analysis protocols and the use of a conclusive definition for eating out. Authors decided to distinguish eating at work from eating out in general as eating at work is an ambiguous area in out of home eating, since it can include eating at the work canteen or acquiring an item from a shop or a vending machine, but it can also include eating or drinking something prepared at home. Results of the cross-sectional analysis showed that BMI was positively associated with eating at restaurants among men, particularly older men, after adjusting for socio-demographic and lifestyle factors. Essentially no association between BMI and eating at restaurants was observed among women, as well as between BMI and eating at work in both genders. In a prospective analysis among men, eating at restaurants was also found to be positively, though not significantly, associated with weight gain.

Eating out in national and international public health nutrition strategies

Although several publications incriminate eating out in the current obesity epidemic, governmental policies and measures for the catering sector are unfocused. Lachat and colleagues (2009) reviewed food and nutrition-related policy documents in 53 member states of the WHO European region and noted that the catering sector is a formally acknowledged stakeholder in nutrition policies of several European countries. The strategies developed were mostly directed to consumers through labeling and advertising. With respect to the caterers, staff training and dialogue to enhance the implementation of national nutrition policies were also foreseen by some countries. Nevertheless, strategies for stimulating or monitoring the implementation of policies ensuring affordability of healthy eating out or enhancing the accountability of stakeholders were either poorly developed or simply lacking. The authors also noted that strategies addressing the private sector were rarely developed.

Some European countries have attempted collaborations with caterers and related professionals in the private sector. Most actions, however, aim to provide information to consumers through the use of logos, such as the keyhole logo used in Denmark and Sweden. Since 2008, the UK Food Standards Agency collaborated with several caterers prioritizing efforts to reduce salt, saturated fat and energy intake, promote healthier options and encourage healthier eating commitments among the caterers. More than 40 enterprises are involved in this action including well known restaurants, pubs, coffee shops, sandwich chains, workplace caterers and the UK's leading catering suppliers. To provide consumers with consistent information when they eat out the Agency also introduced a voluntary calorie labeling scheme and a poster was developed to assist staff in giving basic information to customers. The activities of each company participating in this initiative are also captured in a commitments document, which has sections on procurement, menu planning, kitchen practice and consumer information. The commitments vary according to the type of business and foods served and provide an overview of what each company is doing to support the Agency's priorities. The documents are updated once a year, when each company outlines the progress it has made and the plans for the following year.

HECTOR: a European research project on eating out

Stakeholder mobilization is essential in promoting healthy eating out. In 2006, a multi-disciplinary forum was organized in the USA to formulate recommendations to improve the nutritional aspects of eating out. The outcome of the discussions underline: (i) the necessity for a better understanding of the consumers' behavior, (ii) an increased availability of low-calorie foods and (iii) provision of consumers with information on healthy choices when eating out. The EU supported Food-Profit project was also launched in 2006 to provide assistance to the food and catering sector, featuring an online tool that helps food producers to control and reduce the amount of fat, salt and

sugar in their products. In addition, the European FOOD (Fighting Obesity through Offer and Demand) project is a public-private partnership consortium that focuses on restaurants and catering companies and aims to develop and test tailor-made tools to enhance healthy offers and demand.

Apart from engaging stakeholders in strategies and actions, policy makers also need data on consumers' food habits in order to draw up relevant strategies. Towards this objective, a multi-stakeholder group collaborated in the context of the EU-supported project entitled "Eating out: habits, determinants and recommendations for consumers and the European catering sector (the HECTOR project)".

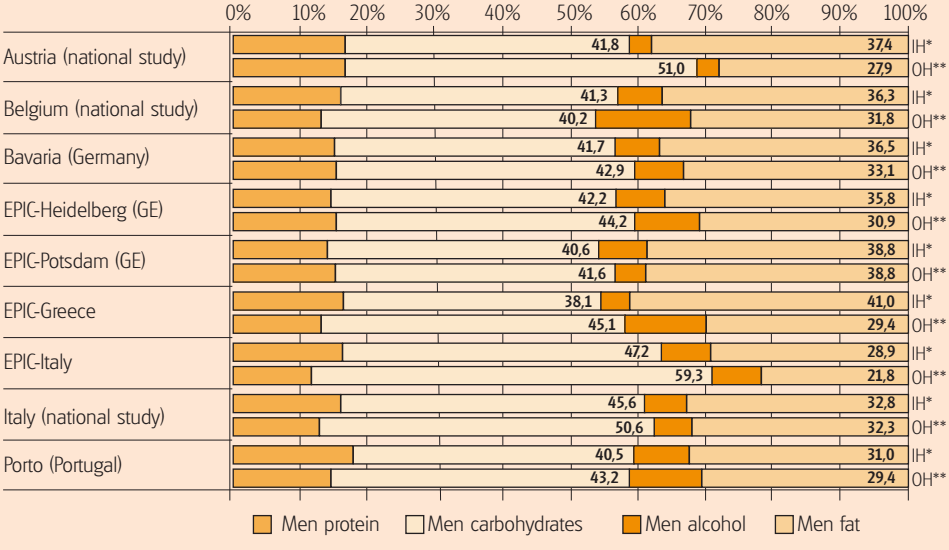
The HECTOR consortium consisted of 60 participants from 17 European countries (Albania, Austria, Belgium, Croatia, Cyprus, Finland, France (IARC-WHO), Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Switzerland, the Netherlands and the United Kingdom) and included (a) academics involved in dietary data collection and analysis; (b) independent nutrition experts on the basis of knowledge of their country's situation; (c) governmental officials that co-operated in food legislative processes; (d) representatives of small and large enterprises of six countries, including large meal providers of institutions (hospitals, schools, universities and prisons), as well as small restaurant owners; (e) representatives of the European headquarters of three multinational catering and catering-supplying companies; (f) Consumer Associations' members; and (g) representatives of FAO and other international agencies. The project was coordinated by the Department of Hygiene, Epidemiology and Medical Statistics of the University of Athens Medical School.

The HECTOR project had three strategic objectives: (a) to assess the dietary intake of consumers when eating out and understand the dynamics of the catering sector; (b) to develop and evaluate strategies and concrete measures for promoting healthy eating out among European consumers and (c) utilize data on out-of-home food expenditures regularly collected through the national household budget surveys (HBS), in order to develop a methodological framework that would allow the assessment and monitoring of in home and out of home food choices.

In order to assess consumers' intakes when eating out, the HECTOR project centrally combined and analyzed dietary data collected from 1994 to 2006 in eight European countries. The samples consisted of individuals aged up to 98 years, who participated in regional studies in Bavaria (Germany) and Porto (Portugal), national studies in Austria, Belgium, Italy and Poland and in segments of the international European Prospective Investigation into Cancer and nutrition (EPIC). Data on dietary intake were mainly collected through single or multiple 24-hour dietary recalls administered by trained interviewers either through face-to-face or telephone interviews. In the case of the nationwide Italian survey and the regional study in Porto participants were asked to provide multiple-day food diaries. Analysis of data from the HECTOR database showed that among adults over 35 years old, the contribution of eating out to the total energy intake was higher in men than in women and this contribution was also higher in northern and central European countries than in southern ones (except for Poland). The highest contribution of eating out to total alcohol intake was reported in Belgium and Greece. In most countries, eating out contributed less to total daily intake of

vitamin C than to the intakes of other water-soluble vitamins. Among foods that were more common out of home were ice cream, sweet and savory products, non-alcoholic beverages (including soft-drinks and juices) beer and spirits. The composition of diet out of home appeared to be quite different from the in home one, especially for the southern and central European countries. Figures 1a and 1b present the contribution of macro-nutrients to the daily caloric intake of adults over 35 years in home and out of home by dataset for men and women, respectively. In Belgium, Italy, Greece and Portugal (regional study in Porto), the energy percentage from protein and fat was generally lower when eating out compared to eating at home and the difference was generally compensated by carbohydrate intake. Comparisons between the southern countries showed that women, compared to men, reported diets richer in fat both in and out of home. In Austria, the contribution of fat was lower in eating out and the contribution of carbohydrates higher. Protein and alcohol contributions were however similar in both eating in and eating out. In Norway (data available only for women), the composition of the out of home dietary choices appeared to be quite similar to the in home ones. Among the three regional German studies (Bavaria, Heidelberg and Potsdam), there were differences in the composition of the diet: in Bavaria and Heidelberg the energy contribution from fat was lower in eating out than eating in home, while in Potsdam there was no substantial difference. Only in Heidelberg, carbohydrates appeared to contribute more to

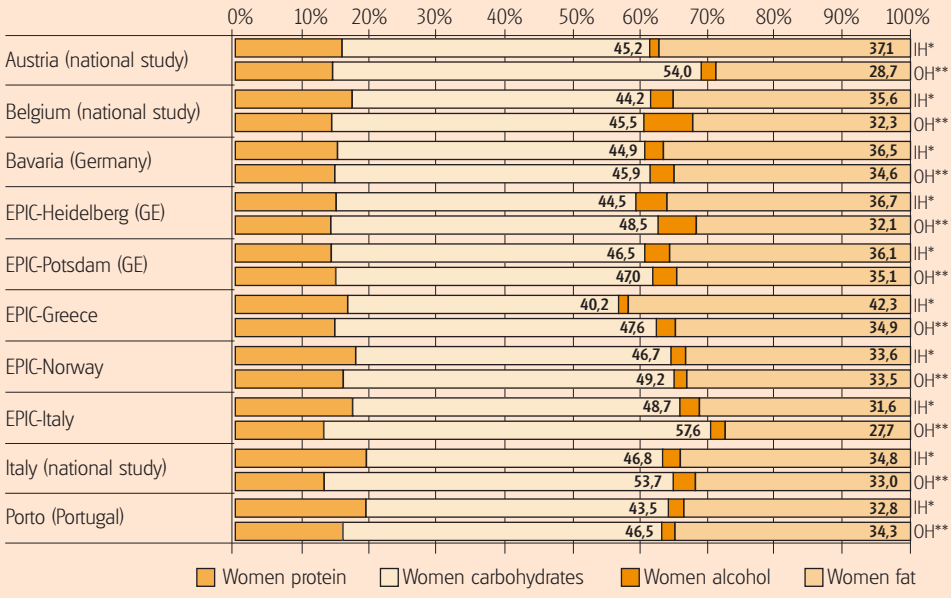
Figure 1a. Contribution (%) of macro-nutients to the daily energy intake in home (IH*) and out of home (OH**) among male participants aged 35-64 years by survey dataset



* Contribution (%) of macro-nutrients to the daily caloric intake within the household premises.

** Contribution (%) of macro-nutrients to the daily caloric intake at places other than the household premises.

Figure 1b. Contribution (%) of macro-nutients to the daily energy intake in home (IH*) and out of home (OH**) among female participants aged 35-64 years by survey dataset



* Contribution (%) of macro-nutrients to the daily caloric intake within the household premises.

** Contribution (%) of macro-nutrients to the daily caloric intake at places other than the household premises.

the eating out energy intake than to the eating in home one. Among adolescents, young adults and elderly, young adult males reported the higher contribution from eating out to their daily energy intake. As expected, eating out was less common among the elderly.

The experience gained through harmonizing the dietary data in order to assess eating out was channeled to construct and pre-test a questionnaire aiming at collecting information on eating out. The HECTOR eating out data collection questionnaire was designed to supplement widely applied tools recording sporadic diet at individual level, such as 24-hour dietary recalls or food diaries, as well as the diaries used in national HBS. The questionnaire was formulated and tested in ten European countries. The work for the construction and feasibility testing of the questionnaire as well as its final version are publicly available at the project's website (www.nut.uoa.gr/hector). Equally important to the set of questions is the definition of eating out in the introductory page which aims to conceptualize the different components of contemporary eating out.

