# Characterising the distributions of height and body-mass index and their interrelationship

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**Abstract**

Height and weight are indicators of healthy versus unhealthy nutrition. Body-mass index (BMI) measures weight gain beyond what is expected from height gain. Having short stature or too little weight for one's height, represented by low BMI, as well as having excessive weight for one's height, represented by high BMI, increases the risk of morbidity and mortality. My thesis aimed to provide summary statistics that characterise the distributions of height and BMI and their interrelationship. Data were collated via the NCD Risk Factor Collaboration (NCD-RisC) network, from population-based studies that had anthropometrics measurements from 1985 to 2019 for a total of 2,896 studies with 187 million participants. Of these, 1,282 surveys provided over 11 million participants aged 20 to 79 years, with 1,021 surveys of over 1.4 million women aged 40-49 years and 815 surveys of over 870,000 men aged 40-49 years. I used a hierarchical Bayesian model to estimate mean, variance and skewness of height and BMI, as well as their correlation coefficient; I also used a regression model to estimate the contribution of the change in mean BMI to the change of prevalence in underweight and obesity. In 2019 versus 1985, mean and variance of both the height and BMI distributions increased in most countries and sexes; skewness of the height distribution remained around zero for both women and men in most countries, while skewness of the BMI distribution, although it was a positive number for both sexes, it decreased in women from most countries and increased in men from all countries. Changes in the prevalence of underweight and total obesity, and to a lesser extent severe obesity, were largely driven by shifts in the distribution of BMI, with smaller contributions from changes in the shape of the distribution. The correlation coefficient between height and BMI did not change significantly from zero for most countries and sexes. Considering that the height gain was not proportional to the BMI increase, segments of the two distributions were affected heterogeneously so policy makers and health practitioners need to tackle the double burden of malnutrition.

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## List of abbreviations

| | |
|---|---|
| **BMI** | Body-Mass Index |
| **DHS** | Demographic Health Survey |
| **FAO** | Food and Agriculture Organization |
| **NCD** | Non-Communicable Disease |
| **NCD-RisC** | NCD Risk Factor Collaboration |
| **NHANES** | National Health and Nutrition Examination Survey |
| **STEPS** | STEPwise approach to Surveillance |
| **UN** | United Nations |
| **WHO** | World Health Organization |

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## Declaration of originality

I hereby declare that the work in this thesis is my own original research and that I have appropriately cited any work that is not my own.

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To my family and friends, if there's one thing Covid-19 has taught us it is how we should truly cherish the time spent together.

*... ad maiora semper.*

# 1 Introduction

## 1.1 Rationale

In the presence of healthy nutrition, individuals and populations should have proportional weight-to-height gain, i.e. increasing height and stable BMI at optimal levels. Having short stature or too little weight for one's height, represented by low BMI, as well as having excessive weight for one's height, represented by high BMI, are both risk factors for non-communicable diseases. Currently, consistent and comparable global data, beyond just means and prevalences, are lacking on the distributions of height and BMI, and their interrelationship. Such information is needed to understand how the distributions of these two anthropometric variables have changed over time, both independently and in relation to one another, and how the change may vary across different regions of the world.

## 1.2 Aims and objectives

The overall aim of my thesis is to investigate the spatiotemporal evolution of the distributions of height and BMI and their interrelationship over the last three decades and across different regions in the world. Three objectives underpin the overall aims:

1) to systematically collate data on height and BMI from population-based measurement surveys for all countries and territories in the world;
2) a) to estimate national trends of the first three moments — mean, variance and skewness — of the distributions of height and BMI; and b) how much the changes in mean BMI contribute to the changes in clinically relevant categories of BMI;
3) to estimate national trends of the correlation coefficient between height and BMI.

## 1.3 Structure of the thesis

In Chapter 2, I provide an overview of how nutrition affects weight and height, and I introduce BMI as a measure of weight independent of height. I then summarise the literature that has characterised the distributions of height and BMI, as well as their interrelationship. In Chapter 3, I describe how I collated data on height and BMI from population-based measurement surveys. In Chapter 4, I characterise the distributions of height and BMI and their interrelationship by estimating national trends of the first three moments — namely mean, variance and skewness — of these two anthropometric variables as well as their correlation coefficient in women and men aged 40-49 years from 1985 to 2019. In Chapter 5, I investigate how much the change in mean BMI contributed to the change in prevalence of clinically relevant prevalences of BMI — underweight, obesity and severe obesity — from 1985 to 2016 in women and men aged 20-79 years across different regions of the world. In Chapter 6, I discuss the implications of my findings and potential directions for future work.

# 2 Background

## 2.1 Overview

In this chapter, I first explain how nutrition during childhood and adolescence, and later in life, affects health in adulthood, with height and weight as indicators of healthy versus unhealthy nutrition. I introduce BMI as an index to track weight gain beyond height gain, and the associations of higher and lower height and BMI with health outcomes. I then summarise the literature that has characterised the distributions of height and BMI, as well as their interrelationship, over geography and time. Finally, I highlight the limitations of the existing studies and how my thesis contributes to filling the current gap.

