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DIET, PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOURS: ANALYSIS OF TRENDS, INEQUALITIES AND CLUSTERING IN SELECTED OECD COUNTRIES

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Abstract

Prevalence of non-communicable diseases has increased in past decades in the OECD. These conditions have many risk factors, including poor quality diet, insufficient physical activity, and excess sedentarism. These behaviours are also at the root of overweight and obesity, which are themselves risk factors leading to non-communicable diseases. Using the most recent data available from individual-level national health surveys and health interviews, this paper paints a picture of the situation in terms of diet and physical activity in eleven OECD countries.

Fruit and vegetable consumption remains low in all countries, as daily consumption of five fruit and vegetables per day rarely reaches 40%; diet quality can also be improved, although it is higher in some countries. Physical activity levels are more encouraging, with over 50% of the population reporting to reach the World Health Organization target in all countries, and excess sedentarism is high in two of the seven countries studied. Disparities by level of education and socio-economic status are visible for all health behaviours: overall, those with higher socio-economic characteristics consume a healthier diet and are more physically active, but also more sedentary. Inequalities and gender gaps vary by country and by health indicator. A latent class analysis was run to classify individuals into different groups, depending on their various health behaviours (adherence to national diet guidelines, sufficient physical activity, and low sedentarism). This approach demonstrated that these behaviours are linked, and allowed to determine the traits (demographic, health) of individuals in each class. This analysis allows policy-makers to specifically target these populations with interventions aiming to improve their health. Globally, men with higher socio-economic characteristics were more likely to be in the groups displaying less healthy behaviours.

Résumé

La prévalence de maladies non transmissibles augmente depuis plusieurs décennies dans l'OCDE. Ces affections ont de nombreux facteurs de risque, dont la mauvaise alimentation, l'activité physique insuffisante, et la sédentarité excessive. Ces comportements sont également à la source de l'obésité et du surpoids, eux-mêmes facteurs de risque menant à de nombreuses maladies non-transmissibles. À l'aide des données individuelles issues d'enquêtes de santé nationales les plus récentes, ce papier détaille la situation en termes d'alimentation et d'activité physique dans onze pays de l'OCDE.

La consommation de fruits et légumes reste basse dans l'ensemble des pays (la consommation de cinq fruits et légumes par jours atteint rarement les 40%), et la qualité de l'alimentation peut également être améliorée, bien qu'elle reste bonne dans certains pays. Les niveaux d'activité physique sont plus encourageants (plus de 50% de la population signale atteindre les recommendations de l'Organisation Mondiale de la Santé dans l'ensemble des pays) et la sédentarité excessive est élevée dans deux des sept pays étudiés. On observe des disparités par niveau d'éducation et par statut socio-économique pour tous les comportements : globalement, les personnes avec des caractéristiques socio-économiques plus élevées mangent plus sainement et font plus d'activité physique, mais sont également plus sédentaires. Les inégalités ainsi que les écarts hommes-femmes varient par pays et par indicateur. Une analyse en classes latentes a permis de classer les individus dans différents groupes, selon leurs comportements de santé (suivi des recommandations en termes d'alimentation, d'activité physique, et de sédentarité). Cette analyse a démontré que ces comportements sont liés, et de déterminer les attributs (démographiques et de santé) des personnes appartenant à chaque classe. Cette analyse permet aux décideurs politiques de cibler ces populations spécifiques avec des interventions dans le but d'améliorer leur santé. De manière générale, les hommes avec des caractéristiques socio-économiques plus élevées ont plus de chances d'être dans les classes présentant les comportements les moins sains.

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Abbreviations

ABIC: Adjusted BIC

AIC: Akaike Information Criterion

AII: Absolute Index of Inequality

BIC: Bayesian Information Criterion

BMI: Body Mass Index

CAIC: Consistent AIC

ENSANUT: Encuesta Nacional de Salud y Nutrición

FAO: Food and Agriculture Organization

FV: Fruit and Vegetables

GPAQ: General Physical Activity Questionnaire

HFI: Healthy Food Index

IPAQ: International Physical Activity Questionnaire

KNHANES: Korea National Health And Nutrition Examination Survey

LCA: Latent Class Analysis

MDS: Mediterranean Diet Score

NCD: Non-Communicable Disease

NHANES: National Health And Nutrition Examination Survey

OR: Odds-Ratio

PA: Physical Activity

RII: Relative Index of Inequality

RRR: Relative Risk Ratio

SB: Sedentary Behaviour

SES: Socio-Economic Status

STEPs: STEPwise approach to Surveillance

WHO: World Health Organization

1. Introduction

1.1. Understanding how different health behaviours occur and correlate

1. The OECD undertook a detailed analysis of individual-level health data, extracted from health interview and health examination surveys, with the aim of exploring recent trends in physical activity, sedentary behaviour, and diet, as well as the demographic determinants associated with these behaviours, in eleven OECD countries. Beyond identifying the current prevalence of healthy and unhealthy behaviours relating to physical activity, sedentarism and diet, associations between these behaviours and other demographic or health factors were established, and the inequalities in terms of education and socio-economic status were studied.

2. A latent class analysis was carried out, with the objective of classifying individuals into groups based on their health behaviours (diet, physical activity, and sedentarism). The results can be used by policymakers, as they provide information on which sub-populations should be targeted by prevention policies.

3. The first part of the paper will focus on the data sources and methods used throughout the analysis, while the second part will provide the results of the descriptive statistics, inequality analyses, regressions, and latent class analyses. The discussion will articulate the strengths and weaknesses of this study, as well as some policy-making guidance emanating from the results of the analyses.

1.2. Unhealthy diet and lack of physical activity are key drivers of major chronic diseases

4. Over the past decades, non-communicable diseases (NCDs) have become a major burden worldwide and throughout the OECD (OECD, 2015[1]; Sassi, 2010[2]). Prevalence of diabetes, cardio-vascular disease, and other chronic diseases has increased significantly. Meanwhile, diet quality has deteriorated, and physical activity has not risen, despite an increasing amount of public policies (OECD, 2017[3]; OECD/EU, 2016[4]).

5. Lack of physical activity (PA), high amounts of sedentary behaviour (SB), and low quality diet are well-known key risk factors for NCDs (Booth, Roberts and Laye, 2012[5]; Forouzanfar et al., 2016[6]). Dietary risks and low PA were directly linked to over 13 million deaths worldwide in 2015 (Forouzanfar et al., 2016[6]). Healthy dietary choices and physical activity have all been proven to be effective in the prevention and treatment of NCDs (WHO, 2003[7]).

6. Insufficient physical activity correlates with many cardio-vascular diseases, as well as diabetes mellitus and certain types of cancer (Lee et al., 2012[8]). The relationship between PA and occurrence of coronary heart disease has been shown to be negative for levels above the minimum energy expenditure (Reiner et al., 2013[9]): the higher the level of physical activity, the lower the chance of coronary heart disease. The relationship between energy expenditure and incidence of stroke forms a U-shaped pattern, with levels of physical activity at both extremes increasing the incidence of stroke. Studies also show a negative relation between physical activity and the risk of type 2 diabetes mellitus,

although level of obesity and physical fitness also influence the relationship. High levels of physical activity have been found to have a protective effect on many types of cancers, including neoplasms of the breast, colon, endometrial and prostate (Leitzmann et al., 2015[10]). Finally, there exists a J-shaped curve where physical inactivity and extreme physical inactivity increase the risk of upper respiratory tract infections (Booth, Roberts and Laye, 2012[5]). Low physical activity lead to over 1.6 million deaths in 2015, an increase of 7% since 2005 (Forouzanfar et al., 2016[6]). It caused heart diseases (1.2 million), diabetes mellitus (250,000), and cancers (170,000).

7. Unhealthy dietary behaviours, such as consuming diets low in fruit or high in sodium, are also associated with cardio-vascular diseases, cancers, and other chronic diseases. The relationship between sodium excretion and death/cardiovascular outcomes has been shown to be J-shaped (O'Donnell et al., 2014[11]). An inverse association has been shown between the intake of different fruit and vegetables and cardiovascular disease and mortality. Reductions for these two outcomes were observed up to an intake of 800 grams per day of fruit and vegetables combined, while risk reductions for overall cancer were observed up to 600 grams of fruit and vegetables per day. These two thresholds go beyond the well-known "five a day" (Aune et al., 2017[12]). Diets high in sodium caused over 4 million deaths in 2015, through strokes, other heart diseases, and kidney diseases. Diets low in fruit lead to 2.9 million deaths in 2015 (Forouzanfar et al., 2016[6]), an increase of 7.8% since 2005, through cancers and heart diseases. These results support public health recommendations to increase fruit and vegetable intake for the prevention of cardiovascular disease, cancer, and premature mortality.

8. In fact, lack of PA, excess sedentarism, and unhealthy diets have a dual effect. In addition to being key risk factors for NCDs, they are also key risk factors for obesity (WHO, 2016[13]; Swinburn et al., 2004[14]) which in turn can lead to NCDs. In 2015, high body mass index (BMI) led to nearly 4 million deaths worldwide. In 2013, 53.8% of adults in the OECD were overweight or obese, while 19.0% were obese (OECD, 2015[1]). Rates have increased immensely over the past 50 years, and continue to do so. Projections show that levels are not expected to decrease in the coming years (OECD, 2017[3]). This double pathway to NCDs makes prevention of these risk factors all the more crucial.

9. Changing environments have been major contributors to the obesity epidemic. Food systems have evolved, with the introduction of mass-produced food, and an increase of food availability and ultra-processed goods (Sassi, 2010[2]; Vandevijvere et al., 2015[15]). Increasing food energy supply levels are shown to be associated with an increase in average body weight, especially in high income countries (Vandevijvere et al., 2015[15]). Furthermore, the substitution of active transport such as walking and cycling with motorized transportation, as well as the evolution of jobs, have led to a decrease in daily physical activity. The drop in daily occupation-related energy expenditure has contributed to a significant portion of the increase in mean body weight for men and women in the United States (Church et al., 2011[16]). A study also showed that 60 minutes of moderate-to-vigorous intensity physical activity daily resulted in significant weight and fat loss over 12 months in sedentary individuals. Physical activity can prevent but also reverse high BMI.

10. Previous work by the OECD has identified policy priorities and the most effective ways to tackle obesity. Tackling major risk factors or chronic diseases requires more than a single preventive intervention: fundamental change can only occur through wide-ranging strategies which address multiple determinants of health (such as diet and physical activity) (Cecchini et al., 2010[17]; Sassi et al., 2009[18]). Prevention policies with

the most attractive cost-effectiveness profile are those which reach the largest amount of individuals, but health systems can also have a strong impact by focusing on those at high risk (at a higher cost, though). Indeed, cost-effectiveness of a preventive measure is typically improved by targeting a high-risk population (Cohen, Neumann and Weinstein, 2008[19]). This increases the proportion of individuals who benefit and therefore the health benefits gained per unit of money spent. For instance, adult obesity screening followed by lifestyle counselling, medication or surgery, in those who are morbidly obese, has been shown to be cost-effective.

11. Policies must be tailored to fit the needs of specific groups of people, to target multiple specific behaviours which may vary across the population. These behaviours as well as the sub-populations which exhibit these behaviours may be country-dependent, therefore requiring different policies for different countries. The following paper aims to identify these different groups, and the characteristics which define them.

2. Data and methods

2.1. Data sources

12. The analyses undertaken in the following paper are based on micro-level data. The OECD obtained access to national health interview and health examination survey data from eleven OECD countries: Australia, Canada, Chile, England, France, Hungary, Italy, Korea, Mexico, Spain and the United States. These countries provide a large geographical range, as well as different population characteristics. The Australian database was accessed remotely, while all other databases were analysed directly. Details on databases and variables used can be found in Annex A.

13. The data for Australia is drawn from the National Health Survey (NHS), and covers 2001, 2004, 2007 and 2011. It contains data on 88,579 individuals. The Canadian dataset includes a total of 922,251 individuals, and includes survey years 1994, 2001, 2003, 2005, 2007, 2009, 2011 and 2013. The data for 1994 is drawn from the National Populations Health Survey (NPHS), while the data for other years is from the Canadian Community Health Survey (CCHS). The dataset for Chile contains data for 2003 and 2009, from the Encuesta Nacional de Salud (ENS), and a total of 8,910 individuals. The database for England is made up of the annual Health Survey for England (1991 to 2014), and includes 348,888 observations. Sixteen editions of the French survey Enquête Santé et Protection Sociale were used (1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2002, 2004, 2006, 2008, 2010, and 2012). The dataset is comprised of 216,103 observations. Two editions of the Hungarian National Diet and Nutritional Status Survey were analysed (2009 and 2014), with a total of 1,988 individuals. Italian data was obtained from the Aspetti della Vita Quotidiana survey, for years 1998 to 2014 (2004 excluded), and encompasses 804,288 individuals. The database for Korea includes data from the Korea National Health And Nutrition Examination Survey (KNHANES) for 1998, 2001, 2005, 2009 and 2014, and contains 128,539 observations. Mexican data is from the Encuesta Nacional de Salud (ENSA) 2000, as well as the Encuesta Nacional de Salud y Nutrición (ENSANUT) 2006 and ENSANUT 2012 surveys. The database contains 600,723 observations. For Spain, eight waves of the Encuesta Nacional de Salud

(1987, 1993, 1995, 1997, 2001, 2003, 2006 and 2011) were used, as well as one wave of the Encuesta Europea de Salud (2014). It amounts to a total of 245,403 individuals. Finally, the American database encompasses eight waves of the NHANES (1999 to 2013, every two years), with a total of 153,980 observations.

The analyses were led using self-reported data on dietary behaviours, physical activity, and sedentary behaviour (see Annex A). This is addressed in the .

14. Discussion (paragraphs 126 and 127). The data collection differs by survey, as different countries use different measurements and thresholds, depending on national guidelines and targets. For instance, different food consumptions were surveyed and physical activity was assessed in different ways. Socio-economic status as well as education were measured differently depending on the country, based on national and cultural differences. Variables were made as comparable as possible for the analyses, but these survey differences must be kept in mind when interpreting results.

15. Dietary data were surveyed either through a 24-hour recall (Korea and the United States) or food frequency questionnaires (Chile, England, Italy, Mexico and Spain). The 24-hour recall allows to record precise data on types and amounts of food consumed, and from them extract daily nutrient intakes. The food frequency questionnaire assesses the frequency with which different foods are consumed, on a daily, weekly or monthly basis. The foods included in the questionnaires differ by country surveyed.

16. The physical activity questionnaires used in the different surveys resemble the General Physical Activity Questionnaire (GPAQ) (WHO), which was used for the NHANES, or the International Physical Activity Questionnaire (IPAQ) (IPAQ, 2005[20]). The GPAQ was developed by the World Health Organization (WHO), and is part of the STEPwise approach to Surveillance (STEPS). STEPS is a standardized method for collecting, analysing and disseminating data in WHO member countries. The questionnaire covers physical activity participation in three domains: PA at work, PA while travelling to and from places, and PA as part of recreational activities. The IPAQ was developed by the IPAQ group, and exists as either short form or long form. It assesses physical activity undertaken across four domains (leisure, domestic and gardening, work-related, and transport-related), and different intensities (vigorous, moderate, and walking). The short form questionnaire surveys overall PA, without breaking it down into the four domains, while the long form questionnaire provides the specific amount of PA by intensity and category. The health surveys used for our analysis differ in the methods of collection of PA data, as the questions included were more or less specific depending on the country. Sedentary behaviour was surveyed similarly across all surveys, by asking the length of daily sedentarism, either on a “usual day” or “usual work day”.

2.2. Analytical methods

17. The analyses were run on four diet and physical activity indicators: consumption of five fruit and vegetables per day, diet score, adherence to the WHO recommendations for PA, and daily sedentarism. Age-standardized prevalence and relative and absolute inequalities, binary and multinomial logistic regressions, as well as a latent class analysis were carried out to assess trends in health behaviours. The analyses were run using Stata/MP 14.1, except for Australia where Stata 10 was used.

2.2.1. Diet quality

18. Diet quality was assessed through two indicators: consumption of five fruit and vegetables per day, and diet scores.

19. Consumption of five fruit and vegetables per day was studied in all countries. In Australia, Canada, Chile, England, France, Italy, Spain and Mexico, the survey data contained either the amount of fruit and vegetables consumed per day, or a variable indicating whether individuals consumed at least five fruit and vegetables per day. In Hungary, Korea and the United States, this information was unavailable, but daily intake of fibre was included (dietary fibre in Hungary and the United States, crude fibre in Korea). Therefore, the number of fruit and vegetables per day was computed based on daily dietary fibre intake. The WHO recommends at least 27g of dietary fibre per day (Nishida et al., 2004[21]). This amount was divided by 5 to so as to correspond to five fruit and vegetables per day. It was subsequently assumed that one portion of fruit and vegetables was equivalent to 5.5 grams of fibre. In Korea, only daily crude fibre intake was included in the data, as opposed to dietary fibre intake. There is no definitive method to convert crude fibre into dietary fibre, although foods generally contain more dietary fibre than crude fibre (Subcommittee on the Tenth Edition of the RDAs et al., 1989[22]). To obtain the equivalent daily dietary fibre intake, we therefore replicated the study performed by Bright-See and McKeown-Eyssen (1984[23]), using the most recent food availability data from the Food and Agriculture Organization (FAO) (FAO, 2017[24]). The resulting value of 5.03 compares well with those obtained for the Asian countries included in the paper.

To further assess diet quality in the different countries studied, diet scores were constructed based on existing literature. Three different scores were used, which were chosen depending on the information available in each country database (Table 1). The methods of calculation for each score will be described in paragraphs 21 to 28, and the comparability of the different diet scores will be addressed in the .

20. Discussion (paragraph 128).

Table 1. Diet scores

Nutrient-based diet score	Mediterranean Diet Score	Healthy Food Index
Korea United States	Chile Italy Spain Mexico	England

Note: The diet score used for each country was chosen based on the information available in each national health survey. Methods of calculation for each score are described in paragraphs 21 to 28
Source: Authors' analysis of national health survey data

21. The diet score used for Korea and the United States is based on the methodology developed by Murphy et al. (1996[25]). The score is constructed using a 24-hour recall, and is based on the daily intake of vitamin A, vitamin C, vitamin B1, vitamin B2, niacin, iron, protein and calcium. Following Murphy et al. (1996[25]) each of the eight nutrients is assumed to be sufficiently consumed if intake is at least 67% of the recommended daily allowance, and insufficiently consumed if intake is below 67% of recommended daily

allowance. Diet is deemed unhealthy if five or more of the eight nutrients are insufficiently consumed, and healthy if fewer than five nutrients are insufficiently consumed.

22. In the United States survey, two 24-hour dietary recalls were led two days in a row (data from the first day were used), and the Dietary Reference Intakes (DRIs) (Institute of Medecine, 2011[26]) from 2011 were used as a reference for sufficient intake of nutrients. In Korea, only one dietary recall was led, and the Korean Reference Dietary Intakes (KRDIs) (The Korean Nutrition Society, 2010[27]) from 2010 were used. The dietary reference intakes in both countries are gender- and age-specific.

23. In Chile, Italy, Spain, and Mexico, diet quality was assessed using the Mediterranean Diet Score (MDS) derived from Pitsavos et al. (2005[28]). The items used to construct the score are divided into "beneficial" and "detrimental" categories (as coined by Trichopoulou et al. (2003[29]). The beneficial items are those suggested on a daily basis or at least five times per week, and include fruit, vegetables, non-refined cereals, pulses, fish, potatoes and olive oil (Table 2). The detrimental items are those presumed to not be a part of the Mediterranean dietary pattern, and include meat and meat products, poultry, and high fat dairy. Wine is also included in the original score.

Table 2. Items included in the Mediterranean Diet Score

Beneficial	Detrimental	Other
Fruit	Meat and meat products	Wine
Vegetables	Poultry	
Non-refined cereals	High fat dairy	
Pulses		
Fish		
Potatoes		
Olive oil		

Source: Trichopoulou et al. (2003[29]), Pitsavos et al . (2005[28]).

24. Because different surveys include different foods consumed, the items used for the construction of the score vary by country (Table 3)

Table 3. Items used to compute the Mediterranean Diet Score in each country

		Chile	Italy	Spain	Mexico
BENEFICIAL	Fruit	X	X	X	X
	Vegetables	X	X	X	X
	Non-refined cereals	X		X (includes all types of cereals)	X (includes all types of cereals)
	Pulses		X	X	X
	Fish	X	X	X	X
	Potatoes		X		X
	Olive oil				
DETRIMENTAL	Meat and meat products		X	X	X
	Poultry		X		X
	High fat dairy	X (includes all types of dairy)	X (includes all types of dairy)	X (includes all types of dairy)	X (includes all types of dairy)
	Wine				

Note: Different variations of the Mediterranean Diet Score had to be calculated across countries as different surveys include different food items.

25. For all countries, neither daily wine consumption nor olive oil consumption were included in our study. Furthermore, only overall dairy consumption, without a "high fat" distinction, was included in the data. In Chile, potatoes, pulses, meat and meat products, and poultry were unavailable. In Italy, non-refined cereal consumption was unavailable. In Spain and Mexico, non-refined cereals included all types of cereal consumed (refined and non-refined). The data for Spain also excluded poultry and potatoes. Points were assigned for monthly consumption of each food item, depending on its category (Table 4). The final score is calculated by summing all individual food scores.

Table 4. Construction of the Mediterranean Diet Score

	Beneficial	Detrimental
No consumption	0	5
1-4 times/month	1	4
5-8 times/month	2	3
9-12 times/month	3	2
13-18 times/month	4	1
>18 times/month	5	0

Note: A score of 0-5 is given for each food item reported in table 3, depending on category (beneficial or detrimental), and frequency of consumption. The Mediterranean Diet Score is computed by adding up all individual food scores. A higher score signifies a better quality diet.
Source: Pitsavos et al. (2005[28]).

26. The data used contained daily or weekly rather than monthly consumption; therefore the score was adjusted accordingly. Scores range from 0 to 19 in Chile, 0 to 33

in Italy, 0 to 28 in Spain, and 0 to 45 in Mexico. The construction of the MDS in the four different countries is available in Annex B. The higher the score, the healthier the diet.

27. In England, the diet score used is the Healthy Food Index (HFI) (Osler et al., 2001[30]). The exact variables used for the original score were not available in the HSE databases, so the criteria were slightly modified to fit our data. The score was calculated according to Table 5; one point was given for each behaviour in accordance with the four statements.

Table 5. Items included in the Healthy Food Index

Original score	Modified score
No daily consumption of butter, margarine or lard	Usual spread consumed is not margarine or butter
Daily consumption of coarse white or coarse rye bread	Usual bread consumed is wholegrain/soft grain/ brown/granary/wheatmeal/wheatgerm
Daily consumption of fruit	Daily consumption of fruit
Daily consumption of vegetables	Daily consumption of vegetables

Note: The criteria in the “Original score” column were changed to those in the “Modified score” column, to fit the data. One point is given for each criteria met by the individual. A higher score indicates a better quality diet.
Source: Osler et al. (2001[30]).

28. The score ranges from 0 (worst quality diet) to 3 (highest quality diet).

The nutrient-based score, the Mediterranean Diet Score, and the Healthy Food Index were used to assess diet quality in each country. The comparability of the different diet scores is reviewed in the .

29. Discussion (paragraph 128) .

30. The diet scores in Chile, England, Italy, Spain and Mexico are not binary, which is a requirement for some of the later analyses (inequalities, logistic regressions). Therefore, the multinomial scores were transformed into dichotomous variables based on the gender-specific averages, as the descriptive statistics showed statistically significant gender disparities in diet quality. For instance, in Chile the gender-based average was 11, for both men and women. Therefore, individuals with a diet score of 11 or above were attributed a score of 1 (healthy diet), while those with a MDS under 11 were attributed a score of 0 (unhealthy diet).

2.2.2. Physical activity and sedentary behaviour

31. The adherence to the WHO recommendations for physical activity were studied. Physical activity was surveyed in various ways. In some countries, respondents answer general questions about their level of moderate-intensity and vigorous-intensity physical activity, as well as walking. In others, respondents answer these same questions, but pertaining to each of the following domains: transportation, work, domestic and garden, and leisure. The variables used in the analysis are available in Annex A.

32. The WHO recommendations for PA are available in Box 1. The higher thresholds for PA, which provide additional health benefits, as well as the frequency of muscle-strengthening activities, were not included in the study. Walking and biking were

considered moderate-intensity physical activity as their Metabolic Equivalents (METs) are between 3.0 and 5.9 (Physical Activity Guidelines Advisory Committee, 2008[31]; Jetté, Sidney and Blümchen, 1990[32]).

33. Adherence to the WHO PA recommendations was computed for Australia, Chile, England, Korea, Mexico, Spain and the United States. Before computing the PA adherence variables, data were cleaned according to the IPAQ guidelines (IPAQ, 2005[20]). Individuals aged 18-64 were assumed to perform sufficient physical activity if the total amounted to at least 150 minutes of moderate-intensity PA per week, at least 75 minutes of vigorous-intensity PA per week, or an equivalent combination of both. More formally, total level of PA was calculated as indicated in equation 1.

$$PA = n_M * min_M + 2 * n_V * min_V$$ **Equation 1**

Where $PA =$ minutes of total physical activity/week

$n_M =$ days of moderate physical activity/week

$min_M =$ minutes of moderate physical activity/day

$n_V =$ days of vigorous physical activity/week

$min_V =$ minutes of vigorous physical activity/day

34. Individuals under the age of 18 were assumed to perform sufficient PA if they accumulated at least 60 minutes of moderate- to vigorous-intensity PA each day, as indicated by the WHO recommendations for physical activity. More formally, total PA in individuals under the age of 18 was calculated as shown in equation 2:

$$PA = min_M + min_V$$ **Equation 2**

Where $PA =$ minutes of total physical activity/week

$n_M =$ days of moderate physical activity/week

$min_M =$ minutes of moderate physical activity/day

Box 1. WHO recommendations for physical activity

WHO recommendations for adults:

1. Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate - and vigorous-intensity activity.

2. Aerobic activity should be performed in bouts of at least 10 minutes duration.

3. 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.

4. Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.

WHO recommendations for young people:

1. Children and youth aged 5–17 should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.

2. Amounts of physical activity greater than 60 minutes provide additional health benefits.

3. 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.

WHO recommendations for older people:

1. Older adults should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity.

2. Aerobic activity should be performed in bouts of at least 10 minutes duration.

3. For additional health benefits, older 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.

4. Older adults, with poor mobility, should perform physical activity to enhance balance and prevent falls on 3 or more days per week.

5. Muscle-strengthening activities, involving major muscle groups, should be done on 2 or more days a week.

6. 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.

35. Sedentary behaviour was also extracted from the databases for Australia, Chile, England, Korea, Mexico, Spain and the United States. Only England and the United States separate data by type of behaviour (TV watching, computer use, weekday/weekend), so the total amount of sedentary time in minutes per day was studied across all databases. The survey asked about sedentary behaviour on a “usual work day”, or on a “usual day”, depending on the country. To study the inequalities, a binary variable was created based on the work of Chau et al. (2013[33]), who showed that there was no

significant effect of sedentary behaviour on all-cause mortality below seven hours per day. Therefore, individuals were assumed to display excess sedentary behaviour if their total sedentary time per day was seven hours or more.

36. It must be noted that being physically active and not displaying excessive sedentary behaviour are different outcomes. They are measured separately, using different survey questions. Sedentary behaviour represents time spent sitting (here an individual is considered excessively sedentary if sitting time lasts more than seven hours daily), while physical activity represents movement for leisure, house work, transportation or at work (an individual is considered physically active if they meet the WHO recommendations). An individual can be excessively sedentary, but still meet the WHO recommendations, and vice versa. This is accentuated here by the fact that all data is self-reported.

2.2.3. Descriptive statistics

37. Weighted descriptive statistics of diet and physical activity behaviours were run on the diet and physical activity indicators, using the weights provided in the databases. The prevalence of each indicator in the different populations was age- and gender-standardized, using the OECD 2010 standard population. Chi² tests allowed us to determine the statistical significance of gender.

2.2.4. Logistic regressions

38. Logistic regressions on fruit and vegetable consumption, diet quality, adherence to the WHO recommendations on PA, and excess sedentary behaviour, let us assess which socio-demographic and health indicators may have an effect on these outcomes. Gender, age, marital status, education, socio-economic status (SES), occupational status, smoking status, and BMI were included as predictors. Age was included as a categorical variable (18-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74), and BMI was split into the regular classification: <18.5 (underweight), 18.5-24.9 (normal weight), 25-29.9 (overweight), >30 (obese). All regressions were weighted. Table 6 summarizes the regressions performed.

Table 6. Dependant and independent variables in the regressions

Dependant variables			
Fruit and vegetables	**Diet score**	**Physical activity**	**Sedentarism**
Whether consumes five or more fruit and vegetables per day	Chile, England, Italy, Spain, Mexico: whether MDS is higher than average or not Korea, United States: nutrient-based score	Whether meets WHO recommendations for PA or not	Whether sedentarism exceeds seven hours daily or not

Independant variables								
Gender	**Age**	**Education**	**SES**	**Occupational status**	**Marital status**	**Smoking status**	**BMI**	**Year**
Male, female	18-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74	Low, medium, high	Low, medium-low, medium, medium-high, high	Employed, not employed	Single, married, separated/widowed/ divorced	Current smoker, ex-smoker, never smoked	Underweight (BMI<18.5), normal weight (18.5≤BMI<25), overweight (25≤BMI<30), obese (BMI≥30)	Country-dependant

Note: Age category 18-19 is unavailable in the United States; SES category high is unavailable in Korea; occupational status is unavailable in Australia and the United States.

39. An odds-ratio allows to quantify how strongly the presence or absence of a certain property is associated with a certain outcome. They are interpreted as follows: for a unit change in the predictor variable, the odds of the outcome is expected to change by a factor of the respective parameter estimate, given the variables in the model are held constant.

2.2.5. Inequality analysis

40. Relative and absolute inequalities were computed for four health outcomes: consumption of five fruit and vegetables per day, diet quality, adherence to the WHO recommendations for physical activity, and duration of daily SB. These inequalities were analysed for both genders, and across two dimensions: level of education and socio-economic status.

41. The inequality indices were computed on the individual data, through log-binomial regressions. The regressions fit the health behaviour of each individual on their relative position in the social hierarchy (education or SES), which interacts with gender and time period (as a continuous variable). Age was also included as a continuous covariate. The model is the following:

$$G(Y) = \beta_0 + \beta_1 * socio * gender * year + \beta_2 * age + \varepsilon \qquad \textbf{Equation 3}$$

42. Where $socio$ is relative position in either the education or SES hierarchy.

43. A log link function was used for the calculation of the Relative Index of Inequality (RII), and an identity link function for the calculation of the Absolute Index of Inequality (AII) (Ernstsen et al., 2012[34]). If the regressions did not converge, the RII was computed using a Poisson regression, and the AII was computed by replacing the binary family by a Poisson family (Khang, Yun and Lynch, 2008[35]). This situation occurred for

Canada, England and Italy, but very few times. The RII is equal to $\exp(\beta_1)$, while the AII is equal to $100 \times \beta_1$.