To increase insight as to what consumers are provided with when eating out, case-studies of catering and catering-related enterprises, including short and medium size enterprises (SMEs) were also conducted. The questions addressed issues related to the nutrient composition of available foods,

portion sizes, pricing policy and services provided, including practices on how menus were compiled, how food was prepared and presented, how specific needs of certain population groups were addressed and how safety principles requirements and environmentally friendly technologies were implemented. The case studies among the participating enterprises demonstrated several elements of current practices and allowed the identification of limitations that impede the smooth engagement of the sector in health promoting strategies. In terms of nutrition knowledge, for example, most respondents replied that there are no national dietary recommendations, which in some cases was true but in others it reflected a lack of caterers' knowledge on national nutrition policies. Attention to the quality of meals in terms of promoting health was stated by few enterprises. More often, quality was a concept associated with hygiene or taste rather than nutritional value. When respondents were asked whether they balance food groups in their menu, they all replied positively. It was, however, noted that salads and vegetable dishes, although present in the menu, they often were relatively more expensive. Concerning nutritional evaluation, large enterprises had sufficient resources to provide information on the nutrient content of foods offered (via website or on-site). Enterprises of small and medium size, however, were not able to provide this information. In terms of support from the public sector, some respondents felt that governments frequently emphasized regulatory issues, which enhanced a feeling of being controlled rather than being assisted to promote healthy choices.

During a two-day workshop, the project's consortium collectively evaluated the project findings in order to identify factors and attributes of the catering sector that hinder or promote healthy food choices. During a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, participants concluded that the catering sector possesses strengths that allow direct involvement in health promotion strategies. The sector's capability to directly introduce changes in the food offered introduces the prospect of being the trend-setter for healthy eating out. Participating in public health nutrition strategies presents further opportunities to the sector, particularly the small and medium size enterprizes. Working towards healthy eating out may also educate, empower and motivate catering staff. Among the weaknesses of the catering sector is its dependence on the supply of ingredients, the lack of financial means and limited technical capacity with regard to estimating the nutritional composition of the food offered. At the same time, there is the threat that a focus on healthy eating might narrow the variety of foods offered and may necessitate a business re-orientation. In a sector with high staff turnover, such investments might be less effective.

The outcomes of the SWOT analysis were further translated to two training and educational material, namely: a calendar (addressing the caterers) and information tip cards (for the consumers). The published calendar was organized in 14 pages designed to convey information on how to increase the supply of healthy foods. Each monthly page provides information about a particular food group (e.g. grains and grain products, meat and meat products, sweets, drinks, fruits, vegetables and legumes) Additional pages illustrate how to calculate portion sizes and include a brief explanation about the relevance of seasonality and a country-specific table of "in season" fruit and vegetables.

Various 'Eating out tips' were also printed out on cards to be displayed on restaurant tables and/or counters of enterprises where the customers could read them while waiting for or having their meal. The idea is to captivate the reader through simple, concise and appealing messages. The calendar and cards were tested in a feasibility study during two weeks in October 2009 including all HECTOR participating catering SMEs and two large companies in Greece and Portugal. The calendar's impact was evaluated with the application of a questionnaire answered by members of the staff. The customer's opinion about the cards was recorded. Several participants translated the text of the calendar and tips to their own languages and the final versions are available in ten European languages (Croatian, Dutch, English, Finnish, Greek, Hungarian, Italian, Norwegian, Polish and Portuguese) (http://www.nut.uoa.gr/hector/tools.asp).

Further to the use of available individual-based dietary data, HECTOR exploited the use of information on out-of-home household expenses collected through the national HBS. These data were analysed to estimate the contribution of out of home food acquisitions to overall daily consumption, taking into account characteristics of the households and members. The aim was to perform a benchmarking exercise to develop a methodological framework which could be applied in countries where no other data on eating out are available. It was concluded, however that the validity of the estimations was strongly affected by the available information on expenses, which was neither standardized nor harmonized across countries.

In conclusion, eating out is becoming increasingly popular and studies suggest that there is considerable room for improvement in terms of both the meals offered and the choices made. There is scarcity, however, of European studies addressing this particular lifestyle habit. This may be attributed to several reasons, including the lack of reliable assessment tools. In view of current interest in undertaking multinational dietary surveys, HECTOR has contributed fundamental knowledge and experience in relation to the eating out aspects of the diet.

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Status of food health claims in Europe

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Abstract

The European Food Safety Authority (EFSA) is an independent body that provides scientific advice and communication on risks associated with the food chain. The main objective of EFSA is to contribute to a high level of consumer protection and maintain confidence in the EU food supply. The EFSA Scientific Panel on Dietetic Products, Nutrition and Allergies (NDA) deals with questions related to human nutrition, including the evaluation of nutritional and health claims made on foods. A number of foods labelled and advertised in the European Community have borne nutrition and health claims without the need of legal authorization, but this situation has changed after the Regulation (EC) No 1924/2006 on Nutrition and Health Claims was adopted in December 2006. This Regulation lays down the harmonisation of rules for the use of nutrition and health claims in foods and establishes a system for their scientific evaluation. Herein, an overview on EFSA's work in the area of health claims made in foods, focusing on the evaluation criteria and current status of applications is provided.

Key words

Health claims, nutrition, regulation, human intervention, EFSA.

Introduction

The European Food Safety Authority (EFSA) was set up in January 2002, following a series of food crises in the late 1990s (e.g. BSE, dioxins), which damaged consumer confidence in the safety of the food chain. EFSA was created as an independent body that provides scientific advice and communication on risks associated with the food chain, based on the most up-to-date scientific information and knowledge. The main goal of EFSA is to contribute to a high level of consumer protection and restore and maintain confidence in the EU food supply. EFSA's remit covers many aspects of the food chain including, food and feed safety, nutrition, animal health and welfare, plant protection and plant health. To this end, EFSA includes ten different Panels that are responsible for different areas of the food chain, composed of highly qualified scientific experts. The EFSA Scientific Panel on Dietetic Products, Nutrition and Allergies (NDA) is the Panel dealing with questions related to nutritional and health claims of foods, novel foods, infant nutrition, food allergies, and dietary reference values.

A number of foods labelled and advertised in the European Community have borne nutrition and health claims so far without the need of legal authorization. This situation has changed after the Regulation (EC) No 1924/2006 on Nutrition and Health Claims was adopted in December 2006. This Regulation lays down the harmonisation of rules for the use of nutrition and health claims in foods and establishes a system for their scientific evaluation. It ensures that any claim made on a food label in the EU is clear, accurate and substantiated, enabling consumers to make informed and meaningful choices and contributing to a high level of consumer protection. The Regulation also ensures fair competition and promotes and protects innovation in the food area by adopting common rules within different European countries and stakeholders.

The NDA Panel deals with the scientific evaluation of health claims, classified into different categories as established in the Regulation. These include "general function claims" based on generally accepted science (Article 13.1) or new science (Article 13.5), risk reduction claims (Article 14) and claims related to children's development and health (Article 14). In every case, in assessing each food/health relationship that forms the basis of a claim, the Panel makes a scientific judgement on the extent to which a cause and effect relationship is established between consumption of the food/constituent and the claimed effect for the target group under the proposed conditions of use. The results of the Panel are translated into Opinions about the evidence that establish a cause-effect relationship based on the highest possible scientific standards. The results of the Panel are also translated into Technical Reports intended to clarify the evaluation procedures or other questions related to the Panel's work as requested by the Commission, Member States or stakeholders. Herein, an overview on EFSA's work in the area of nutrition and health claims, focusing on evaluation criteria and the current status of the evaluation of health claim applications is provided.

European Regulation of health claims made on foods

The Regulation (EC) No 1924/2006 of the European Parliament and the Council on nutrition and health claims made on foods came into force in 2007. It harmonizes the provisions related to nutrition and health claims and lays down the basis for rules governing the authorization of health claims made on foods.

The Regulation includes three different types of claims included in different articles. The article 13.1 health claims, also referred to as "function claims", are those related to the role of a food (constituent) on a normal physiological function, such as growth, development or other functions of the body, psychological and/or behavioural functions, and slimming, weight-control and satiety. These claims should be based on generally accepted science. The article 13.5 claims are also considered as "function claims" but are based on newly established science. The third type of claims are those covered by article 14, which include two categories, those based on evidence of the role of a food (constituent) in reduction of a risk factor for a disease and those related to children's development and health. In the case of risk reduction claims, it should be demonstrated that the food

(constituent) reduces (or beneficially modifies) a factor contributing to the disease. A risk factor is a factor associated with the risk of a disease that may serve as a predictor of development of that disease. Whether or not the alteration of a factor is considered to be beneficial in the context of a reduction of disease risk claim depends on the extent to which it is established that: (i) the risk factor is an independent predictor of disease risk (such a predictor may be established from intervention and/or observational studies) and (ii) the relationship of the risk factor with the development of the disease is biologically plausible. Except for well-established risk factors, such as the association between reducing LDL-cholesterol and reducing the risk of coronary heart disease, the extent to which the reduction of a factor is beneficial in the context of a reduction of disease risk claim is considered on a case-by-case basis (EFSA NDA Panel. 2011a). In the context of children claims, the effects should be demonstrated specifically in the target population.

Although the evaluation process of claims under different articles is similar, the submission procedure and dialogue between the parties involved has been slightly different. Claims based on generally accepted science (Art. 13.1) were collected by different EU member states and submitted by national authorities to the European Commission (EC) until 31 January 2008. Then, EC requested EFSA to assess these claims, but direct exchanges between applicants and EFSA have not been established during the evaluation. The submitted claims have been scientifically assessed to verify whether or not a relationship between the food intake and the claimed effect exists and this assessment has been translated in scientific opinions. These opinions have been the basis for the decision of the EC in relation to their inclusion in a list of allowed European health claims. In addition, rejected claims with the reason for rejection will be listed in a Community Register. In the case of claims under articles 13.5 and 14, the applicants have submitted a specific dossier and there has been direct dialogue between the applicant and EFSA staff during the evaluation process. In this way, the applicant has been able to provide additional information or clarifications when required.

Evaluation criteria of health claims

In the evaluation process of health claim applications the EFSA NDA Panel addresses the following issues: (i) the characterisation of the food (constituent); (ii) the definition of the health claim and its relevance for human physiology; and (iii) the substantiation of the health claim, this means the extent to which a cause-effect relationship has been established between the intake of the food (constituent) and the claimed effect in the target population group and under the proposed conditions of use.

Characterisation of the food (constituent)

The requirements to consider that a food or a food category or a food constituent is sufficiently characterization can differ depending on the type of food addressed and the claim. In general, it should be sufficient to confirm the identity and establish that the studies provided for substantiation of the

health claim were performed with the food/constituent. For claims on microorganisms, data on genus, species and strain (genetic typing) identification and characterization are required; for claims related to food categories, differences in composition within the category that could influence the claimed effect should be taken into account; for claims on botanical products, data on the taxonomic name of the plant, the part of the plant used and production process, and standardization of the final product in the compounds responsible for the claimed effect should be provided.

Definition of the health claim and relevance to human physiology

The health claims should be specific and the effect measurable according to the Regulation. In this context, there are many examples of health-relationships presented in the applications evaluated so far that have been considered as non-defined, including "gut health", "digestive health", "intestinal microbiota" or "immune system". For instance, "gut health" is a broad concept that could include many different aspects related to bowel function; however, "intestinal regularity/transit" is a specific health claim related to a well-defined aspect of the bowel function that can be measured by generally accepted methods and, therefore, can be assessed.