## 2.2 Height and weight throughout the life course

### *2.2.1 Nutrition determining height and weight during growth*

Growth and development during childhood and adolescence are modulated by complex interactions between genetics and environment,[1,2] of which nutrition is a key determinant.[3-5] Food and nutrition, including energy balance (calories-in and calories-out) and quality of macronutrients (proteins, carbohydrates, fats) and micronutrients,[6,7] along with physical activity,[8] affect weight gain and height achieved in adulthood.[9-16] Height and weight are among the main anthropometric variables used to assess population growth and nutritional status,[17] as they reflect the quality of nutrition and healthiness of the social living environment at home, at school and in the community during childhood and adolescence, and are also highly predictive of health outcomes in adulthood.[18-21] Weight gain itself affects height gain, leading to complex correlations between these two anthropometric variables throughout the life course. During developmental ages, nutritional imbalances have the potential to prevent healthy height gains or amplify unhealthy weight gains.[22-24] Specifically, childhood weight gain is associated with an increased height gain during this time, but, when weight gain is excessive, height gain reduces during adolescence because of early onset puberty.[25] Individuals with overweight and obesity status during their childhood and/or adolescence are more likely to stay so in adulthood.[9,26-31]

Overall, optimal growth should aim at proportional weight-to-height gains, avoiding situations of undernutrition, which may lead to too little height gain (short stature) and too little weight gain (underweight status); or overnutrition, which may lead to excessive weight gain (overweight or obesity status). Proportional weight-to-height gains are key because, while adult height is mostly determined during adolescence, weight gain can continue indefinitely throughout the life course via changes in the nutrition or in the living environment which can affect both the individual and the population.

### *2.2.2 The need to account for the relationship between weight and height*

Height and weight are highly correlated so, in the case of optimal nutrition, it is expected on average that a taller person has a larger weight. There is a need to have a measure of whether an individual has too little or too much weight compared to their height. The Benn index ($kg/m^B$) was introduced to normalise the weight-to-height ratio, where the Benn parameter (B) is the coefficient from a linear regression of log weight (kg) on log height (m).[32] By manipulating the power of the denominator height in the weight-to-height ratio, this index was meant to achieve a lack of correlation between height and weight. A Benn parameter of 2, also known as Quetelet's index or BMI nowadays, showed the strongest correlation with weight (and other measures of adiposity) and the weakest correlation with height.[32-34] Numerically, a coefficient of 2, as currently used in the calculation of BMI, means that, as height increases by 1%, weight increases by 2%. BMI, defined as weight in kilograms over height squared in meters ($kg/m^2$), functions on the premise that weight increases proportionately to height squared so that, when dividing weight by height squared, it results in an index that is uncorrelated with height. Because of this, BMI is an index that standardises the weight-for-height ratio, and allows geographical and temporal comparisons, despite different populations achieving different average body height and weight.

It must be considered that, although BMI is the most commonly used anthropometric measure, it does not distinguish between fat mass and fat-free mass (also known as lean or muscle mass). There has been some debate in the literature regarding alternative anthropometric measures for adiposity, such as waist circumference, waist-to-hip ratio or bioimpedance. Although these other anthropometric measures would allow to also estimate body composition, BMI is currently accepted as a good proxy for body fatness as it is less prone to random measurement error,[35] with any differences between associations of other adiposity measures being too small for clinical significance.[36]

## 2.3 Health outcomes associated with different levels of height and BMI

### *2.3.1 Health outcomes associated with short and tall stature*

Individual-level evidence from prospective cohorts have shown an association between higher stature and lower all-cause mortality.[37-44] Studies using Mendelian randomisation have shown a causal link between stature and health outcomes, where a difference of ~20 cm in height had a 17% lower risk of cardiovascular mortality but 20–40% higher risk of various site-specific cancers.[45-47] Greater height is associated with a higher risk for some forms of cancer, including colorectal, postmenopausal breast and ovarian cancers, and possibly pancreatic, prostate and premenopausal breast cancers; but a lower risk of cardiovascular and respiratory diseases.[21,37-49]

Short stature is associated with lower life expectancy, higher risk of cardiovascular and respiratory diseases, but also lower risk of some cancers.[21,37-49] Moreover, short maternal stature increases the risk of small-for-gestational-age and preterm births, both of which may cause pregnancy complications and even neonatal death.[50,51] Shorter individuals also achieve on average lower social outcomes related to education, earnings, and general social position obtained,[19,52-55] which in turn are associated with negative health outcomes.[56]

### *2.3.2 Health outcomes associated with high and low BMI*

Higher BMI is associated with increased risk of all-cause and cause-specific mortality[57] from cardiovascular and kidney diseases, diabetes, some cancers and musculoskeletal disorders.[35,58-67] Higher BMI is also causally linked to other risk factors such as increased blood glucose and blood pressure,[68,69] which are markers of diabetes and hypertension and mediate some of the negative health outcomes associated with higher BMI.[70] The economic, morbidity and mortality burden of high BMI is growing,[70-76] with an estimated 2.5 million cardiovascular diseases, chronic kidney disease and diabetes deaths globally (15% of all deaths from these causes) in 2010 attributed to higher BMI. Additionally, an estimated 544,300 incident cancer cases, predominantly breast, endometrial, colorectal, liver and kidney cancers, were attributable to higher BMI in 2012; a third of these were attributable to the increase in BMI from 1980 to 2002 (allowing for a 10-year time-lag in cancer development from the time of risk factor exposure).[71] Being underweight is also associated with increased morbidity and mortality, as well as a number of adverse pregnancy outcomes including maternal mortality; preterm birth; delivery complication; and intrauterine growth retardation.[77]