44. The RII can be interpreted here as a rate ratio. It is equivalent to the ratio of the prevalence of the health behaviour in those with the lowest education or SES to the prevalence in those with the highest education or SES. The AII can be interpreted here as a rate difference. It represents the percentage point difference in health between those with the lowest education or SES and those with the highest. The AII is sensitive to the mean health behaviour under study of the population. Furthermore, the two indices can evolve differently through time. For instance, if sedentary behaviour were to double in all socio-economic categories between two time points, the RII would remain unchanged, but the AII would double (Wagstaff, Paci and Doorslaer, 1991[36]).

2.2.6. Latent class analysis

45. Latent class analysis (LCA) is a statistical technique which is used to sort individuals from a heterogeneous population into homogenous unobservable (latent) classes. The algorithm uses observable variables (manifest variables) to separate individuals into groups of people who share similar characteristics, by searching for the most frequent and similar patterns among the distributions of these variables. The technique produces latent class membership probabilities (γ), which list the probability of belonging to each latent class, and the item-response probabilities (ρ), which list the probability of possessing a certain manifest characteristic conditional on latent class membership. These probabilities are model-based: they depend on the model specification and estimated parameters, and are therefore called posterior probabilities. After determining the latent classes, logistic multinomial regressions based on the posterior probabilities of latent class membership were run, to assess the characteristics of those belonging to each class.

LCA has been used to study the clustering of risky behaviours in young people (Evans-Polce, Lanza and Maggs, 2016[37]; Laska et al., 2009[38]; Vasilenko et al., 2015[39]), epidemiologic outcomes (Calfee et al., 2014[40]; Canoui-Poitrine et al., 2013[41]), as well as diet, physical activity and sedentary behaviour (Huh et al., 2011[42]; Iannotti and Wang, 2013[43]). The technique is increasingly used in the social sciences, and tends to be applied to small samples drawn from schools and universities (Dewilde, 2004[44]).

46. The traditional latent class model is as follows:

$$\mathbb{P}(Y_i = y) = \sum_{c=1}^{n_c} \gamma_c \prod_{m=1}^{M} \prod_{k=1}^{r_m} {\rho_{mk|c}}^{I(y_m=k)} \qquad \textbf{Equation 4}$$

Where $Y_i = (Y_{i1}, \dots, Y_{iM})$ represents individual i's responses to the M manifest variables (items), and the possible values of Y_{im} are $\{1, \dots, r_m\}$.

$n_c =$ number of latent classes in the model

$\gamma_c =$ latent class membership probability for class c

$\rho_{mk|c} =$ item-response probability for variable $m \in \{1, \dots, M\}$ and answer $k \in \{1, \dots, r_m\}$ conditional on latent class membership in c.

$I(y_m = k) =$ indicator function which is equal to 1 if $y_m = k$ and 0 otherwise.

47. Variables concerning physical activity, sedentarism, and diet were included. Physical activity was assessed by determining whether the WHO recommendations were met or not. Sedentarism was assessed by determining whether daily SB exceeded seven hours. Diet was evaluated differently depending on the country. We followed the most recent national guidelines pertaining to each country included: Chile (Instituto de Nutrición y Tecnología de los Alimentos, 2013[45]), Korea (The Korean Nutrition Society, 2010[27]), Mexico (Academia Nacional de Medicina, 2015[46]), Spain (Dapcich et al., 2004[47]), and the United States (Institute of Medecine, 2011[26]).

48. When categorical variables are used, which is the case here, LCA makes no assumptions about the distributions of the indicators, except that of local independence. This means that within each latent class, the manifest variables are statistically independent of each other. Dependence between these variables in the overall sample is expected, and the latent class variable accounts for these interrelations.

49. To ensure that the best fitting model was selected for each country, models running from two to six classes were estimated and compared. Models were selected based on fit statistics: the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Adjusted Bayesian Information Criterion (ABIC) and Consistent Akaike Information Criterion (CAIC), as well as overall interpretability of the resulting classes. The results also display the G^2, a likelihood-ratio χ^2 statistic which is similar to the more renowned Pearson χ^2. The AIC and BIC represent relative model fit. Previous work shows that the AIC tends to overestimate the number of classes necessary, while the BIC tends to underestimate it (McLachlan and Peel, 2000[48]). The ABIC is the adjusted BIC, which adjusts on sample size (Sclove, 1987[49]), and the CAIC is the consistent AIC (Bozdogan, 1987[50]). When studying larger samples, the most likely error is overfitting, and it is best to use a more parsimonious criterion such as the BIC (Dziak et al., 2012[51]). The CAIC has been shown to behave similarly to the BIC in several simulations (Dias, 2006[52]; Yang and Yang, 2007[53]), and the ABIC has also been shown to perform well as a model-selection criterion (Wu, 2009[54]). As the samples used for our analyses were large (N>2000 for all datasets), our models were chosen based mostly on the BIC and CAIC.

50. When weights are used, the fit statistics are based on a pseudo-likelihood rather than a true likelihood, which may complicate their interpretation. To ensure best model fit, 200 randomly selected seeds were used to estimate each model. The analysis produces the percentage of seeds associated with the best fitted model, which is the percentage of iterations resulting in the highest log-likelihood. This number indicates whether the resulting model most likely represents a local maximum (if the percentage is quite low), or a global maximum (if the percentage is high). A model is thought to be acceptable if this percentage is at least 25% (Methodology Minutes, 2016[55]). A higher percentage of seeds associated with the best fitted model indicates that the model appears well-identified (Berglund, 2016[56]). Entropy indicates level of separation of classes: higher levels of entropy indicate better separation of latent classes. Weights were used for all analyses, and were standardized through the LCA plugin used.

51. After the LCA was completed, multinomial logistic regressions were run. Two regressions were run for each country: one with latent class membership as the independent variable, and one with weight status (BMI<25, 25≤BMI<30, BMI≥30) as the independent variable. For the regressions on latent class membership, the reference was the class we deemed presented the least healthy behaviours. For the regressions on weight status, BMI≤25 was the reference. These regressions were led outside the scope of the

LCA plugin as this method was less time-costly, and has been used in other studies (Adams et al., 2013[57]; Heitzler et al., 2011[58]). Individuals were assigned to the latent class for which they had the highest latent class membership probability. Age, gender, SES, education level, a geographic variable (except for the United States) as well as ethnicity (United States only) were included in the regressions. In Chile and Korea, the geographic variable assesses whether the region of residence is rural or urban (Chile), and rural, intermediate, or urban (Korea). The variable for Chile was created using data from the Instituto Nacional de Estadísticas (Instituto Nacional de Estadísticas, 2014[59]): regions whose rural population was higher than the national average were considered to be rural, while those whose rural population was lower were considered to be urban. The data for Korea was obtained via OECD.Stats (OECD, 2017[60]). For Mexico, the variable used was included in the original database, and establishes a region as rural, urban or metropolitan. In Spain, a dichotomous variable was created from a pre-existing variable indicating size of city of residence. On the one hand, cities with over 100,000 inhabitants and capitals of autonomous communities were considered "large cities", while cities with fewer than 100,000 inhabitants were considered "small cities". No regional variables were available for the United States. However, an ethnicity variable was included in the analysis: non-Hispanic white, non-Hispanic black, Mexican-American, and other ethnicity. After running the regressions, the Relative Risk Ratios (RRRs) were studied. RRRs are comparable to Odds-Ratios (OR), as they are the exponentiated parameters resulting from the regressions. RRRs are interpreted as follows: for a unit change in the predictor variable, the relative risk of the outcome relative to the reference group is expected to change by a factor of the respective parameter estimate, given the variables in the model are held constant.

52. The LCAs were carried out using the DoLCA plugin from the Methodology Center at PennState University (Lanza et al., 2015[61]). This plugin produces maximum likelihood estimates for parameters using the EM "expectation-maximization" algorithm. It constructs the classes and produces the class membership probabilities and item-response probabilities. To strengthen the analysis, we included as many observations as possible, without applying age restraints to the data. The data for Chile refers to ages 15-100; the data for Korea refers to ages 12-95; the data for Mexico refers to ages 20-69; the data for Spain refers to ages 15-69; the data for the United States refers to ages 12-80. All observations containing missing data for the manifest variables were removed before estimation.

3. Health behaviours are correlated with socio-economic characteristics, but also with each other[1]

3.1. Healthy diet and physical activity differ by gender and country

53. Descriptive statistics were run on four health indicators: consumption of five fruit and vegetables per day, healthy diet, physical activity meeting the WHO recommendations, and excessive sedentary behaviour. Explanation of the difference between insufficient physical activity and excessive sedentary behaviour can be found in paragraph 36.

Box 2. Descriptive statistics: summary of main results

Overall, fruit and vegetable consumption still needs to be improved, although rates are higher in some countries. Consumption has been increasing in Canada, Mexico and the United States. Prevalence of healthy diet depends on the score used, and is similar between countries within a same score. Physical activity levels are globally acceptable, and excess sedentary behaviour varies strongly between countries. In some cases, the use of different measures or food items prevents cross-country comparability of results.

3.1.1. Diet can still be improved

54. Only a minority of the population reports consumption of a sufficient amount of fruit and vegetables. In countries for which either fruit and vegetable consumption or dietary fibre consumption was used, only between 6% and 35% of the population consumed a sufficient amount of fruit and vegetables. In Korea, about 60% of the population meets recommended consumption, based on crude fibre consumption. High levels of fruit and, above all, vegetable consumption have been showed in the past for the Korean population (OECD, 2015[1]). However, it could not be excluded that such outstanding performances can be (partially) attributed to a different unit of measure. (Figure 1). Differences between men and women are statistically significant in all countries but Mexico. Women consume more fruit and vegetables in all countries but Hungary, Korea and the United States, the three countries where fruit and vegetable consumption was based on daily fibre intake. The evolution over time of fruit and vegetable consumption, in countries where data for multiple years was available, can be found in Annex C. Overall, consumption has decreased in the past decade in Australia, France and Hungary, while consumption in England has also decreased but shown sign of an upturn in recent years. Consumption in Italy and Spain is stable, and has increased in Canada, Mexico and the United States.

[1] Results of the analysis presented in this section are based on self-reported data. A discussion of the implications can be found in the .

Discussion.

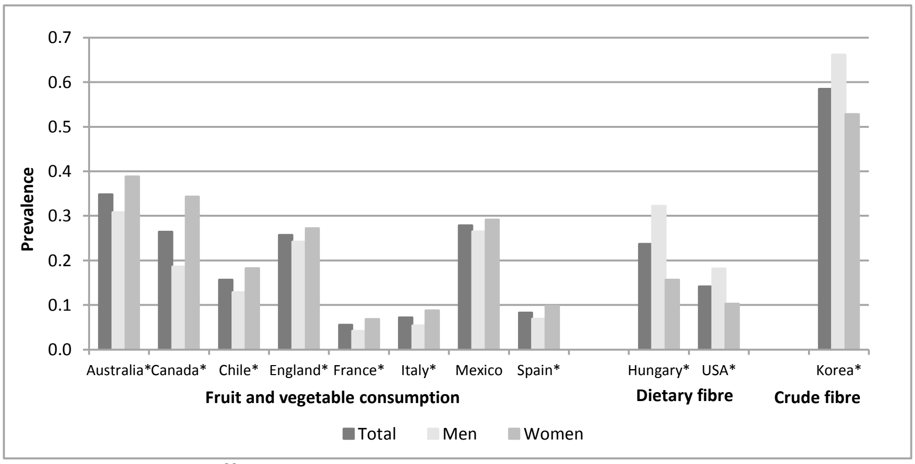
55. Over 50% of individuals consume a healthy diet in the four countries where the MDS was computed, and over 80% in Korea and the United States, where the nutrient-based score was used (Figure 2). Just over 30% of individuals in England consume a healthy diet – it is also the only country where gender disparities are not statistically significant. Women consume healthier diets than men in all other countries. The prevalence of individuals consuming a healthy diet is similar within the different diet scores used, but varies between scores. Scores can be compared within a method of scoring, but should not be compared between different methods. A larger discussion of diet scores and their significance can be found in Waijers, Feskens and Ocké (2007[62]) as well as Wirt and Collins (2009[63]). The full distributions of the five non-binary diet scores are available in Annex D.

3.1.2. Physical activity is high, but so is sedentary behaviour

56. Adherence to the WHO recommendations for PA is over 50% in all countries studied (Figure 3). Levels are highest in Chile, England and Mexico, with over 70% of individuals reporting levels of PA meeting the recommendations, while Australia and Korea display the lowest levels of PA. Gender differences are statistically significant everywhere but Mexico, and men are more physically active than women in all those countries.

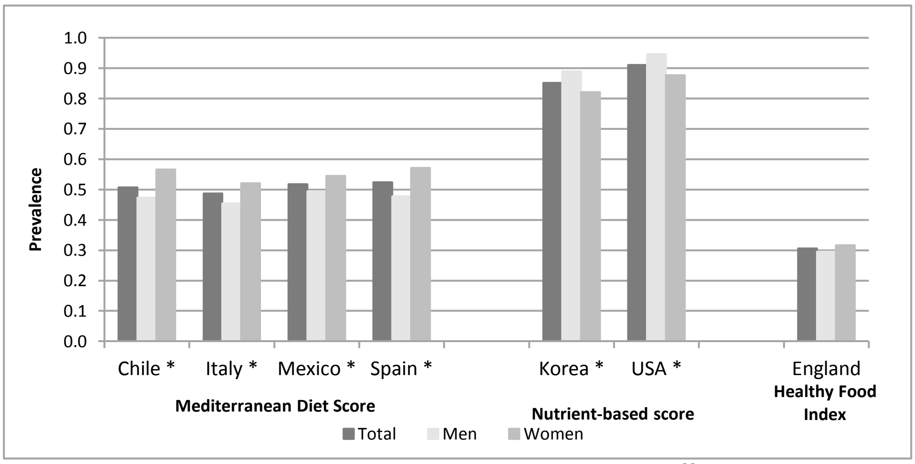
57. Excess sedentary behaviour (i.e. more than 7 hours/day spent sitting) is especially high in Korea and the United States, where it affects over 50% of individuals (Figure 4). Rates are much lower in Chile and Mexico, where they are below 20%. Gender disparities are statistically significant everywhere but Korea and the United States. Men are more sedentary than women in all countries where the difference is significant, except Australia, where the gap reaches nearly 9 percentage points.

Figure 1. Prevalence of consumption of five fruit and vegetables per day



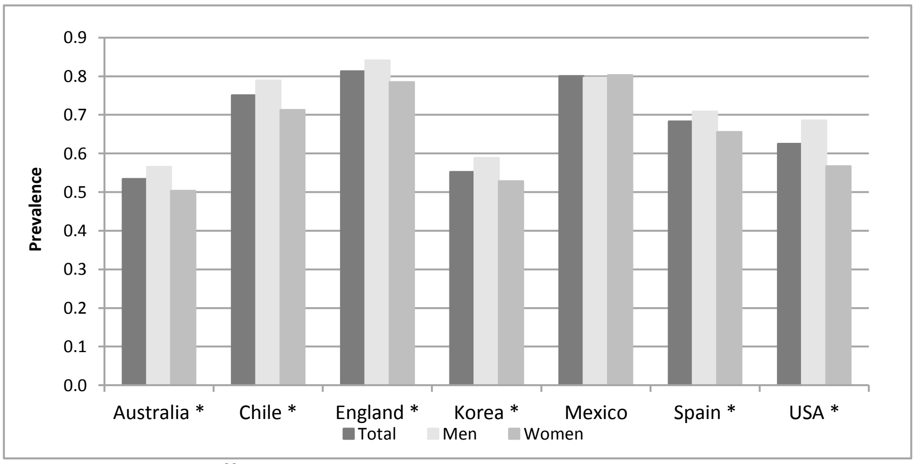
Note: Rates were computed differently depending on the country – caution is necessary when interpreting the results. Rates have been age- and sex-standardized and refer to ages 15-64 except in Hungary (18-64) and Italy (14-64). Rates for Hungary, Korea and the United States were converted from daily fibre intake. * indicates that the difference in rates between men and women is significant at the 5% level (Chi² test).
Source: OECD analysis of health survey data.

Figure 2. Prevalence of healthy diet according to diet scores



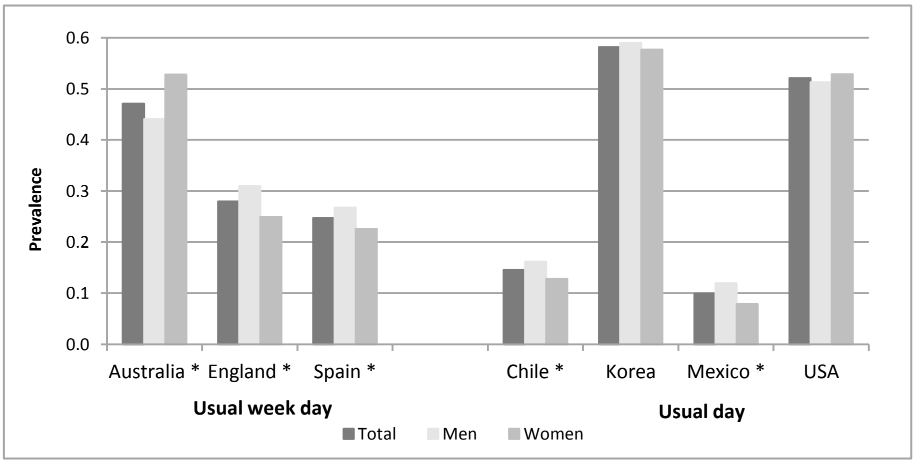
Note: Scores are comparable within a same diet score, but not between different diet scores – caution is necessary when interpreting results. Rates have been age- and sex-standardized and refer to ages 15-64 except in England (16-64). Individuals were assumed to consume a healthy diet in Chile, Italy, Mexico and Spain if their MDS was greater than or equal to the gender-specific average (11 in Chile, 18 in Italy, 23 in Mexico, 16 in Spain). Individuals were assumed to consume a healthy diet in England if their HFI was greater than or equal to the gender-specific average (2 for both genders). * indicates that the difference in rates between men and women is significant at the 5% level (Chi² test).
Source: OECD analysis of health survey data.

Figure 3. Prevalence of adherence to WHO recommendations for physical activity



Note: Rates were computed differently depending on the country – caution is necessary when interpreting the results. Data have been age- and sex-standardized and refer to ages 15-64 except in Australia (18-64), and England (16-64). * indicates that the difference in rates between men and women is significant at the 5% level (Chi² test).
Source: OECD analysis of health survey data.

Figure 4. Prevalence of excess sedentary behaviour



Note: Rates were computed differently depending on the country – caution is necessary when interpreting the results. Data have been age- and sex-standardized and refer to ages 15-64 except in England (16-64). * indicates that the difference in rates between men and women is significant at the 5% level (Chi² test). Excess sedentary behaviour is defined as over seven hours of daily sedentary behaviour.
Source: OECD analysis of health survey data.

3.2. Gender, education and socio-economic status affect health behaviours

3.2.1. Women consume a healthier diet, but men are more physically active

58. Logistic regressions were run on four indicators: consumption of five fruit and vegetables per day, healthy diet, adherence to the WHO recommendations for PA, and excess daily SB. The full results of the regressions, which also include age, marital status, occupational status, smoking status, weight status and time period as covariates, are available in Annex E. Interpretation of odds-ratios is explained in paragraph 0.

Box 3. Logistic regressions: summary of main results

Overall, women as well as people with a high level of education or SES are more likely to consume five fruit and vegetables per day in most countries. The same conclusions can be drawn for consuming a healthy diet, although SES is less often statistically significant.

Women are consistently less likely to perform sufficient physical activity than men. In all countries but Mexico and Chile, those with a high level of education or SES are also more likely to meet the WHO recommendations. In most countries, women and men are just as likely to exhibit excessive sedentary behaviour. Globally, those with higher SES or education are more likely to be excessively sedentary.

59. Gender affects fruit and vegetable consumption in nearly all countries (Figure 5), with women more likely than men to consume five fruit and vegetables per day in Australia, Canada, Chile, England, France, Italy and Spain, and less likely in Hungary, Korea and the United States. Disparities by level of education are consistent across countries (Figure 6): those with a high level of education are more likely to consume the recommended amount of fruit and vegetables compared to those with a medium level of education, while those with a low level of education are less likely to do so. In the United States, both those with low or high levels of education are more likely to consume five fruit and vegetables per day than those with a medium level of education. Education does not affect fruit and vegetable consumption in Chile, Italy, and Korea. Differences by socio-economic status display a similar pattern (Figure 7): the lower the SES, the less likely an individual is to consume five fruit and vegetables per day. However, SES is less often significant than level of education across countries. This is consistent with literature suggesting that level of education is a stronger determinant for healthy behaviours than other socio-economic determinants, such as income (Feinstein et al., 2006[64]). In the United States, those with low SES are again more likely to consume sufficient fruit and vegetables than those with medium SES.

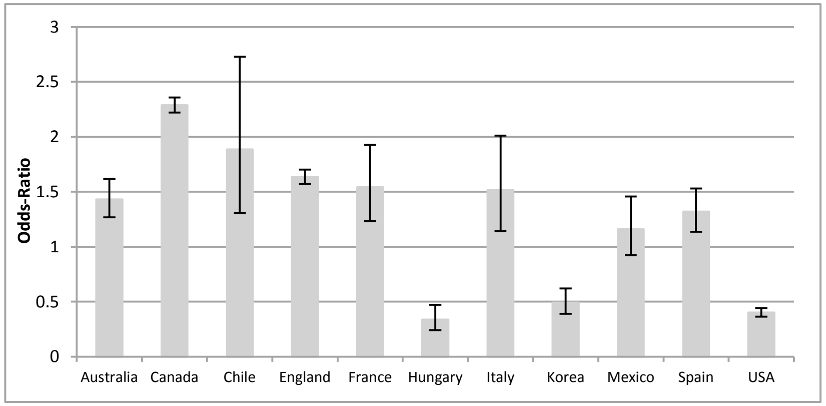
60. Gender is statistically significant for healthy diet in all countries but Mexico (Figure 8). Women are more likely to consume a healthy diet in Chile, England, Italy and Spain, while men are more likely to in Korea and the United States. In England, Italy and the United States, those with a high level of education are more likely to display a healthy diet than those with a medium level of education (Figure 9), and in England, Korea, Mexico and the United States, those with a low level of education are less likely to consume a healthy diet. Education is not significant in Chile and Spain. SES is significant in determining diet quality in few countries (Figure 10). In Korea and the United States, those with lower SES are less likely to consume a healthy diet. Those with higher SES are more likely to consume a healthy diet in England and the United States. In Italy, the situation is reversed: those with lower SES are more likely to consume a healthy diet

while those with higher SES are less likely to do so. In Chile, Mexico and Spain, SES is not significant.

61. Women are consistently less likely than men to perform sufficient amounts of physical activity (Figure 11). Level of education does not affect physical activity levels in Chile (Figure 12), and in some countries only low or high education is significant. In most countries, those with a higher level of education are more likely to display sufficient levels of PA. In Mexico however, those with a high level of education are less likely than those with a low or medium level to meet the WHO recommendations. This pattern also exists for socio-economic status (Figure 13). Those in Mexico with a medium-high level of SES are less likely to perform sufficient PA, and those with low SES are more likely to. A similar situation is observed in Chile. SES is not significant in England, Korea, or Spain. In Australia and the United States, physical activity increases with SES, although the gradient is less clear-cut in the United States.

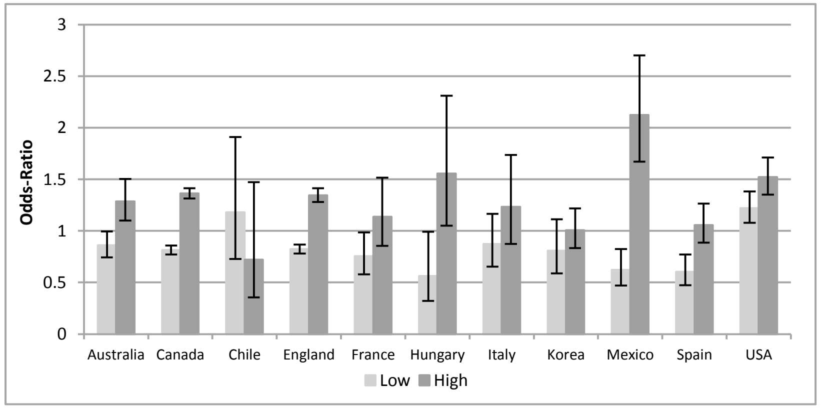
62. Women are less likely to display excess SB in England and Spain (Figure 14). In Australia, those with either low or high education are more likely to be sedentary than those with a medium level of education (Figure 15). In Korea, Mexico and Spain, those with a high level of education are more likely to be sedentary than those with a low or medium level of education. In the United States, those with low education are less likely to be sedentary, while those with high education are more likely. In all countries, those with medium-high or high SES are more likely to display excessive SB than those with a medium level of SES (Figure 16). Lower levels of education are significant in Chile, Mexico and Spain – those in this category display lower levels of excess SB.

Figure 5. Odds-Ratios for consumption of five fruit and vegetables per day by gender



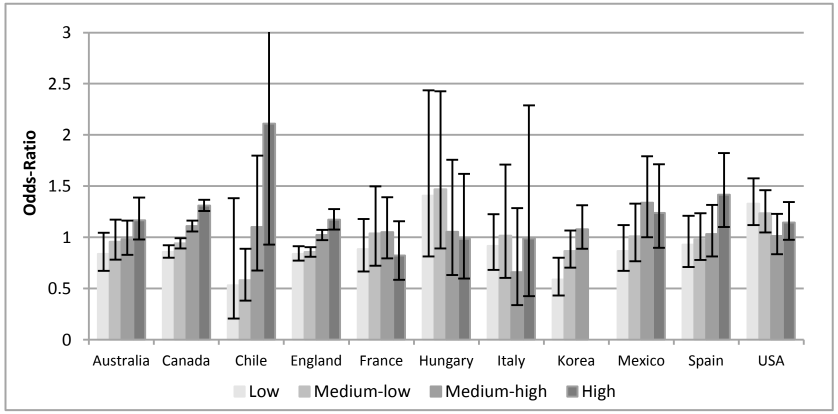
Note: Reference category is men: OR>1 signifies that women are more likely than men to consume five fruit and vegetables per day. Data refer to ages 18-64 except in Canada (15-64).
Source: OECD analysis of health survey data.

Figure 6. Odds-Ratios for consumption of five fruit and vegetables per day by education level



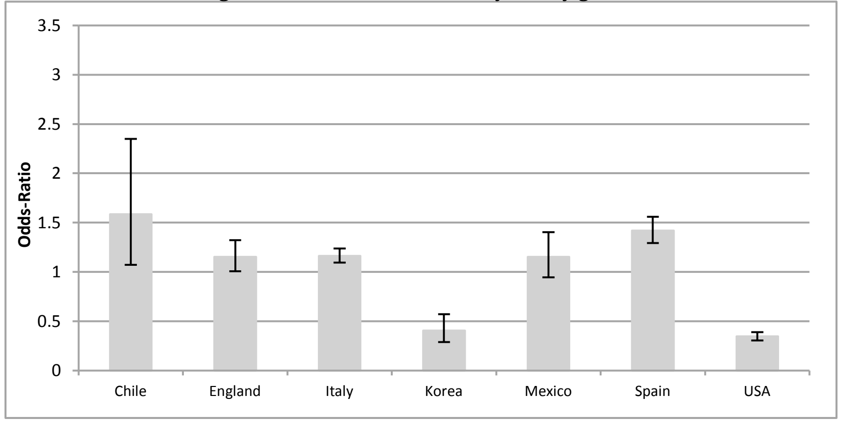
Note: Reference category is medium level of education: OR>1 signifies that those in that education category are more likely to consume five fruit and vegetables per day. Data refer to ages 15-64 except in Canada (15-64).
Source: OECD analysis of health survey data.

Figure 7. Odds-Ratios for consumption of five fruit and vegetables per day by socio-economic status



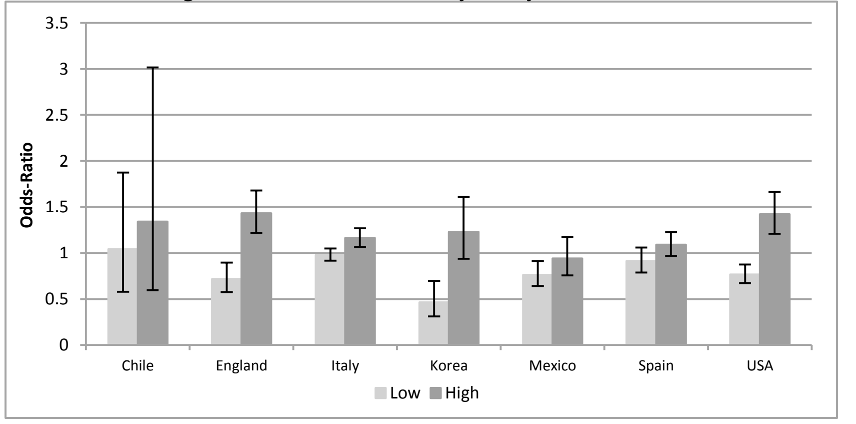
Note: Reference category is medium SES: OR>1 signifies that those in that SES category are more likely to consume five fruit and vegetables per day. Upper confidence interval was truncated for Chile (4.8). Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

Figure 8. Odds-Ratios for healthy diet by gender



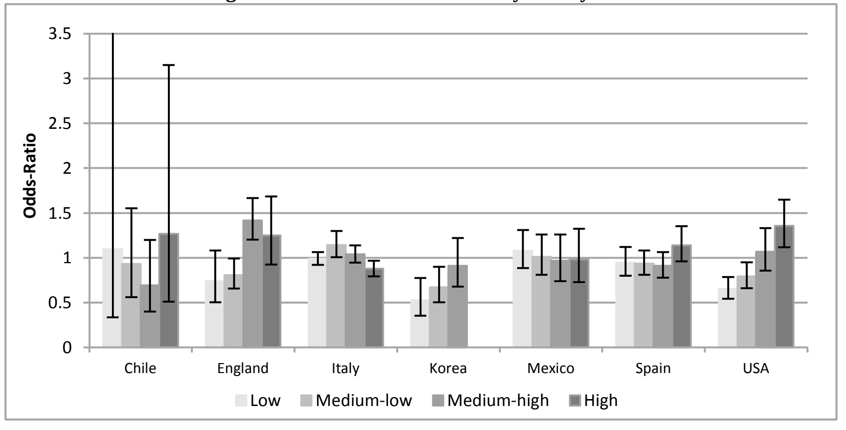
Note: Reference category is men: OR>1 signifies that women are more likely than men consume a healthy diet. Data refer to ages 18-64.
Source: OECD analysis of health survey data.