The claim effect should also be considered as a beneficial physiological effect to be acceptable. For example, claims related to contribution to "maintaining a healthy/beneficial intestinal microbiota" or to "increasing the numbers of lactobacilli or bifidobacteria" have not been considered beneficial per se (EFSA NDA Panel 2011b). It is considered that the mere passage of the microorganism administered (e.g. lactobacilli) and their survival in the gastrointestinal tract does not imply that this exerts any beneficial influence on the host physiology. Moreover, current scientific knowledge is still insufficient to define the bacterial groups and their relative abundance that constitutes a healthy microbiota. Many studies have tried to identify the specific bacteria that contribute to a normal microbiota by comparing its composition in healthy and populations with a specific disease or populations at disease risk (Bisgaard et al., 2011; Lepage et al., 2011; Sanz et al., 2011). This has led to establish associations between alterations in specific bacterial groups and certain conditions, but all these alterations do not necessarily reflect causality of the underlying disease (Bloom et al., 2011). However, claims such as "contribution to the "defence against pathogens" or to "decreasing potentially pathogenic microorganisms" have been considered beneficial. Another example of claims non-considered beneficial physiological effects are those related to general "stimulation of the immune system" or to "reducing inflammation". Several claims have referred to the contribution of a food (constituent) to the stimulation of the immune system for example by increasing cytokine production, numbers of macrophages, natural killer cell activity, or stimulating components of cellular and humoral immunity (EFSA NDA Panel 2011b). However, the NDA Panel has considered that the stimulation of these immunological responses or immune parameters is not a beneficial physiological effect per se. Regarding claims related to inflammation, the Panel has considered that adequate inflammatory responses are of primary importance for the defence against injury of any origin and that changes in markers of inflammation such as various interleukins do not indicate a beneficial physiological effect per se unless these changes are linked to a beneficial physiological or clinical outcome (EFSA NDA Panel 2011b).

In this context, EFSA has recently published a guidance document on scientific requirements for health claims related to gut and immune function to facilitate study design for submissions. This guide addresses the beneficial effects and outcome measures that are acceptable for substantiation of claims in these areas (EFSA Journal 2011;9(4):1984). Similar guidance documents have been prepared for other claim areas such as bone health, oral and dental health and weight management, which are submitted for public consultation. Hopefully, these guidance documents will help better define the beneficial effects and outcome measures in future health claim applications related to these areas and increase the possibilities of success.

Substantiation of the health claim

To establish the extent to which a cause and effect relationship is established between consumption of the food/constituent and claimed effect the EFSA NDA Panel takes into consideration all of the evidence from pertinent studies weighting its overall strength, consistency and biological plausibility, the quality of individual studies, the applicability of studies to the target group and the conditions of use proposed.

Health claim substantiation is mainly based on human intervention studies conducted in the target population using the food and ingredient in the intended dose level. This is especially important in case of claims based on new scientific knowledge (Art. 13.5), intended for children's health or claims associated with reduction of a risk factor for disease (Art. 14). Double-blinded randomized placebo-controlled intervention studies are of primary importance to substantiate cause-effect relationships. Additionally, other studies are considered in the evaluation process (e.g. randomized non-controlled studies, controlled non-randomized studies, observational studies etc.), but evidence derived from them is considered in a second order of importance. The NDA Panel considers that the population group for which health claims are intended is the general (healthy) population or specific subgroups thereof, for example, elderly people, physically active subjects, or pregnant women. The NDA Panel considers on a case-by-case basis the extent to which it is established that extrapolation from other study groups to the target group is biologically justified (EFSA NDA Panel, 2011a). For example, data from irritable bowel syndrome patients have been accepted in the context of claims related to reduction of intestinal discomfort; however, data on joints-osteoarthritis patients were no acceptable to substantiate a claim related to maintaining normal joints. Applications for claims which specify target groups other than the general (healthy) population are the subject of on-going discussions with the EC and Member States with regard to their admissibility (EFSA NDA Panel, 2011b). Animal or in vitro studies may provide supportive evidence and mechanistic data, but per se are not enough to substantiate a claim.

Status of health claim evaluations

Up to now the EFSA NDA has adopted and published the scientific opinions corresponding to all general function health claim applications based on generally accepted science (Article 13.1 health

claims) submitted to EFSA via the Member States/EC, except for botanical claims. These opinions have been published in different batches. The first batch was published in October 2009 and included 523 opinions corresponding to 2,000 applications and 200 foods, and approximately one third was positive. In February 2010, a second batch of opinions (32), including 416 applications was published with a lower percentage of success (20% approximately). In October 2010, a third batch of opinions (75) related to 808 claims were published. In April 2011, EFSA's NDA Panel published the outcome of the evaluations of the fourth batch including 442 health claims, addressed in 63 opinions. By that date, the evaluation covered about 80% of 'general function' health claims submitted initially, excluding the so-called "botanical" claims. Finally, on 30 June 2011 EFSA's NDA panel finalized the evaluation of 536 health claims, addressed in 73 opinions, and the remaining group of 35 claims was published in a sixth batch on 28 July 2011. This last publication is the culmination of more than three years' work by EFSA's experts. Since 2008 the Panel has assessed 2,758 food-related general function health claims to determine whether they were supported by sound scientific evidence. The EC and Member States will then consider EFSA's scientific advice in deciding on the possible authorization of such claims for food products and their inclusion in a positive list. These approved claims can help European consumers to make more informed choices about their diet. In this evaluation process, the main reasons for the unfavourable opinions were related to the poor quality of the information provided to EFSA, including inability to identify or sufficiently characterize the specific substance on which the claim is based (for example, claims on "probiotics", or on "dietary fibre" without specifying the particular fibre); the lack of evidence that the claimed effect is indeed beneficial to the maintenance or improvement of body functions; or the lack of precision regarding the health claim being made. In addition, some claims were outside the scope of the current legal framework. The outcomes of evaluations were favourable when there was sufficient evidence to support the claims. This was the case for about one in five claims reviewed, which include those related for example to vitamins and minerals; specific dietary fibres and blood glucose control, blood cholesterol, or weight management; live yoghurt cultures and lactose digestion; antioxidant effects of polyphenols in olive oil; and meal replacement and weight control; fatty acids and heart function; and sugar replacers (such as xylitol and sorbitol) and maintenance of tooth mineralization or lowering the increase of blood glucose levels after meals.

In June 2011, the NDA Panel had also published 53 opinions related to children's health claims (Art. 14), 26 opinions related to risk reduction claims (Art. 14), 32 opinions related to function claims based on new science (Art. 13.5) and 1 opinion related to conditions of use (Art. 19). The number of claim applications under these articles has been considerable lower, as expected, and the main reasons for unfavourable outcomes have been related to lack of sufficient evidence for the substantiation of the claimed effect based on well-designed human intervention trials. The outcomes of evaluations were favourable when there was sufficient evidence to support the claims. This was the case of claims related, for example, to the role of water-soluble tomato concentrate and reduction in platelet aggregation (Art. 13.5 claim), thiamine and normal carbohydrate and energy-yielding metabolism (Art. 14 children' health claim), oat beta-glucan and reducing the risk for (coronary) heart

disease by lowering blood LDL-cholesterol concentrations (Art. 14 risk reduction claim), and xylitol chewing gum and reducing the risk of caries.

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Mediterranean diet and public health nutrition: future and challenges

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Abstract

The Mediterranean diet has an optimal historic moment by the recent recognition by UNESCO as Intangible Cultural Heritage of Humanity and the excellent level of scientific research that is being developed in different countries and in Spain in particular. The health benefits of this dietary pattern are multiplied and reach fields of knowledge such as immunity, allergic diseases, the psyche or even quality of life. This gives the Mediterranean diet a maximum international projection and reinforces the fact it could be stated as the healthiest and the most sustainable eating pattern in the planet and as the key player in the public health nutrition field not only at the Mediterranean area but also globally. It also represents an unprecedented ancient cultural heritage that should be preserved and promoted from different areas of the political and economic agenda, in addition to the health agenda.

Key words

Mediterranean diet, public health nutrition, culture, sustainability, scientific evidence.

Mediterranean Diet: Intangible Cultural Heritage of Humanity

Since last November 16th, 2010, the Mediterranean diet was inscribed on the UNESCO's Representative List of Intangible Cultural Heritage of Humanity. The objective of this initiative was to safeguard the immense legacy representing the cultural value of the Mediterranean diet, as well as to share and disseminate its values and benefits internationally.

The Mediterranean diet is a cultural, historical, social, territorial and environmental heritage transmitted from generation to generation for centuries, and it is intimately linked to the lifestyles of the Mediterranean peoples throughout their history. A legacy passed on a temporal and spatial constant flow, a living heritage, unique and outstanding cultural spaces, uses promoting respect for cultural diversity and human creativity, expression of sociability and communication between their villages and individuals, a way to reinforce individuals identities in their places of origin, an integrative element of communities with the nature and the history, a defense mechanism of the agriculture and sustainable rural development, the landscape and environment of our territory. Besides, a

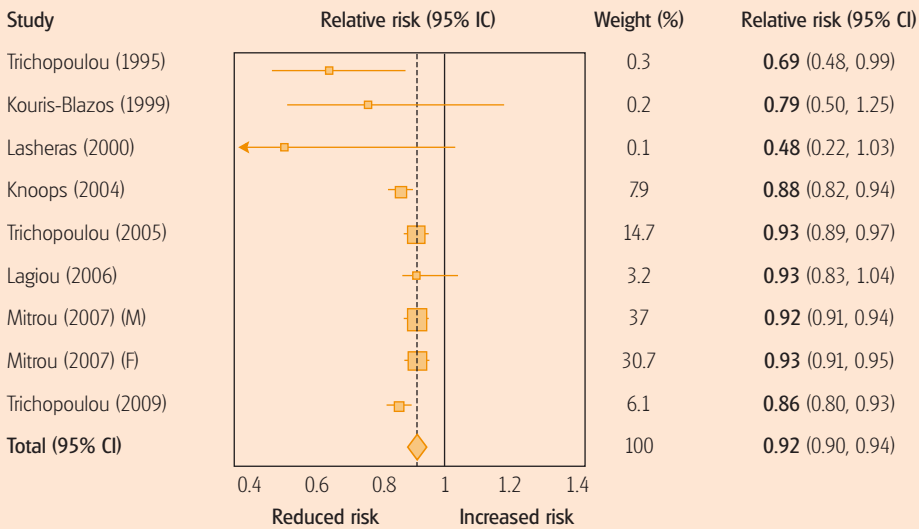
dietary pattern associated with benefits to individual and public health. From this conviction, Spain, with Italy, Greece and Morocco, deposited at the UNESCO's Secretariat the candidacy which is currently a reality, under the coordination of the Mediterranean Diet Foundation. Undoubtedly, this landmark achievement opens up a wide range of opportunities around this food model which also has been associated with numerous health benefits.