## 2.4 Literature on the distributions of height and BMI

### *2.4.1 Current literature on summary statistics characterising the height distribution*

Multiple studies reported that secular trends in adult height increased for different countries and sexes.[15,17,18,78-89] The most comprehensive study on adults from all countries in the world reported that the pace of growth in height has not been uniform over the past century.[90] The rise in height stopped in people born in the 1960s and plateaued in those born in the 1980s in high-income Asia Pacific countries. Height gain also plateaued in South Asian countries, but is continuing in East and Southeast Asian countries. Mixed results were reported for mean height trends in the high-income Western countries, with northern European countries and English-speaking countries of this region showing a plateau while southern European countries still increasing at similar pace to Latin American and Caribbean countries. Little to no height gains were observed in most countries within the sub-Saharan Africa and some countries Central, Asia, the Middle East and North Africa regions. Overall, although there was about a 20 cm difference between the shortest and tallest countries for both men and women, most countries gained height in the last century, between 2 and 20 cm for women and between 1 and 15 cm for men.[90]

One study reported on mean together with standard deviation (the square of variance) of women's adult height in 59 low- and middle-income countries over the past half century using cross-sectional survey data.[91] The following results are for the first birth cohort, 1950-1959, compared to the last, 1980-1989. 34 of the 59 countries showed no significant change in standard deviation of height between the first and last birth cohort; of these, 16 experienced increased in mean height, three showed decreases in mean height, and the remaining 15 did not show any significant change in mean height. 25 out of 59 countries, approximately 40% of total countries in this study, experienced a significant change in standard deviation of height between the first and last birth cohorts. Of the nine countries where standard deviation increased, four showed an increase in mean height, one showed a decrease, and four did not change significantly in mean height; seven of these nine countries were in sub-Saharan Africa.

Height is a polygenetic additive metric trait so its distribution is likely to be very close to symmetry and normality.[92] Studies using conscript data between the 1860s and the 1970s from Switzerland[93] and Italy[94] reported that height distribution moved from left-skewness to symmetry.

### *2.4.2 Current literature on summary statistics characterising the BMI distribution*

Trends in mean BMI and clinically relevant BMI categories are among the most researched and reported topics in the literature as they are usually used as an indicator of overall healthy growth in a population. There are different clinically relevant categories of BMI as they allow categorisation of individuals for intervention. Underweight (BMI $\leq$ 18.5 kg/m$^2$) and obesity (BMI $\geq$ 30 kg/m$^2$) are among the most widely used to understand the distribution of BMI as they identify the two tails and are linked to adverse health outcomes.[35,59,62,95] The most recent report on comparable national mean BMI in adults covered a period between 1975 and 2016.[96] Globally, age-standardised mean BMI increased in the four decades for people of all ages and sexes, reaching mean BMI $\geq$ 25 kg/m$^2$ (cut-off for overweight) in some regions.[96] For at least four decades, prevalence of underweight decreased and that of obesity increased in most countries with significant variation in the magnitude of these changes across regions of the world.[96,97]

Reporting trends of mean BMI or BMI prevalences separately however does not explain any variations within the distribution. For example, reporting mean or prevalences alone does not explain whether the rise in obesity or the decrease of underweight over time and across different countries were due to a shift in the BMI distribution, versus changes in the low- or high-BMI tails of the distribution. The existing literature has therefore also used other methods to characterise the BMI distribution. Some studies looked into the associations between mean BMI and clinically relevant BMI categories alone,[98-100] while others looked into this same association but also including other factors, such as age, gender or socio-economic status.[101,102] Other studies focused on the shape of the distribution by exploring either percentiles of distribution; [103-107] quantiles;[108-113] or specific summary statistics such as variance (or standard deviation) and skewness to depict the distribution.[114-117] Some studies investigated trends of mean BMI and variance (or standard deviation) of BMI, reporting that where mean BMI increased, so did variance of BMI.[101,103,105] Studies on trends on skewness of BMI have mixed results depending on geographical area, time of the study, gender and age group investigated.[104,112,117,118] Finally, to interpret changes in the distribution across time, a previous study used visual comparison of the BMI distribution over time.[118]