Figure 9. Odds-Ratios for healthy diet by education level



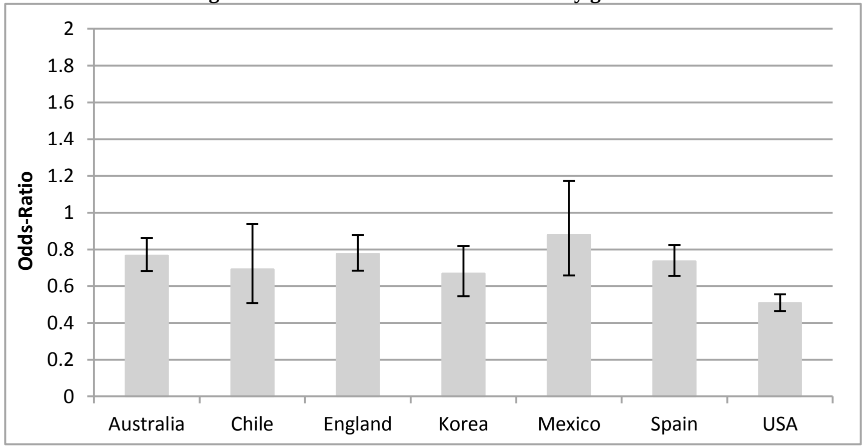
Note: Reference category is medium level of education: OR>1 signifies that those in that education category are more likely to consume a healthy diet. Data refer to ages 18-64.
Source: OECD analysis of health survey data.

Figure 10. Odds-Ratios for healthy diet by SES



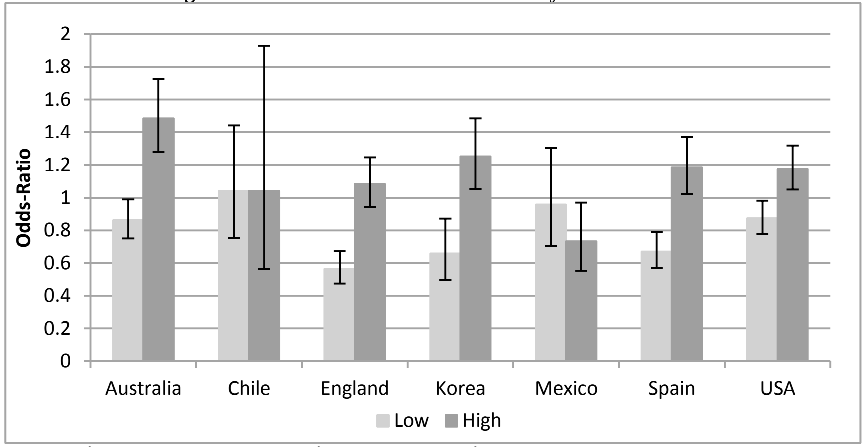
Note: Reference category is medium SES: OR>1 signifies that those in that SES category are more likely to consume a healthy diet. Data refer to ages 18-64.
Source: OECD analysis of healthy survey data.

Figure 11. Odds-Ratios for sufficient PA by gender



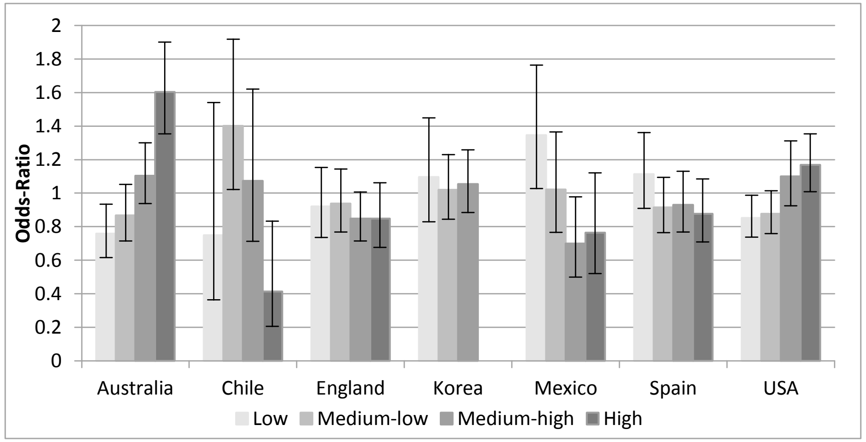
Note: Reference category is men: OR>1 signifies that women are more likely than men to display sufficient physical activity. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 12. Odds-Ratios for sufficient PA by education level



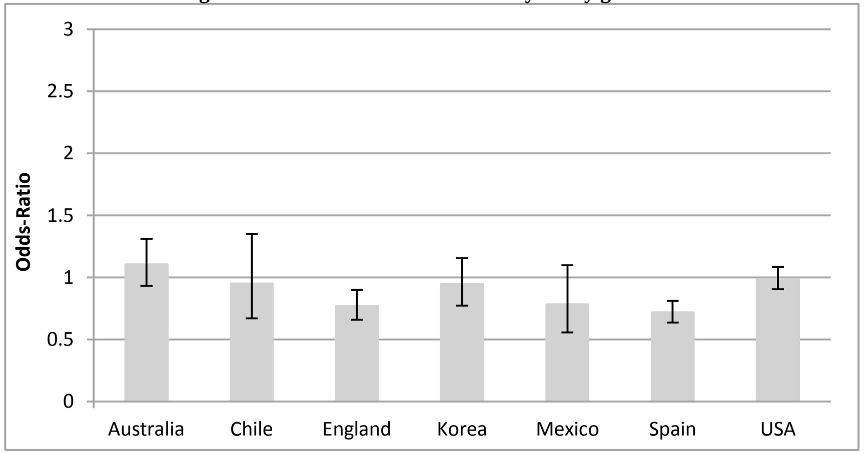
Note: Reference category is medium level of education: OR>1 signifies that those in that education category are more likely to display sufficient physical activity. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 13. Odds-Ratios for sufficient PA by socio-economic status



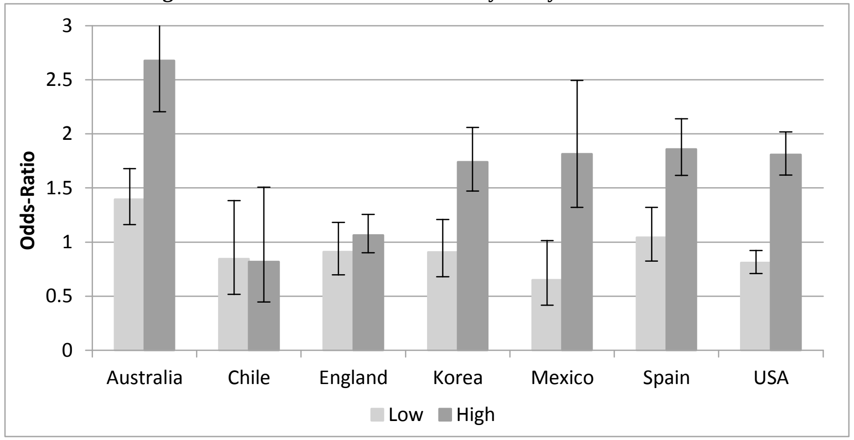
Note: Reference category is medium SES: OR>1 signifies that those in that SES category are more likely to display sufficient physical activity. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 14. Odds-Ratios for excess daily SB by gender



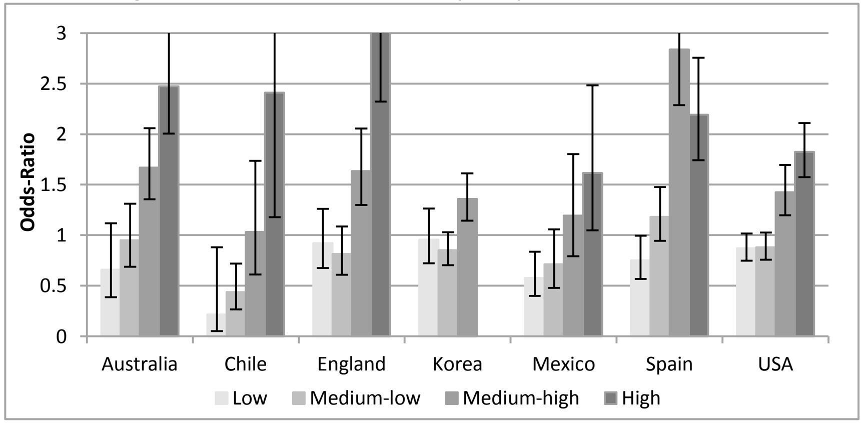
Note: Reference category is men: OR>1 signifies that women are more likely to display excess daily SB. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 15. Odds-Ratios for excess daily SB by education level



Note: Reference category is medium level of education: OR>1 signifies that those in that education category are more likely to display excess SB. Upper confidence interval was truncated for Australia (3.3). Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 16. Odds-Ratios for excess daily SB by socio-economic status



Note: Reference category is medium SES: OR>1 signifies that those in that SES category are more likely to display excess SB. Upper confidence intervals were truncated for Australia (3.1), Chile (4.9), England (3.9), and Spain (3.5). Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

3.2.2. Inequalities in healthy lifestyles by level of education and socio-economic status are prominent

63. The scale of socio-economic disparities was estimated for four indicators: consumption of five fruit and vegetables per day, diet quality, sufficient PA, and excess SB. The indices were computed across two dimensions: level of education, and socio-economic status. Relative inequalities are statistically significant when the confidence interval does not include 1, and absolute inequalities are significant when the confidence interval does not include 0. When the index is not significant, the dimension under study does not play a significant role in determining the indicator under study.

Box 4. Relative and absolute inequalities: summary of main results

On the whole, persons with a lower level of education or SES are less likely to consume the recommended daily amount of fruit and vegetables, and less likely to consume an overall healthy diet.

In most countries, those with a lower level of education or SES are more likely to perform insufficient physical activity. In all countries, those with higher education or SES are more likely to display excessive sedentary behaviours, and inequalities are stronger by education than SES.

Diet quality is higher in those with high education or SES

64. The prevalence of those eating too few fruit and vegetables is higher in individuals with a low level of education compared to those with a high level of education (Figure 17). These inequalities are low overall in Chile, France, Italy and Spain, although in those countries inequalities are only significant in women. Canadian, English and Mexican men and women as well as Korean men display the largest inequalities. In English women, prevalence of low fruit and vegetable consumption is 59% higher in those with a low rather than a high level of education. The trends in relative inequalities for fruit and vegetable consumption are available in Annex F. Overall, relative inequalities by education have increased or remained stable for men and women, while relative inequalities by SES have mostly increased for men, and decreased for women.

65. Countries with the strongest relative inequalities in fruit and vegetable consumption also display the strongest absolute inequalities (Figure 19). In Mexico, the prevalence of low education men consuming insufficient fruit and vegetables is 33 percentage points higher than in those with a high level of education. The difference is lower in women (just under 30 percentage points). The lowest inequalities for both men and women occur in France and Italy, with under 3 percentage points' difference in men, and 7 percentage points' in women. Education has no effect on fruit and vegetable consumption in Hungary and the United States. The trends in absolute inequalities for fruit and vegetable consumption can be found in Annex G. Absolute inequalities by education have mostly decreased or remained stable for men, while they have globally increased for women. The absolute inequalities by SES have risen for both men and women, on the whole.

66. Relative inequalities of fruit and vegetable consumption by SES are more often significant than by level of education (Figure 18), meaning that SES is a stronger determinant of fruit and vegetable consumption than level of education across countries.

In all but Spanish women, fruit and vegetable consumption is higher in women with high SES. Relative inequalities are highest for Mexican men and Canadian and Korean women. Overall, the relative inequalities by education and SES are quite similar.

67. Absolute inequalities are smaller by SES than by education, the largest being 26 percentage points' difference for women in Canada, and 20 percentage points' difference for men in Mexico (Figure 20). Spanish women with high SES have a lower prevalence of sufficient fruit and vegetable consumption than those with low SES.

68. Inequalities are clearly highest in Chile, Korea and the United States (Figure 21), however it must be emphasised that the diet scores used are not all the same, and therefore inequalities should not be compared between scores. Values are much higher for Korean and American men than women, as the prevalence of low quality diet in low education men in those countries is over four times higher than in highly educated men, while the value is below 3 in Korea and below 2 in the United States for women. Inequalities are much less pronounced in men and women in England, Italy, and Spain.

69. Absolute inequalities by education are highest in Korean men (16 percentage point difference) and Chilean women (22 percentage point difference) (Figure 23). The United States, where relative inequalities were very large, displays lower absolute inequalities than England, where relative inequalities were small. This means that the overall prevalence of low quality diet is higher in England than in the United States. The inequalities are particularly variable across countries for both men and women, and the confidence intervals are large.

70. Relative inequalities of diet quality by SES are similar to those by education (Figure 22). They are strongest in the United States for both genders, and are higher for men in most countries, especially the United States and Korea. The difference in prevalence between those of low and high SES is nearly non-existent in England and Italy. However, the prevalence of low quality diet in Spain is slightly higher in men and women of high rather than low education (approximately 25% higher).

71. Chile displays the highest absolute inequalities by SES in terms of diet quality (Figure 24). Prevalence of low quality diet is approximately 13 percentage points higher in men of low rather than high SES and 24 percentage points higher in women of low SES. The trend is reversed in Spain: prevalence of low quality diet is approximately 7 percentage points higher in men and women of high SES. Absolute inequalities are weak in England and Italy.

People with high education or SES perform more physical activity, but are also more excessively sedentary overall

72. In most countries, prevalence of insufficient PA is higher in those with a lower level of education (Figure 25). This is especially the case in England, where prevalence is over two times higher in those with low education, and Australia, where prevalence is 75% higher. Results in Korea, Spain, and the United States show that prevalence of low PA is approximately 50% higher in men of low education, and 40% higher in women of low education. In Chile and Mexico, on the other hand, men and women with a high level of education are less likely to meet the WHO recommendations. Gender disparities within countries are low, except in England.

73. Absolute inequalities for lack of physical activity by education are strongest in Australian men and women, with nearly 30 percentage points' difference in prevalence between those of high and low education (Figure 27). In Mexico and Chile, fewer men

and women with high education perform sufficient PA, as the rates are 6-7 percentage points and 8-10 percentage points lower, respectively.

74. Relative inequalities by SES are smaller than by education, and less often significant (Figure 26). Results between countries differ more in women. Again, physical inactivity is more prevalent among Mexican and Chilean people with high SES.

75. Figure 28 shows that prevalence of insufficient physical activity is about 25 percentage points higher in men and women with low SES in Australia, 5-7 percentage points in England and Spain, while American women display a 16% point difference. Results for Mexico and Chile once again show a higher prevalence of physical inactivity in those with high SES (8-12 percentage points' difference).

76. The inequalities for sedentary behaviour were computed using those with the lowest levels of education and SES as references.

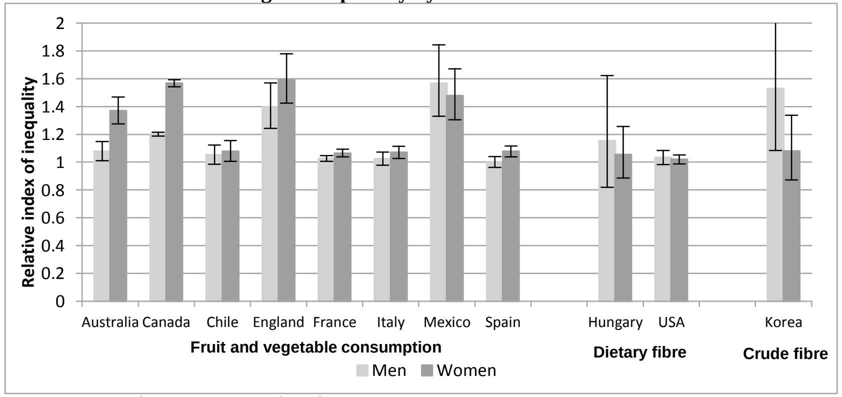
77. Individuals with a higher level of education have a higher prevalence of sedentary behaviour (Figure 29). Inequalities are especially strong in Chilean, Mexican and Spanish women, where prevalence of sedentary behaviour is over five times higher in those of high education. For men, inequalities are highest in Mexico and Spain. In countries where inequalities are higher in women, the gaps are quite large, but in countries where inequalities are higher in men, the inequalities are much smaller.

78. Absolute inequalities are similar and very high for men in Australia, Chile, Korea and the United States; prevalence of sedentary behaviour is over 35 percentage points higher in those of high education (Figure 31). Absolute inequalities are consistently lower in women than in men although they are nearly identical in Spain. The values in England and Mexico are the lowest, despite Mexico displaying the highest relative inequalities.

79. Similarly, sedentary behaviour is more prevalent in men and women of high SES (Figure 30). Prevalence of sedentary behaviour among women with high SES is over ten times higher than in their lower SES counterparts in Spain and over five times higher in Mexico. Relative inequalities are much lower in Australia, Chile, England, Korea and the United States. Gender gaps are visible in Spain and Mexico, but are much lower in other countries. Overall, inequalities are smaller by SES than by education.

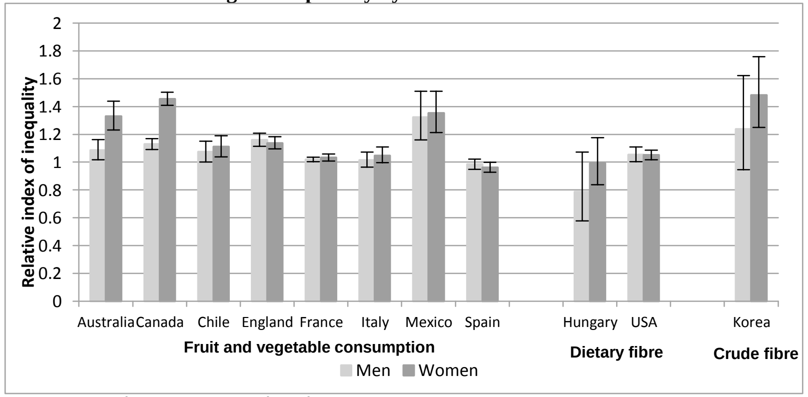
80. Absolute inequalities for sedentary behaviour by SES are very high for women in Australia and Spain (Figure 32). Inequalities for women in other countries are much lower, and weaker than in men. For men, absolute inequalities are similar in Chile, England, Korea and the United States, between 29 and 33 percentage points, and remain highest in Australia.

Figure 17. Relative index of inequality for consumption of fewer than five fruit and vegetables per day by level of education



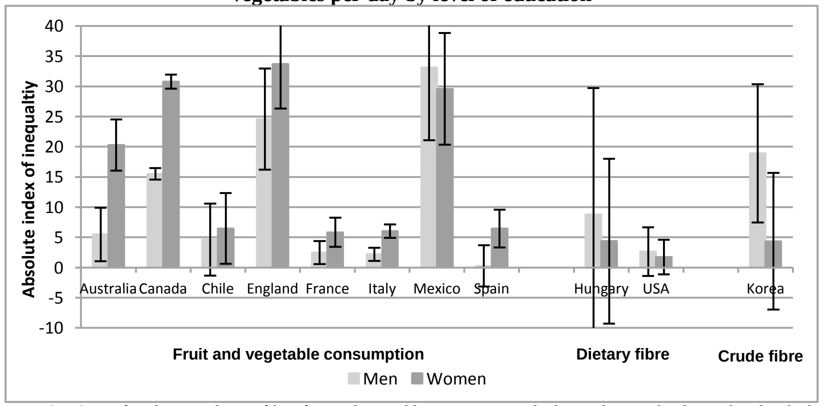
Notes: RII>1 signifies that prevalence of low fruit and vegetable consumption is higher in those with a low rather than high level of education. Upper confidence interval truncated for Korea (2.2). Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

Figure 18. Relative index of inequality for consumption of fewer than five fruit and vegetables per day by socio-economic status



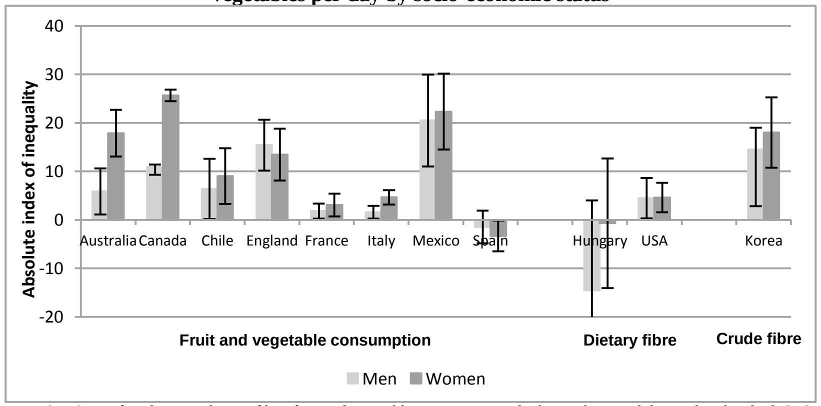
Notes: RII>1 signifies that prevalence of low fruit and vegetable consumption is higher in those with low rather than high SES. Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

Figure 19. Absolute index of inequality for consumption of fewer than five fruit and vegetables per day by level of education



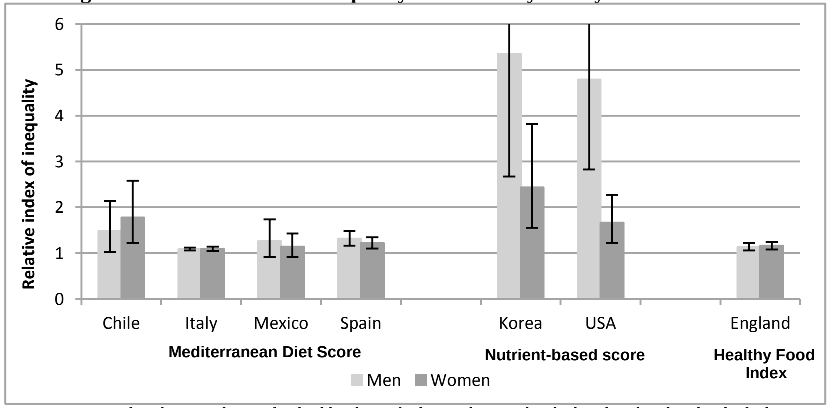
Note: AII>0 signifies that prevalence of low fruit and vegetable consumption is higher in those with a low rather than high level of education. For example, in Australia, prevalence of low fruit and vegetable consumption is 5 points higher in men with a low rather than high level of education. Data refer to ages 18-64 except in Canada (15-64). Upper confidence interval truncated for England (33.0), Mexico (45.1). Lower confidence interval truncated for Hungary (-12.2). *Source*: OECD analysis of health survey data.

Figure 20. Absolute index of inequality for consumption of fewer than five fruit and vegetables per day by socio-economic status



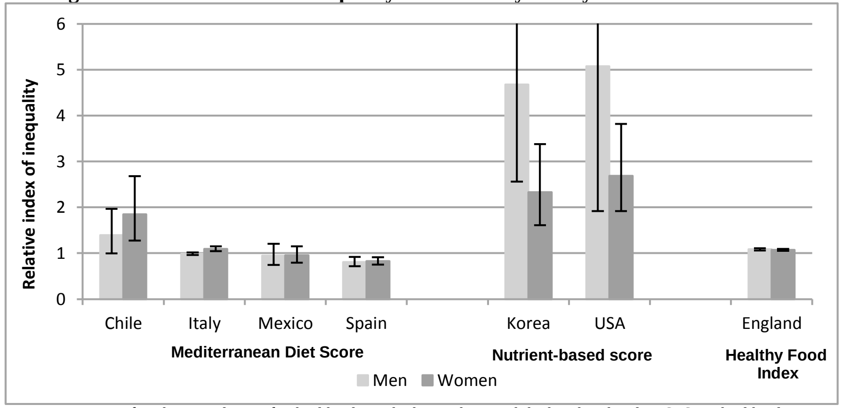
Note: AII>0 signifies that prevalence of low fruit and vegetable consumption is higher in those with low rather than high SES. For example, in Australia, prevalence of low fruit and vegetable consumption is 6 points higher in men with low rather than high SES. Data refer to ages 18-64 except in Canada (15-64). Lower confidence interval truncated for Hungary (-33.1). *Source*: OECD analysis of health survey data.

Figure 21. Relative index of inequality for unhealthy diet by level of education



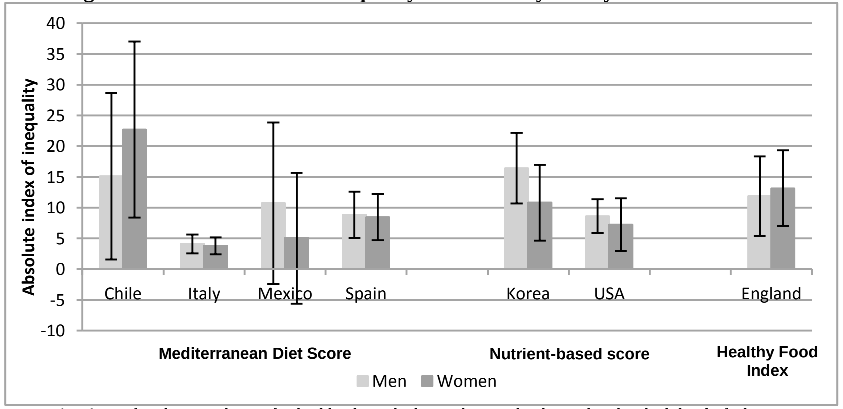
Note: RII>1 signifies that prevalence of unhealthy diet is higher in those with a high rather than low level of education. Unhealthy diet was determined by computing the average of the diet scores in Chile, England, Italy, Mexico and Spain. Upper confidence intervals truncated for Korea (10.7), the United States (8.1). Data refer to ages 18-64. Inequalities can be compared within a diet score, but must not be compared between scores.
Source: OECD analysis of health survey data.

Figure 22. Relative index of inequality for unhealthy diet by socio-economic status



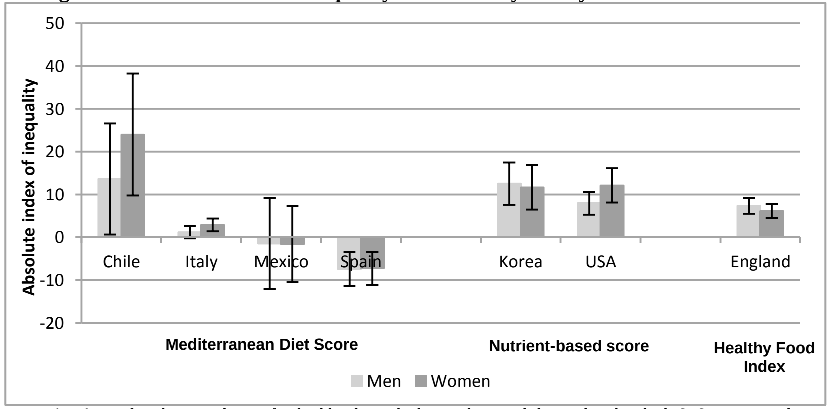
Note: RII>1 signifies that prevalence of unhealthy diet is higher in those with high rather than low SES. Unhealthy diet was determined by computing the average of the diet scores in Chile, England, Italy, Mexico and Spain. Upper confidence intervals truncated for Korea (8.5) and the United States (9.9). Data refer to ages 18-64. Inequalities can be compared within a diet score, but must not be compared between scores.
Source: OECD analysis of health survey data.

Figure 23. Absolute index of inequality for unhealthy diet by level of education



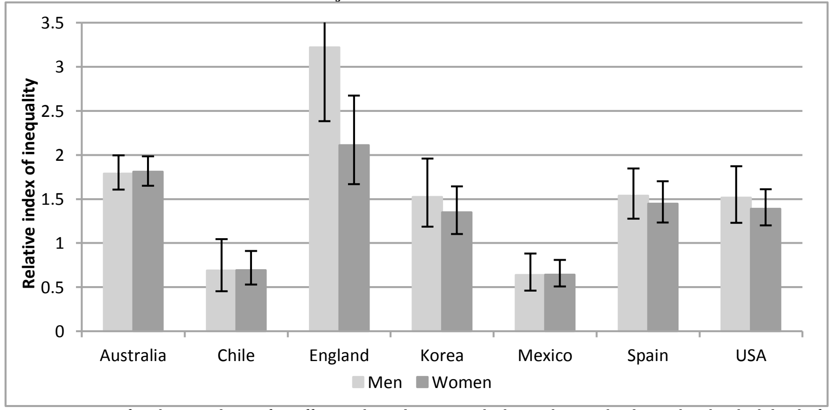
Note: AII>0 signifies that prevalence of unhealthy diet is higher in those with a low rather than high level of education. For example, in Chile, prevalence of unhealthy diet is 15 points higher in men with a low rather than high level of education. Unhealthy diet was determined by computing the average of the diet scores in Chile, England, Italy, Mexico and Spain. Data refer to ages 18-64. Inequalities can be compared within a diet score, but must not be compared between scores. *Source*: OECD analysis of health survey data.

Figure 24. Absolute index of inequality for unhealthy diet by socio-economic status



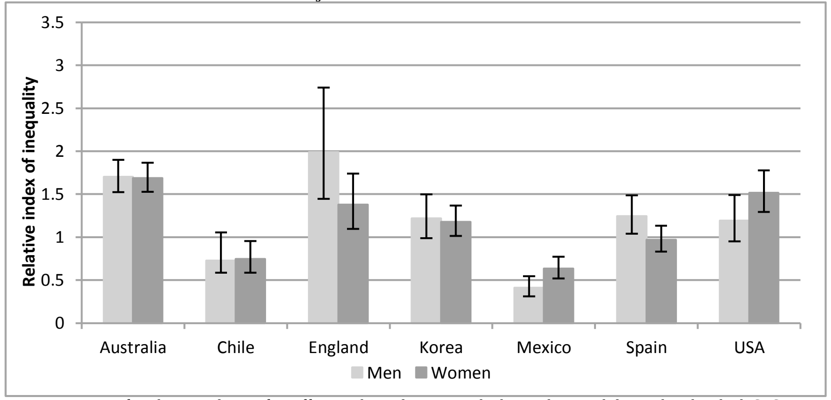
Note: AII>0 signifies that prevalence of unhealthy diet is higher in those with low rather than high SES. For example, in Chile, prevalence of unhealthy diet is 14 points higher in men with low rather than high SES. Unhealthy diet was determined by computing the average of the diet scores in Chile, England, Italy, Mexico and Spain. Data refer to ages 18-64. Inequalities can be compared within a diet score, but must not be compared between scores. *Source*: OECD analysis of health survey data.