Increasing scientific evidence linked to the Mediterranean Diet

Relevant prospective epidemiological studies and some clinical or community trials, such as the PREDIMED study, are increasing in the last decades exponentially the level and the quality of the evidence around the Mediterranean diet. The evidence of the Mediterranean diet can be grouped into different areas:

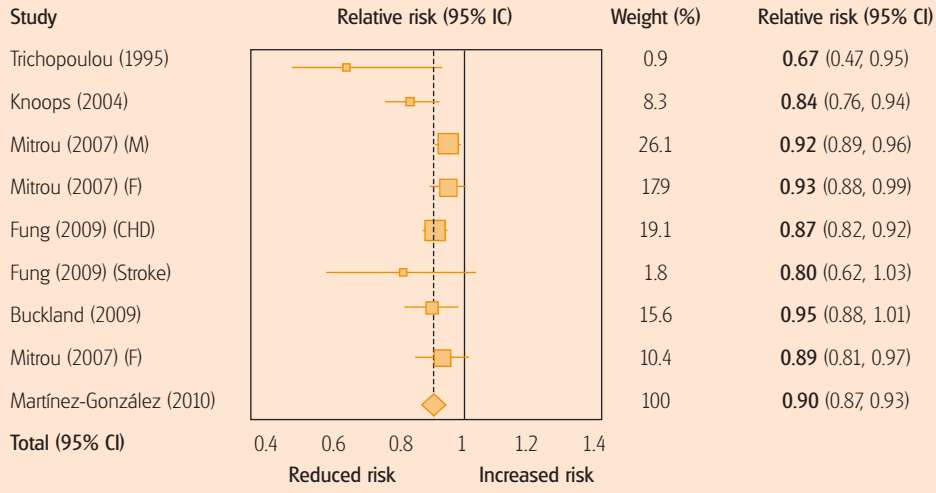
- Longevity and mortality (figure 1).
- Coronary heart disease (figure 2).
- Obesity.
- Diabetes and metabolic syndrome (figure 3).

Figure 1. Risk of all cause mortality associated with two point increase in adherence score for Mediterranean diet. The centre of each square shows the relative risk of each study and extended lines show 95% confidence intervals. The area of the square is proportional to the amount of information provided by the study. The diamond indicates the total effect size.



Source: Sofi et al., 2010.

Figura 2. Risk of mortality from cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet. The centre of each square indicates the relative risk of each study and extended lines show 95% confidence intervals. The area of the square is proportional to the amount of information provided by the study and the diamond represents total effect size for coronary heart disease (CHD).



Source: Sofi et al, 2008 y 2010.

- Cancer.
- Bronchial asthma.
- Cognitive function and Alzheimer's disease (figure 4).
- Depression (figure 5).
- Nutrition adequacy (figure 6).
- Quality of life.

From a review of the evidence from the Mediterranean diet interventions conducted a few years ago, we concluded that the Mediterranean diet showed favorable effects on lipoprotein levels, endothelium vasodilatation, insulin resistance, metabolic syndrome, antioxidant capacity, myocardial and cardiovascular mortality, and cancer incidence in obese patients and in those with previous myocardial infarction.

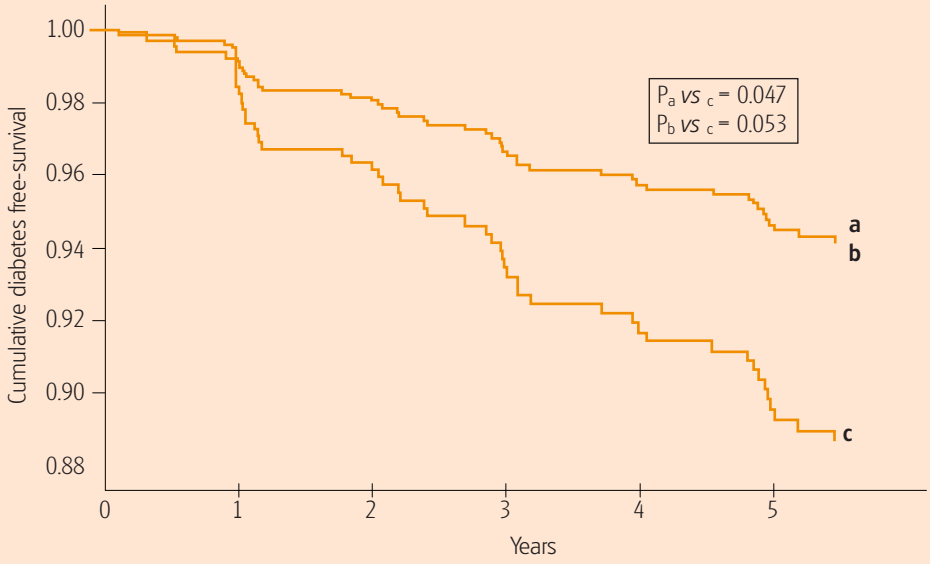
Moreover, preliminary results from PREDIMED trial point out that the Mediterranean diet, especially rich in virgin olive oil, is associated with higher levels of plasma antioxidant capacity. The plasma total antio-

xidant capacity is related to a reduction in body weight after 3 years of intervention in a high cardiovascular risk population with a Mediterranean-style diet rich in virgin olive oil. As well, further PREDIMED results suggest there is no rationale to maintain the fear that Mediterranean food items rich in fats of vegetable origin (olive oil or tree nuts) may cause weight gain or be responsible for an increased risk of obesity, provided that the energy intake does not exceed energy expenditure.

In the elderly population, the reviewed evidence is as well promising. In fact, the Mediterranean diet has been associated in the PREDIMED study to a lower incidence of type II diabetes, both at the nut and the oil virgin olive oil group (figure 3)

The Mediterranean diet was related to benefits on risks factors for cardiovascular disease such as lipoprotein levels, endothelium vasodilatation, insulin resistance, the prevalence of the metabolic syndrome, antioxidant capacity, the incidence of acute myocardial infarction, and cardiovascular mortality. Some positive associations with quality of life and inverse associations with the risk of certain cancers and with overall morality were also observed.

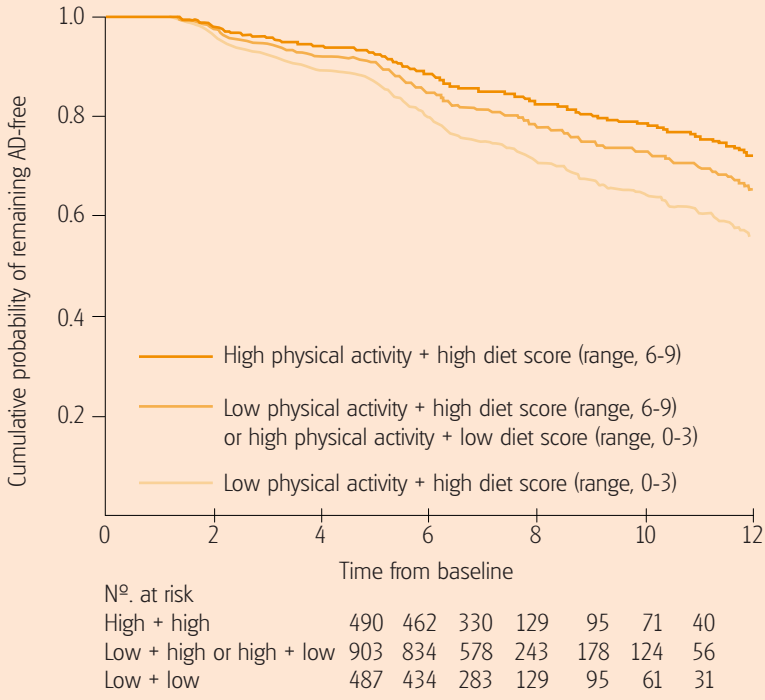
Figure 3. Cumulative survival free of diabetes by intervention group in the PREDIMED study. Cox regression models for incidence of diabetes in relation to the intervention groups with a mediterranean diet (MD) versus control group. Adjusted for gender, age, energy intake, BMI, waist circumference, physical activity, tabacco, fasting blood glucose, blood lipids therapy, adherence to the Mediterranean Diet and weight changes during the study



a: Group DM + Virgin olive oil; b: Group Md + Nuts; c: Group control low fat diet.

Source: Salas-Salvadó et al., 2010.

Figure 4. Incidence of Alzheimer disease (AD) based on the levels of physical activity and the adherence to a Mediterranean diet (high or low)



Cox survival curves analysis. The lack of physical activity is defined as an average of 0 hours a week of activity, high physical activity is defined as an average of 1.3 hours per week of vigorous activity, 2.4 hours per week of moderate or 3.8 hours per week of light activity or a combination of both.

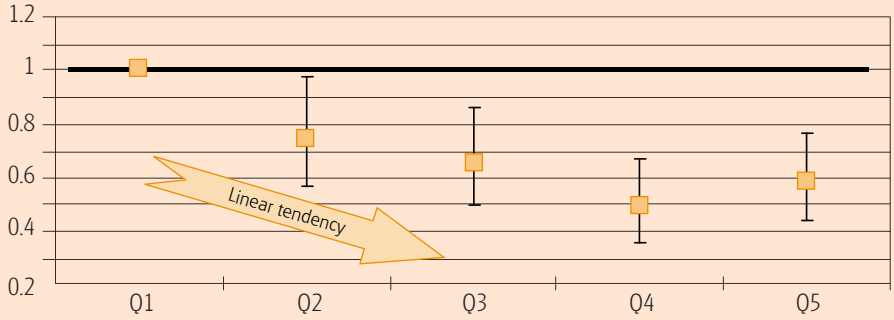
Source: Scarmeas et al., 2009.

In a recent meta-analysis on the evidence on the relationship between Mediterranean diet and health status, a two point increase in the adherence score was significantly associated with a reduced risk of mortality (figure 1). Likewise, a greater adherence to a Mediterranean diet was associated with a 9% reduction in overall mortality; 9% reduction in cardiovascular disease mortality; 6% reduction in neoplasm incidence or mortality; and 13% reduction in incidence of Parkinson's disease and Alzheimer's disease in the general population.

On the other hand, results from the Medi-RIVAGE and PREDIMED studies suggest a higher protective effect against cardiovascular risk factors with a MD compared to a low-fat diet, with the added strength of higher compliance among whom followed the MD.

According some studies in New York the Mediterranean diet and physical activity represent two important elements in preventing Alzheimer's disease (figure 4). Also, recent findings from the SUN

Figure 5. Mediterranean diet and depression: incidence relative risk of depression according quintiles of baseline adherence to the Mediterranean diet adjusted for multiple health and socioeconomic variables in the SUN cohort.



Source: Sánchez-Villegas et al., 2009.

cohort certify that MD compliance may reduce the incidence of depression and increase the quality of life (figure 5).

Vernele et al. reviewed studies that have investigated the effect of the MD on overall cancer mortality and found some evidence that greater adherence to a MD was associated with a reduced risk of cancer, ranging from 14% to 27% depending on the increment in MD measured (Vernele et al. 2010). A high adherence to the MD was associated with reduced risk of breast cancer, ranging from 21% to 55%, and a reduced risk of colorectal cancer ranging from 21 to 28% was observed only in men. The range of risk reduction against some respiratory tract, gastric and oral cancers was around the 20-30% for those individuals whose diet was closest to the MD pattern.