### *2.4.3 Current literature on the interrelationship between height and BMI*

Some studies characterised the interrelationship between height and BMI by reporting their mean separately within the same study.[119,120] Only one study with worldwide coverage from 1985 to 2019 reported on trends in mean BMI and mean height together in children and adolescents aged 5-19 years.[121] In this study, the mean height of 19-year old individuals increased in developing economies including some parts of East and Southeast Asia, South Asia, the Middle East and North Africa, and Latin America and the Caribbean. Although to a lesser extent, mean height also increased in high-income Western countries, some Central and Eastern Europe countries and high-income Asia Pacific countries. Mean height stagnated in sub-Saharan Africa. In the same study, the mean BMI of 19-year old individuals increased for most regions and sexes, from small increases in high-income Asia Pacific, some European, central Asian and sub-Saharan African countries; to larger increases in East and Southeast Asia, Oceania and some Latin American countries. For this study, when considering mean height and mean BMI together, from 1985 to 2019, 19-year-old individuals in Central Asia and some European countries had moderate-to-large gains in height alongside little-to-no increases in BMI. These trends were remarkably better than those observed in the majority of countries from sub-Saharan Africa and Oceania, and some countries from the high-income Western region and Latin America and the Caribbean, where the BMI increase was faster than the height gain. This report shows that trends for both anthropometric variables are already heterogeneous at mean level, and are likely to be even more heterogeneous at the individual level.

Another way to characterise the interrelationship of two anthropometric variables is through the correlation coefficient. The correlation coefficient measures the extent to which two variables are linearly related: a positive correlation indicates that an increase in one variable is related to an increase in other; a negative correlation indicates that an increase in one variable is related to a decrease in the other. Although, as reported in Section 2.2.2, there is a large body of research investigating trends of the correlation coefficient between height and weight, trends of the correlation coefficient between height and BMI is an understudied topic. Only one study was conducted in multiple countries and reported a negative relationship between height and BMI, but this was at a single time point.[122] Another study, which covered multiple time points, also reported a negative relationship between these two anthropometric variables but it was restricted to the UK only.[119] Previous studies at different time points assume that the correlation coefficient between height and BMI is expected to be negative.[123-125]

### *2.4.4 Rationale of investigating distributional changes*

Although as reported in Section 2.3.1 for height and in Section 2.3.2 for BMI these two anthropometric measures have health-related implications associated particularly with their high and low exposure levels, previous literature (reported Section 2.4.1 for height and in Section 2.4.2 for BMI) used different summary statistics to investigate the whole spectrum of their exposure levels (i.e. the whole distribution) rather than specific subgroups at higher exposure levels (i.e. stunting for height and underweight and obesity for BMI). Capturing population-wide shifts as well subpopulation-specific patterns is crucial because risk typically increases across the spectrum of a risk factor.[126] That means that, for example for BMI, a larger portion of the population being at overweight levels may be more worrying from a public health perspective than a smaller portion of the population at obesity levels. It is important to assess the full extent of distributional changes to produce packages of interventions for population-wide measures as well as targeted interventions for subpopulations identified by segments of the distributions.[127]

As seen in the previous literature reported in Section 2.4.1 for height and in Section 2.4.2 for BMI, the shape of a unimodal distribution can be described by its moments: the first moment, the mean, which is a measure of the central tendency of the distribution; the second central moment, the variance of the distribution, which is a measure of its width; the third normalised central moment, the skewness, which is a measure of the symmetry of the distribution. Figure 1 schematically shows how a distribution is affected by an increase or decrease in each of its first three moments — namely mean, variance and skewness — while keeping the other two fixed. Mean is the most commonly used and reported moment to describe distributional changes over time. Figure 1 shows how changes in mean correspond to the direction in which the distribution is shifting, either upwards (when increasing) or downwards (when decreasing).

It is important to note that, although mean will tell us in which direction the distribution is shifting, it will not give any information regarding various segments of the distribution, which is why previous studies also investigated other moments. Variance describes the degree of spread within a distribution. Figure 1 shows how a decrease in variance narrows the range, making the density higher toward the mode of the distribution; whereas, an increase in variance widens the range, lowering the density towards the mode of the distribution. Skewness is a measure of the symmetry of the distribution, where a skewness of zero is represented by a perfectly symmetric density. Figure 1 shows how a decrease in skewness towards a negative value (left-skewed distribution) corresponds to a distribution with a longer left tail; conversely, an increase in skewness towards a positive value (right-skewed distribution) corresponds to a distribution with a longer right tail.

As reported in Section 2.4.1, although to different degrees, mean height is increasing in most countries and sexes,[15,17,18,78-90] standard deviation of height tends to stay the same,[91] while skewness of height has been around zero since the 70s.[93,94] This means that the distribution of height is shifting upwards with small changes into its shape, i.e. the height growth is homogenous among the whole population. BMI on the other hand, as reported in Section 2.4.2, shows increasing mean in most countries and sexes,[95,96] as well as increasing standard deviation,[101,103,105] and increasing skewness.[104,112,118] This means that the distribution of BMI is not simply shifting upwards but it is also widening while forming a longer right tail, i.e. a larger portion of the population is now at overweight levels, with BMI increasing even faster within the segment of the population that was already at obesity levels. In the scenario of healthy nutrition and growth, the ideal health outcome of a homogeneous growth of height would be accompanied by an increase in BMI only for underweight regions, which would translate to a positive relationship between these two anthropometric variables only for the underweight population; but, as reported in Section 2.4.3, previous studies at different time points assume that the correlation coefficient between height and BMI is expected to be negative.[123-125] Taken together, these observations instead indicate that the BMI increase is above and beyond the height growth, which is particularly true and alarming for the population represented by the right tail of the BMI distribution, i.e. overweight and obesity. Investigating the moments of the distributions of height and BMI together is an essential step to understand the evolution of these two anthropometric variables across regions and over time so that public health practitioners and policy makers can effectively target and prevent the related negative health outcomes.