Figure 25. Relative index of inequality for insufficient physical activity by level of education



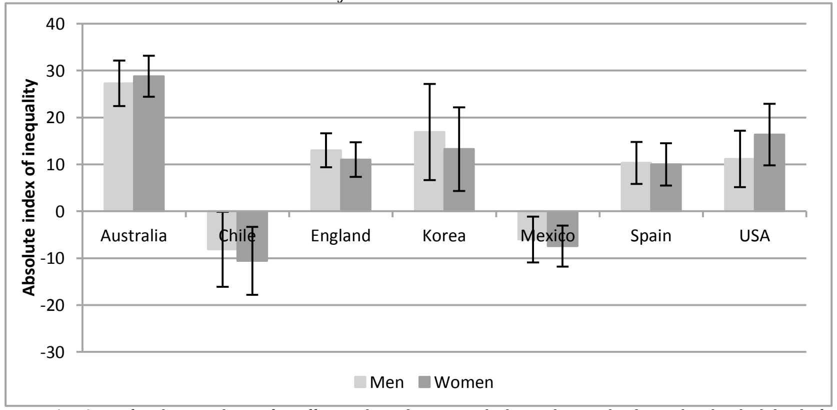
Note: RII>1 signifies that prevalence of insufficient physical activity is higher in those with a low rather than high level of education. Upper confidence interval truncated for England (4.4). Data refer to ages 18-64.
Source: OECD analysis of health survey data.

Figure 26. Relative index of inequality for insufficient physical activity by socio-economic status



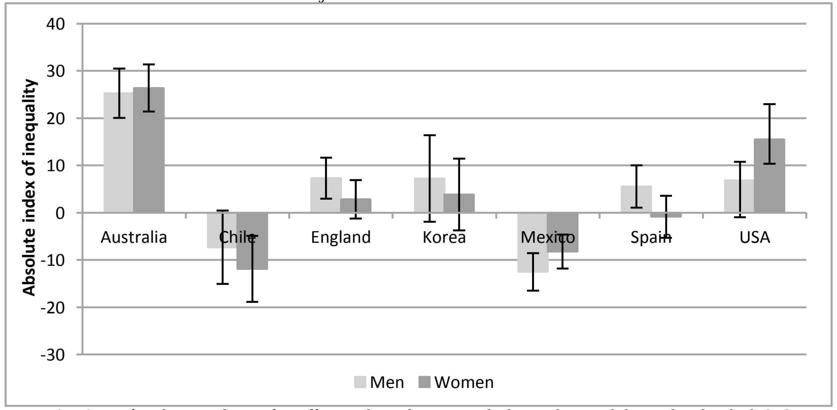
Note: RII>1 signifies that prevalence of insufficient physical activity is higher in those with low rather than high SES. Data refer to ages 18-64.
Source: OECD analysis of health survey data.

Figure 27. Absolute index of inequality for insufficient physical activity by level of education



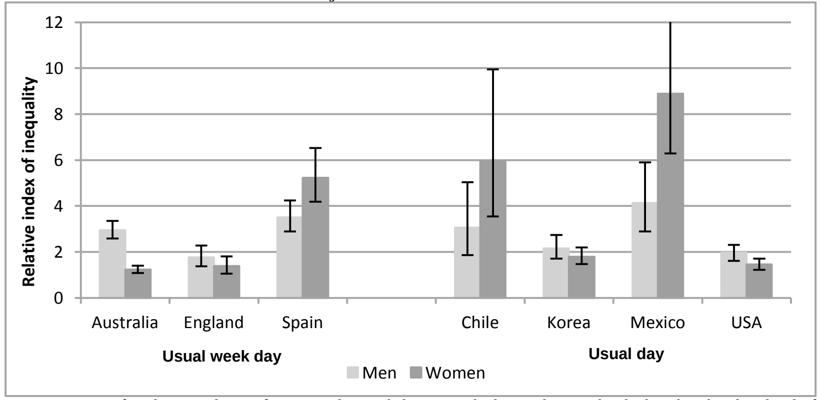
Note: AII>0 signifies that prevalence of insufficient physical activity is higher in those with a low rather than high level of education. For example, in Australia, prevalence of insufficient physical activity is 27 points higher in men with a low rather than high level of education. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 28. Absolute index of inequality for insufficient physical activity by socio-economic status



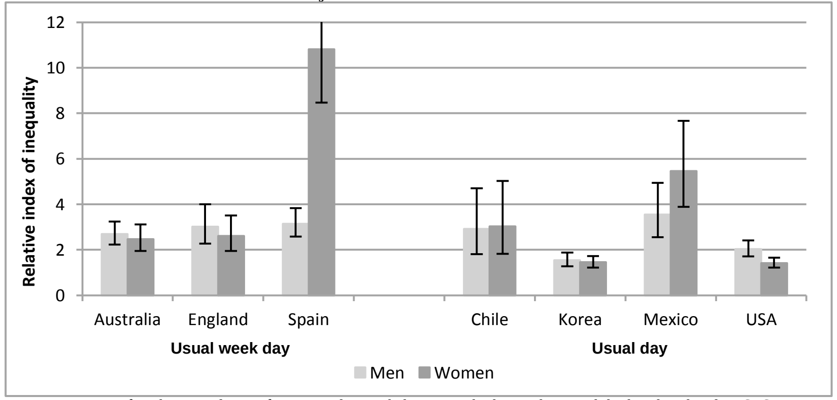
Note: AII>0 signifies that prevalence of insufficient physical activity is higher in those with low rather than high SES. For example, in Australia, prevalence of insufficient physical activity is 25 points higher in men with low rather than high SES. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 29. Relative index of inequality for excess sedentary behaviour by level of education



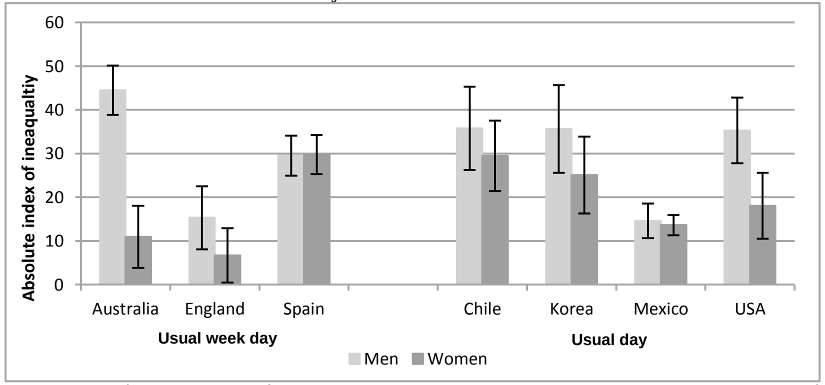
Note: RII>1 signifies that prevalence of excess sedentary behaviour is higher in those with a high rather than low level of education. Excess sedentary behaviour is defined as over seven hours of daily sedentary behaviour. Data refer to ages 18-64. Upper confidence interval truncated for Mexico (12.6). *Source*: OECD analysis of health survey data.

Figure 30. Relative index of inequality for excess sedentary behaviour by socio-economic status



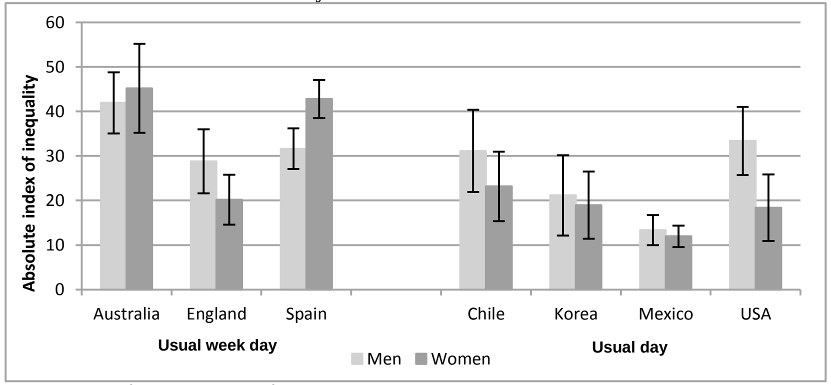
Note: RII>1 signifies that prevalence of excess sedentary behaviour is higher in those with high rather than low SES. Excess sedentary behaviour is defined as over seven hours of daily sedentary behaviour. Data refer to ages 18-64. Upper confidence interval truncated for Spain (13.8). *Source*: OECD analysis of health survey data.

Figure 31. Absolute index of inequality for excess sedentary behaviour by level of education



Note: AII>0 signifies that prevalence of excess sedentary behaviour is higher in those with a high rather than low level of education. For example, in Australia, prevalence of excess sedentary behaviour is 44 points higher in men with a high rather than low level of education. Excess sedentary behaviour is defined as over seven hours of daily sedentary behaviour. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

Figure 32. Absolute index of inequality for excess sedentary behaviour by socio-economic status



Note: AII>0 signifies that prevalence of excess sedentary behaviour is higher in those with high rather than low SES. For example, in Australia, prevalence of excess sedentary behaviour is 42 points higher in men with high rather than low SES. Excess sedentary behaviour is defined as over seven hours of daily sedentary behaviour. Data refer to ages 18-64. *Source*: OECD analysis of health survey data.

3.3. Health behaviours cluster and are associated with socio-demographic factors

81. The latent class analyses were run on the data from Chile, Korea, Mexico, Spain and the United States. The manifest variables included pertain to sufficient physical activity, low sedentarism, and different diet items drawn from the national recommendations. Annex H displays the characteristics of the different LCAs run, with the G^2, AIC, BIC, as well as other fit statistics, for comparison. These analyses were followed by multinomial logistic regressions, to identify the characteristics of each resulting latent class. The number of classes in each country differs as the optimal number was determined by comparing different fit statistics, as well as overall interpretability of the classes.

Box 5. Latent class analysis for policy-making

Latent class analysis allows the clustering of individuals into different classes, based on their behaviours. It is a useful tool for policy-making, as it allows to determine which behaviours occur simultaneously, and which sub-populations display these behaviours (gender, age, socio-economic status, region of residence, etc). As a result, these sub-populations can be specifically targeted by public policies aiming at improving their lifestyle and their well-being. Latent class analysis can be also used to 'fine-tune' the scope of policies already in place by putting particular emphasis on some aspects of the action or by modifying its scope. Overall, well-designed and targeted policies are more effective and efficient.

3.3.1. Diet quality, physical activity and sedentarism cluster together

Box 6. Latent class analysis: summary of main results

The latent class analysis allowed to classify individuals into groups depending on their health behaviours. In the five countries studied, a model with either three (in two countries) or four (in three countries) latent classes was found to be optimal. Summarizing the results across countries must be done with care, as the items in the analysis differ by country. However, overall, each country-level model includes:

- one class containing individuals with a high quality diet and high levels of physical activity
- one class containing individuals with a low quality diet and high levels of physical activity
- one class containing individuals with a low quality diet and low levels of physical activity
- one class which differs according to the country

82. Figures 33 to 37 represent the item-response probabilities of the chosen model for each country. The probabilities displayed represent the probability of a member of a given latent class to meet or exceed the recommendations in terms of diet, PA and SB. For instance, if the item-response probability for fruit and vegetable consumption in class 1 is 0.8, then there is an 80% chance that a member of class 1 consumes at least the recommended minimum amount of fruit and vegetables (a high probability is a positive outcome). If the item-response probability for soft drinks and sweets in class 2 is 0.8, then there is an 80% chance that a member of latent class 2 consumes the recommended amount or more (a high probability is a negative outcome). The item-response probability

for high PA represents the probability of meeting the WHO recommendations for PA or exceeding them, and the item-response probability for low SB represents the probability of performing less SB than the recommended maximum (high probabilities are positive outcomes). In each country, class 1 represents individuals displaying the healthiest behaviours overall, and class 3 those displaying the least healthy behaviours.

83. In Chile, the final LCA model has three classes (Figure 33). The BIC and CAIC indicate that this model fits the data best, as these indicators increase for the model with four classes (Table H.1). Furthermore, the percentage of seeds associated with the best fitting model decreases from 52.2% for this model to 28% for the model with an extra class, lowering the probability that it reaches a global maximum. The three classes are easily distinguishable: the first presents a good quality diet and high levels of PA, the second displays a lesser quality diet while maintaining good PA levels, and the third presents a low quality diet and very low PA.

84. The first latent class represents approximately 14% of respondents. Consumption of fruit and vegetables, cereals, fish and dairy are highest of all three classes. Although the indicators for high PA and low SB aren't the highest, rates remain good. The second class represents 82% of individuals, making it the largest class of the three. Those in this category display low quality diet, with the lowest consumptions of fruit and vegetables, cereals, and dairy, but the highest levels of PA, and the lowest SB. Finally, class 3 represents only 4% of the sample. Although consumptions of fruit and vegetables, cereals, and dairy aren't the lowest, PA is non-existent, and excess SB is prevalent among virtually all members

85. Overall, the sample for Chile presents high levels of physical activity and low levels of sedentarism, but unhealthier diet habits.

86. The final LCA model for Korea is made of four classes (Figure 34). This model was chosen because of the composition of the resulting classes, which display more variation in PA relative to the model with three classes, which displays lower fit statistics but less distinctive classes. The increase in BIC and CAIC between the model with three classes and the model with four classes remains low (Table H.2).

87. The first latent class contains 23% of the population. It has the smallest amounts of people exceeding the daily recommendations for energy, protein, fibre and sodium. PA is low, and SB is high. The second latent class is the most populated, with 37% of the sample, and is the opposite of the first. Those in this class display the highest consumptions of all food items: fibre levels are very high, but so are sodium, protein and energy levels. PA and SB are acceptable. The third class is the least populated, with only 8% of the sample. Here, excess energy and fibre consumption are low, but protein and sodium intake are high. Furthermore, PA is the lowest of all classes, with only 21% of those in this class meeting the WHO recommendations, and SB is very high, as virtually all members exceed seven hours/day. The final class contains 32% of the sample. This class displays high intakes of protein, fibre and sodium, and low levels of energy intake. PA is the highest, and SB the lowest amongst all classes.

88. In the Korean sample overall, sodium and protein intakes are high, while excess energy intake is low. Physical activity is insufficient, and sedentarism is excessive.

89. The LCA model chosen for Mexico has three classes (Figure 35). The BIC and CAIC indicate that this is the optimal number of classes for the data, and the classes were more easily interpreted than in the case of the model with four classes. The entropy and percentage of seeds associated with the best fitting model are high (Table H.3). The

characteristics of the three latent classes are comparable to those for Chile. One of the classes displays high levels of physical activity as well as a good quality diet, while another displays similar levels of PA and SB, with a lesser quality diet. Finally, the third class exhibits low levels of PA, high levels of SB, and a low quality diet.

90. The first latent class contains about 13% of the sample. Fruit and vegetable consumption is far above those in the two other classes, and consumptions of other foods are all highest also. Those in this class are most physically active, and excess SB is very low. The second class represents 82% of the population, making it the largest. On the one hand, those in this class display poor diet quality, as consumptions of fruit and vegetables as well as cereals/pulses are low. On the other hand, PA levels are high, and excess SB affects only a very small portion of the class. The third and final class contains only 5% of the sample. Diet is unhealthy, with the lowest consumption of cereals/pulses and low consumption of fruit and vegetables. Furthermore, PA is lowest, and SB is highest.

91. Overall, the Mexican sample reports high levels of PA and low levels of SB, coupled with unhealthier dietary habits.

92. The Spanish LCA model is made up of four classes (Figure 36). This model had the highest percentage of seeds associated with the best fitted model (Table H.4). It is the most easily interpreted, despite the model with five classes presenting better fit statistics. Diet quality varies mostly through consumption of cereals, dairy, meat/eggs and soft drinks/sweets, while consumption of fish and FV (Fruit and Vegetables) is low for all classes. Additionally, none of the classes display extremely low levels of PA or high levels of SB, unlike some other countries.

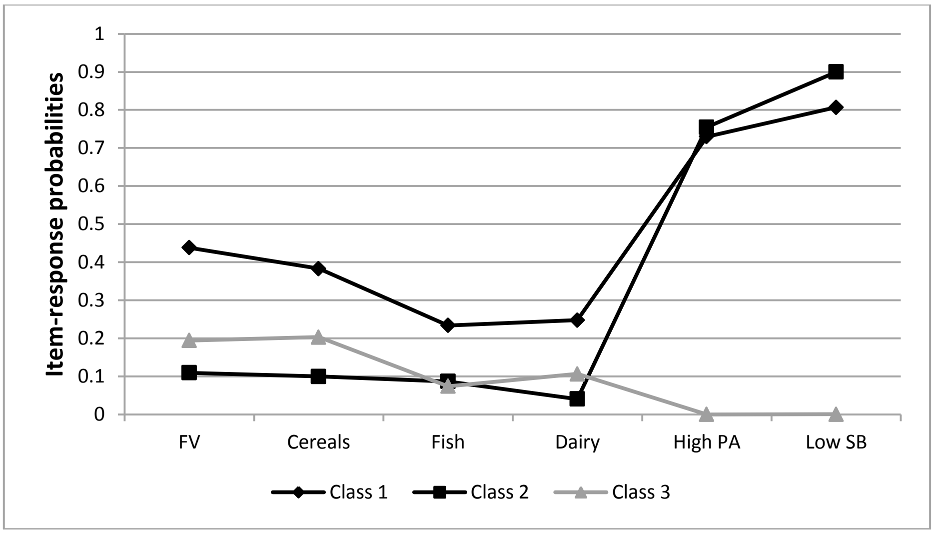
93. The first class contains 26% of the population. FV consumption is highest of all, while consumption of meat/eggs and soft drinks/sweets are lowest. PA and SB are good, as nearly 80% of those in this class meet the recommendations. The second latent class contains 30% of the sample. This class is characterized by low levels of FV and fish consumption, but higher levels for cereals and dairy. Consumptions of meat/eggs and soft drinks/sweets are high. PA levels are lowest, and excess SB is highest. The third latent class contains 8% of the population. Virtually no members of this class meet the recommendations for FV, fish, cereals or dairy, but they consume large amounts of meat and eggs, and soft drinks and sweets. Nevertheless, PA levels remain acceptable, and excess SB is low. The fourth and final class is the largest, with 36% of the sample. The patterns of consumption in this class are very similar to those in class 2, only slightly higher overall, except for meat/eggs and soft drinks/sweets. However, PA and SB are the best of the four classes, as over 90% of those in this class adopt the healthy behaviours.

94. The final LCA model for the United States has four classes (Figure 37). At 92%, the percentage of seeds associated with the best fitted model is very high (Table H.5). This is also the model most easily interpretable, as the classes get more complicated as of five. Fibre intake is low across the board, while sodium intake is high, and classes are mostly distinguished by differences in PA and SB, as well as energy intake.

95. The first latent class is the largest, with 42% of the sample. Excess energy intake is low, although cholesterol/fat, sodium and protein intakes are high. Fibre intake is very low. PA and SB are the best of all classes, with levels equal to those in class 2. The second latent class contains 31% of the sample. PA and SB levels are the same as class 1; however, members of this class are bigger eaters than members of class 1. All members consume at least the recommended energy and sodium intake, and cholesterol/fat as well as protein intakes are also very high. Fibre intake is the highest of all classes. The third

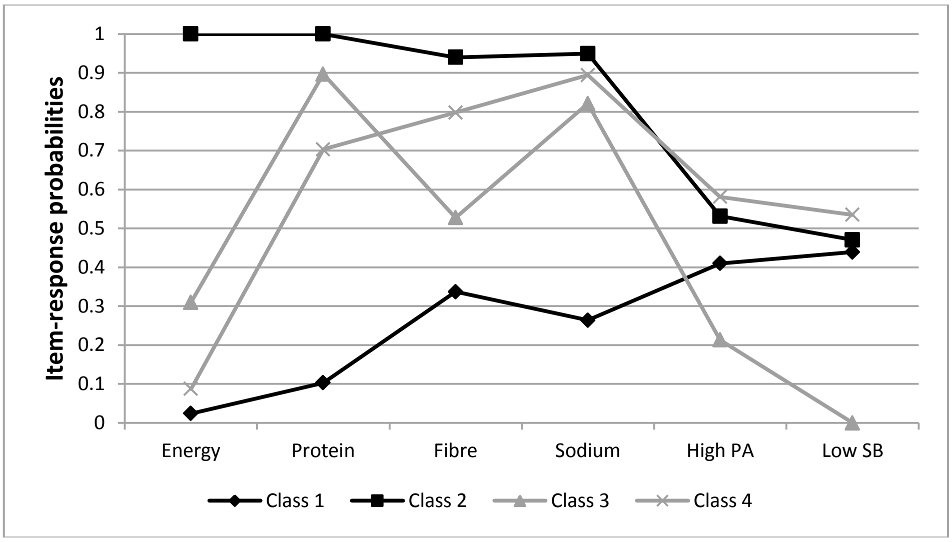
class contains 15% of the population. Intakes for cholesterol/fat, sodium and protein are high, and fibre consumption remains low. All members of this class display excessive SB and none meet the recommendations for PA. The last class is the smallest, with 12% of the population. Members of this class have the lowest intakes for all food items, and display low levels of PA and high levels of SB.

Figure 33. Probabilities of health behaviours for Chile



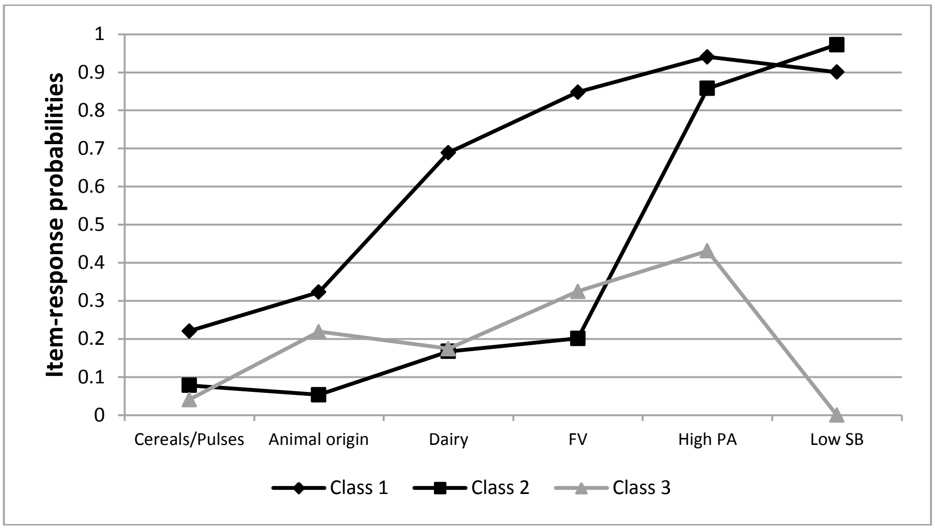
Note: The item-response probabilities are the probabilities that an individual in a given class meets or exceeds the recommendation for food consumption, physical activity, or low sedentarism. *Source*: OECD analysis of health survey data.

Figure 34. Probabilities of health behaviours for Korea



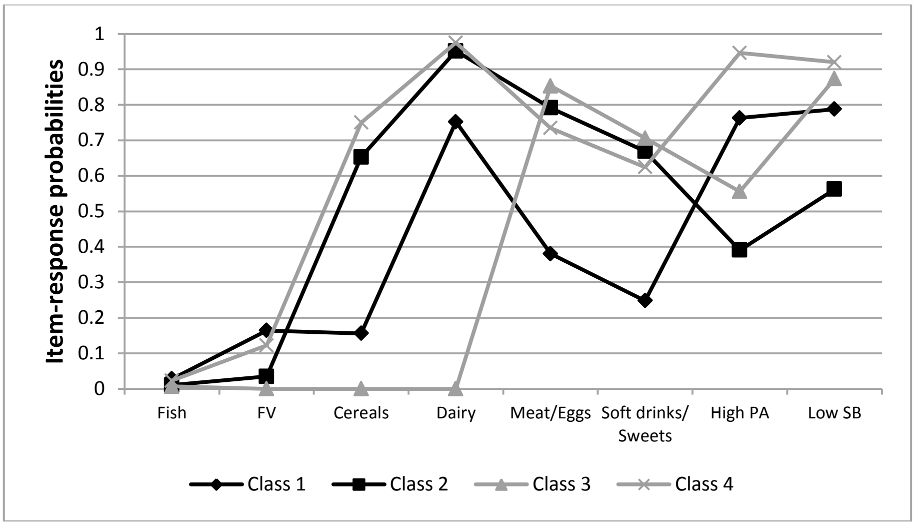
Note: The item-response probabilities are the probabilities that an individual in a given class meets or exceeds the recommendation for food consumption, physical activity, or low sedentarism. *Source*: OECD analysis of health survey data.

Figure 35. Probabilities of health behaviours for Mexico



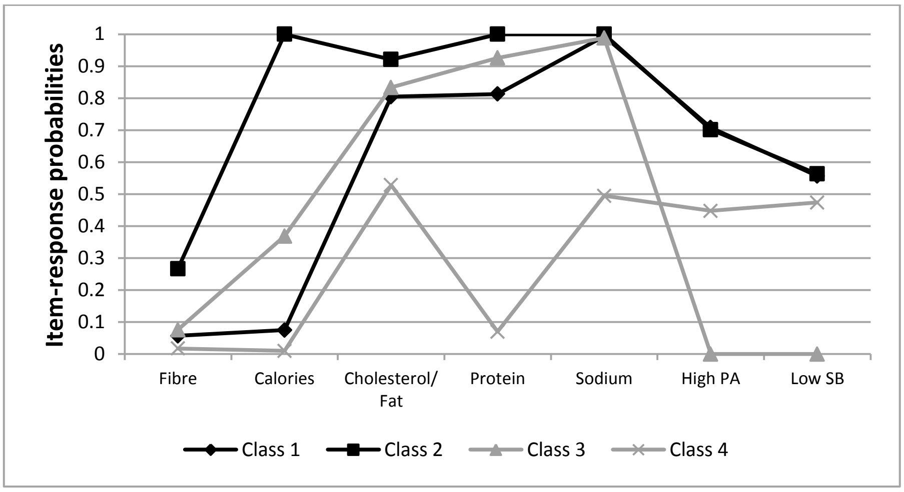
Note: The item-response probabilities are the probabilities that an individual in a given class meets or exceeds the recommendation for food consumption, physical activity, or low sedentarism. *Source*: OECD analysis of health survey data.

Figure 36. Probabilities of health behaviours for Spain



Note: The item-response probabilities are the probabilities that an individual in a given class meets or exceeds the recommendation for food consumption, physical activity, or low sedentarism. *Source*: OECD analysis of health survey data.

Figure 37. Probabilities of health behaviours for the United States



Note: The item-response probabilities are the probabilities that an individual in a given class meets or exceeds the recommendation for food consumption, physical activity, or low sedentarism. *Source*: OECD analysis of health survey data.

3.3.2. Health behaviours are associated with specific socio-demographic characteristics

Box 7. Multinomial regressions: summary of main results

Overall, men with higher socio-economic characteristics (SES, education) are more likely to belong to the latent classes exhibiting the least healthy behaviours, except in the United States:

- In Chile, men aged under 20 or over 60, with low education or high SES are more likely to be in the latent class with the least healthy behaviours. Men over the age of 35 are more likely to be overweight, while women aged 50-64 are more likely to be obese.
- In Korea, men aged 50-64 with medium or higher levels of education and SES are most likely to be in the latent class displaying the least healthy behaviours, while men over 35 are more likely to be overweight, and being obese is not characterized by any variables included in the study.
- In Mexico, men with high education or high SES are more likely to be in the latent class presenting the least healthy behaviours, and women over the age of 35 are more likely to be obese.
- In Spain, men with medium or high SES or education, living in large cities, are more likely to belong to the latent class exhibiting the least healthy behaviours. Men over the age of 50 are more likely to be obese or overweight.
- In the United States, white women over the age of 50, who are overweight or obese, are at highest risk of being in the latent class with the least healthy behaviours. Non-white people are more likely to be overweight or obese.

Results for unhealthy diet, low physical activity/high sedentarism, overweight, and obesity are more variable depending on the country.

96. In each country, the latent class whose members display the least healthy behaviours (class 3) was chosen as the reference in the regressions.

Chile

97. In Chile, class 3 displays low consumption of fruit and vegetables and cereals, low PA, and high SB. Those in class 1 display the healthiest behaviours (high consumption of healthy foods, high PA and low SB), while those in class 2 are located between the two (high PA and low SB but low consumption of healthy foods).

98. In Chile, women are more likely to be in class 1 rather than class 3 (Figure 38), while gender has no significant effect on membership to class 2 relative to class 3. Those with low education are less likely to be in class 1 rather than class 3, but having a high level of education has no effect. Similarly, having low SES is not statistically significant, but those with high SES are more likely to be in class 3 rather than class 2. Living in a rural or urban environment has no effect. Those under the age of 20 are more likely to be in class 3 rather than classes 1 or 2 (Table I.1), and those over 65 are also more likely to be in class 3 relative to class 2. Weight status has no statistical effect on latent class membership in Chile.

99. On the whole, men aged under 20 or over 65, with low education or high SES are more likely to display the least healthy behaviours.

100. Women are less likely to be overweight and more likely to be obese rather than normal weight, relative to men (Figure 39). Education and SES are not significant in determining weight status. Those living in Tarapacá are more likely to be overweight, while those living in Atacama and Aysén are more likely to be both overweight or obese rather than normal weight. Latent class membership has no statistically significant effect on weight status in Chile (Table I.2). Those aged under 35 are more likely to be of normal weight rather than overweight or obese, and those aged 50-64 are more likely to be obese rather than normal weight. Residence in regions other than Tarapacá, Atacama or Aysén is not statistically significant.

101. Overall, individuals aged 35 or more are more likely to have a weight problem, as well as those living in Tarapacá, Atacama or Aysén. Men are more likely to be overweight, while women are more likely to be obese.

Korea

102. In Korea, those displaying the least healthy behaviours (class 3) display sodium and protein intakes which exceed the recommendations, low fibre consumption, and high physical inactivity. Class 1 displays low excessive intakes of energy, protein, fibre and sodium, and average PA. The second class contains the “big-eaters”, with high food intakes, and acceptable PA and SB. Those in class 4 present the highest levels of PA, and high intakes of all nutrients but energy.