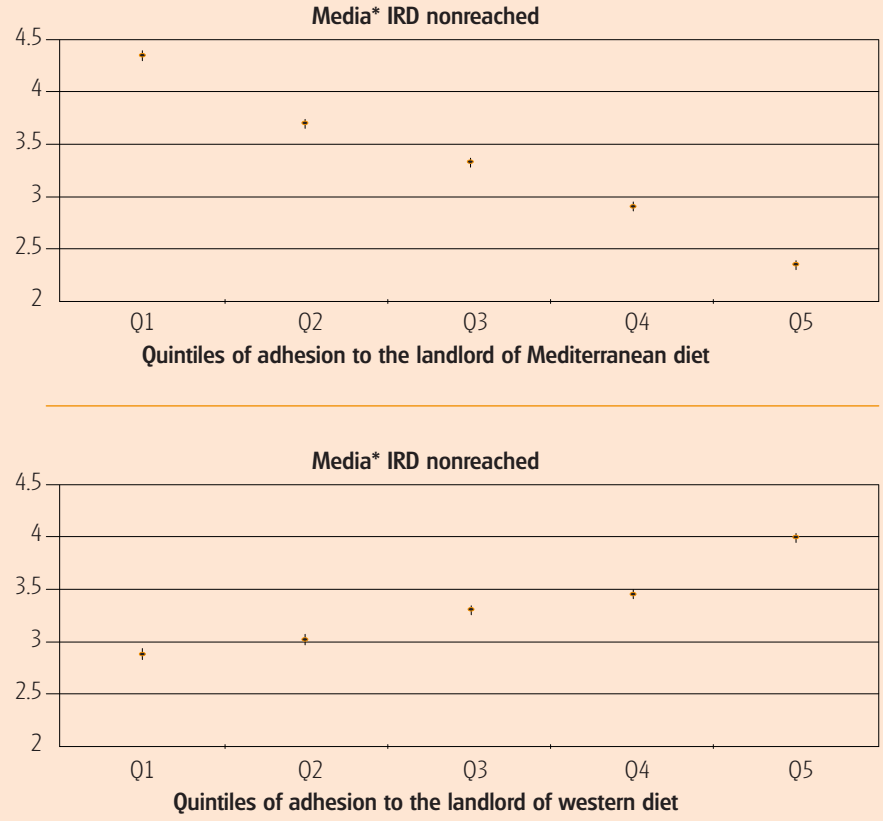
Although the epidemiological evidence regarding the relationship between the MD and overweight/obesity is inconsistent, it reveals that the MD is not related to any increased risk of overweight/obesity. In fact, the systematic review by Buckland et al. actually points towards a possible role of the MD in preventing overweight/obesity, and some physiological mechanisms could explain this protective effect.

Serra-Majem et al. have been who have shown that the nutritional adequacy improves along with the degree of compliance to the Mediterranean diet in adults and as well in children and adolescents (figure 6).

The new Mediterranean diet pyramid

The traditional Mediterranean Diet (MD) pyramid has evolved to adopt the new way of life. By taking into consideration all scientific evidence for the health benefits of the Mediterranean Diet and its

Figure 6. Average number of micronutrient intakes below mean requirements in different quintiles of the Mediterranean and Western dietary patterns



*Adjusted for age and gender
Source: Serra Majem *et al.*, 2009.

protective effect against chronic diseases, as well as present way of life and environmental constraints, was developed the modern Mediterranean diet pyramid. As an initiative of the Mediterranean Diet Foundation and with the collaboration of numerous international entities, a wide range of experts in nutrition, anthropology, sociology and agriculture have reached a consensus in a new richer design with the incorporation of qualitative elements.

The new pyramid follows the previous pattern: at the base, food items that should sustain the diet and provide the highest energy intake, such as plant origin foods that provide key nutrients and other protective substances that contribute to general well-being, and at the upper levels, foods to be eaten in moderate amounts such as those of animal origin and/or rich in sugars and fats that should be eaten in moderation and some of them left for special occasions.

The health benefits of the Mediterranean Diet and its protective effect against chronic diseases has been well established by the scientific community. This new pyramid includes all the food groups; it is in the proportions and the frequencies that relies a healthy or unhealthy diet. It addresses the healthy adult population, and should be adapted to the specific requirements in case of children, pregnant women and other circumstances and health conditions.

Moreover, social and cultural elements characteristic of the Mediterranean way of life are incorporated in the graphic design. So, it is not just about prioritizing some food groups from others, but also paying attention to the way of selecting, cooking and eating them. Meals have an essential role in the Mediterranean Diet, and thus it also reflects and introduces the concept of the composition of main meals. A balanced composition of the main meals should include fruits, vegetables and cereals, complemented in a lower contribution to daily energy intake with other plant foods, dairy products and protein sources.

The pyramid establishes dietary daily, weekly and occasional guidelines in order to follow a healthy and balanced diet.

Every day

- The three main meals should contain three basic elements, which can also be found throughout the day:
  - Cereals. One or two servings per meal in the form of bread, pasta, rice, couscous and others. Preferably whole grain, since some valuable nutrients (magnesium, phosphorus, etc.) and fibre can be lost during processing.
  - Vegetables. Presents at lunch and dinner; more or equal two servings per meal, at least one of the serving should be raw. A variety of colours and textures provide a diversity of antioxidants and protective compounds.
  - Fruits. One or two servings per meal. Should be chosen as the most frequent dessert.
- A daily intake of 1.5 to 2 litres of water should be guaranteed. A good hydration is essential to maintain the corporal water equilibrium, although needs may vary among people because of age, physical activity, personal circumstances and weather conditions. As well as water, non-sugar rich herbal infusions and broths (with low fat and salt content) may complete the requirements.
- Dairy products should be present in moderate amounts (two servings per day), with a preference for low-fat dairy, traditionally in the form of yoghurt, cheese and other fermented dairy products. They contribute to bone health, but can also be an important source of saturated fat.
- Olive oil is located at the centre of the pyramid; should be the principal source of dietary lipids because of its high nutritional quality. Its unique composition gives it a high resistance to cooking temperatures and should be used for cooking as well as dressings (one tablespoon per person).

- Spices, herbs, garlic and onions are a good way to introduce a variety of flavours and palatability to dishes and contribute to the reduction of salt addition. Olives, nuts and seeds are good sources of healthy lipids, proteins, vitamins, minerals and fibre. A reasonable consumption of olives, nuts and seeds (such as a handful) make for a healthy snack choice.
- Respecting religious and social beliefs, a moderate consumption of wine and other fermented beverages (1 glass per day for women and 2 glasses per day for men, as a generic reference) during meals is recommended.

Weekly

A variety of plant and animal origin proteins should be consumed. Traditional Mediterranean dishes do not usually have animal-origin protein foods as the main ingredient but rather as a source of flavour. On a weekly base, the frequency of those sources of proteins is provided: fish (two or more servings), legumes (more than two servings), white meats (two servings) and eggs (two to four servings). Red meat (less than two servings, preferably lean cuts) and processed meats (less than one serving) should be in smaller quantity and frequency. For potatoes, a weekly recommendation is also given, and the message of preferably fresh potatoes is provided.

Occasionally

In the vertex of the pyramid are represented the sugary and unhealthy fat rich foods (sweets). Sugar, candies, pastries and beverages such as sweetened fruit juices and soft drinks, should be consumed in small amounts.

Lifestyle and preserving the cultural elements

Together with the proportion and frequency recommendations of consumption, the incorporation of lifestyle and cultural elements is one of the innovations of the pyramid. Adopting a healthy lifestyle and preserving the cultural elements should also be considered in order to acquire all the benefits from the Mediterranean diet. These elements are summarized though some key concepts:

Moderation

Serving sizes should be based on frugality and moderation, to adapt the urban and modern lifestyles to energy needs. This aspect is emphasised due to the major public health challenge of obesity.

Conviviality

The aspect of conviviality is important for the social and cultural value of the meal, beyond nutritional aspects. Cooking, sitting around the table and sharing food in company of family and friends is a social support and gives a sense of community.

Culinary activities

Devoting enough time and space for such culinary activities is stressed, giving account to their role in everyday meals, celebrations and religious festivals in every culture.

Seasonality, biodiversity, eco-friendliness, traditional and local food products are presented at the bottom of the pyramid to highlight how the new revised modern Mediterranean diet is compatible with the development of a sustainable diet model for the present and future Mediterranean generations. The preference for seasonal, fresh and minimally processed foods maximises the content of protective nutrients and substances in the diet.

Activity

Regular practice of moderate physical activity (at least 30 min throughout the day) as a basic complement to the diet for balancing energy intake, for healthy body weight maintenance and for many other health benefits. Walking, taking the stairs v. the lift, housework, etc., are simple and easy ways of doing exercise. Practising leisure activities outdoors and preferably with others makes it more enjoyable and strengthens the sense of community.

Adequate rest

Resting during the day (nap) as well as adequate night sleep is also part of a healthy and balanced lifestyle.

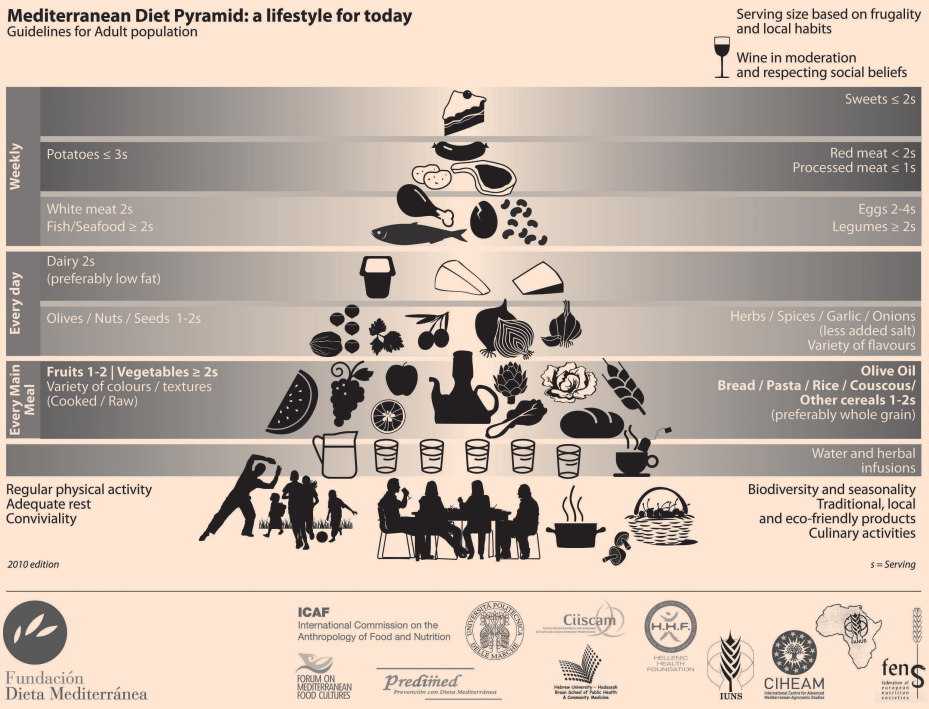
The new pyramid is a result of international consensus and is based on the latest scientific evidence in the of health and nutrition published in hundreds of scientific articles in the last decades, thus contributing to the harmonization of educational tools used in the promotion of the Mediterranean Diet and responds to the need for a common framework among Mediterranean countries. The use and promotion of this pyramid is recommended without any restrictions and the 2010 edition has been adapted, translated and edited in ten different languages (English, Spanish, Catalan, Galician, Euskera, French, Arabic, Italian, Portuguese and Greek) by the Mediterranean Diet Foundation in collaboration with some International Organizations (figure 7).

The future perspectives

The recognition on behalf of the UNESCO, with the consequent increased visibility and acceptance of Mediterranean diet around the world, along with better and more scientific evidence regarding its benefits and effectiveness on longevity, quality of life and disease prevention, make this dietary pattern experience an unprecedented historical moment. This is a favorable situation that could possibly enable the strengthening of the Mediterranean diet around the world, translating in improvements in health indicators around the world and in a reducing the environment impact by production and transportation of food resources. To this end, the Mediterranean diet should be seen as what it is: an extremely healthy and environmentally sustainable food model, as well as an ancient culture heritage that confers identity and belonging.

This food culture has three serious threats: 1) fast food american food culture based on meat, refined grains, potatoes, ice cream, candies and beverages high in sugar, 2) the economic crisis affecting in particular the most disadvantaged groups, and affecting key food groups of the

Figura 7. La nueva pirámide de la dieta mediterránea fruto del consenso internacional de la fundación dieta mediterránea



Mediterranean diet such as fruits, vegetables, virgin olive oil, nuts and fish, reducing their consumption, or inversely, refined grains or potatoes or and sugars, increasing their consumption, and 3) the promotion of high protein diets, also prescribed by doctors and specialists, as a tool for weight loss or maintenance, with a major impact on health.