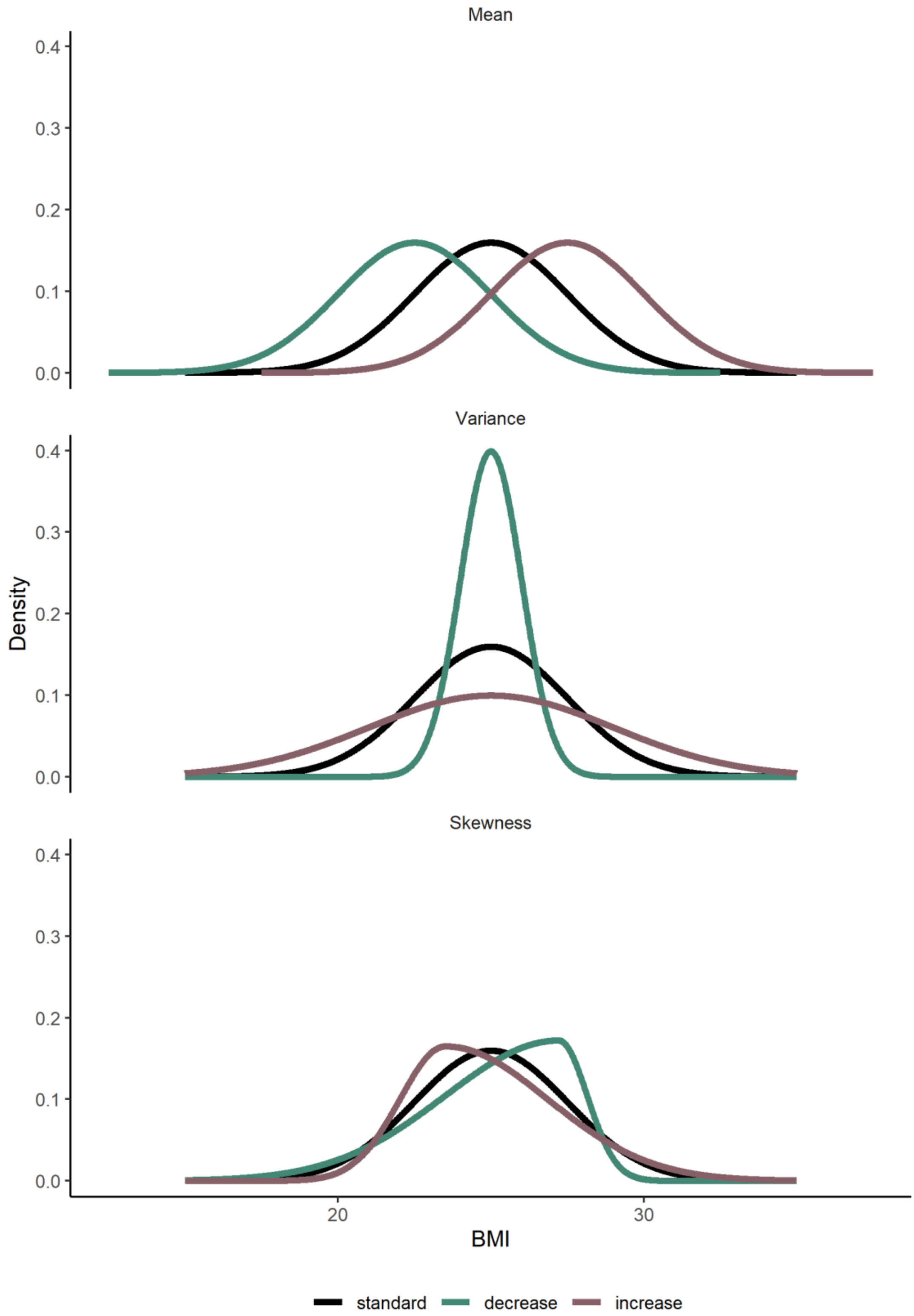


**Figure 1.** Illustrative example of change in a distribution due to an increase or decrease in one of its first three moments.

The base distribution has mean = 25 kg/m$^2$, variance = 6.25 (kg/m$^2$)$^2$, and skewness = 0. The increase and decrease of each moment are: 2.5 kg/m$^2$ for mean, 2.25 (6.25 kg/m$^2$)$^2$ for variance and 1 for skewness.

### *2.4.5 Limitations of existing literature and research gap*

Ideally, improved nutrition would result in a population gaining height over time, with a weight gain that is not in excess of what would be optimal given the change in height. Considering the rise in both mean height and BMI globally in adults, it is crucial for public health practitioners and policy makers to understand how height and BMI change together in populations to the point where the weight gain is in excess of the height gain. The current understanding of the change in mean alone does not provide sufficient information for targeted interventions, i.e. policies that target specifically the tails of the distribution versus a holistic approach aimed indiscriminately at all segments of the distributions. For this reason, it is essential to investigate how the full distributions of height and BMI are evolving.