103. Figure 40 shows that women as well as individuals with low SES or education are more likely to be in classes 1 or 4 rather than class 3. Having higher levels of SES has no statistically significant effect, while those with a high level of education are more likely to be in class 3 rather than classes 2 or 4. Those living in a rural area are more likely to be in class 3 rather than class 1. People under the age of 20 are less likely to be in class 3 than in any other class (Table I.3). People aged 50 to 64 are more likely to be in class 3 rather than classes 1 or 2, while those aged under 35 or over 65 are more likely to be in class 4 relative to class 3. Weight status has no significant effect on latent class membership.

104. On the whole, men aged 50-64 with medium or higher levels of education and SES are most likely to exhibit unhealthy behaviours. Women with lower socio-economic characteristics are more likely to be in classes 1 or 4.

105. Women, as well as people with higher levels of education or SES are more likely to be normal weight rather than overweight (Figure 41). Conversely, those with a low level of education are more likely to be overweight. None of these variables are statistically significant for obesity. Those aged under 20 are more likely to be normal weight rather than overweight (Table I.4). Latent class membership has no effect neither on overweight nor on obesity.

106. Overall, men with lower levels of education and SES are most at risk of being overweight, while no socio-economic characteristics seem to significantly impact being obese in Korea.

Mexico

107. In the model for Mexico, the overall pattern is similar to the one in Chile: one class with high consumption of healthy foods, high PA and low SB (class 1), one class with low consumption of healthy foods, but high PA and low SB (class 2), and one class with low consumption of healthy foods, low PA and high SB (class 3).

108. In Mexico, women are more likely to be in classes 1 or 2 rather than 3 (Figure 42). Individuals with high education or SES are more likely to be in class 3 rather than class 2. Low education or SES, as well as the typology of the area of residence, age, and weight status, have no significant impact on class membership (Table I.5).

109. Overall, men with high education and SES are more likely to display unhealthy behaviours.

110. Women are more likely to be obese rather than normal weight (Figure 43), while individuals with a high level of education are less likely to be overweight or obese. Those living in a rural area are also less likely to be obese rather than normal weight. Those aged 20-34 are less likely to be overweight or obese relative to those aged 35-49 (Table I.6). SES and latent class membership have no statistical effect on weight status.

111. Overall, women over the age of 35 with average education are more likely to be overweight/obese.

Spain

112. In the Spanish sample, the third class displays low consumptions of fish, FV, cereals and dairy exceeding the recommendations, high intakes of meat/eggs and soft drinks/sweets, acceptable levels of PA, and low levels of SB. The other classes display higher levels of fish, FV, cereals and dairy consumption, and lower intakes of meat/eggs and soft drinks/sweets. The first class has the highest intake of FV, and the lowest consumption of excess meat/eggs and soft drinks/sweets. Class 2 has high levels of food consumptions, the lowest PA and highest SB, while class 4 displays the highest PA and lowest SB.

113. Women in Spain are more likely to be in any latent class but the third (Figure 44). Individuals with a low level of education are more likely to be in latent class 3 rather than 4, while a high level of education has no effect on the outcome. Those with high SES are more likely to be in classes 1 or 2, but having low SES is not statistically significant for any of the classes. People living in a large city are more likely to be in class 3 rather than classes 2 or 4. Those under the age of 20 are more likely to belong to class 2 but less

likely to belong to class 4 rather than class 3 (Table I.7). People over the age of 65 are more likely to belong to classes 1 or 4, and those aged 50 to 64 are more likely to belong to class 1 also.

114. Overall, men with average SES and education, living in large cities are most likely to present unhealthy behaviours.

115. Women as well as those with a high level of education or living in a big city are more likely to be normal weight rather than obese or overweight (Figure 45). Those with high SES are less likely to be obese, while individuals with a low level of education are more likely to be obese. People under the age of 35 are less likely to be overweight or obese, while those over the age of 50 are more likely to be overweight or obese, relative to those aged 35-49. (Table I.8).

116. On the whole, men over the age of 50 with lower levels of education and living in smaller cities are most likely to be overweight/obese.

The United States

117. In the United States model, the third class contains individuals displaying high levels of excess cholesterol/fat, protein and sodium consumption, as well as the lowest levels of PA and highest levels of SB. The other classes present higher PA but mostly high consumptions of sodium, protein, and cholesterol/fat. Class 1 displays relatively lower consumptions of calories, cholesterol/fat and protein, and has the highest levels of PA, tied with class 2. Class 2 displays the highest consumption of fibre and all other nutrients. Class 4 contains those who eat the least; they also perform less PA and are more sedentary than classes 1 and 2.

118. In the United States, women are more likely to be in class 3 rather than classes 1 or 2 (Figure 46). Individuals with a low level of education are more likely to be in class 1 rather than class 3, and those with high SES are more likely to be in class 3 rather than class 2. Having a high level of education or low SES has no significant effect on class membership. Non-Hispanic black people are more likely to be in class 4, while Mexican-American people are more likely to be in classes 1 or 2. Those aged 20-34 are more likely to be in class 1 rather than 3 (Table I.9), while those aged over 65 are more likely to be in class 3 rather than 2, and those aged 50 to 64 are more likely to be in class 3 rather than 4. People who are overweight or obese are more likely to be in class 3 rather than classes 1 or 2, and those who are obese are more likely to be in class 3 rather than 4.

119. Overall, non-Hispanic white women or women of other ethnicities over the age of 50 with weight problems are more likely to present unhealthy behaviours.

120. Women are less likely to be overweight rather than of normal weight (Figure 47). People with medium SES are more likely to be obese, while level of education has no significant effect on weight status. Mexican-American people are more likely to be overweight or obese, non-Hispanic black people are more likely to be obese, and those of other ethnicities are more likely to be of normal weight relative to non-Hispanic white people. People in latent classes 1 or 2 are less likely than those in class 3 to be overweight or obese and those in latent class 4 are less likely to be obese (Table I.10). People aged 20 to 34 are also less likely to be overweight or obese.

121. On the whole, Mexican-American or non-Hispanic black people, with medium SES and in latent class 3 are more likely to be overweight or obese.

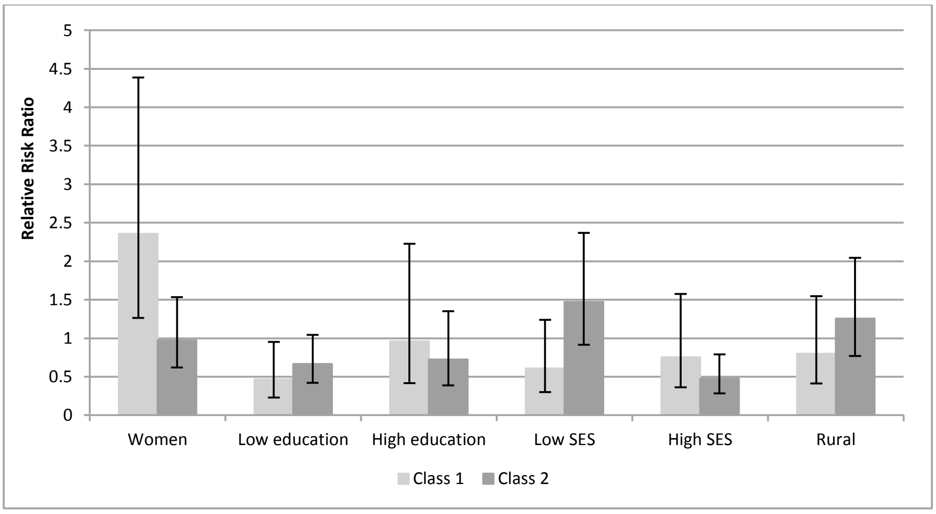
122. The following table displays the main characteristics of those displaying unhealthy behaviours in each country as well as the characteristics of overweight or obese people :

Table 7. Men with higher socio-economic characteristics are more likely to display unhealthy behaviours

	Latent class exhibiting the least healthy behaviours	Low quality diet	Low PA/High SB	Overweight	Obese
Chile	Men, under 20 or over 65, with low education, high SES	Aged 35-49, with low or medium SES	Men, under 20 or over 65, with low education, high SES	Men, aged over 35, living in Tarapacá, Atacama or Aysén	Women, aged 50-64, living in Atacama or Aysén
Korea	Men, aged 50-64, with medium or high education or SES	Aged under 20 with medium education	Women aged under 20 with low SES and education, living in an urban area	Men over 35, low or medium SES, low education	-
Mexico	Men, with high education, high SES	Women with low or medium SES or education	Men, with high education, high SES	Aged over 35, with low or medium education	Women, aged over 35, low or medium education, living in metropolitan areas
Spain	Men, with low or medium SES or education, living in large cities	Women with higher SES or education, living in a small city	Women aged under 20 with high SES, living in a small city	Men, over the age of 50, low or medium education, living in small cities	Men, over the age of 50, with low education, living in small cities
USA	Women, non-Hispanic white or other ethnicities, over the age of 50, overweight or obese	Men aged 20-34, Mexican-American, with low education and normal weight	Women, non-Hispanic white or other ethnicities, over the age of 50, overweight or obese	Men, Mexican-American, class 4	Non-Hispanic black or Mexican-American, over the age of 35, medium SES, class 4

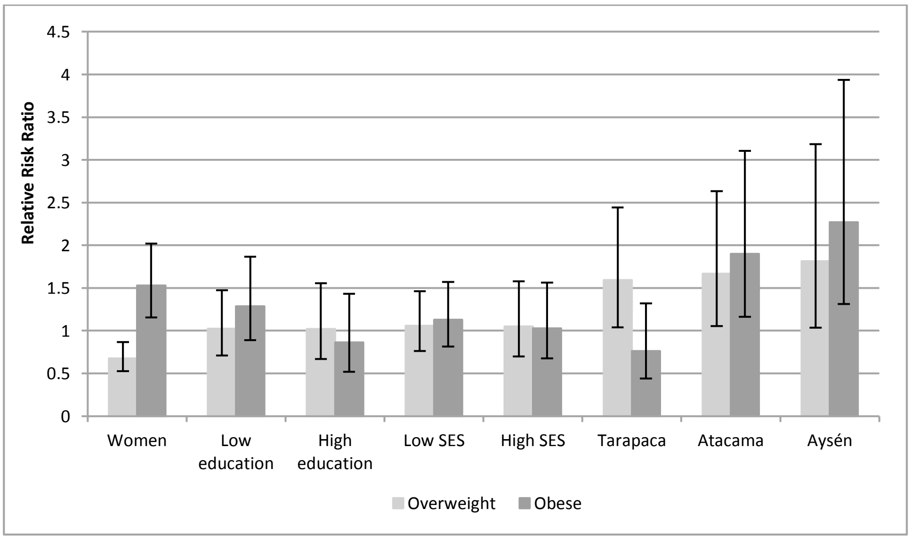
Note: The cell for obesity in Korea is empty because no variables were statistically significant. Overweight is defined as 25 $kg/m^2 \leq BMI<30\ kg/m^2$, obesity is defined as $BMI>30\ kg/m^2$.

Figure 38. Relative Risk Ratios for multinomial logistic regression on latent class membership in Chile



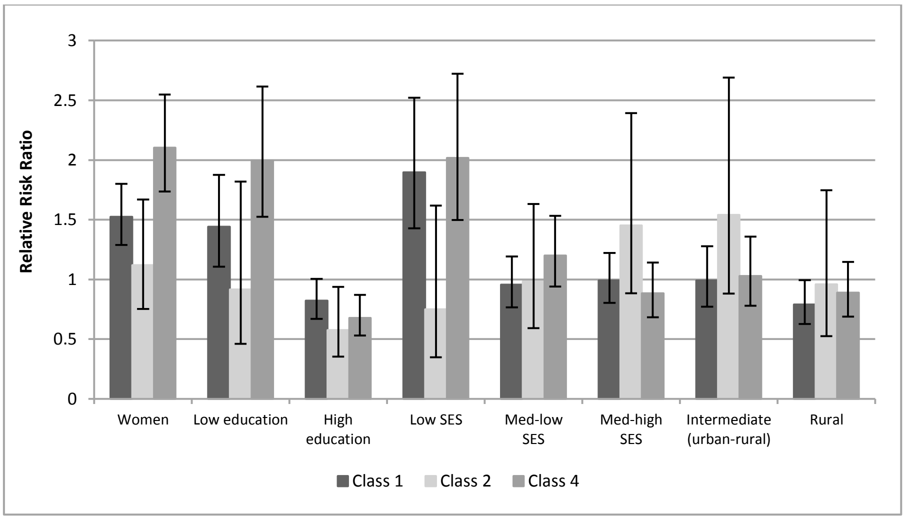
Note: Reference category is class 3 (the class considered with the unhealthiest behaviours). RRR>1 signifies that those in this category of the population are more likely to belong to a specific latent class relative to the reference: women are 2.4 times more likely than men to be in class 1 rather than class 3. *Source:* OECD analysis of health survey data.

Figure 39. Relative Risk Ratios for multinomial logistic regression on weight status in Chile



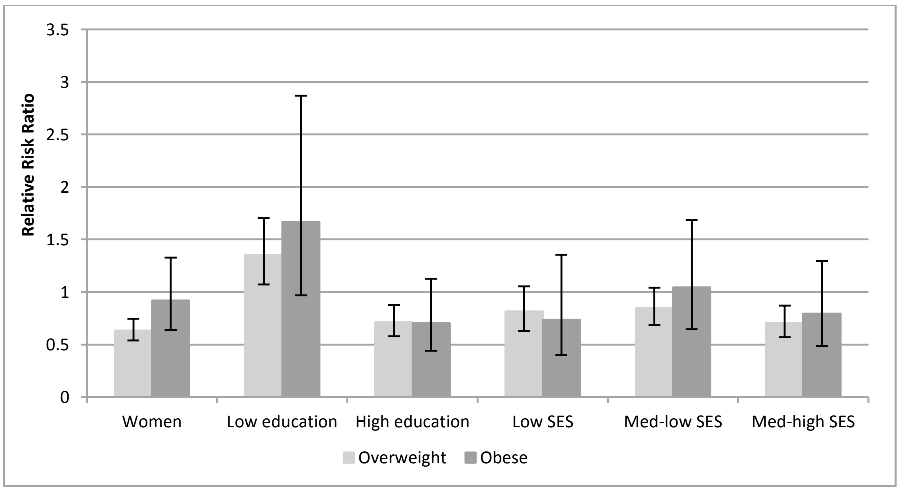
Note: Overweight was defined as 25≤BMI<30, obesity was defined as BMI≥30. Only the statistically significant regions are displayed. Reference category is BMI<25. RRR>1 signifies that those in this category of the population are more likely to be overweight/obese rather than the reference: women are 1.5 times more likely than men to be obese rather than normal weight. *Source*: OECD analysis of health survey data.

Figure 40. Relative Risk Ratios for multinomial logistic regression on latent class membership in Korea



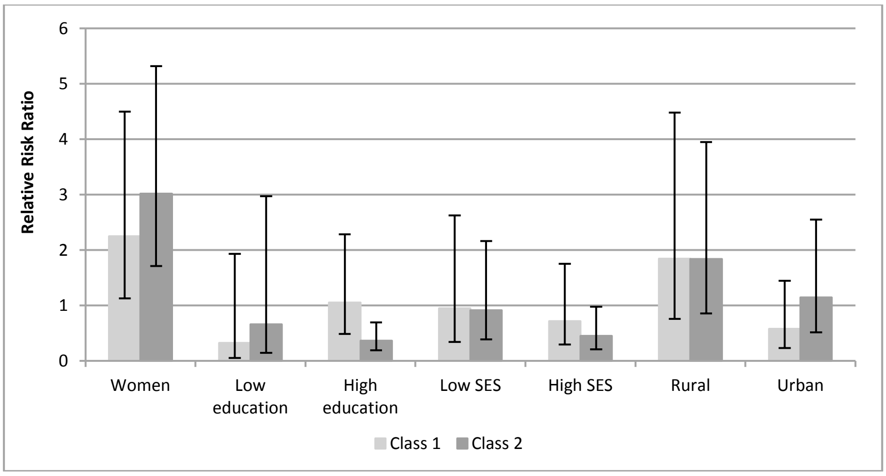
Note: Reference category is class 3 (the class considered with the unhealthiest behaviours). RRR>1 signifies that those in this category of the population are more likely to belong to a specific latent class relative to the reference: women are 1.5 times more likely than men to be in class 1 rather than class 3. *Source*: OECD analysis of health survey data.

Figure 41. Relative Risk Ratios for multinomial logistic regression on weight status in Korea



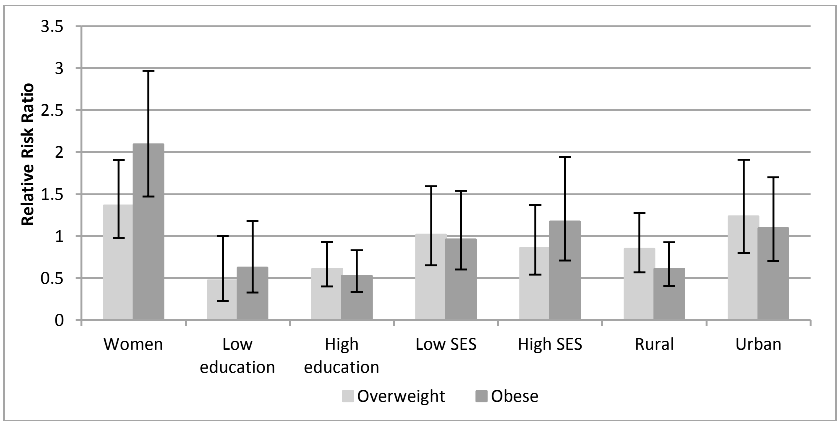
Note: Overweight was defined as 25≤BMI<30, obesity was defined as BMI≥30. Reference category is BMI<25. RRR>1 signifies that those in this category of the population are more likely to be overweight/obese rather than the reference: people with a low level of education are 1.4 times more likely than those with a medium level of education to be overweight rather than normal weight. *Source*: OECD analysis of health survey data.

Figure 42. Relative Risk Ratios for multinomial logistic regression on latent class membership in Mexico



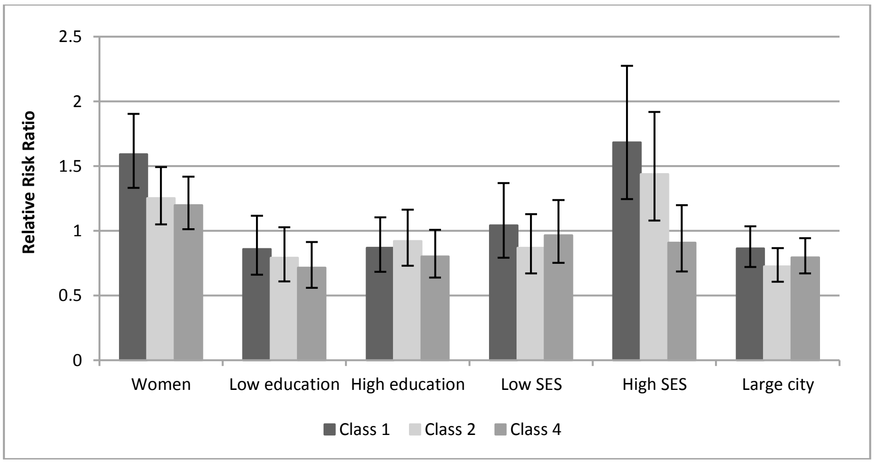
Note: Reference category is class 3 (the class considered with the unhealthiest behaviours). RRR>1 signifies that those in this category of the population are more likely to belong to a specific latent class relative to the reference: women are 2.3 times more likely than men to be in class 1 rather than class 3.
Source: OECD analysis of health survey data.

Figure 43. Relative Risk Ratios for multinomial logistic regression on weight status in Mexico



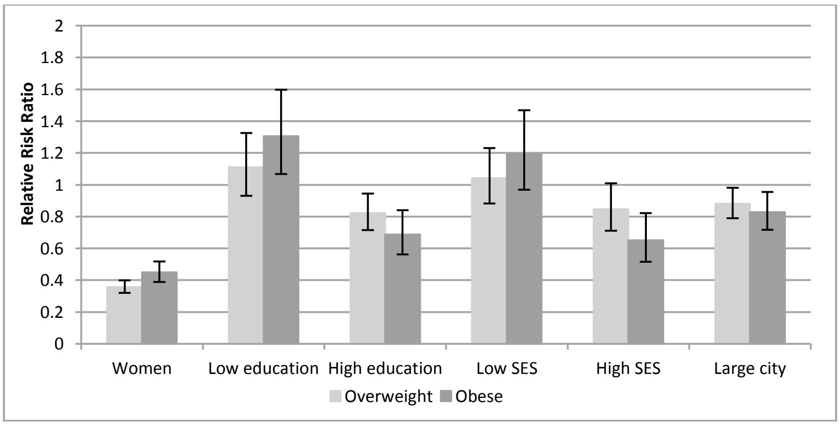
Note: Overweight was defined as 25≤BMI<30, obesity was defined as BMI≥30. Reference category is BMI<25. RRR>1 signifies that those in this category of the population are more likely to be overweight/obese rather than the reference: women are 2.1 times more likely than men to be obese rather than normal weight.
Source: OECD analysis of health survey data.

Figure 44. Relative Risk Ratios for multinomial logistic regression on latent class membership in Spain



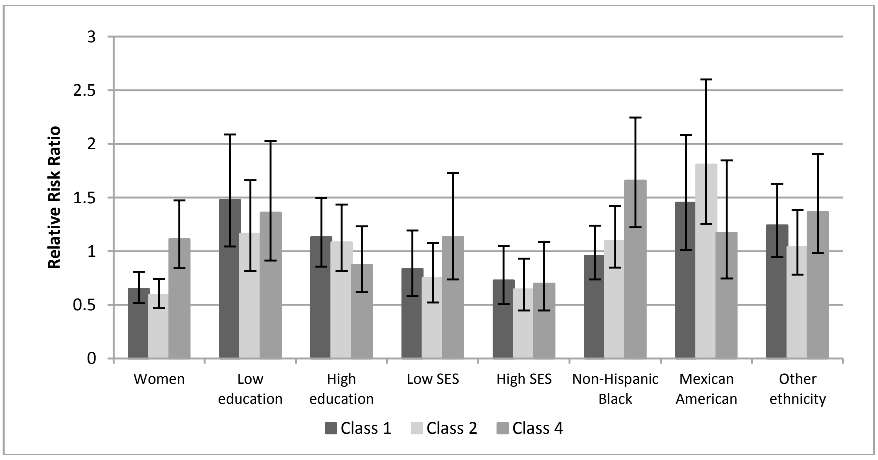
Note: Reference category is class 3 (the class considered with the unhealthiest behaviours). RRR>1 signifies that those in this category of the population are more likely to belong to a specific latent class relative to the reference: women are 1.6 times more likely than men to be in class 1 rather than class 3.
Source: OECD analysis of health survey data.

Figure 45. Relative Risk Ratios for multinomial logistic regression on weight status in Spain



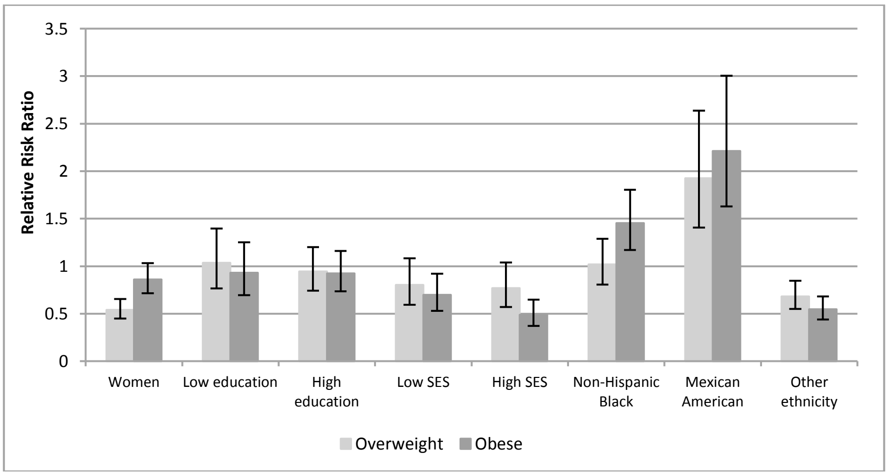
Note : Overweight was defined as 25≤BMI<30, obesity was defined as BMI≥30. Reference category is BMI<25. RRR>1 signifies that those in this category of the population are more likely to be overweight/obese rather than the reference: people with a low level of education are 1.3 times more likely than those with a medium level of education to be obese rather than normal weight.
Source : OECD analysis of health survey data.

Figure 46. Relative Risk Ratios for multinomial logistic regression on latent class membership in the United States



Note: Reference category is class 3 (the class considered with the unhealthiest behaviours). RRR>1 signifies that those in this category of the population are more likely to belong to a specific latent class relative to the reference: people with a low level of education are 1.5 times more likely than those with a medium level of education to be in class 1 rather than class 3.
Source: OECD analysis of health survey data.

Figure 47. Relative Risk Ratios for multinomial logistic regression on weight status in the United States



Note: Overweight was defined as 25≤BMI<30, obesity was defined as BMI≥30. Reference category is BMI<25. RRR>1 signifies that those in this category of the population are more likely to be overweight/obese rather than the reference: people who are non-Hispanic black are 1.4 times more likely than people who are white to be obese rather than normal weight.
Source: OECD analysis of health survey data.

4. Discussion

Strengths of study

123. A latent class analysis was conducted to determine clusters of individuals who present similar behaviours, and determine their characteristics. Unlike traditional cluster analysis, LCA is a finite mixture model, meaning that it builds clusters using a probabilistic model rather than by calculating a distance (such as in Principal Components Analysis or Multiple Components Analysis). The model therefore possesses goodness of fit statistics, rendering evaluation of the model possible.

124. This study uses nationally representative data from multiple countries displaying a wide geographical range. In LCAs, data are often drawn from small-scale surveys including only a couple hundred of individuals. Here, our sample sizes range from 2,222 observations (Mexico) to 11,955 (Spain) from internationally recognized regular health surveys, representing eleven OECD countries. Following this study, different behavioural groups in each country, as well as their characteristics, can now be distinguished.

Limitations of study

125. The dietary, physical activity and sedentary behaviour data used in this study are self-reported, meaning they were not retrieved through measure. The dietary data were collected through 24-hour recalls (Korea and the United States) or food frequency questionnaires (Chile, England, Italy, Mexico, and Spain). The physical activity data were retrieved either through the GPAQ (United States) or similar questions. The sedentarism data were retrieved through questions such as "Total minutes spent sitting at work on a usual day".

126. Self-reported dietary data have been subject to controversies. Findings from 24-hour recalls or multiple-day diary records show a poor correlation with annual food frequency questionnaires, and it is assumed that 24-hour recalls underestimate intake (Forouzanfar et al., 2015[65]). This method mainly suffers from the difficulty in remembering foods consumed and estimating quantities (Subar et al., 2015[66]). Food frequency questionnaires may also suffer from recollection bias. When recalling to an interviewer the foods and quantities consumed, there is a potential desire to present oneself positively (social desirability bias) through under-reporting. These drawbacks hold for self-reported physical activity and sedentarism data: physical activity behaviour may be unremarkable, intermittent, or incidental, and therefore difficult to remember (Atkin et al., 2012[67]). Furthermore, the sedentary item in the IPAQ, for example, has generally been shown to have moderate reliability but moderate to poor convergent validity when compared with objectively measured sedentary behaviour by accelerometry. Increase of obesity and overweight has also lead to an environment in which poor diet or insufficient physical activity are stigmatized. Nevertheless, under-reporting of the nutrients used in our study has been shown to be low (Subar et al., 2015[66]), and self-reported data on physical activity and exercise have shown a clear association between increased physical activity and several health benefits (Physical Activity Guidelines Advisory Committee, 2008[31]).

127. Measuring these dietary and physical activity behaviours would resolve the self-report issue. Dietary data can be retrieved objectively using doubly labelled water for measuring energy intake, or through other recovery biomarkers for other nutrients (Freedman et al., 2014[68]; Freedman et al., 2015[69]). However, these methods remain expensive. Physical activity and sedentarism can be measured through tools such as pedometers, posture monitors, accelerometers, heart-rate monitors or armbands, but just like self-report, they have their own disadvantages (Sylvia et al., 2014[70]; Atkin et al., 2012[67]). All in all, self-reported data must be interpreted with caution, as misreporting does occur. Despite that, self-report questionnaires remain cost-effective, readily accessible to the majority of the population, and have a relatively low participant burden (Atkin et al., 2012[67]). They are especially the simplest solution when used in the larger context of an all-encompassing health survey, as is the case with the surveys used in our study. As suggested by relevant literature in the field, we also minimized the effect of self-reporting bias by using data to assess differences across population groups and to examine trends over time, rather than by using this data in absolute terms (Mitka, 2013[71]).

128. Three different diet indexes were used throughout this paper: the first was based on daily intake of eight nutrients; the second was based on daily consumption of different types of fat, bread, and fruit and vegetables (Healthy Food Index); and the third was based on daily intake of a number of food items, split into “beneficial” and “detrimental” categories (Mediterranean Diet Score). These three indexes all have the same objective, which is to measure diet quality. However, they do so in very different ways, as the foods included, the cut-off values used, and the final score range vary greatly. The MDS has received increased attention in recent years, as it has been linked to reductions in cardiovascular disease, certain types of cancer, and overall mortality (Sofi et al., 2013[72]; Waijers, Feskens and Ocké, 2007[62]). Although less widely-used and renowned, the HFI, which was used for assessing diet score in England, is also associated with better cardio-vascular and overall survival (Osler et al., 2001[30]). These different scores allow us to determine diet quality within a country, and compare countries using the same scores. However, we do not recommend comparing diet quality between countries using different scores, as they do not assess behaviours in the same way.

129. The latent class analysis was conducted using the national dietary guidelines from the countries studied. The data provided by the surveys didn’t contain all the variables necessary to fully test adherence to the recommendations. For instance, the survey for Chile didn’t include information on pulses consumption and the survey for Spain was missing consumption of olive oil and dried fruit, while the national guidelines for these countries include those items. Nevertheless, we believe sufficient variables were included to correctly assess diet quality.

130. Some of the weaknesses of the study are visible in the results. Hungary, Korea and the United States are the only countries for which daily fruit and vegetable consumption was computed from daily fibre intake (dietary fibre for Hungary and the United States, crude fibre for Korea). These countries are also the only three for which prevalence of consumption of five fruit and vegetables per day is higher in men than in women, and for which the gap in relative inequalities for diet score between men and women are the highest (Korea and the United States). This may be a coincidence, or it may be due to the data used. Furthermore, the prevalences of excess SB differ greatly between countries. These variations may be due to different interpretations due to cultural differences, or to the self-report issues mentioned previously.