The erosion that can cause these threats, especially economic, must be countered with actions based on nutritional education, with the commitment that neither cost nor unfounded food choices cannot and should not be a barrier to the availability of basic foods of the Mediterranean diet: olive oil, fruits, vegetables, grains, dairy, nuts or fish. Especially if governmental administrations do their part and do not compromise with inappropriate actions the work done by these productive sectors and, on the contrary, support and promote beneficial and cultural aspects of these foods from our geographical and cultural environment.

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Education and training in public health nutrition in Europe

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Abstract

Malnutrition in all its forms persists across Europe; the distribution of this burden is uneven. Historically major improvements in health in Europe occurred because of the organised efforts of society enshrined in a public health approach. The historical perspective and complex nature of current problems all point to the need for a renewed and refocused approach that is driven by public health. A well trained and supported public health nutrition workforce should be the cornerstone to the delivery of improved nutrition related health across Europe. A public health approach, based on prevention is the only sustainable long term way to reduce the burden of nutrition related public health problems. An individual treatment model will never be sufficient; a substantial shift of resources and support to prevention is urgently required. A well trained and well supported workforce is crucial; to date relatively little attention has been paid as to how this workforce is developed and supported.

There is now agreement about the roles this workforce should fulfil, and increasingly support for these roles. Universities need to ensure that the training they provide meets the demands for these competent professionals. Appropriate career structures need to be in place to ensure well trained people have careers and stay in the profession and have time and support to develop into future leaders. This continuity and sustainability is vital to achieving long term improvements in population health.

Key words

Public health nutrition, public health, nutrition, workforce, capacity, malnutrition.

Introduction

It is estimated that nearly half of all deaths world-wide can either directly or indirectly be attributed to poor nutrition (which includes diet and physical activity). Malnutrition in all its forms (under nutrition, over nutrition, specific vitamin and mineral deficiencies) is linked to morbidity and mortality for both non-communicable and also communicable diseases. In both low and middle income countries, as well higher income countries under and over nutrition co-exist; for example in South Africa there are nearly as many overweight and obese children as underweight and stunted children. In inner city areas of Southampton, UK, there are nearly as many underweight children as overweight

children. In most countries in Europe a growing minority of the elderly are undernourished. Low birth weight and poor child growth persist in many countries in Europe, or at least in vulnerable subgroups.

It is helpful to reflect on the changes that have occurred in Europe over the last 150 years. In the middle of the 19th century as rapid industrialisation drew people from rural areas to urban centres where there were jobs in the newly built factories, the quality of life for many was extremely poor- infant mortality rates were high and life expectancy was low. There was very poor sanitation and water quality, food was often adulterated and of poor quality and in big cities such as London alcoholism and prostitution were rife. In London the situation became so serious that the government was forced to act; sanitation was improved and laws were enacted to protect the public against food adulteration. By the turn of the 20th century health visitors and school meals were in place to ensure that young people were properly fed and looked after. Infant and other mortality rates began to fall, not because of medical treatments, but because of public health measures that improved the environments in which people lived and the quality of people's diets. Later clean air acts were put in place that reduced the terrible air pollution. In other words the major improvements to the health of the population were achieved by public health actions. Public health professionals were trained and funded to deliver and ensure this public health. The population supported the role of government in building and supporting this public health system; society agreed that there was a need for a collective sense of responsibility to ensure and maximise the health of the populace.

After the Second World War and the formation of the European Union (as it is now called) a major objective of the Union was to ensure that the people of Europe would never again be food insecure. The Common Agriculture policy (CAP) was developed to protect and ensure the supply of foods that were at the time considered essential. Today nearly half the EU budget is spent (€49.8 BILLION) on CAP. The drivers and concerns in the 1940s, where few were overweight and suffered from chronic diseases has changed dramatically. Yet the main policies supporting CAP have not changed accordingly. Today excess and unbalanced over consumption have led to high rates of overweight and obesity and related chronic diseases, with many of the main foods of concern still being subsidised by CAP. In addition, the model of economic development for Europe that has brought great benefits in terms of growth of GDP since the Second World War, has contributed to climate change and continued inequality. The way foods are produced and distributed contributes significantly to greenhouse gases and climate change- upwards of 20%.

Within most health budgets in most countries, the majority of expenditure is on treatment, not on prevention. Public health rarely gets more than 4% of any health budget, while governments pay lip service to the importance of a public health preventive approach. The historical perspective and complex nature of current problems all point to the need for a renewed and refocused approach that is driven by public health, where the State takes collective responsibility for ensuring a healthy environment. When UNICEF looked across Europe and other rich countries, they showed that coun-

tries that maintained a stronger community public health approach were more likely to have healthier and happy children. The United Kingdom, which from the 1980s moved away from the idea of collective public health, had the worst child health, and the greatest gaps in health between the rich and the poor- this gap has widened in the last twenty years even though the population average measure of wealth has increased.

The challenge that is relevant to this presentation is how to ensure that a population primary preventive approach continues, when many of the drivers that shape our health are pushing against this public health approach. Regulation and government intervention are strongly opposed by large food and beverage industries that argue that self- regulation and information is sufficient. But there is ample evidence that under the right circumstances fiscal policies and regulations are very effective. Progress on smoking control is one good example of such a public health approach. Developing and supporting a well trained workforce is crucial.

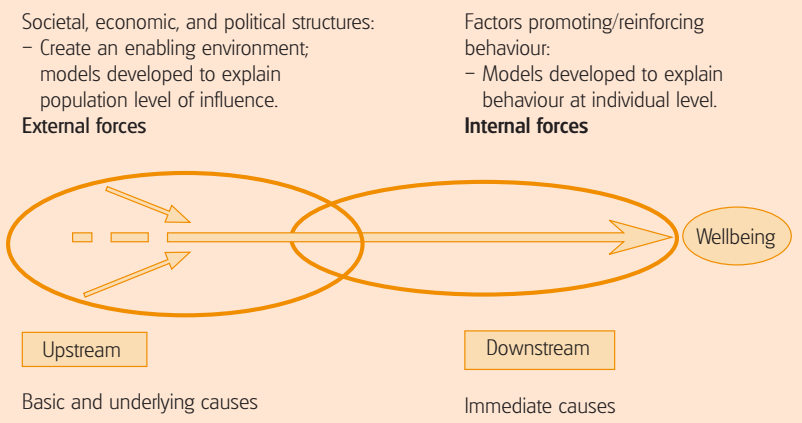
Nutrition in context

Poor nutrition rarely occurs in isolation from poor social, economic and public health inequalities, yet all too often the approach to addressing the major nutrition problems in a country focus on superficial informed choice models of intervention. Access to healthy food, care and education are basic human rights that should be met for all people. The assumption in these interventions is often that the reason people are eating poorly, or not being more physically active, or why young women are anaemic, is because they don't know what to do and all that is needed is more information. This may be true in some groups, at some times, but lack of knowledge is unlikely to be the main constraint to people eating more healthily or being more active. It is generally only the well and better educated that take any notice of nutrition information on food packaging. It seems that all too often the target group for an intervention, who are seen to have a problem, are rarely asked what they think the constraints are, or there is rarely a deeper exploration as to the real factors constraining behaviour. Where programmes have been successful they have spent time before rushing in to intervene in identifying the key constraint to achieving ideal behaviour, and worked with the target group to help them address that constraint. Instead of telling people to eat more healthily, it might be a lot more effective if we forced companies to make the food healthier. Even that would be unlikely to be sufficient, recent research shows that taxation and subsidy may be very effective in making the healthy choices more affordable.

To date, most of the health professionals that lead and are responsible for shaping these interventions are not appropriately trained and have a more individualised clinical model of delivery. It is becoming increasingly recognised across Europe that what is needed is a properly trained public health nutrition workforce to ensure that the approaches adopted address the major issues that are affecting the health of the population in the most effective way possible.

figure 1 summarises the interplay between upstream and downstream causes of poor nutrition. Constraints may operate at an internal or external level. It should be clear that the more external or upstream causes of problems, if addressed will be more likely to have greater impact on the health of the population, than a focus on those constraints operating at the more individual or family level. At whatever level the programmes aimed at addressing these constraints need to be developed based on evidence of effectiveness and after engagement with the target group or stakeholders that can shape the outcome.

Figure 1.



Most countries in Europe state that they have some policies or action plans or programmes in place to address their major nutrition related health problems (mainly the focus is on obesity), but few have properly implemented and evaluated these policies. Most reviews show that a lack of capacity is a major constraint to the effective implementation of policy.

Building the public health nutrition workforce in Europe

In order to build the workforce it is essential to know the roles and tasks that they will be required to fulfil. Workforce development has to equip people to fill these roles. It is also clear that there is not one role, but a number of roles and that the complexity and level of responsibility increases with experience and seniority. To develop and support competent practitioners it is important to match the level of training to the stage of development of the practitioner. If basic training in public health nutrition is at an undergraduate level, what is reasonable to expect the new graduate to be able to do; for postgraduate training the level of competence may be expected to be higher. But for practitioners to progress all need experience, they need to demonstrate that they can apply their knowledge and skills to perform the required functions. It is thus vital to be clear what these functions are, and how

competence can be demonstrated in practice. It is not sufficient for a professional to only know what to do in theory; they have to be able to do it in practice to a required standard.

In the broadest context the key roles are within a public health context, with a particular focus on nutrition issues; and nutrition here always includes both diet and physical activity. A public health approach focuses on the population and on health promotion and disease prevention (ideally ways to keep the population well). This approach is distinct from a clinical treatment model which focuses on the individual. The challenge in public health is to do what is best for the population which sometimes may be seen to be acting against what might be seen to be best for a few individuals. It is about making decisions that work best for the majority.

For public health the box below summarises the ten key areas for public health practice. These show that key areas cover broad issues about working with and for communities, collaborative working, and leadership, as well as the more technical areas of competence such as surveillance and assessment, and policy and strategy development.

Box 1. Ten Key Areas of Public Health Practice

- Surveillance and assessment of the population's health and wellbeing
- Promoting and protecting the population's health and wellbeing
- Developing quality and risk management within an evaluative culture
- Collaborative working for health
- Developing health programmes and services and reducing inequalities
- Policy and strategy development and implementation
- Working with and for communities
- Strategic leadership for health
- Research and development – knowledge to action.

These core public health areas have been drawn together and summarised for the core functions of a public health nutritionist:

- Research and analysis
  - Monitor, assess, and communicate population nutritional needs, issues and priorities
  - Develop and communicate intelligence about determinants of nutrition problems, policy impacts, intervention effectiveness and prioritisation through research and evaluation
- Build Capacity
  - Develop the various tiers of the public health nutrition workforce
  - Build community capacity and social capital to engage in, identify and build solutions to nutrition problems and issues.

- Build organisational capacity, inter-sectorial partnerships and systems to facilitate and coordinate effective public health nutrition action

– Intervention management

- Plan, develop, implement, and evaluate interventions that address the determinants of priority public health nutrition issues and problems
- Enhance and sustain population knowledge and awareness and awareness of healthful eating so that dietary choices are informed choices
- Advocate for food and nutrition related policy and government support to protect and promote health
- Promote equitable access to safe and healthy food so that healthy choices are easy choices.

The Education and training required to develop the above competencies needs to ensure the right perspective and approach to support interventions that address key constraints:

– Not just education and knowledge.

– Not just individual level of focus.

– Addressing wider social, economic and political factors, using a human rights based approach.

– Addressing basic and underlying (upstream) causes.

The education and training needs to be practically oriented where students get the opportunity to put the theory into practice. A key recommendation from the JobNut project was that the European Union should support internships so that students get work based experience in a supportive environment. Much of the training to date has focused too much on knowledge and not enough on the development of skills. Project planning and the development of effective interventions requires a logical and systematic approach, which starts from an analysis of the problems and environment and works towards practical implementation, and always builds in process and outcome evaluation. As in any profession reflection is critical.