To the best of my knowledge, no study with global and extensive temporal coverage ever characterised the distributions of height and BMI as well as their interrelationship: all studies reported in previous sections looked at one or two summary statistics for one anthropometric measure only. Information on how people are distributed in various groups related to their height or weight is not available but is much needed for effective clinical and nutritional interventions. Another crucial limitation of the current evidence base is the representativeness of studies: with a few exceptions of global analyses[90,95,96,121] or groups of low- and middle-income countries,[101,108] studies were limited to single countries; to one gender only;[98,100,102,103,105-116,118] and to specific age groups;[98,100-103,105-118] ethnic groups;[106,107] socioeconomic status;[113-115] or urban or rural living.[104,114] Furthermore, existing studies that focused specifically on trends often used data from only two or three time-points, and multi-country studies rely on the available data from countries that often cover varying periods. This variability in temporal data availability makes geographical comparisons unreliable because the magnitude of a country's height and BMI difference likely changes over time.

To date, trends of summary statistics characterising the distributions of height and BMI and their interrelationship have not been systematically quantified. To shed light on these gaps in the current literature, in this thesis I investigate trends of summary statistics that characterise the distributions of height and BMI and their interrelationship for the last three decades worldwide. Understanding the evolution of the distributions of height and BMI across regions and over time focusing not only on mean, but also on variance and skewness (and clinically-relevant prevalences in the case of BMI), as well as their correlation coefficient will provide policy makers and public health practitioners with essential knowledge regarding the entire distributions of these two anthropometric variables for effective targeted interventions among different populations.

## 2.5 Summary

In this chapter, I explained how the anthropometrics measures of height and weight capture important aspects of growth and nutrition, with BMI as a metric intended to measure weight independently of height. Ideal nutrition would lead to height gain with a proportional weight gain to maintain stable BMI. However, although mean height has increased over time throughout the world, mean BMI and prevalence of obesity have also increased. To understand how height and BMI are changing in the population, previous literature used different methods to characterise the distributions of these two anthropometric variables. For height, the most widely reported metric was secular trend of mean, with a smaller group of studies also looking into variance and skewness. For BMI, previous studies primarily investigated trends of mean BMI and clinically relevant categories of BMI; and some others investigated the shape of the BMI distribution using other summary statistics, including percentiles, quantiles, variance and skewness. Some studies jointly investigated height and BMI reporting trends of mean for the two anthropometric variables, and a few explored the interrelationship of height and BMI by estimating the correlation coefficient. Overall, summary statistics characterising the distributions of height and BMI, beyond mean and prevalences, and their interrelationship are underexplored. To have a complete understanding of how the distributions of these two anthropometric variables vary across different territories and over time, my aims are to estimate trends of summary statistics characterising the distributions of height and BMI, and also their interrelationship, that are comparable across world regions and years.

# 3 Collation of a worldwide database on height and BMI measurements

## 3.1 Overview

Robust global analysis of the distributions of height and BMI, and their interrelationship, requires high-quality data from as many countries and years as possible. As part of my PhD work, I put significant effort into the systematic and comprehensive collation of height and weight measurement data from population-based surveys worldwide, together with a broader set of cardiometabolic risk factors including blood pressure, glucose and blood lipids within the NCD Risk Factor Collaboration (NCD-RisC). The resulting database is hereafter referred to as the NCD-RisC database. Establishing and maintaining the NCD-RisC database is a collective effort, and I took a major role in assembling the anthropometric database for the purposes of the analyses related to my thesis. I provide an overview of the data collation and harmonisation process in Figure 2, with further details described in subsequent sections of this chapter.

### *3.1.1 Contribution to the construction of database*

My work included identifying suitable data sources; checking study design against pre-defined inclusion and exclusion criteria; establishing whether studies recorded information on anthropometric measurements; communicating with collaborators (by e-mail and in person) to request the data; extensive checks on the datasets shared by collaborators; and resolving any queries that arose regarding study characteristics, measurement protocols and data quality issues, such as implausible or missing measurements and inconsistencies with published reports. I improved the workflow of inclusion of new surveys in NCD-RisC database implementing automation in the extraction process, i.e. whenever new rounds of surveys were added, metadata from previous rounds would be preserved changing the year, and other entries would be imported and updated automatically. I also automated the manual process of updating information regarding collaborators that provided multiple but unrelated surveys, i.e. the process previously required manual checks of duplicated names or duplicated entries for different risk factors which instead now are automatically picked up by the system. Specifically for the purpose of my research, I designed and implemented the process of generating a consistent set of summary statistics for the distributions of height and BMI using the NCD-RisC database: the moments that characterise their distribution independently — namely mean, variance and skewness — and correlation coefficient between these two anthropometric variables.