Policy implications

131. In a policy perspective, the at-risk populations identified should be targeted by interventions. In recent years, OECD countries have been implementing public policies encouraging a healthy lifestyle. These policies include fiscal and pricing measures, transport policies, product reformulation, school-based and worksite interventions, and more (OECD, 2017[3]). Communication policies, such as food labelling, mass media and social media campaigns, have been shown to have some impact. Very often, however, these types of measures do not focus on specific population groups but rather target indistinctly the whole population.

132. Findings from this analysis support the implementation of more refined policy actions to target specific unhealthy behaviours in different population groups, defined by gender, age group, socio-economic status and, to some extent, place of residence. For example, women are in general less likely to meet a sufficient level of physical activity than men. Consequently, interventions to increase the level of physical activity should have a special focus on women and address real (or perceived) barriers to get engaged in physical activity. For example, the Scottish National Agency for Sport identified lack of time and childcare, lack of money or transport, personal safety, and difficult access to facilities among the top causes of low levels of physical activity in women (SportScotland, 2005[73]). Previous OECD work (Sassi et al., 2009[18]) has identified workplace interventions as an effective and cost-effective action to increase the level of physical activity and to tackle NCDs. A further adaptation of this intervention to specifically target women would address many of the barriers mentioned above and may help increase physical activity in women.

133. Further work is needed to understand how policy actions can be adapted to target specific population groups and how the effectiveness of interventions varies across population groups. Analyses presented in this paper provide new insights about the clustering of unhealthy healthcare behaviours. However, with few exceptions (e.g. price measures), there is still limited knowledge about how different population groups respond to the same policy action. Future research should focus on understanding which factors influence the effectiveness of policies across population groups and on how to identify best practices to maximize the cost-effectiveness of interventions.

5. Conclusion

134. Various statistical analyses were run on data relating to diet, physical activity and sedentary behaviour in eleven OECD countries. The results show that diet quality is low in nearly all countries studied, and rates of daily consumption of five fruit and vegetables rarely reach 40%. Physical activity rates are more encouraging, as over 50% of the population reaches the WHO target in all countries studied, although the higher WHO threshold, for which physical activity provides additional health benefits, was not analysed. Excess daily sedentary behaviour (seven hours or more) is high in two of the seven countries studied. Significant socio-economic and gender-based gaps are evident for most of these indicators and in most countries. These inequalities most often disadvantage those with a lower education or SES, who are more likely to consume unhealthy diets, as well as perform insufficient physical activity, except in Chile and Mexico. The inequalities for sedentarism disadvantage those with higher levels of education and SES. The gaps differ for men and women, with inequalities being generally higher in women, although no clear gender-based pattern is discernible across countries.

135. Classes were built to identify the subpopulations with unhealthy behaviours. In Chile and Mexico, three classes were constructed: one class with good quality diet, high levels of physical activity and low levels of sedentarism, one class with a poor quality diet but good levels of physical activity and sedentarism, and one class with a poor quality diet and low levels of physical activity. In Korea, Spain and the United States, the models with four classes were optimal. The patterns in these three countries are less clear-cut, with most latent classes displaying medium to high levels of physical activity, but varying degrees of diet quality.

136. The analyses in this paper have established the sub-populations at highest risk for unhealthy lifestyles in five OECD countries, based on their diet, physical activity, and sedentarism behaviours. Higher socio-economic characteristics appear to be determinant for membership in the latent class with the least healthy behaviours in some countries, which may seem surprising. However, diet quality is not the only item determining a healthy lifestyle included in the LCA. Sedentarism has been shown to be higher in those with higher socio-economic characteristics (Stamatakis et al., 2014[74]; O'Donoghue et al., 2016[75]), which explains why some of the classes displaying the least healthy behaviours are defined by higher socio-economic characteristics.

- In Chile, men under 20 or over 65, with low education and high SES are most at risk for unhealthy diet paired with insufficient physical activity. Men over the age of 35 are more likely to be overweight, while women aged 50 to 64 are more likely to be obese.
- In Korea, men aged 50-64, with medium or high education and SES are most likely to display unhealthy behaviours, by consuming excess protein and sodium, and performing very little physical activity and displaying high amounts of sedentarism. In this country, men over the age of 35, with medium SES and a low level of education are most likely to be overweight.

- In Mexico, men with high SES and education are most likely to present an unhealthy lifestyle, by consuming few healthy foods, and displaying very high levels of sedentarism and low levels of physical activity. Individuals over the age of 35 with low or medium education are most likely to be overweight, while women over the age of 35 with low or medium education, and living in metropolitan areas, are more likely to be obese.
- In Spain, men with low or medium SES or education living in large cities are most likely to belong to the latent class exhibiting the least healthy behaviours, by consuming small amounts of healthy foods, high amounts of unhealthy foods, and performing average levels of physical activity. Men over the age of 50, with low or medium levels of education and living in small cities are more likely to be overweight or obese.
- In the United States, women who are neither Mexican-American nor non-Hispanic black, over the age of 50, and overweight or obese, are most likely to display unhealthy behaviours (high intake of energy, cholesterol, fat, protein and sodium, very low levels of physical activity, and very high levels of sedentarism). Mexican-American men belonging to this latent class are most likely to be overweight. People who are non-Hispanic black or Mexican-American, over the age of 35, have medium SES and belong to the class displaying the least healthy behaviours, are most likely to be obese.

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Annexes

Annex A. Characteristics of the surveys and variables used

Table A.1. Characteristics of the surveys and variables used

	Australia	Canada	Chile	England
Name of survey	National Health Survey (NHS)	Canadian Community Health Survey (CCHS)	Encuesta Nacional de Salud	Health Survey for England (HSE)
Survey years	2001, 2004, 2007, 2011	1994, 2001, 2003, 2005, 2007, 2009, 2011, 2013	2003, 2009	1991-2014 (yearly)
Total number of individuals	88,579	922,251	8,910	348,888
Diet variables	Usual daily serves of vegetables, usual daily serves of fruit	Daily consumption of fruit; daily consumption of vegetables	Consumption of five fruit and vegetables per day (binary); frequency of fruit consumption; frequency of vegetable consumption; frequency of whole grain consumption; frequency of fish consumption; frequency of dairy consumption	Type of spread normally used on bread (1994, 1997, 1998); type of bread usually consumed (1994, 1997, 1998); frequency of vegetable consumption (1994, 1997, 1998, 1999); frequency of fruit consumption (1994, 1997, 1998, 1999); daily vegetable consumption (1993, 1994, 1997, 1998, 1999, 2006, 2007, 2008, 2011, 2013, 2014); daily fruit consumption (1993, 1994, 1997, 1998, 1999, 2006, 2007, 2008, 2011, 2013, 2014); daily amount of butter (1999, 2006, 2007, 2008); type of fat usually used for cooking (1999, 2006, 2007, 2008); daily consumption of brown bread (1999); daily consumption of wholemeal bread (1999)
Physical activity variables	Whether exercised/performed physical activity in the last week which met the 150 minutes recommended guideline (derived variable provided in the database)		Frequency vigorous PA at work; duration vigorous PA at work; frequency moderate PA at work; duration moderate PA at work; frequency vigorous PA for recreation; duration vigorous PA for recreation; frequency moderate PA for recreation; duration moderate PA for recreation; frequency walk/bike; duration walk/bike	Frequency and duration of different sports
Sedentary behaviour variables	Total minutes spent sitting at leisure on a usual work/week day; total minutes spent sitting at work on a usual day		Time spent sitting or lying on a usual day	Total time spent sitting on a weekday
Type of dietary assessment			Food Frequency Questionnaire	Food Frequency Questionnaire
Survey years used in the analyses	2011	2013	2009	Fruit and vegetable consumption: 2013 Physical activity and sedentary behaviour: 2014 Diet score: 2008

	France	Hungary	Italy	Korea
Name of survey	Enquête Santé et Protection Sociale (ESPS)	Hungarian National Diet and Nutritional Status Survey	Aspetti della Vita Quotidiana	Korean National Health And Nutrition Examination Survey (KNHANES)
Survey years	1990-1998 (yearly), 2000-2012 (every two years)	2009, 2014	1998-2014 (yearly – excluding 2004)	1998, 2001, 2005, 2009, 2014
Total number of individuals	216,103	1,988	804,288	128,539
Diet variables	Daily consumption of fruit; daily consumption of vegetables	Daily dietary fibre intake (grams)	Frequency of fruit consumption; frequency of vegetable consumption; frequency of pulses consumption; frequency of potato consumption; frequency of fish consumption; frequency of cereal consumption; frequency of dairy consumption; frequency of meat consumption; frequency of poultry consumption	Daily energy intake (kcal), daily sodium intake (milligrams), daily crude fibre intake (grams), daily protein intake (grams)
Physical activity variables				Frequency vigorous PA at work; duration vigorous PA at work; frequency moderate PA at work; duration moderate PA at work; frequency vigorous PA for recreation; duration vigorous PA for recreation; frequency moderate PA for recreation; duration moderate PA for recreation: frequency PA for transportation; duration PA for transportation
Sedentary behaviour variables				Time spent sitting in a usual day
Type of dietary assessment			Food Frequency Questionnaire	24-hour dietary recall interview
Survey years used in the analyses	2012	**2014 for descriptive statistics, 2009 for other analyses**	Fruit and vegetable consumption: 2013 Diet score: 2012	2014

	Mexico	Spain	United States
Name of survey	Encuesta Nacional de Salud (ENSA), Encuesta Nacional de Salud y Nutrición (ENSANUT)	Encuesta Nacional de Salud (ENS) ; Encuesta Europea de Salud (EES)	National Health And Nutrition Examination Survey (NHANES)
Survey years	2000, 2006, 2012	1987, 1993, 1995, 1997, 2001, 2003, 2006, 2011, 2014	1991-2013 (every two years)
Total number of individuals	600,723	245,403	153,980
Diet variables	Daily cereal consumption; daily pulses consumption; daily consumption of foods of animal origin; daily dairy consumption; frequency cereal consumption; frequency fruit consumption; frequency vegetable consumption; frequency potato consumption; frequency pulses consumption; frequency fish consumption; frequency meat consumption; frequency poultry consumption; frequency dairy consumption	Frequency cereal consumption; frequency pulses consumption; consumption of a least five fruit and vegetables per day; frequency fruit consumption; frequency vegetable consumption; frequency meat consumption; frequency fish consumption; frequency dairy consumption	Daily energy intake (kcal); daily sodium intake (milligrams); daily protein intake (grams); daily fat intake (grams); daily dietary fibre intake (grams); daily cholesterol intake (grams)
Physical activity variables	Frequency vigorous PA; duration vigorous PA; frequency moderate PA; duration moderate PA; frequency walk; duration walk	Frequency vigorous PA; duration vigorous PA; frequency moderate PA; duration moderate PA; frequency walk; duration walk	Frequency vigorous PA at work; duration vigorous PA at work; frequency moderate PA at work; duration moderate PA at work; frequency vigorous PA for recreation; duration vigorous PA for recreation; frequency moderate PA for recreation; duration moderate PA for recreation; frequency walk/bike; duration walk/bike
Sedentary behaviour variables	Total time spent sitting in a day	Total time spent sitting in a normal weekday	Total time spent sitting on a typical day
Type of dietary assessment	Food Frequency Questionnaire with number of days each food item is consumed per week, number of times per day, number of portions, and portion size	Food Frequency Questionnaire	Two 24-hour dietary recall interviews
Survey years used in the analyses	2012	Fruit and vegetable consumption: 2014 Physical activity and sedentary behaviour: 2011 Diet score: 2014 LCA: 2011	2013

Annex B. Construction of the Mediterranean Diet Score in different countries

Table B.1. Construction of MDS in Chile

Food item	Points	Value
Fruit, vegetables	0	Never
	1	Once/week
	2	Twice/week
	3	3 times/week
	4	4 times/week
	5	≥5 times/week
Whole grain	0	<once/month or never
	1	<once/week
	2	Every other day
	3	Daily or >once/day
Fish	0	<once/month
	1	<3 times/month
	2	Once/week
	3	>once/week
Dairy	0	Once/day or <3 times/day or ≥3 times/day
	1	Every other day
	2	<once/week
	3	<once/month or never

Note: Questions in the survey were: "In a typical week, how often do you consume .. ?".
Source: Add the source here. If you do not need a source, please delete this line.

Table B.2. Construction of MDS in Spain

Food item	Points	Value
Fruit, vegetables, cereals, pulses, fish	0	Never or hardly ever
	1	<once/week
	2	1-2 times/week
	3	3+ times/week
	4	Daily
Meat	0 1 2 3 4 5	Constructed through summation of "frequency of meat consumption" and "frequency of cold cuts consumption"
Dairy	0	Daily
	1	3+ times/week
	2	1-2 times/week
	3	<once/week
	4	Never or hardly ever

Note: Add the note here. If you do not need a note, please delete this line.
Source: Add the source here. If you do not need a source, please delete this line.

Table B.3. Construction of MDS in Italy

Food item	Points	Value
Fruit, pulses, potatoes, fish	0	Never
	1	<once/week
	2	Several times/week
	3	Once/day or >once/day
Vegetables	0 1 2 3 4 5	Constructed through summation of "frequency of consumption of greens" and "frequency of consumption of vegetables"
Dairy	0 1 2 3 4 5	Constructed through summation of "frequency of consumption of dairy products" and "frequency of consumption of milk"
Meat	0 1 2 3 4 5	Constructed through summation of "frequency of consumption of beef" and "frequency of consumption of pork" and "frequency of consumption of cold cuts"
Poultry	0	Once/day or >once/day
	1	Several times/week
	2	<once/week
	3	Never

Note: Questions in the survey were: "How frequently do you consume the following foods?"
Source: Add the source here. If you do not need a source, please delete this line.

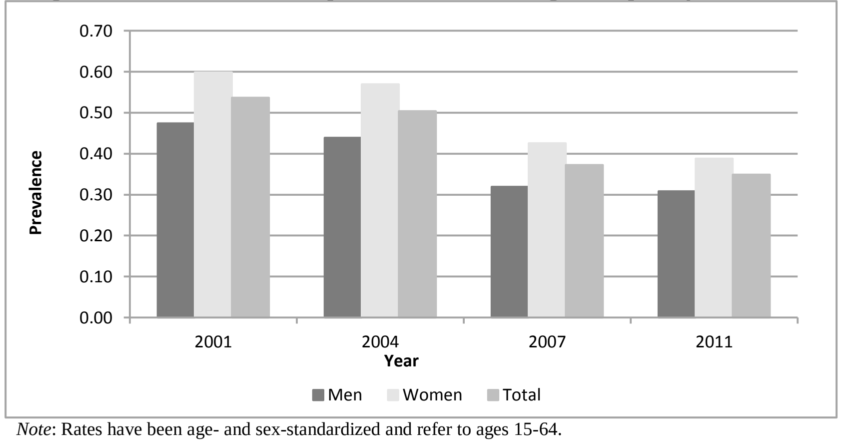
Table B.4. Construction of MDS in Mexico

Food item	Points	Value
Fruit, vegetables, cereals, potatoes, pulses, fish	0	0 times
	1	Once
	2	Twice
	3	3 times
	4	4 times
	5	≥5 times
Meat, poultry, dairy	0	≥5 times
	1	4 times
	2	3 times
	3	Twice
	4	Once
	5	0 times

Note: Questions in the survey were: "How many days in the past week did you eat the following foods?"
Source: Add the source here. If you do not need a source, please delete this line.

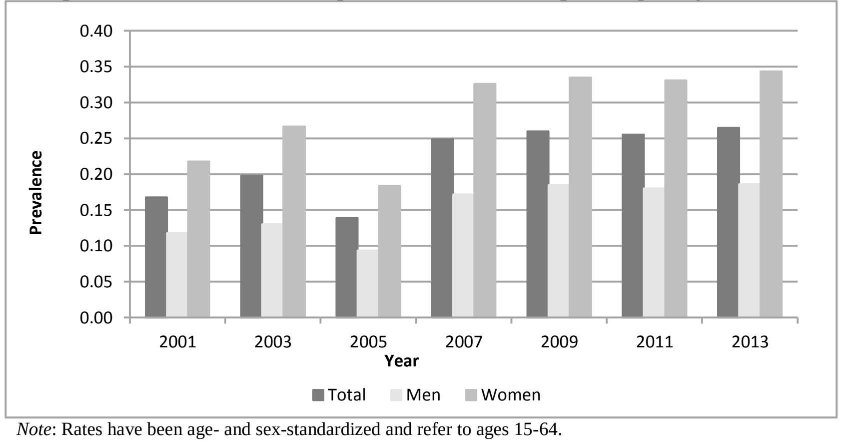
Annex C. Trends in consumption of five fruit and vegetables per day

Figure C.1. Evolution of consumption of five fruit and vegetables per day in Australia



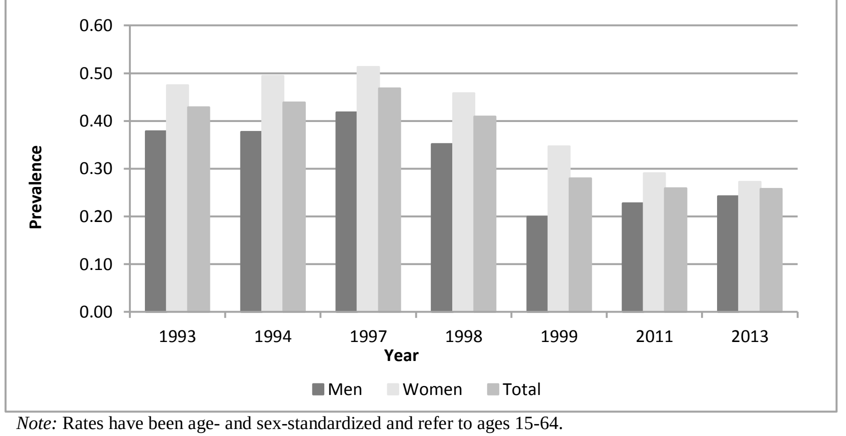
Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure C.2. Evolution of consumption of five fruit and vegetables per day in Canada



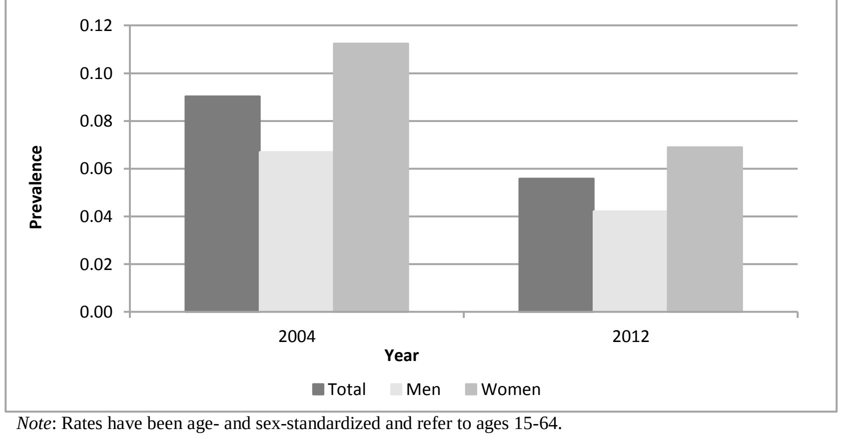
Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure C.3. Evolution of consumption of five fruit and vegetables per day in England



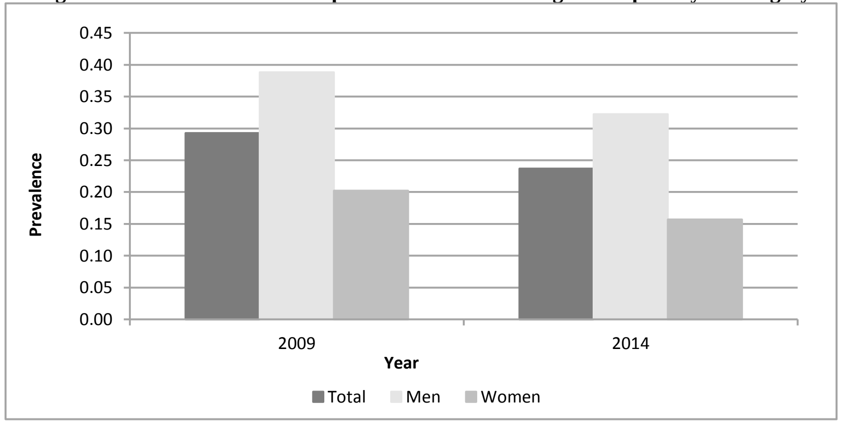
Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure C.4. Evolution of consumption of five fruit and vegetables per day in France



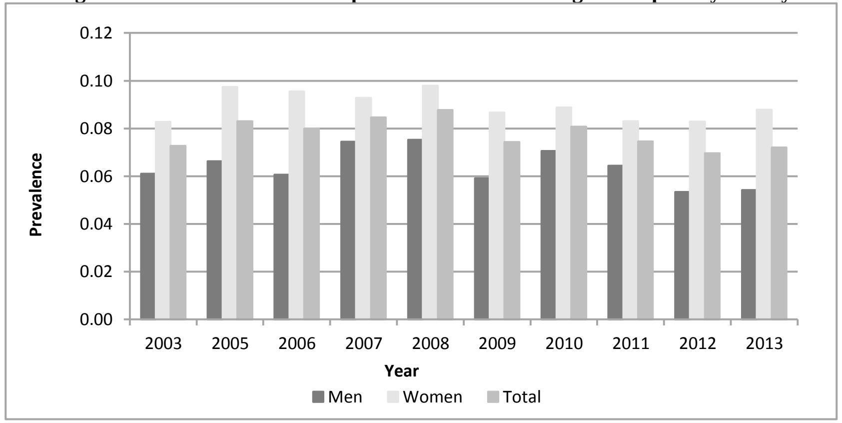
Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure C.5. Evolution of consumption of five fruit and vegetables per day in Hungary



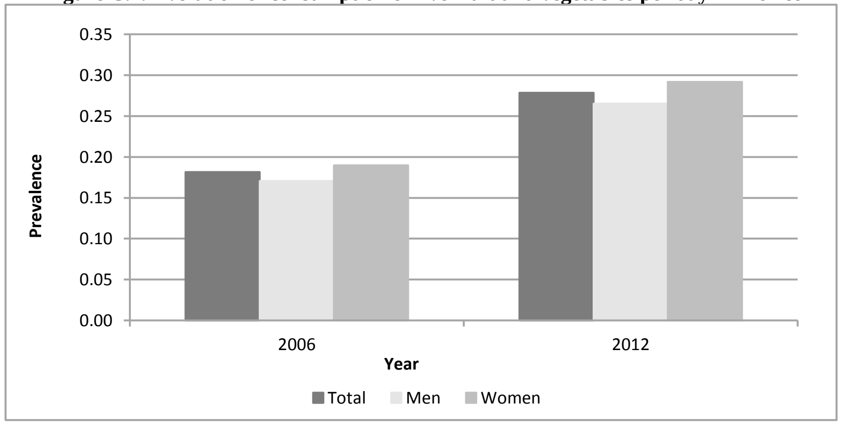
Note: Rates have been age- and sex-standardized and refer to ages 18-64. Rates were converted from daily dietary fibre intake.
Source: OECD analysis of health survey data.

Figure C.6. Evolution of consumption of five fruit and vegetables per day in Italy



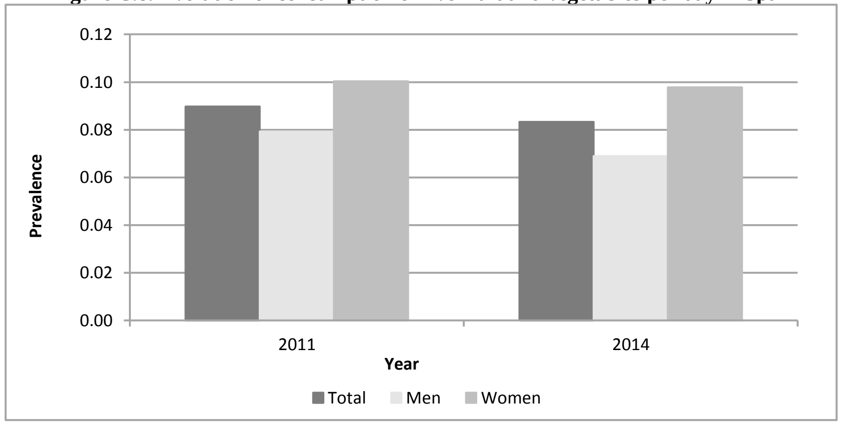
Note: Rates have been age- and sex-standardized and refer to ages 15-64 except in 2013 (14-64).
Source: OECD analysis of health survey data.

Figure C.7. Evolution of consumption of five fruit and vegetables per day in Mexico



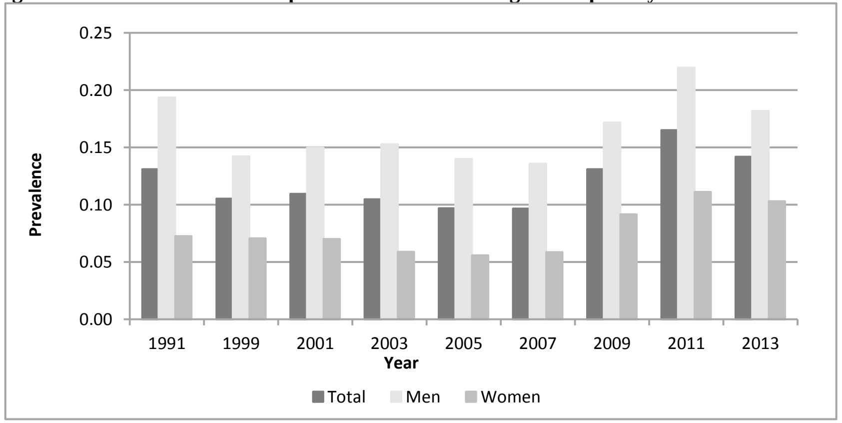
Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure C.8. Evolution of consumption of five fruit and vegetables per day in Spain



Note: Rates have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

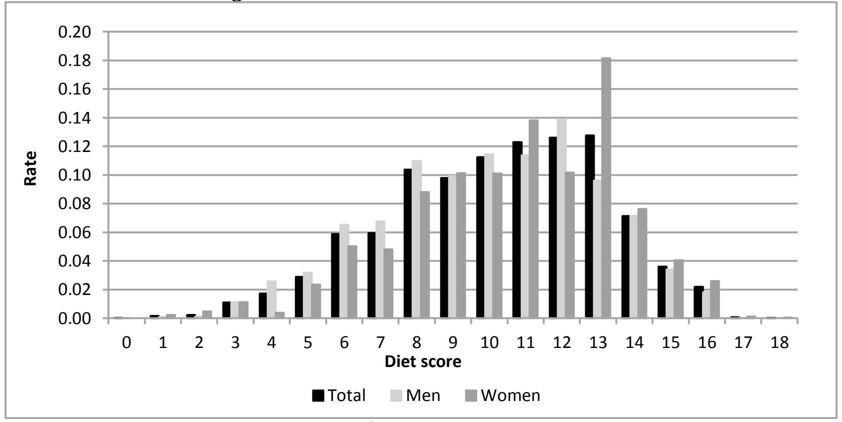
Figure C.9. Evolution of consumption of five fruit and vegetables per day in the United States



Note: Rates have been age- and sex-standardized and refer to ages 15-64. Rates were converted from daily dietary fibre intake.
Source: OECD analysis of health survey data.

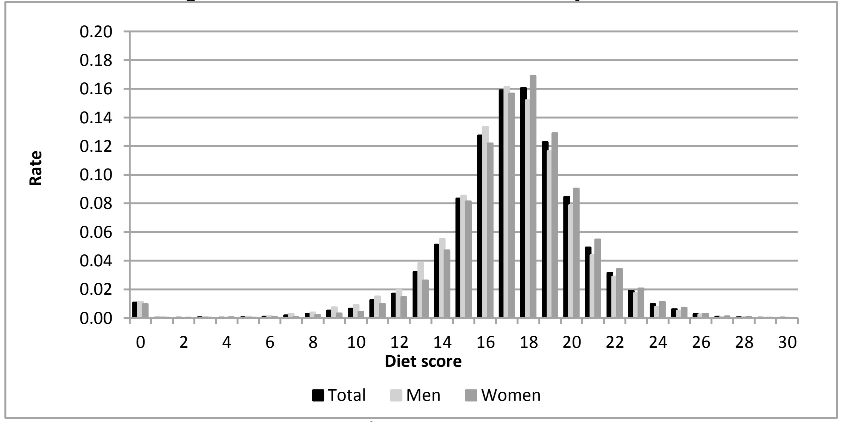
Annex D. Age-standardized distributions of diet scores (Mediterranean Diet Score and Healthy Food Index)

Figure D.1. Mediterranean Diet Score in Chile



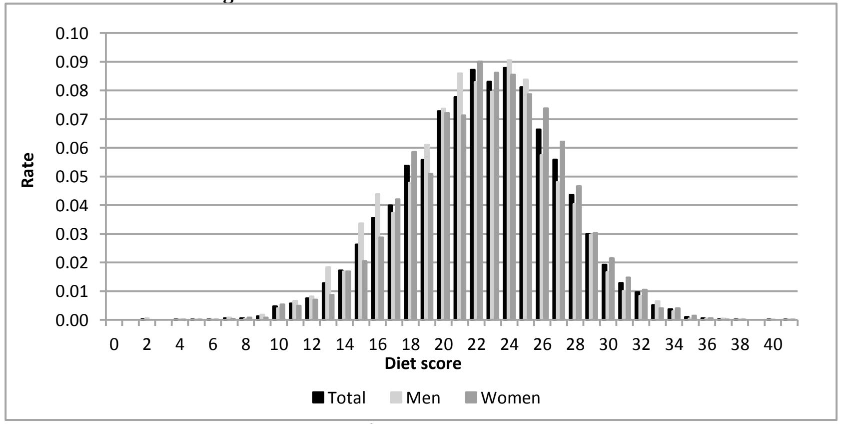
Note: Data have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure D.2. Mediterranean Diet Score in Italy



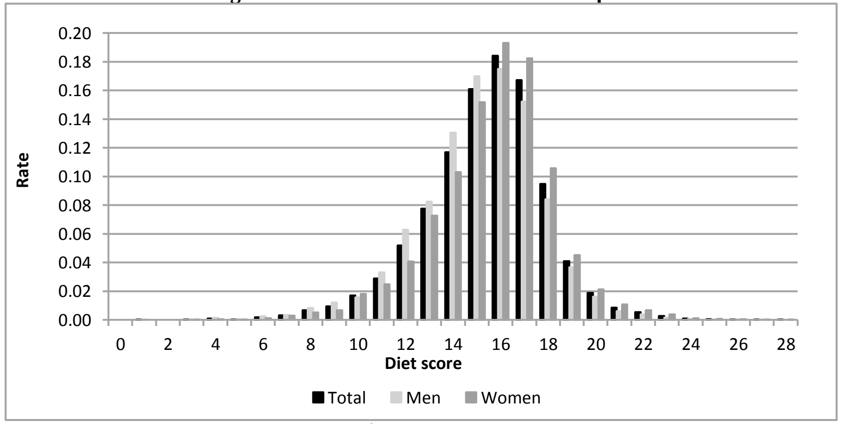
Note: Data have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure D.3. Mediterranean Diet Score in Mexico



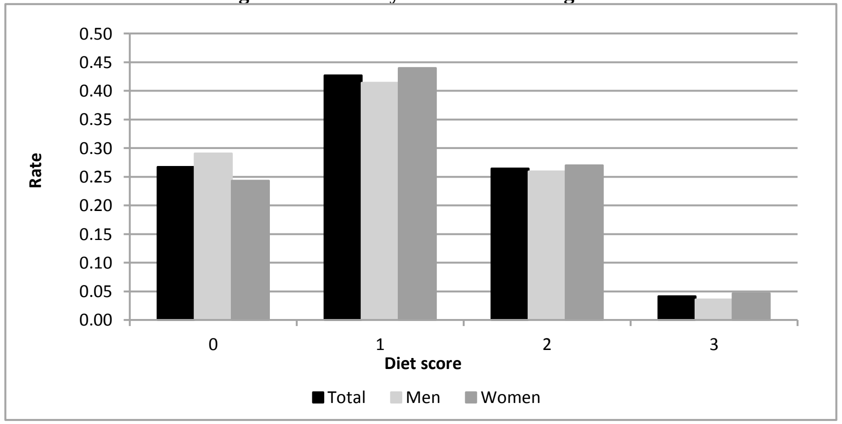
Note: Data have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure D.4. Mediterranean Diet Score in Spain



Note: Data have been age- and sex-standardized and refer to ages 15-64.
Source: OECD analysis of health survey data.