A recent practical handbook in public health nutrition has listed the 12 golden rules of PHN practice:

1. Know and engage the community.

2. Seek first to understand and define the problem before acting.

3. Look upstream to determinants.

4. Recognise existing capacity and build on that.

5. Position activity within existing mandates for action.

6. Check what others have done and learnt, and use this intelligence.

7. Think first what can go wrong and manage the risks.

8. Pick the best options relative to context.

9. Use logic and plan.

10. Manage implementation that your strategies are delivered as planned.

11. Evaluate everything you do.

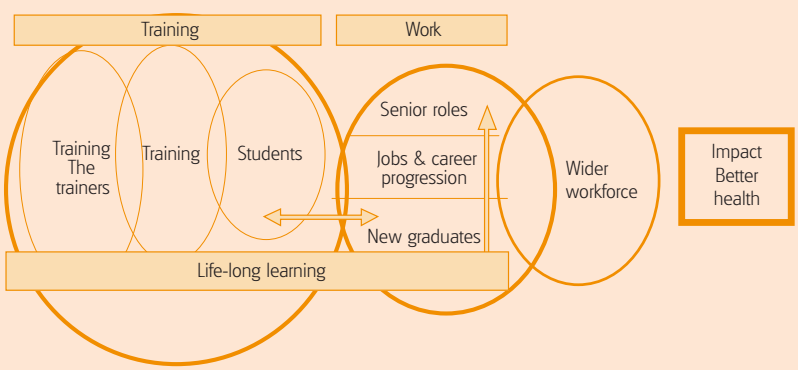
12. Share what you learn, particularly your mistakes.

How to build the capacity?

The current content of courses aimed at training public health nutritionist across Europe are not well matched to the areas considered core. It can not be assumed that the skills to develop and deliver public health nutrition training are available in all European universities. If the end product of training is a competent professional, the course content must be appropriate, and the staff providing the training must be suitable trained. In building the workforce a key step may be to train the trainers (figure 2) to ensure the quality of training. It is also clear that training does not stop with graduation, ongoing continuing or professional development is critical. It is also essential to ensure that there is appropriate work based support to help new graduates gain suitable experience as they develop their career and progress from new recruits to future leaders. Figure 2 highlights that a key role of the public health nutrition workforce is to build the capacity of the wider non-specialist public health nutritionist workforce. It will always be the case that the more hands on delivery of services will be by this wider workforce- and it is thus a key role of the public health nutritionist to ensure this service delivery is well supported, up-to-date, and following best practice.

A competent workforce will not be able to deliver improvements to public health unless the system and structure in which they work is also functioning properly. To deliver sustainable public health outcomes requires a structure built on the foundations of adequate resourcing, intelligence or evidence about the determinants and constraints and approaches to achieve actions; and leadership.

Figure 2.



The core strategic domains include: partnerships; organisational development; project management quality; workforce development; and community development. For many problems the solutions may lie within the community and engaging with and supporting community development are critical to improving public health.

To work people need jobs, and to justify employing public health nutritionists employers need to be able to show that having this workforce makes a difference. It's a cyclical process, well trained staff doing a good job shows the impact the workforce can make which supports more jobs which then leads to even more improvements. This practical demonstration of the difference a well trained workforce can make to the achievement of policy objectives and the delivery of programmes is vital.

Internationally the World Public Health Nutrition Association (www.wphna.org) is taking a leading role in developing the international workforce in public health nutrition. The plans are to develop an international certification system that can be used to assure quality and to protect and support professional standards.

Summary

It is important that we know what the causes of problems are, but this will never be sufficient to solve these problems. Scholarship and intelligence is also required to understand how best to develop programmes and interventions that are most likely to work in practice and to build in evaluation into the way these programmes are implemented. There are no shortages of polices and action statements; so far we have not been very successful at turning policy into action.

A well trained and supported public health nutrition workforce should be the cornerstone of the delivery of improved nutrition related health across Europe. A public health approach, based on prevention is the only sustainable long term way to reduce the burden of nutrition related public health problems. An individual treatment model will never be sufficient; a substantial shift of resources and support to prevention is urgently required. A well trained and well supported workforce is crucial; to date relatively little attention has been paid to how this workforce is developed and supported.

There is now agreement about the roles this workforce should fulfil, and increasingly support for these roles. Universities need to ensure that the training they provide meets the demands for these competent professionals. Appropriate career structures need to be in place to ensure well trained people have careers and stay in the profession and have time and support to develop into future leaders. This continuity and sustainability is vital to achieving the long term improvements in population health.

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HEPA promotion in Europe

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Abstract

The World Health Organisation (WHO) has recognised physical inactivity as a key risk factor in the prevention and control of chronic diseases, and encourages member states to include the promotion of physical activity in the national health policies. Physical activity recommendations summarise the evidence on how much and what kind of physical activity enhance health, and thus can inform promotional efforts.

The first evidence-based physical activity recommendations for health was published in 1995 and updated in the late 2010's. The most recent recommendations were issued by the U.S. Department of Health and Human Services and WHO. Children and youth are advised to do at least one hour of moderate- to vigorous-intensity physical activity every day. Adults and older adults are recommended to do a minimum of 150 minutes moderate-intensity or 75 minutes vigorous-intensity aerobic activity or their equivalent combination per week, and muscle-strengthening activities. There are recommendations also for people with disabilities and for pregnant and postpartum women.

Physical activity recommendations are not sufficient to increase physical activity levels of populations, but they form solid foundation for promotional policies, programmes, and interventions. WHO has provided guidance for population based approaches and for interventions to increase physical activity at national level. Majority of European countries have included physical activity in their national health policies. Three large-scale national physical activity promotion programmes and six national case studies of physical activity and sport promotion in children and adolescents have been documented and systematically assessed. A review of studies reporting interventions on diet and physical activity identified more than two hundred tried and tested interventions. Assessment of these promotional efforts provides information on the important elements of successful promotional approaches.

European countries are beginning to increasingly adopt the latest scientific knowledge in developing efforts to promote physical activity for public health, but there remains a need to adopt the newest physical activity recommendations nationally and to design national physical activity plans.

Key words

Health promotion, recommendation, policy, programme, intervention.

Background

The World Health Organisation's (WHO) Global Strategy on Diet Physical Activity and Health (WHO, 2004) is a landmark document in recognising physical inactivity as a key risk factor in the prevention and control of chronic diseases. It encourages the member states to place physical activity promotion in the national health promotion policies. To further support the member states in the implementation of the global strategy on national level the WHO provided guidance for population based approaches (WHO, 2007) and for interventions (WHO, 2009) to increase physical activity.

Evidence-based physical activity recommendations for health have been issued since 1995. New physical activity recommendations based on updated scientific evidence have been published in the late 2010's. As the recommendations summarise the existing scientific evidence on how much and what kind of physical activity is needed to enhance health, they should inform and guide physical activity promotion for public health. This has happened in a variety of ways globally and in Europe. Recently Oja et al. (2010) argued that a review of the current physical activity recommendations in Europe should be undertaken in view of the most recent evidence.

In this chapter we summarise the development of physical activity recommendations for health, and describe recent policy and programme development with particular focus on the European situation.

Physical activity recommendations

Physical activity recommendations are issued to summarise the evidence on the relationship between physical activity and health, to indicate the respective dose-response relations, and to recommend how much and what kind of physical activity enhances health.

The most widely known evidence-based physical activity recommendation for public health was issued in 1995 by the U.S. Centres for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) (Pate et al., 1995). It reads: "Every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week". This recommendation has been adopted worldwide and in many European countries.

Recently, two extensively documented evidence-based physical activity recommendations have been presented in the United States: the first by the American Heart Association (AHA) & ACSM (Haskell et al., 2007, Nelson et al., 2007) and the second by the US Department of Health and Human Services (US DHHS, 2008).

According to the 2007 AHA & ACSM recommendation (Haskell et al., 2007) all healthy adults need moderate-intensity aerobic physical activity for a minimum of 30 min on five days each week or vigorous-intensity aerobic activity for a minimum of 20 min on three days each week in order to promote and maintain their health (table 1). This recommendation also notes that combinations of moderate- and vigorous-intensity activity can be performed to meet the recommended activity level.

In addition, the recommendation includes guidelines for activities that increase or maintain musculo-skeletal health. The recommendation for older adults (Nelson et al., 2007) is similar to the adult recommendation with additional guidance for special activities for flexibility and balance.

The US DHHS 2008 recommendations (table 2) are based on an extensive review of literature (Physical Activity Guidelines Advisory Committee, 2008). The recommendations for adults and older

Table 1. ACSM & AHA recommendations (Haskell et al., 2007; Nelson et al., 2007)

TARGET GROUP: ADULTS (AGED 18-65)

RECOMMENDATION

Aerobic activity

All healthy adults need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on 3 days a week.

Also, combinations of moderate- and vigorous-intensity can be performed to meet this recommendation.

Moderate-intensity aerobic activity can be accumulated toward the 30-minutes minimum from bouts lasting 10 minutes or more.

NOTE: The recommended amount of aerobic activity is in addition to routine activities of daily life of light intensity or lasting less than 10 minutes in duration.

Muscle-strengthening activity

Adults will benefit from performing activities that maintain or increase muscular strength and endurance for a minimum of 2 days a week.

It is recommended that 8-10 exercises be performed on 2 or more non-consecutive days each week using the major muscle groups. To maximise strength development, a resistance should be used that allows 8-12 repetitions of each exercise resulting in volitional fatigue.

NOTE: Muscle-strengthening activities include a progressive weight-training program, weight-bearing callisthenics, stair climbing, and similar resistance exercises that use the major muscle groups.

TARGET GROUP: OLDER ADULTS (AGED 65+)

RECOMMENDATION

Aerobic activity

Same as for adults.

Muscle-strengthening activity

Same as for adults with the exception that the intensity should be moderate to high.

Flexibility activity

Older adults should perform activities that maintain or increase flexibility on at least 2 days each week for at least 10 minutes each day.

Balance exercise

Community-dwelling older adults with substantial risk of falls should perform exercises that maintain or improve balance.

NOTE: Participation in aerobic and muscle-strengthening activities above minimum recommended amounts provides additional health benefits and results in higher levels of fitness. Older adults should exceed the minimum recommended amounts of physical activity if they have no conditions that preclude higher amounts of physical activity.

Table 2. US Department of Health and Human Services' recommendations (US DHHS, 2008)

TARGET GROUP: CHILDREN AND ADOLESCENTS (AGED 6-17)

RECOMMENDATION

Children and adolescents should do 60 minutes (1 hour) or more of physical activity daily.

Aerobic

Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.

Muscle-strengthening

As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week.

Bone-strengthening

As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.

NOTE: It is important to encourage young people to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.

TARGET GROUP: ADULTS (AGED 18-64)

RECOMMENDATION

Adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes, and preferably, it should be spread throughout the week.

For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate-intensity, or 150 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in physical activity beyond this amount.

Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

NOTE: All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.

TARGET GROUP: OLDER ADULTS (AGED 65 AND OLDER)

RECOMMENDATION

The guidelines for older adults are the same as for adults regarding aerobic and muscle-strengthening activities.

In addition older adults should do exercises that maintain or improve balance if they are at risk of falling.

NOTE: When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.

All older adults should avoid inactivity. Some physical activity is better than none, and older adults who participate in any amount of physical activity gain some health benefits.

Continues

Table 2. Continuation

TARGET GROUP: WOMEN DURING PREGNANCY AND THE POSTPARTUM PERIOD)

RECOMMENDATION

Healthy women who are not already highly active or doing vigorous-intensity activity should get at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity per week during pregnancy and the postpartum period. Preferably, this activity should be spread throughout the week.