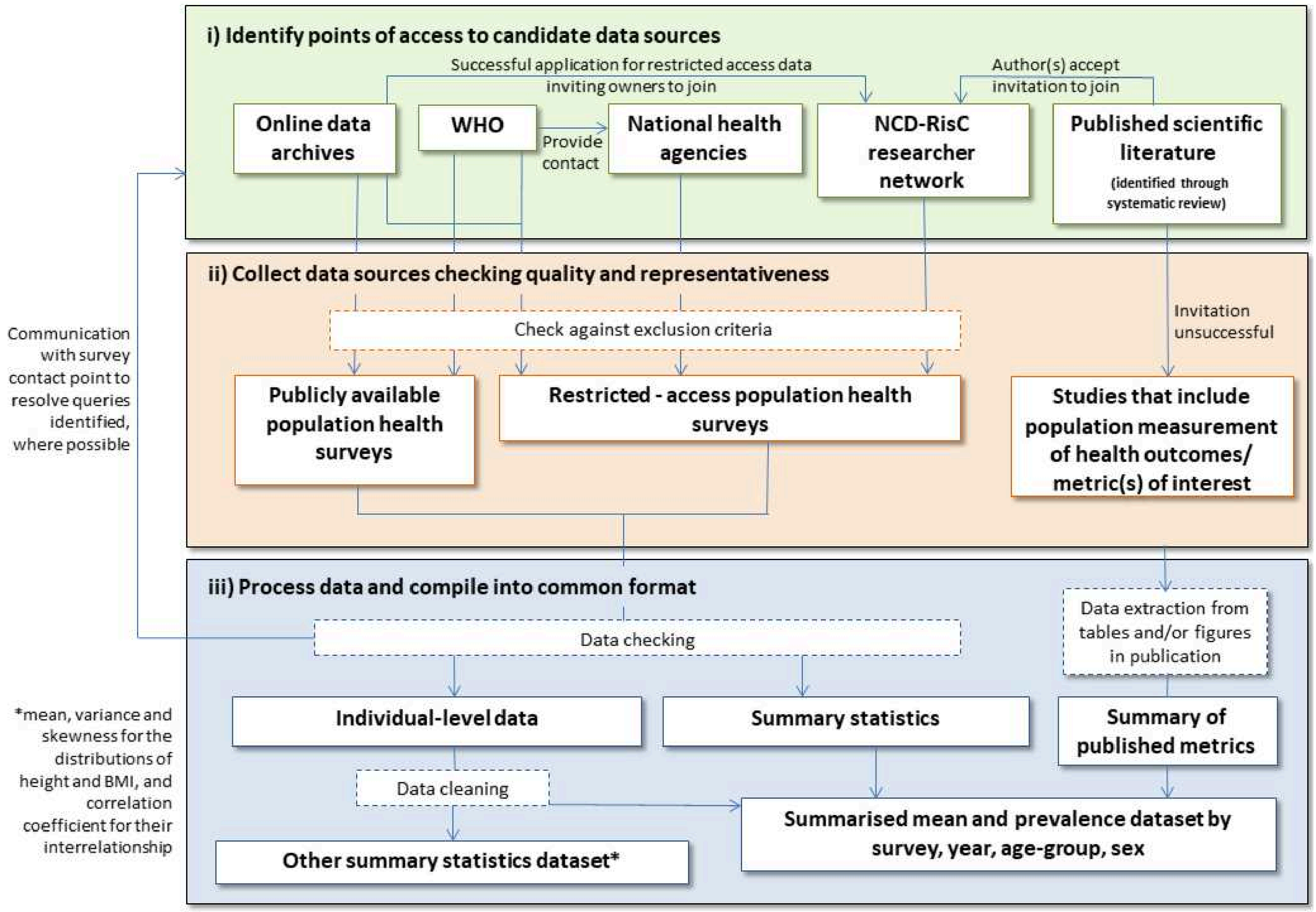


**Figure 2.** Flow-chart of the data collation and management process.

## 3.2 Methods

### *3.2.1 Countries and regions of study*

A total of 200 countries and territories were included in the NCD-RisC database. They were organised into nine world regions for the purposes of analysis and presentation (Appendix Table 1). The regional grouping of countries was on the basis of geography and national income; the exception was the grouping of a few high-income English-speaking countries together with Western European countries, to form a geographically dispersed high-income Western region. These countries, which include Australia, Canada, New Zealand and the USA, are often distinct in cardiometabolic risk factors from their geographical neighbours and share more similarities with those in the high-income Western region.[90,95-97,121,128-131] This resemblance among countries within a region was important because, as further explained in Section 4.2.1 the hierarchical Bayesian model that I used allowed sharing of information across countries to a greater extent for those within the same region, to estimate each country's moments of the distributions of height and BMI.

### *3.2.2 Data access*

The NCD-RisC database was collated through multiple routes for identifying and accessing data. Data were primarily accessed through members of NCD-RisC, a worldwide network of health researchers and practitioners who hold primary data from population-based surveys that measured cardiometabolic risk factors and share these data for pooled analyses. The collaboration's aim is to document systematically the worldwide trends and variations in NCD risk factors. In the first instance, members comprised of those invited from a previous global data-pooling effort[132-135] and those identified through a systematic literature review (details of the review are published elsewhere).[95-97,121,129,130,136] Membership has since grown as additional data have been contributed.

NCD-RisC works closely with the World Health Organization (WHO). Requests were sent, via WHO and its regional and country offices, to ministries of health and other national health and statistical agencies for help with identifying and accessing population-based surveys. Similar requests were sent via the World Heart Federation to its national partners. Data were also downloaded directly from publicly accessible online data sources such as the Demographic and Health Surveys (DHS); WHO-STEPwise approach to Surveillance (STEPS) surveys; the US National Health and Nutrition Examination Survey (NHANES); those hosted in the Inter-University Consortium for Political and Social Research database; the UK Data Service; and the European Health Interview & Health Examination Surveys Database.