Figure D.5. Healthy Food Index in England



Note: Data have been age- and sex-standardized and refer to ages 16-64.
Source: OECD analysis of health survey data.

Annex E. Results of the logistic regressions on fruit and vegetable consumption, physical activity and sedentary behaviour

Table E.1. Logistic regressions on fruit and vegetable consumption

	Australia		Canada		Chile		England		France		Hungary	
	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E
Age group												
18-19	ref.		ref.		ref.		ref.		ref.		ref.	
20-24	0.8158	0.2439	0.8143 ***	0.0291	1.0179	0.4552	0.9421	0.0689	1.1809	0.6168	0.7162	0.3525
25-29	0.8251	0.2322	0.8085 ***	0.0293	1.4312	0.6898	1.0193	0.0729	1.0699	0.5530	0.5919	0.2884
30-34	0.7795	0.2339	0.8758 ***	0.0330	0.7212	0.3522	1.2745 ***	0.0914	1.1718	0.6060	0.9066	0.4246
35-39	0.8388	0.2322	0.8423 ***	0.0321	1.0333	0.4990	1.4505 ***	0.1052	1.4845	0.7566	0.7558	0.3734
40-44	0.8882	0.2340	0.7949 ***	0.0305	0.7715	0.3512	1.7235 ***	0.1267	1.6215	0.8282	0.9694	0.4836
45-49	1.1421	0.2353	0.7778 ***	0.0314	1.4887	0.6820	2.0062 ***	0.1471	1.5658	0.8072	1.2721	0.6309
50-54	1.3747	0.2382	0.8059 ***	0.0315	1.4288	0.6618	2.5282 ***	0.1870	1.7877	0.9142	1.1493	0.5551
55-59	1.5034	0.2388	0.8119 ***	0.0311	1.2191	0.6074	2.8395 ***	0.2133	2.2856	1.1630	1.5288	0.7331
60-64	2.2969 ***	0.2385	0.8538 ***	0.0322	1.1353	0.5638	3.1696 ***	0.2391	1.9971	1.0326	1.3751	0.6598
Gender												
Man	ref.		ref.		ref.		ref.		ref.		ref.	
Woman	1.4312 ***	0.0622	2.2889 ***	0.0353	1.8870 ***	0.3545	1.6345 ***	0.0331	1.5418 ***	0.1753	0.3380 ***	0.0575
Marital status												
Single	0.9613	0.0807	0.9377 ***	0.0186	0.6767	0.1499	0.9173 **	0.0268	1.0003	0.1569	1.0496	0.2208
Married	ref.		ref.		ref.		ref.		ref.		ref.	ref.
Other	0.8212 *	0.0845	0.9999	0.0264	0.7590	0.1746	0.7923 ***	0.0246	0.8832	0.1629	0.6463	0.1869
Education												
Low	0.8602 *	0.0736	0.8136 ***	0.0219	1.1800	0.2902	0.8231 ***	0.0214	0.7553 *	0.1030	0.5643 *	0.1626
Medium	ref.		ref.		ref.		ref.		ref.		ref.	
High	1.2864 **	0.0792	1.3626 ***	0.025	0.7228	0.2625	1.345 ***	0.0341	1.1378	0.1667	1.5570 *	0.3131
SES												
Low	0.8375	0.1126	0.8577 ***	0.0310	0.5322	0.2592	0.8392 ***	0.0357	0.8857	0.1286	1.4067	0.3939
Medium-low	0.9571	0.1035	0.9400 *	0.0260	0.5802 *	0.1254	0.8557 ***	0.0243	1.0395	0.1941	1.4698	0.3764
Medium	ref.		ref.		ref.		ref.		ref.		ref.	
Medium-high	0.9817	0.0870	1.1099 ***	0.0271	1.1019	0.2755	1.0210	0.0253	1.0514	0.1501	1.0538	0.2748
High	1.1666	0.0891	1.3097 ***	0.0281	2.1107	0.8830	1.1723 ***	0.0512	0.8220	0.1430	0.9845	0.2501
Occupational status												
Not employed			ref.		ref.		ref.		ref.		ref.	
Employed			1.0181	0.0186	1.2989	0.2110	1.0902 ***	0.0246	0.9163	0.1094	0.7476	0.1467
Smoking												
Current smoker	ref.		ref.		ref.		ref.		ref.		ref.	
Ex-smoker	1.7941 ***	0.0915	1.7173 ***	0.0358	1.4638	0.3151	1.9603 ***	0.0541	1.4963 **	0.1958	1.3558	0.3195
Never smoked	1.8228 ***	0.0871	1.7007 ***	0.0363	1.2107	0.2416	2.073 ***	0.0497	1.5236 ***	0.1753	1.1355	0.2214
BMI category												
Underweight	1.1490	0.3067	0.8287 ***	0.0358	0.8003	0.7284	0.7794 **	0.0756	1.0784	0.2926	1.0521	0.4959
Normal weight	ref.		ref. ***		ref.		ref. **		ref.		ref.	
Overweight	1.0010	0.0742	0.8853 ***	0.0154	1.0145	0.2324	1.0660	0.0239	0.8664	0.0964	0.8055	0.1630
Obese	0.9658	0.0784	0.7526 ***	0.0144	0.9053	0.2060	1.0094	0.0254	1.0136	0.1380	1.1553	0.2534
Year												
1993							ref.					
1994							1.0311	0.0277				
1997							1.1692 ***	0.0378				
1998							0.9098 ***	0.0246				
1999							0.4629 ***	0.0426				
2004									ref.			
2005			ref.									
2007			2.1464 ***									
2009			2.2510 ***									
2011			2.1536 ***				0.3721 ***	0.0172				
2012									0.8218	0.0526		
2013			2.2360 ***				0.3767 ***	0.0148				
Constant	0.2576 ***	0.2534	0.0652 ***	0.0031	0.1002 ***	0.0488	0.2084 ***	0.0157	0.0486 ***	0.0258	0.6622	0.3109

	Italy		Korea		Mexico		Spain		USA	
	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E
Age group										
18-19	ref.		ref.		ref.		ref.			
20-24	0.8857	0.3674	0.9897	0.2649	1.2013	0.3105	0.5781	0.1914	ref.	
25-29	0.6271	0.2688	1.2166	0.3341	1.2623	0.3177	0.5674	0.1839	1.1786	0.1213
30-34	0.4540	0.2047	2.2006 **	0.6046	1.6124	0.4162	0.7804	0.2329	1.5629 ***	0.1582
35-39	0.4841	0.2078	2.0627 **	0.5816	2.2434 **	0.5718	0.8426	0.2489	1.4392 ***	0.1476
40-44	0.6311	0.2668	2.5125 ***	0.7234	1.9759 **	0.4846	1.2013	0.3512	1.4409 ***	0.1532
45-49	0.6468	0.2800	3.1415 ***	0.9100	1.2073	0.3258	1.5446	0.4500	1.4244 ***	0.1557
50-54	0.5910	0.2513	5.4488 ***	1.5903	1.8582 *	0.4898	1.8130 *	0.5270	1.2963 **	0.1437
55-59	0.7828	0.3444	3.8971 ***	1.1454	2.1750 **	0.5869	2.8359 ***	0.8179	1.3228 **	0.1582
60-64	1.0387	0.4372	5.2905 ***	1.6092	1.9912 *	0.5631	2.2456 **	0.6505	1.1600	0.1384
Gender										
Man	ref.		ref.		ref.		ref.		ref.	
Woman	1.5159 **	0.2181	0.4921 ***	0.0582	1.1595	0.1347	1.3187 ***	0.1002	0.4009 ***	0.0203
Marital status										
Single	1.0904	0.1854	0.8728	0.1264	0.9649	0.1341	1.0312	0.0914	0.8834	0.0585
Married	ref.		ref.		ref.		ref.		ref.	
Other	0.8456	0.1783	0.6907 *	0.1171	0.7749	0.1194	0.8474	0.0981	0.7884 **	0.0606
Education										
Low	0.8736	0.1285	0.8094	0.1317	0.6227 ***	0.0886	0.6050 ***	0.0747	1.2211 **	0.0776
Medium	ref.		ref.		ref.		ref.		ref.	
High	1.2322	0.2157	1.008	0.0970	2.1236 ***	0.2606	1.0578	0.0959	1.5209 ***	0.0911
SES										
Low	0.9151	0.1369	0.5864 ***	0.0925	0.8670	0.1126	0.9271	0.1256	1.3279 ***	0.1163
Medium-low	1.0170	0.2700	0.8656	0.0916	1.0086	0.1413	0.9811	0.1156	1.2362 **	0.1045
Medium	ref.		ref.		ref.		ref.		ref.	
Medium-high	0.6596	0.2241	1.0799	0.1077	1.3386 *	0.1993	1.0333	0.1271	1.0135	0.0994
High	0.9869	0.4237			1.2397	0.2050	1.4159 **	0.1830	1.1454	0.0931
Occupational status										
Not employed	ref.		ref.		ref.		ref.			
Employed	1.3765 *	0.2100	0.9414	0.0830	1.1579	0.1280	1.0436	0.0830		
Smoking										
Current smoker	ref.		ref.		ref.		ref.		ref.	
Ex-smoker	1.4073	0.2680	1.0867	0.1545	1.2138	0.1808	2.0018 ***	0.2001	2.0035 ***	0.1530
Never smoked	1.3014	0.2102	1.0209	0.1362	1.1612	0.1514	1.7293 ***	0.1547	1.8548 ***	0.1208
BMI category										
Underweight	1.7567	0.5903	0.9237	0.1740	0.5174	0.1945	0.9202	0.2575	1.1841	0.2505
Normal weight	ref.		ref.		ref.		ref.		ref.	
Overweight	0.8006	0.1207	0.7346 ***	0.0690	1.0931	0.1328	0.9003	0.0767	0.8162 **	0.0484
Obese	0.6309 *	0.1474	0.9987	0.2001	0.8855	0.1075	0.8113 *	0.0829	0.6891 ***	0.0419
Year										
1999									ref.	
2001									1.0914	0.1178
2003									1.0585	0.1176
2005									0.9398	0.1044
2006					ref.					
2007									0.8995	0.0988
2009									1.2977 *	0.1348
2011							ref.		1.5757 ***	0.1721
2012					1.3928 ***	0.1305				
2013									1.2992 *	0.1364
2014							0.9265	0.0464		
Constant	0.0664 ***	0.0288	1.2709	0.3749	0.0991 ***	0.0282	0.0477 ***	0.0136	0.0747 ***	0.0112

Note: Underweight refers to BMI<18.5, normal weight refers to 18.5≤BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table E.2. Logistic regressions on healthy diet

	Chile		England		Italy		Korea		Mexico		Spain		USA	
	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E
Age group														
18-19	ref.		ref.		ref.		ref.	ref.	ref.		ref.			
20-24	0.7587	0.4000	1.3858	0.3660	1.2627 **	0.1039	1.6725	0.5196	1.1607	0.2358	1.0418	0.1806	ref.	
25-29	0.6137	0.3568	1.5279	0.4046	1.6480 ***	0.1354	2.1074 *	0.7045	1.4737	0.3035	1.3355	0.2262	0.9930	0.1123
30-34	0.7740	0.4642	1.7125 *	0.4516	1.7841 ***	0.1463	2.1950 *	0.7421	1.3229	0.2805	1.4772 *	0.2413	1.0405	0.1168
35-39	0.6509	0.3782	1.5433	0.4069	1.9066 ***	0.1563	2.5357 **	0.8985	1.5714 *	0.3337	2.0643 ***	0.3328	1.1019	0.1292
40-44	0.8905	0.5087	1.8545 *	0.4882	2.0241 ***	0.1659	2.7872 **	0.9931	2.0569 ***	0.4218	2.6535 ***	0.4286	0.9254	0.1081
45-49	1.7946	1.0393	1.5612	0.4140	2.3560 ***	0.1947	3.3130 **	1.1847	1.8888 **	0.4214	2.6547 ***	0.4321	0.8800	0.1032
50-54	1.5843	0.9147	1.8489 *	0.4968	2.5414 ***	0.2133	5.2662 ***	1.9427	2.3509 ***	0.5048	3.5691 ***	0.5886	1.1259	0.1399
55-59	0.9960	0.5919	1.6824	0.4530	2.8960 ***	0.2459	4.0115 ***	1.4644	2.4588 ***	0.5433	4.5370 ***	0.7721	1.2484	0.1717
60-64	1.1368	0.7062	2.2714 **	0.6074	3.2819 ***	0.2753	5.3387 ***	2.0801	2.1917 **	0.5242	5.5084 ***	0.9324	1.2102	0.1597
Gender														
Man	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
Woman	1.5869 *	0.3177	1.1522 *	0.0802	1.1639 ***	0.0361	0.4048 ***	0.0710	1.1518	0.1163	1.4186 ***	0.0677	0.3449 ***	0.0217
Marital status														
Single	1.1105	0.2966	0.9846	0.1017	0.9549	0.0381	0.7085	0.1501	0.7735 *	0.0868	0.8064 ***	0.046	0.8220 **	0.0598
Married	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
Other	1.2150	0.3686	0.6945 **	0.0823	0.9379	0.0456	0.7336	0.1545	0.7905	0.1028	0.8388 *	0.0590	0.8497 *	0.0656
Education														
Low	1.0413	0.3120	0.7186 **	0.0814	0.9795	0.0340	0.4648 ***	0.0967	0.7648 *	0.0691	0.9136	0.0689	0.767 ***	0.0508
Medium	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
High	1.3407	0.5544	1.432 ***	0.1170	1.1633 **	0.052	1.2295	0.1696	0.9415	0.1060	1.0904	0.0658	1.4201 ***	0.1158
SES														
Low	1.0960	0.6613	0.7398	0.1436	0.9902	0.0369	0.5244**	0.1045	1.0775	0.1077	0.9463	0.0812	0.6529 ***	0.0618
Medium-low	0.9314	0.2423	0.8077 *	0.0842	1.1440 *	0.0740	0.6730 **	0.0994	1.0111	0.1137	0.9360	0.0688	0.7917 *	0.0730
Medium	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
Medium-high	0.6918	0.1938	1.4155 ***	0.1185	1.0389	0.0492	0.9098	0.1365	0.9665	0.1309	0.9096	0.0731	1.0681	0.1200
High	1.2679	0.5889	1.2498	0.1908	0.8770 *	0.0445			0.9829	0.1489	1.1393	0.0998	1.3574 **	0.1348
Occupational status														
Not employed	ref.		ref.		ref.		ref.	ref.	ref.		ref.			
Employed	1.4886	0.3240	0.9752	0.0800	0.8307 ***	0.0281	1.2314 **	0.1513	0.9537	0.0877	1.0471	0.0525		
Smoking														
Current smoker	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
Ex-smoker	1.6755 *	0.3913	1.8609 ***	0.1984	1.0971 *	0.0457	1.0958	0.2128	0.9823	0.1269	1.6842 ***	0.1053	1.6828 ***	0.1544
Never smoked	1.5437	0.3860	2.3355 ***	0.2154	1.2227 ***	0.0425	1.6524	0.3047	1.1705	0.1238	1.593 ***	0.0814	1.3488 ***	0.0870
BMI category														
Underweight	0.2726	0.1992	1.0083	0.3262	0.9496	0.0781	0.9769	0.2334	0.3909 **	0.1058	1.1031	0.1792	0.9107	0.1795
Normal weight	ref.		ref.		ref.		ref.	ref.	ref.		ref.		ref.	
Overweight	1.2078	0.2977	0.9865	0.0818	0.9161 **	0.0305	0.6933 **	0.0896	0.9884	0.0927	0.9333	0.0499	0.9380	0.0706
Obese	1.2339	0.3496	0.9475	0.0812	0.8001 ***	0.0387	1.0814	0.2955	0.8117 *	0.0801	0.8406 **	0.0536	0.8822	0.0620
Year														
1999													ref.	
2001													1.0144	0.1149
2003													1.1432	0.1334
2005									ref.				1.2913 *	0.1525
2006														
2007													1.0892	0.1222
2009													1.3658 **	0.1537
2011											ref.			
2012									1.1626	0.0918				
2013													1.0032	0.1165
2014											1.0365	0.0339		
Constant	0.4586	0.2558	0.1266 ***	0.0335	0.4880 ***	0.0439	3.8069 ***	1.3638	0.5935 *	0.1349	0.3412 ***	0.0551	15.4222 ***	2.4510

Note: Underweight refers to BMI<18.5, normal weight refers to 18.5≤BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table E.3. Logistic regressions on physical activity

	Australia		Chile		England		Korea		Mexico		Spain		USA	
	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E
Age group														
18-19	ref.		ref.		ref.		ref.		ref.		ref.			
20-24	0.9546	0.2276	1.4633	0.4724	1.3964	0.3178	0.8921	0.2395	1.3728	0.4335	1.1861	0.2620	ref.	
25-29	0.7777	0.2184	1.1719	0.4237	1.0869	0.2389	0.5725 *	0.1555	0.8756	0.3042	1.2044	0.2610	0.9496	0.0928
30-34	0.6299 *	0.2189	0.9534	0.3351	0.8081	0.1717	0.4584 **	0.1244	1.0057	0.3667	0.8934	0.1852	0.7318 ***	0.0694
35-39	0.5623 **	0.2188	1.2377	0.4327	0.6577	0.1405	0.5592 *	0.1557	0.9628	0.3274	0.8181	0.1670	0.7144 ***	0.0696
40-44	0.6077 *	0.2204	1.1535	0.3946	0.6443 *	0.1367	0.5175 *	0.1450	1.0089	0.3442	1.0015	0.2051	0.6023 ***	0.0598
45-49	0.5943 *	0.2218	1.1957	0.4206	0.5910 *	0.1243	0.4931 *	0.1400	1.1390	0.4144	0.8522	0.1757	0.5190 ***	0.0521
50-54	0.5885 *	0.2247	1.0737	0.3904	0.6791	0.1451	0.5749	0.1635	1.0126	0.3681	0.8784	0.1824	0.5190 ***	0.0536
55-59	0.5297 **	0.2264	1.0844	0.3864	0.6712	0.1446	0.4198 **	0.1196	0.9708	0.3546	1.0311	0.2170	0.4439 ***	0.0478
60-64	0.7338	0.2249	0.7547	0.2661	0.7106	0.1516	0.4284 **	0.1245	0.7094	0.2466	1.0844	0.2274	0.3582 ***	0.0378
Gender														
Man	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Woman	0.7666 ***	0.0595	0.6909 *	0.1077	0.7748 ***	0.0494	0.6684 ***	0.0692	0.8790	0.1293	0.7356 ***	0.0425	0.5079 ***	0.0235
Marital status														
Single	1.1681 *	0.0760	1.1878	0.2276	1.0756	0.0955	1.0443	0.1438	0.8693	0.1511	1.2994 ***	0.0956	1.1032	0.0675
Married	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Other	1.1425	0.0815	1.0283	0.2222	0.9249	0.0821	0.9825	0.1525	0.9891	0.1793	1.1497	0.0991	1.1153	0.0704
Education														
Low	0.8624 *	0.0704	1.0411	0.1730	0.5651 ***	0.0501	0.6581 **	0.0946	0.9592	0.1508	0.6700 ***	0.0564	0.8742 *	0.0521
Medium	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
High	1.4857 ***	0.0765	1.0434	0.3272	1.0838	0.0771	1.2514 *	0.1089	0.7327 *	0.1048	1.1849 *	0.0885	1.1766 **	0.0681
SES														
Low	0.7588 **	0.1065	0.7492	0.2758	0.9210	0.1055	1.0962	0.1562	1.3468 *	0.1855	1.1125	0.1146	0.8528 *	0.0635
Medium-low	0.8672	0.0986	1.4007 *	0.2251	0.9370	0.0956	1.0192	0.0976	1.0225	0.1511	0.9145	0.0838	0.8773	0.0649
Medium	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Medium-high	1.1037	0.0834	1.0742	0.2255	0.8480	0.0743	1.0552	0.0946	0.6988 *	0.1198	0.9310	0.0919	1.1005	0.0983
High	1.6045 ***	0.0866	0.4134 *	0.1479	0.8480	0.0973			0.7638	0.1496	0.8775	0.0951	1.1685 *	0.0876
Occupational status														
Not employed			ref.		ref.		ref.		ref.		ref.			
Employed			1.2521	0.1749	1.9485 ***	0.1292	0.7969 **	0.0651	1.0120	0.1346	0.8263 **	0.0509		
Smoking														
Current smoker	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Ex-smoker	1.6675 ***	0.0839	1.1219	0.2012	1.4218 ***	0.1254	1.5023 ***	0.1793	1.1163	0.2053	1.3456 ***	0.1033	1.2815 ***	0.0910
Never smoked	1.3878 ***	0.0788	0.8489	0.1222	1.2530 **	0.0965	1.4509 ***	0.1655	1.2213	0.1816	1.3669 ***	0.0849	1.0811	0.0604
BMI category														
Underweight	0.4095 **	0.3159	2.8844	1.8421	0.8128	0.2283	0.611 **	0.1010	0.9439	0.3709	0.5926 **	0.1183	0.7435	0.1258
Normal weight	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Overweight	0.9440	0.0709	0.8214	0.1334	1.0075	0.0764	1.0174	0.0871	0.9012	0.1312	0.8147 **	0.0539	0.8598 *	0.0519
Obese	0.6650 ***	0.0747	0.7510	0.1337	0.7171 ***	0.0515	0.8451	0.1442	0.8593	0.1244	0.5377 ***	0.0400	0.5833 ***	0.0330
Year														
1997					ref.		ref.							
1998					0.6387	0.2001								
2006					0.7043	0.2328			ref.					
2007													ref.	
2008					1.4086	0.5241								
2009													1.0136	0.0614
2011													1.0380	0.0723
2012					1.1784	0.4916			0.8774	0.1011				
2013					0.2292 ***	0.0619							0.8814	0.0576
2014					0.2419 ***	0.0654								
Constant	1.3410	0.2375	4.2403 ***	1.5003	24.6113 ***	8.3025	2.5827 ***	0.7579	8.4781 ***	2.8494	3.6360 ***	0.7363	5.2821 ***	0.6309

Note: Underweight refers to BMI<18.5, normal weight refers to 18.5≤BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table E.4. Logistic regressions on sedentary behaviour

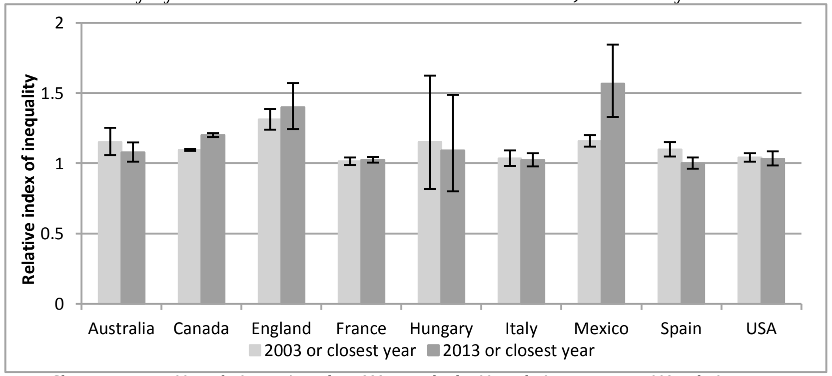
	Australia		Chile		England		Korea		Mexico		Spain		USA	
	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E	OR	S.E
Age group														
18-19	ref.		ref.		ref.		ref.		ref.		ref.			
20-24	0.7423	0.4103	1.0287	0.3910	0.5384 *	0.1392	0.5738 *	0.1523	0.5747	0.1972	0.4644 ***	0.0914	ref.	
25-29	1.0985	0.3980	1.0369	0.4604	0.5518 *	0.1431	0.9374	0.2591	0.7200	0.2884	0.3251 ***	0.0642	1.1542	0.1088
30-34	1.2014	0.4002	1.1413	0.4597	0.4840 **	0.1265	0.5815 *	0.1575	0.6545	0.2886	0.2563 ***	0.0483	1.1228	0.1060
35-39	1.0903	0.4009	0.6772	0.2840	0.4474 **	0.1176	0.4846 **	0.1349	0.4251 *	0.1745	0.2300 ***	0.0428	1.0593	0.1035
40-44	1.0756	0.4016	0.6531	0.2717	0.3592 ***	0.0945	0.5622 *	0.1577	0.5691	0.2289	0.2298 ***	0.0428	1.2090	0.1216
45-49	0.9802	0.4051	0.9205	0.3924	0.3602 ***	0.0945	0.6961	0.1969	0.3270 **	0.1338	0.2206 ***	0.0421	1.0607	0.1077
50-54	0.9658	0.4063	1.4321	0.6769	0.4785 **	0.1251	0.5569 *	0.1584	0.3981 *	0.1741	0.2147 ***	0.0418	1.1937	0.1241
55-59	0.8775	0.4090	0.8039	0.3556	0.4681 **	0.1256	0.5231 *	0.1493	0.7584	0.3502	0.1967 ***	0.0390	1.1414	0.1242
60-64	0.9270	0.4214	1.6665	0.7425	0.3217 ***	0.0875	0.5368 *	0.1568	1.0776	0.4623	0.1616 ***	0.0336	1.0453	0.1158
Gender														
Man	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Woman	1.1063	0.0870	0.9504	0.1702	0.7702 **	0.0609	0.9452	0.0962	0.7822	0.1349	0.7189 ***	0.0447	0.9906	0.0455
Marital status														
Single	0.7580 **	0.1003	1.1197	0.2460	1.1726	0.1279	1.5218 **	0.2025	1.4681	0.2947	1.1469	0.0833	1.3217 ***	0.0810
Married	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Other	0.8966	0.1148	1.2703	0.3495	1.2424	0.1519	1.2577	0.1989	1.2765	0.2915	1.0528	0.0971	1.3297 ***	0.0877
Education														
Low	1.3959 ***	0.0943	0.8449	0.2127	0.9087	0.1225	0.9056	0.1337	0.6495	0.1473	1.0439	0.1252	0.8083 **	0.0548
Medium	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
High	2.6778 ***	0.0989	0.819	0.2551	1.0635	0.0900	1.7415 ***	0.1492	1.8159 ***	0.294	1.8593 ***	0.1326	1.8081 ***	0.1010
SES														
Low	0.9495	0.1649	0.2161 *	0.1549	0.9235	0.1463	0.9560	0.1367	0.5777 **	0.1093	0.7514 *	0.1073	0.8728	0.0687
Medium-low	0.9495	0.1649	0.4388 **	0.1103	0.814	0.1203	0.8514	0.0826	0.7130	0.1436	1.1811	0.1339	0.8824	0.0686
Medium	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Medium-high	1.6706 ***	0.1066	1.0318	0.2736	1.6337 ***	0.1909	1.3582 **	0.1195	1.1945	0.2506	2.8366 ***	0.3122	1.4255 ***	0.1261
High	2.4748 ***	0.1074	2.4083 *	0.8771	3.0200 ***	0.4044			1.6151 *	0.3547	2.1904 ***	0.2560	1.8231 ***	0.1360
Occupational status														
Not employed			ref.		ref.		ref.		ref.		ref.		ref.	
Employed			1.5945 *	0.3058	1.2958 **	0.1238	0.8760	0.0718	1.3557	0.2249	1.1437 *	0.0772		
Smoking														
Current smoker	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Ex-smoker	1.5491 ***	0.1128	1.2499	0.2913	1.1025	0.1288	1.0131	0.1198	1.0483	0.2122	1.2039 *	0.0968	1.0984	0.0794
Never smoked	1.1565	0.1062	0.8782	0.1756	0.8973	0.0904	0.9142	0.1048	0.7508	0.1328	0.9695	0.0661	1.0524	0.0605
BMI category														
Underweight	1.4666	0.5623	0.5867	0.4350	1.1969	0.4215	1.0155	0.1669	0.418	0.1892	1.4599	0.3011	1.2799	0.2083
Normal weight	ref.		ref.		ref.		ref.		ref.		ref.		ref.	
Overweight	1.0682	0.0940	1.4116	0.2860	0.9488	0.0876	1.0342	0.0881	1.0913	0.2036	1.1048	0.0761	1.1629 *	0.0692
Obese	1.2713 *	0.1035	0.8404	0.1951	1.1063	0.1008	1.2566	0.2302	1.034	0.1881	1.3345 **	0.1127	1.5356 ***	0.0875
Year														
2006									ref.					
2007													ref.	
2009													1.1148	0.0712
2011													1.1938 *	0.0849
2012									0.7566	0.1187				
2013													2.0754 ***	0.1367
Constant	0.3248 **	0.4228	0.1093 ***	0.0452	0.5081 *	0.1479	1.1377	0.3245	0.1474 ***	0.0576	0.4210 ***	0.0794	0.1716	0.0207

Note: Underweight refers to BMI<18.5, normal weight refers to 18.5≤BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.

Source: OECD analysis of health survey data.