Pregnant women who habitually engage in vigorous-intensity aerobic activity or are highly active can continue physical activity during pregnancy and the postpartum period, provided that they remain healthy and discuss with their health-care provider how and when activity should be adjusted over time.

TARGET GROUP: ADULTS WITH DISABILITIES

RECOMMENDATION

Adults with disabilities, who are able to, should get at least 150 minutes per week (2 hours and 30 minutes) of moderate-intensity, or 75 minutes (1 hour and 15 minutes) per week of vigorous-intensity aerobic activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes, and preferably, it should be spread throughout the week.

They should also do muscle-strengthening activities of moderate or high intensity that involve all major muscle groups on 2 or more days per week as these activities provide additional health benefits.

NOTE: When adults with disabilities are not able to meet the guidelines, they should engage in regular physical activity according to their abilities and should avoid inactivity.

Adults with disabilities should consult their health-care providers about the amounts and types of physical activity that are appropriate for their abilities.

adults are in principal similar to the 2007 ACSM & AHA recommendations, but they recommend total weekly time (150 minutes) rather than the number of sessions per week (five times 30 minutes per week). The 2008 document includes also specific recommendations for young people, for people with disabilities and for pregnant and postpartum women. Accordingly, children and adolescents should do at least one hour physical activity every day, which should include moderate- and vigorous-intensity aerobic activities and muscle-strengthening and bone-strengthening activities. The recommendation for older adults is similar to the adult recommendation in regard to aerobic and muscle-strengthening activity and also includes activities for flexibility and balance. Also the recommendation for adults with disabilities follows largely the adult recommendation, but activities should be done according to people's abilities. Healthy pregnant and postpartum women are advised to engage in moderate-intensity physical activity according to the adult recommendation, and those who habitually engaged in vigorous-intensity activities can continue to do so during pregnancy and postpartum period with the support of their health-care provider.

As general principles the US DHHS 2008 recommendations state:

- Some activity is better than no activity.
- Many health benefits increase with the increase of the intensity, frequency and/or duration of activity.
- The health benefits of physical activity greatly outweighs the health risks.
- The health benefits of physical activity are largely independent of gender, race and ethnicity.

The U.S. 2008 recommendations were largely adopted by the World Health Organisation in its global physical activity recommendations published in 2010 (table 3). They include recommendations

Table 3. WHO global recommendations (WHO, 2010).

TARGET GROUP: CHILDREN AND YOUTH (AGED 5-17)
RECOMMENDATION
Accumulate at least 60 minutes of moderate-to vigorous-intensity physical activity daily. Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week..
IN ADDITION: Amounts of physical activity greater than 60 minutes provide additional health benefits.
TARGET GROUP: ADULTS (AGED 18-64)
RECOMMENDATION
At least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity. Aerobic activity should be performed in bouts of at least 10 minutes duration.
Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.
IN ADDITION: For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity.
TARGET GROUP: OLDER ADULTS (AGED 65 AND OLDER)
RECOMMENDATION
The recommendation for aerobic and muscle-strengthening activities is the same as for adults.
In addition older adults with poor mobility should perform physical activity to enhance balance and prevent falls on 3 or more days per week.
.Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.
IN ADDITION: When older adults cannot do the recommended amounts of physical activity due to health conditions, they should be as physically active as their abilities and conditions allow.

for children and youth, adults and older adults. Children and youth are advised to do at least one hour of moderate- to vigorous-intensity physical activity every day. This should be mostly aerobic, but it should include also muscle- and bone-strengthening activities. Adults are recommended to do a minimum of 150 minutes moderate-intensity or 75 minutes vigorous-intensity aerobic activity or their equivalent combination per week, and in addition muscle-strengthening activities on at least two days a week. For additional health benefits double the amount of weekly activity is recommended. The recommendation for older adults is the same as for adults with regard to aerobic and muscle-strengthening activities. Older adults with poor mobility should also do activities that enhance balance and prevent falls.

The more recent recommendations do not refute the 1995 recommendation, but they include new specifications as well as several new elements compared to the 1995 recommendation. The most notable new elements are the new target groups and the inclusion of vigorous-intensity activities and activities for muscle strength, flexibility, and bone health. Another difference is that the latest recommendations are based on the total weekly activity time rather than number of sessions per week, although the new recommendations advise spreading the activity throughout the week. It can be said that while the 1995 recommendation introduced life-style activities as health-enhancing physical activity, the latest recommendations, by the inclusion of vigorous-intensity activities, also acknowledge the potential of sportive activities to contribute to public health.

As evidence on the health benefits of physical activity continues to accumulate, recommendations need to be refined accordingly. Outcome-specific dose-response evidence will allow for outcome-specific recommendations. With greater participation especially in more strenuous activities the issue of the health risks and their prevention becomes increasingly important. The growing evidence base on the negative health effects from lack of physical activity, which may be independent of physical activity, is also likely to provide sufficient knowledge for the provision of recommendations on physical inactivity.

Physical activity recommendations as such are not sufficient to increase physical activity levels of populations (Troiano & Haskell, 2010). However, as the recommendations provide evidence-based summary of the health benefits of physical activity, they form solid foundation for promotional policies and interventions as well as metrics for monitoring physical activity levels of populations.

Based on their latest physical activity recommendations the U.S. Government has issued a national plan for how to move from recommendations to action. Also several European countries are in the process of establishing national recommendations followed by a respective action plan. Most recently Finland (Fogelholm et al., 2005) and Austria (Titze et al., 2010) have issued national physical activity recommendations, based on the latest scientific evidence. The United Kingdom is in the process of issuing their national recommendations, and at least Sweden is preparing to develop their own recommendations.

Policy development

The WHO's guide for population-based approach to physical activity (WHO, 2007) is meant to assist the member states and other stakeholders in the development and implementation of a national physical activity plan and provide guidance on policy options for effective promotion of physical activity at the national regional and local level. The guide lists the following elements to be important for successful policies and plans: high-level political commitment, integration in national policies, identification of national goals and objectives, overall health goals, specific objectives, funding, support from stakeholders, cultural sensitivity, integration of physical activity within other related sectors, multi-sectorial coordination, multiple intervention strategies, targeting whole populations as well as specific population groups, clear identity, implementation at different levels within the local setting, leadership and workforce development, dissemination, and monitoring and evaluation. This guide further provides a stepwise framework for planning and implementation and examples of areas for action.

Another guidebook by WHO Europe presented a European framework for the promotion of physical activity (WHO Europe, 2007). It was targeted to policy makers and experts in member states to design and implement physical activity-promoting policy and action as part of national public health agenda and through multi-sectorial cooperation. The document includes sections on the challenge, guiding principles for action, guidelines for action, and on setting goals and measuring success.

HEPA Europe, the European network for the promotion of health-enhancing physical activity, conducted in close collaboration with the WHO Regional Office for Europe an analysis of national policy documents on the promotion of physical activity (Daugbjerg et al., 2009). Forty-nine national policy documents were identified. The policies addressed important project elements such as goals, implementation, timeframe, responsible body and evaluation, but there was limited consideration for inter-sectorial collaboration and targeting groups most in need for increased physical activity.

Programmes and interventions

In addition to global, European and national physical activity policy development, evidence and experiences on physical activity programmes and other interventions are increasing.

Cavill et al. (2006) illustrated a theory-based promotional approach by analysing national physical activity promotion programmes from Finland, England, and Switzerland. The general approach was based on four tasks: (1) using the evidence for the health benefits of physical activity to make the case and increase action by policy makers, (2) conducting surveillance to collect evidence on the prevalence of physical activity, (3) reviewing evidence on 'what works' in increasing physical activity and influencing practice, and (4) evaluating practice. The analysis showed clear differences in how the four tasks were undertaken in these countries and demonstrated how cultural and political factors strongly influence the promotional efforts.

Another HEPA Europe project analysed different approaches to physical activity and sport promotion in children and adolescents using case studies from six European countries (Kelly at al., 2009). The case projects came from the Netherlands, Sweden, Germany, Spain, Finland and Switzerland. The analysis was aimed at discovering the experiences and lessons learned from implementing a physical activity promotion project. According to the analysis the following project elements were identified as important:

- Allowing enough time for project planning and development, utilizing formative evaluation and stakeholder piloting and testing.
- Involving parents and teachers in the design, recruitment and delivery of a project is crucial.
- Short event type sub-project provides flexibility and the possibility to tailor approaches to different target audiences.
- Continuing reaching the active should be considered a success but to reach the inactive may need tailored approaches.
- Drop out from sports often seen in adolescence may be due to pressures from the sport community associated with performance related goals over participation for all objectives.
- The internet is emerging as an important tool for such projects, both to engage children and adolescents and to support and communicate with implementers, teachers and parents.
- Schools are a good setting to reach many targets and certain sub groups; sports clubs have the resources and facilities to offer a wide range of activities.
- Evaluation of projects is improving, but it is important to continue to understand target groups needs and inform refinements and improvements for future work.

An extensive review by WHO (2009) identified 395 published studies reporting 261 interventions on diet and physical activity. The evidence was presented under eight categories: (1) policy and environment, (2) mass media, (3) school setting, (4) the workplace, (5) the community, (6) primary health care, (7) older adults, (8) religious settings. Multi-component interventions that are adapted to the local context were found to be the most successful. Interventions that used the existing social structures of a community, such as schools or the weekly meetings of older adults, reduced barriers to implementation. Effective interventions invariably involved participants in the planning and implementation stages. This review provides an up-to-date summary of findings from tried and tested diet and physical activity interventions that aim to reduce the risk of chronic non-communicable diseases.

Summary and conclusions

Physical activity guidelines and recommendations have evolved from earlier fitness- and individual-oriented exercise prescriptions to public health-oriented recommendations. The new recommendations, started by the CDC & ACSM recommendation in 1995 (Pate et al., 1995), considered all physi-

cal activity, whether at work or home, or during leisure or transport, to be potentially health-enhancing. The 1995 recommendation emphasised daily or almost daily moderate-intensity activity, such as walking, cycling and gardening, and targeted primarily adult populations. Based on new evidence, more recent recommendations emphasise the total weekly activity and include wider spectrum of activities with regard to the type and intensity. Thus activities for muscle and bone strength and flexibility, and vigorous-intensity activities are also recommended. The newer recommendations consider also more target groups in order to provide guidance to the whole population.

The WHO and WHO Europe have published guidelines to assist the member states and other stakeholders in the development and implementation of national physical activity plan and to provide guidance on policy options for effective promotion of physical activity at national and sub-national level. Most European countries have integrated the promotion of physical activity at least to some extent in their national health policies. However, there is a need to continue to update the policies both methodologically and substantially. Three national physical activity programmes for adults and six programmes for children and adolescents have been systematically analysed. They illustrate the importance of the cultural and political environment in the planning and implementation of such programmes as well as the strengths and weaknesses of them. An extensive review commissioned by the WHO identified and assessed over 200 published interventions on diet and physical activity for the prevention of non-communicable diseases. The interventions targeted different policy areas, settings and population groups. Elements of successful interventions were identified.

A number of evidence-based physical activity recommendations and policy development guidelines are available to support the design and implementation of physical activity policies, programmes and interventions to promote public health. Leading physical activity recommendations have been issued by U.S. experts and authorities and policy guidelines have been developed by the World Health Organisation. While there has been diffusion of this information to national scenes globally and in Europe, this has taken place in rather spontaneous and unorganised way. Although the European countries are beginning to increasingly adopt the latest scientific knowledge in developing efforts to promote physical activity for public health, there remains a need to adopt the newest recommendations nationally and to design national physical activity plans.

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