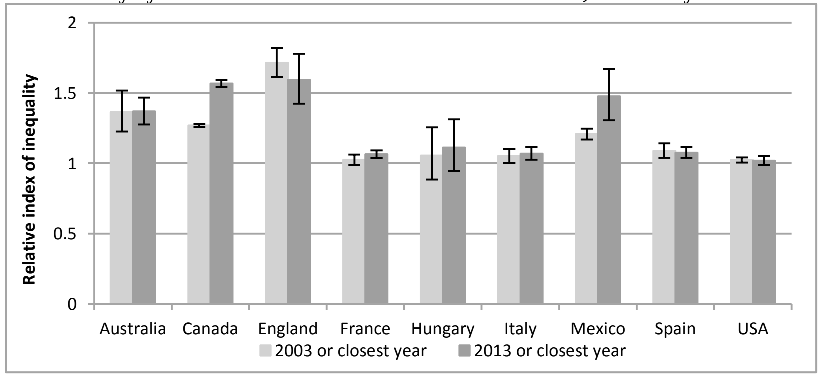
Annex F. Trends in relative index of inequality for consumption of five fruit and vegetables per day

Figure F.1. Relative index of inequality for consumption of five fruit and vegetables per day by level of education for men in 2003 and 2013, or closest years



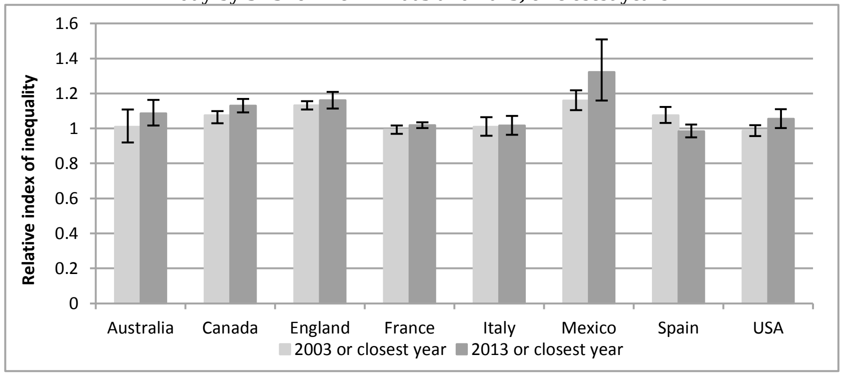
Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64).
Source: OECD analysis of health survey data.

Figure F.2. Relative index of inequality for consumption of five fruit and vegetables per day by level of education for women in 2003 and 2013, or closest years



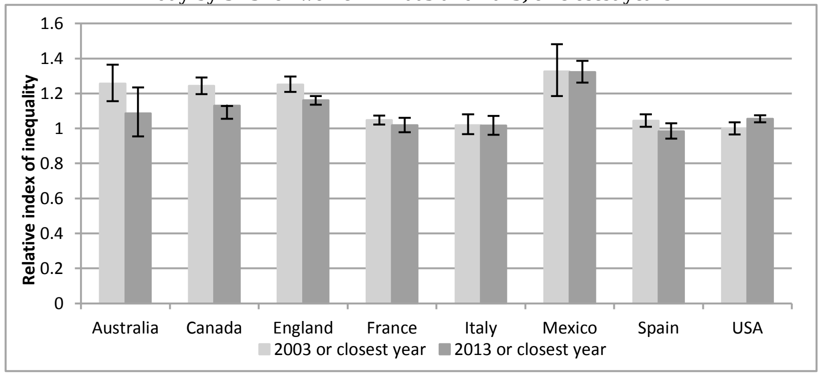
Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64).
Source: OECD analysis of health survey data.

Figure F.3. Relative index of inequality for consumption of five fruit and vegetables per day by SES for men in 2003 and 2013, or closest years



Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

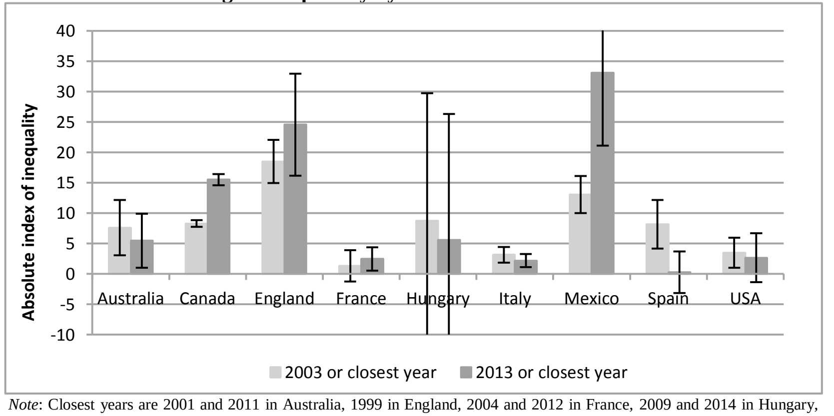
Figure F.4. Relative index of inequality for consumption of five fruit and vegetables per day by SES for women in 2003 and 2013, or closest years



Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

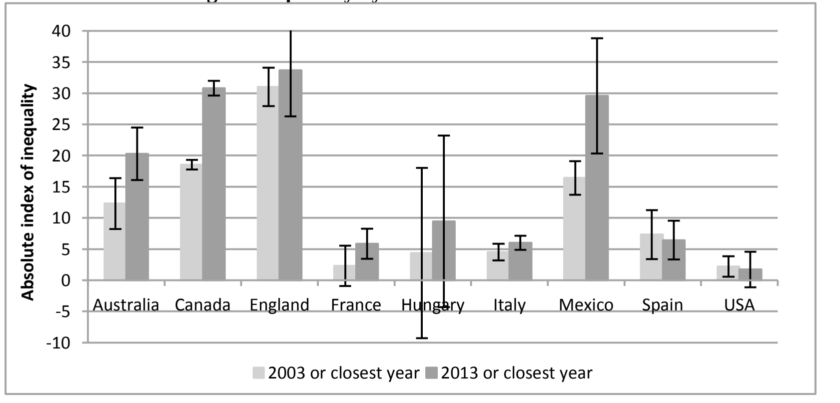
Annex G. Trends in absolute index of inequality for consumption of five fruit and vegetables per day

Figure G.1. Evolution of absolute index of inequality for consumption of five fruit and vegetables per day by level of education in men



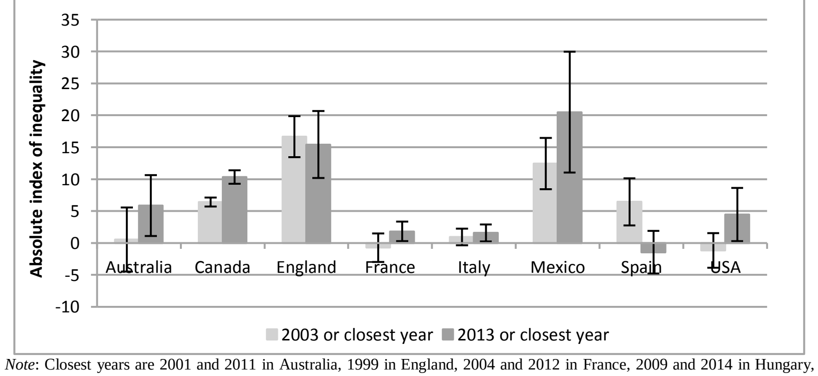
Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

Figure G.2. Evolution of absolute index of inequality for consumption of five fruit and vegetables per day by level of education in women



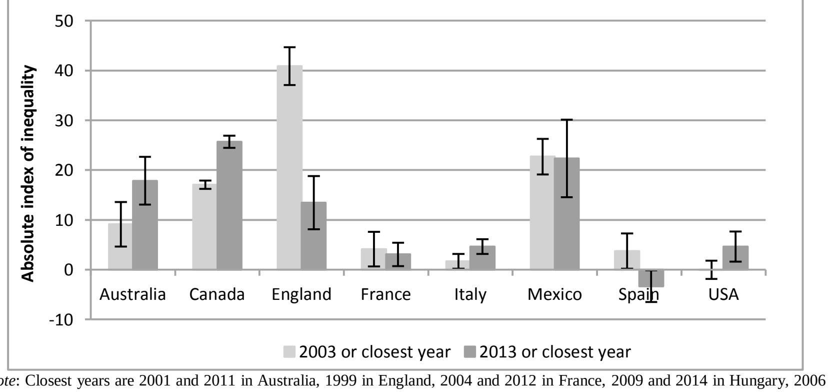
Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64).*Source*: OECD analysis of health survey data.

Figure G.3. Evolution of absolute index of inequality for consumption of five fruit and vegetables per day by socio-economic status in men



Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64). *Source*: OECD analysis of health survey data.

Figure G.4. Evolution of absolute index of inequality for consumption of five fruit and vegetables per day by socio-economic status in women



Note: Closest years are 2001 and 2011 in Australia, 1999 in England, 2004 and 2012 in France, 2009 and 2014 in Hungary, 2006 and 2012 in Mexico, 2011and 2014 in Spain. Data refer to ages 18-64 except in Canada (15-64).
Source: OECD analysis of health survey data.

Annex H. Fit statistics for the Latent Class Analysis models

Table H.1. LCA fit statistics for Chile

	2 classes	3 classes	4 classes	5 classes	6 classes
G²	217.1	126.1	91.4	67	53.5
AIC	243.1	166.1	145.4	135	135.5
BIC	327	295.5	319.5	354.2	400.4
CAIC	340	315.5	346.5	388.2	441.4
ABIC	285.7	232	233.7	246.2	270.1
Entropy	0.57	0.7	0.67	0.52	0.52
DF	50	43	36	29	22
%	100%	52.5%	28%	72%	21.5%
N	4770				

Source: OECD analysis of health survey data.

Table H.2. LCA fit statistics for Korea

	2 classes	3 classes	4 classes	5 classes	6 classes
G²	292.4	143.9	87.5	47.1	22.8
AIC	318.4	183.9	141.5	115.1	104.8
BIC	402.4	313.1	316.0	334.8	369.7
CAIC	415.4	333.1	343.0	368.8	410.7
ABIC	361.1	249.5	230.2	226.8	239.4
Entropy	0.77	0.76	0.71	0.66	0.73
DF	50	43	36	29	22
%	100%	58.5%	48%	30.5%	43.5%
N	4727				

Source: OECD analysis of health survey data.

Table H.3. LCA fit statistics for Mexico

	2 classes	3 classes	4 classes	5 classes	6 classes
G²	166.1	75.3	39	26.3	21.4
AIC	192.1	115.3	93	94.3	103.4
BIC	266.2	229.5	247.1	288.3	337.4
CAIC	279.2	249.5	274.1	322.3	378.3
ABIC	224.9	165.9	161.3	180.3	207.1
Entropy	0.72	0.79	0.73	0.66	0.64
DF	50	43	36	29	22
%	92%	84%	75.50%	44%	3%
N	2222				

Source: OECD analysis of health survey data.

Table H.4. LCA fit statistics for Spain

	2 classes	3 classes	4 classes	5 classes	6 classes
G²	1366.8	778.7	390.2	293.6	238.5
AIC	1400.8	830.7	460.2	381.6	344.5
BIC	1526.4	1022.8	718.8	706.7	736.1
CAIC	1543.4	1048.8	753.8	750.7	789.1
ABIC	1472.4	940.1	607.55	566.9	567.7
Entropy	0.33	0.33	0.47	0.57	0.48
DF	238	229	220	211	202
%	33%	60.50%	68.00%	21.50%	26%
N	11955				

Source: OECD analysis of health survey data.

Table H.5. LCA fit statistics for the United States

	2 classes	3 classes	4 classes	5 classes	6 classes
G²	1036.7	600.6	299.8	210.2	123.3
AIC	1066.7	646.6	361.8	288.2	217.3
BIC	1167.8	801.6	570.7	551	534
CAIC	1182.8	824.6	601.7	590	581
ABIC	1120.1	728.5	472.2	427.1	384.6
Entropy	0.78	0.79	0.73	0.82	0.7
DF	112	104	96	88	80
%	100%	37.50%	92.00%	30.50%	18%
N	6239				

Source: OECD analysis of health survey data.

Annex I. Results of the multinomial logistic regressions on latent class membership and weight status

Table I.1. Regression on latent class membership in Chile

CLASS	RRR	S.E.	CLASS	RRR	S.E.
CLASS 1			**CLASS 2**		
Gender			**Gender**		
man	ref.		man	ref.	
woman	2.3553 ***	0.7471	woman	0.9751	0.2254
Age group			**Age group**		
<20	0.2402 ***	0.1154	<20	0.2693 ***	0.0854
20-34	0.7415	0.3557	20-34	0.8553	0.3238
35-49	ref.		35-49	ref.	
50-64	1.6032	0.7065	50-64	0.8757	0.2864
65+	0.8546	0.3914	65+	0.3520 ***	0.1042
SES			**SES**		
low	0.6090	0.2211	low	1.4713	0.3573
medium	ref.		medium	ref.	
high	0.7545	0.2835	high	0.4745 ***	0.1235
Education			**Education**		
low	0.4678 **	0.1699	low	0.6643 *	0.1535
medium	ref.		medium	ref.	
high	0.9616	0.4120	high	0.7249	0.2308
Rural			**Rural**		
not rural	ref.		not rural	ref.	
rural	0.8004	0.2694	rural	1.2543	0.3123
Weight status			**Weight status**		
normal weight	ref.		normal weight	ref.	
overweight	0.5493	0.2028	overweight	0.9020	0.2576
obese	0.6045	0.2198	obese	0.9337	0.2556
Constant	1.8334	0.9505	**Constant**	33.168 ***	13.6262
			CLASS 3	ref.	

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.2. Regression on weight status in Chile

WEIGHT STATUS	RRR	S.E.
NORMAL WEIGHT	ref.	
OVERWEIGHT		
Class		
class 1	0.5284 *	0.2014
class 2	0.8779	0.2656
class 3	ref.	
Gender		
man	ref.	
woman	0.6750 ***	0.0864
Age group		
<20	0.1844 ***	0.0427
20-34	0.4806 ***	0.0839
35-49	ref.	
50-64	1.0693	0.2128
65+	0.9716	0.2088
SES		
low	1.0561	0.1749
medium	ref.	
high	1.0492	0.2185
Education level		
low	1.0235	0.1904
medium	ref.	
high	1.0209	0.2196
Region		
Tarapaca	1.5926 **	0.3481
Antofagasta	1.0830	0.2274
Atacama	1.6673 **	0.3894
Coquimbo	1.2536	0.3015
Valparaiso	1.2973	0.2805
L. Bdo. O'Higgins	1.3749	0.3295
Maule	1.2457	0.2733
Biobio	0.7735	0.2097
La Araucania	1.1804	0.2784
Los Lagos	0.9744	0.2246
Aysén	1.8146 **	0.5207
Magallanes y Antartica	0.9685	0.3045
Metropolitana de Santiago	ref.	
Los Rios	0.7210	0.1653
Arica y Parinacota	1.0219	0.2340
Constant	2.1499 **	0.7386

WEIGHT STATUS	RRR	S.E.
OBESE		
Class		
class 1	0.5369 *	0.2007
class 2	0.8765	0.2477
class 3	ref.	
Gender		
man	ref.	
woman	1.5288 ***	0.2177
Age group		
<20	0.1784 ***	0.0569
20-34	0.4071 ***	0.0779
35-49	ref.	
50-64	1.8003 ***	0.3630
65+	1.0381	0.2325
SES		
low	1.1297	0.1899
medium	ref.	
high	1.0273	0.2194
Education level		
low	1.2878	0.2440
medium	ref.	
high	0.8611	0.2234
Region		
Tarapaca	0.7612	0.2133
Antofagasta	1.1671	0.2654
Atacama	1.8984 ***	0.4765
Coquimbo	1.2195	0.3093
Valparaiso	0.7254	0.1624
L. Bdo. O'Higgins	1.1912	0.3887
Maule	1.2664	0.2931
Biobio	0.9500	0.2604
La Araucania	1.5221 *	0.3808
Los Lagos	1.2044	0.3066
Aysén	2.2716 ***	0.6370
Magallanes y Antartica	1.2904	0.3703
Metropolitana de Santiago	ref.	
Los Rios	1.2251	0.2863
Arica y Parinacota	1.0421	0.2658
Constant	0.7543	0.2675

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.3. Regression on latent class membership in Korea

CLASS	RRR	S.E.
CLASS 1		
Gender		
man	ref.	
woman	1.5232 ***	0.1300
Age group		
<20	3.7826 ***	0.8869
20-34	0.9629	0.1194
35-49	ref.	
50-64	0.7243 **	0.0849
65+	0.8715	0.1239
SES		
low	1.8979 ***	0.2750
medium-low	0.9548	0.1081
medium	ref.	
medium-high	0.9902	0.1060
Education		
low	1.4414 **	0.1940
medium	ref.	
high	0.821	0.0848
Province typology		
urban	ref.	
intermediate	0.9917	0.1281
rural	0.7885 *	0.0930
Weight status		
normal weight	ref.	
overweight	1.0528	0.0994
obese	1.1284	0.2490
Constant	0.6762 **	0.0895
CLASS 2		
Gender		
man	ref.	
woman	1.1208	0.2273
Age group		
<20	16.3509 ***	5.3574
20-34	1.2452	0.4034
35-49	ref.	
50-64	0.4485 *	0.1547
65+	1.1455	0.3738
SES		
low	0.7507	0.2941
medium-low	0.9836	0.2543
medium	ref.	
medium-high	1.4531	0.3694
Education		
low	0.9164	0.3209
medium	ref.	
high	0.5762 *	0.1434
Province typology		
urban	ref.	
intermediate	1.5407	0.4385
rural	0.958	0.2935
Weight status		
normal weight	ref.	
overweight	1.3944	0.3140
obese	0.3527	0.2239
Constant	0.0663 ***	0.0203
CLASS 3	ref.	
CLASS 4		
Gender		
man	ref.	
woman	2.1035 ***	0.2061
Age group		
<20	5.0634 ***	1.3004
20-34	1.6791 **	0.2589
35-49	ref.	
50-64	0.9559	0.1397
65+	2.0282 ***	0.3263
SES		
low	2.0184 ***	0.3083
medium-low	1.2003	0.1499
medium	ref.	
medium-high	0.8833	0.1156
Education		
low	1.9958 ***	0.2751
medium	ref.	
high	0.6781 **	0.0862
Province typology		
urban	ref.	
intermediate	1.0285	0.146
rural	0.8885	0.1156
Weight status		
normal weight	ref.	
overweight	0.9315	0.1010
obese	1.1406	0.2609
Constant	0.2576 ***	0.0419

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.4. Regression on weight status in Korea

WEIGHT STATUS	RRR	S.E.
NORMAL WEIGHT	ref.	
OVERWEIGHT		
Class		
1	1.0301	0.0963
2	1.3940	0.3149
3	ref.	
4	0.9338	0.1003
Gender		
man	ref.	
woman	0.6343 ***	0.0521
Age group		
<20	0.3357 ***	0.0812
20-34	0.9565	0.1224
35-49	ref.	
50-64	1.137	0.1327
65+	0.9798	0.1362
SES		
low	0.8151	0.1065
medium-low	0.8473	0.0897
medium	ref.	
medium-high	0.7051 **	0.076
Education		
low	1.3529 *	0.1598
medium	ref.	
high	0.7121 **	0.0756
Constant	0.6501 **	0.0854

WEIGHT STATUS	RRR	S.E.
OBESE		
Class		
1	1.1127	0.2439
2	0.3564	0.2274
3	ref.	
4	1.1336	0.2586
Gender		
man	ref.	
woman	0.9209	0.1722
Age group		
<20	0.455	0.2005
20-34	1.3834	0.3642
35-49	ref.	
50-64	0.7222	0.2037
65+	0.5564	0.1848
SES		
low	0.7377	0.2285
medium-low	1.0435	0.2554
medium	ref.	
medium-high	0.7933	0.1994
Education		
low	1.6658	0.4618
medium	ref.	
high	0.7042	0.1689
Constant	0.0740 ***	0.0215

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.5. Regression on latent class membership in Mexico

CLASS	RRR	S.E.
CLASS 1		
Gender		
man	ref.	
woman	2.2518 *	0.7947
Age group		
20-34	0.7643	0.3022
35-49	ref.	
50-64	1.1069	0.5266
65+	1.0626	0.9836
SES		
low	0.9507	0.4928
medium	ref.	
high	0.7173	0.3273
Education		
low	0.3250	0.2955
medium	ref.	
high	1.0533	0.4155
Rural		
rural	1.8437	0.8348
urban	0.5817	0.2707
metropolitan	ref.	
Weight status		
normal weight	ref.	
overweight	2.0664	0.8945
obese	1.3957	0.6101
Constant	1.5692	0.8811

CLASS	RRR	S.E.
CLASS 2		
Gender		
man	ref.	
woman	3.0201***	0.8728
Age group		
20-34	0.7507	0.2423
35-49	ref.	
50-64	0.9386	0.3931
65+	1.4222	1.0591
SES		
low	0.9165	0.4015
medium	ref.	
high	0.4502 *	0.1787
Education		
low	0.6579	0.5064
medium	ref.	
high	0.3638 **	0.1206
Rural		
rural	1.8390	0.7176
urban	1.1442	0.4685
metropolitan	ref.	
Weight status		
normal weight	ref.	
overweight	1.2141	0.4412
obese	1.0582	0.3979
Constant	20.9690 ***	9.5575
CLASS 3	ref.	

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.6. Regression on weight status in Mexico

WEIGHT STATUS	RRR	S.E.
NORMAL WEIGHT	ref.	
OVERWEIGHT		
Class		
class 1	1.7200	0.7706
class 2	1.0774	0.3976
class 3	ref.	
Gender		
man	ref.	
woman	1.3654	0.2319
Age group		
20-34	0.2948 ***	0.0590
35-49	ref.	
50-64	0.9100	0.2065
65+	0.8966	0.3953
SES		
low	1.0192	0.2329
medium	ref.	
high	0.8612	0.2037
Education level		
low	0.4733	0.1804
medium	ref.	
high	0.6096 *	0.1318
Rural		
rural	0.8516	0.1747
urban	1.2342	0.2751
metropolitan	ref.	
Constant	1.9605	0.8417

WEIGHT STATUS	RRR	S.E.
OBESITY		
Class		
class 1	1.2975	0.6729
class 2	0.9752	0.4371
class 3	ref.	
Gender		
man	ref.	
woman	2.0919 ***	0.3747
Age group		
20-34	0.2751 ***	0.0582
35-49	ref.	
50-64	0.7924	0.1821
65+	0.5454	0.2411
SES		
low	0.9625	0.2312
medium	ref.	
high	1.1734	0.3028
Education level		
low	0.6235	0.2036
medium	ref.	
high	0.5259 **	0.1233
Rural		
rural	0.6113 *	0.1303
urban	1.0934	0.2469
metropolitan	ref.	
Constant	1.8150	0.9380

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.7. Regression on latent class membership in Spain

CLASS	RRR	S.E.
CLASS 1		
Gender		
man	ref.	
woman	1.5923 ***	0.1455
Age group		
<20	0.6289 *	0.1588
20-34	0.7597 **	0.0892
35-49	ref.	
50-64	1.5730 ***	0.1804
65+	2.9885 ***	0.5736
SES		
low	1.0414	0.1454
medium	ref.	
high	1.6837 ***	0.2586
Education level		
low	0.8589	0.1146
medium	ref.	
high	0.8690	0.1063
City		
small city	ref.	
big city	0.8639	0.0799
Constant	1.3197 *	0.1961
CLASS 2		
Gender		
man	ref.	
woman	1.2516 **	0.1119
Age group		
<20	3.1848 ***	0.6328
20-34	0.9230	0.1022
35-49	ref.	
50-64	0.8584	0.0983
65+	1.3714	0.2706
SES		
low	0.8698	0.1155
medium	ref.	
high	1.4382 **	0.2113
Education level		
low	0.7908 *	0.1053
medium	ref.	
high	0.9211	0.1093
City		
small city	ref.	
big city	0.7253 ***	0.0656
Constant	2.6678 ***	0.3710
CLASS 3	ref.	

CLASS	RRR	S.E.
CLASS 4		
Gender		
man	ref.	
woman	1.1982 **	0.1033
Age group		
<20	0.4267 ***	0.0953
20-34	0.9872	0.1047
35-49	ref.	
50-64	1.0087	0.1097
65+	1.7593 ***	0.3268
SES		
low	0.9653	0.1225
medium	ref.	
high	0.907	0.1289
Education level		
low	0.7151 ***	0.0894
medium	ref.	
high	0.8027 *	0.0935
City		
small city	ref.	
big city	0.7945 ***	0.0694
Constant	4.4703 ***	0.5986

Note: (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.8. Regression on weight status in Spain

WEIGHT STATUS	RRR	S.E.
NORMAL WEIGHT	ref.	
OVERWEIGHT		
Class		
class 1	0.9949	0.1120
class 2	0.9190	0.1014
class 3	ref.	
class 4	0.8578	0.0906
Gender		
man	ref.	
woman	0.3572 ***	0.0200
Age group		
<20	0.1603 ***	0.0271
20-34	0.4871 ***	0.0350
35-49	ref.	
50-64	1.5480 ***	0.1060
65+	2.0286 ***	0.2261
SES		
low	1.0413	0.0885
medium	ref.	
high	0.8467 *	0.0757
Education level		
low	1.1107	0.1006
medium	ref.	
high	0.8216 ***	0.0582
City		
small city	ref.	
big city	0.8799 **	0.0492
Constant	1.6759 ***	0.2107

WEIGHT STATUS	RRR	S.E.
OBESITY		
Class		
class 1	0.7892 *	0.1096
class 2	1.0315	0.1395
class 3	ref.	
class 4	0.58556	0.0769
Gender		
man	ref.	
woman	0.4484 ***	0.0325
Age group		
<20	0.0342 ***	0.0123
20-34	0.4345 ***	0.0438
35-49	ref.	
50-64	2.0970 ***	0.1822
65+	2.8765 ***	0.3735
SES		
low	1.1927 *	0.1264
medium	ref.	
high	0.6510 ***	0.0771
Education level		
low	1.3053 ***	0.1345
medium	ref.	
high	0.6872 ***	0.0702
City		
small city	ref.	
big city	0.8278 ***	0.0607
Constant	0.7598 *	0.1220

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

Table I.9. Regression on latent class membership in the United States

CLASS	RRR	S.E.
CLASS 1		
Gender		
man	ref.	
woman	0.6455 ***	0.0743
Age group		
20-34	1.5082 ***	0.2376
35-49	ref.	
50-64	0.8249	0.1282
65+	0.8011	0.1263
SES		
low	0.8334	0.1525
medium	ref.	
high	0.7275 *	0.1347
Education level		
low	1.4764 **	0.2614
medium	ref.	
high	1.1304	0.1603
Ethnicity		
non-Hispanic white	ref.	
non-Hispanic black	0.9544	0.1262
Mexican American	1.4510 **	0.2680
other ethnicity	1.2401	0.1724
Weight status		
BMI<25	ref.	
25≤BMI<30	0.7299 **	0.1111
BMI≥30	0.4954 ***	0.0717
Constant	4.4182 ***	1.1503
CLASS 2		
Gender		
man	ref.	
woman	0.5898 ***	0.0697
Age group		
20-34	1.2239	0.1971
35-49	ref.	
50-64	0.8284	0.1302
65+	0.6615 **	0.1085
SES		
low	0.7491	0.1384
medium	ref.	
high	0.6445 **	0.1205
Education level		
low	1.1643	0.2114
medium	ref.	
high	1.0811	0.1563
Ethnicity		
non-Hispanic white	ref.	
non-Hispanic black	1.0968	0.1457
Mexican American	1.8080 ***	0.3357
other ethnicity	1.0393	0.1519
Weight status		
BMI<25	ref.	
25≤BMI<30	0.7053 **	0.1106
BMI≥30	0.4737 ***	0.0707
Constant	5.2981 ***	1.3889
CLASS 3	ref.	

CLASS	RRR	S.E.
CLASS 4		
Gender		
man	ref.	
woman	1.1130	0.1595
Age group		
20-34	0.9419	0.1852
35-49	ref.	
50-64	0.6391 **	0.1260
65+	0.9077	0.1731
SES		
low	1.1298	0.2457
medium	ref.	
high	0.6978	0.1578
Education level		
low	1.3588	0.2768
medium	ref.	
high	0.8710	0.1535
Ethnicity		
non-Hispanic white	ref.	
non-Hispanic black	1.6576 ***	0.2572
Mexican American	1.1724	0.2718
other ethnicity	1.3665 *	0.2315
Weight status		
BMI<25	ref.	
25≤BMI<30	0.7198 *	0.1319
BMI≥30	0.5466 ***	0.0952
Constant	1.1428	0.3543

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.

Source: OECD analysis of health survey data.

Table I.10. Regression on weight status in the United States

WEIGHT STATUS	RRR	S.E.
NORMAL WEIGHT	ref.	
OVERWEIGHT		
Class		
class 1	0.7386 **	0.1122
class 2	0.7129 **	0.1113
class 3	ref.	
class 4	0.7340 *	0.1342
Gender		
man	ref.	
woman	0.5413 ***	0.0520
Age group		
20-34	0.5937 ***	0.0734
35-49	ref.	
50-64	1.0817	0.1515
65+	1.1011	0.1534
SES		
low	0.8025	0.1224
medium	ref.	
high	0.7701 *	0.1171
Education level		
low	1.0350	0.1584
medium	ref.	
high	0.9449	0.1160
Ethnicity		
non-Hispanic white	ref.	
non-Hispanic black	1.0191	0.1219
Mexican American	1.9256 ***	0.3089
other ethnicity	0.6812 ***	0.0752
Constant	2.8941 ***	0.6681

WEIGHT STATUS	RRR	S.E.
OBESE		
Class		
class 1	0.5022 ***	0.0724
class 2	0.4786 ***	0.0710
class 3	ref.	
class 4	0.5567 ***	0.0964
Gender		
man	ref.	
woman	0.8593	0.0809
Age group		
20-34	0.4805 ***	0.0578
35-49	ref.	
50-64	1.1609	0.1537
65+	0.8193	0.1128
SES		
low	0.6995 **	0.0989
medium	ref.	
high	0.4903 ***	0.0699
Education level		
low	0.9327	0.1400
medium	ref.	
high	0.9230	0.1074
Ethnicity		
non-Hispanic white	ref.	
non-Hispanic black	1.4535 ***	0.1603
Mexican American	2.2132 ***	0.3459
other ethnicity	0.5475 ***	0.0611
Constant	5.1622 ***	1.1303

Note: Normal weight refers to BMI<25, overweight refers to 25≤BMI<30, and obese refers to BMI≥30. (*) means significant at the 5% level, (**) means significant at the 1% level, (***) means significant at the 0.1% level.
Source: OECD analysis of health survey data.

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