### *3.2.3 Inclusion and exclusion criteria*

The following inclusion and exclusion criteria were rigorously applied to all data sources to ensure the quality of data and the representativeness of the underlying sample. Data sources were included in the NCD-RisC database if:

- measured data on height and weight were available;
- study participants were five years of age and older;
- data were collected using a probabilistic sampling method with a defined sampling frame;
- data were from population samples at the national, sub-national (i.e., covering one or more subnational regions, more than three urban communities or more than five rural communities), or community level; and
- data were from the countries and territories listed in Appendix Table 1.

All data sources that only used self-reported weight and height without a measurement component were excluded because these data are subject to biases that vary with geography, time, age, sex and socioeconomic characteristics.[137-139] Data on population subgroups whose anthropometric status may differ systematically from the general population were also excluded for the following cases:

- studies that had included or excluded people based on their health status or cardiovascular risk;
- studies whose participants were only ethnic minorities;
- studies on specific educational, occupational, or socioeconomic subgroups, with the exception noted below;
- studies that recruited through health facilities, with the exception noted below.

School-based data in countries and age-sex groups with enrolment of 70% or higher were included. Data whose sampling frame was health insurance schemes were included for countries where at least 80% of the population were insured. Both thresholds are consistent with previous publications,[90,95-97,121,128-130,136] and ensured that, in countries where education and healthcare rely heavily on private facilities, the data included in the NCD-RisC database would not be biased by socioeconomic status. Finally, data collected through general practice and primary care systems in high-income and central European countries with universal insurance were also included, because contact with the primary care systems tends to be as good as or better than response rates for population-based surveys.

In my thesis, data on participants aged 20-79 years from surveys conducted from 1985 to 2019 were included. Additional exclusion criteria were applied in each of my subsequent analyses depending on my scope in that specific instance, and I reported them in relevant sections.

### *3.2.4 Data management*

Anonymised individual record data from the sources included were reanalysed according to a common protocol. Pregnant participants were excluded before any analysis, and so were those with implausible BMI levels (defined as BMI ≤ 10 kg/m$^2$ or BMI ≥ 80 kg/m$^2$) or with implausible height or weight values (defined as height ≤ 80 cm, height ≥ 250 cm, weight ≤ 8 kg or weight ≥ 300 kg). Note that, in NCD-RisC database, thresholds for implausible weight, height and BMI were different for children and adolescents aged under 15 years; these thresholds are stated in a previous publication[121] but not included here because my analysis did not include this age group.

When individual record data were available, the following summary statistics were generated by sex and age group in each data source for height and BMI separately: mean, prevalence of various categories (for BMI only), variance, and skewness; as well as correlation coefficient between height and BMI. If individual record data could not be shared, only summary statistics of mean height and mean and prevalence of BMI were prepared by NCD-RisC collaborators who had access to the data, but not variance, skewness or correlation coefficient. Both of the possible above routes for data available at either individual-level or summary-level are shown schematically in part iii of the flowchart in Figure 2. All analyses incorporated appropriate sample weights and complex survey design in calculating age-sex-specific means and prevalence when applicable. Standard data request sheets were provided to collaborators with step-by-step instructions to generate summaries by sex and age. Computer codes were provided to NCD-RisC collaborators who requested assistance. All submitted individual and summary data were checked by at least two independent researchers. Questions and clarifications were discussed with the collaborators and resolved before data were incorporated in the database.

Finally, data from all nationally representative sources that were identified but not accessed via the outlined routes were incorporated by extracting summary statistics from published reports. Data were extracted from published reports only when reported by sex and in age groups no wider than 20 years. Summary statistics from the first global-data pooling study[132] were also incorporated when such data could not be accessed through the routes described.

For each data source accessed via the above routes, information was recorded about the study population, period of measurement, sampling approach, and measurement methods. This information was used to establish that each data source was population-based; to assess whether it covered the whole country, multiple subnational regions, or one or a small number of communities; and whether it was rural, urban, or both combined. All data sources were carefully checked against the inclusion and exclusion criteria. Duplicate data sources were identified by comparing studies from the same country and year. All NCD-RisC members are asked periodically to review the list of sources from their country; to suggest additional sources not in the database; and to verify that the included data meet the inclusion criteria listed and are not duplicates. The NCD-RisC database is continuously updated through contact with NCD-RisC members and all the above routes.

## 3.3 Data used in this thesis

As there are differences in levels and trends in relation to sex in BMI[96] and height[90] I pooled and analysed height and weight data separately for women and men. In Chapter 4, I investigate the trends of moments describing the distributions of height and BMI: mean, variance and skewness. Within the same chapter, I also investigate trends of the correlation coefficient between height and BMI to understand how the relationship between these two anthropometric variables evolved over time and in different regions. For these analyses I used only individual-level data, from which I then calculated the moments and the correlation coefficient needed for each study-year by sex and age group (Figure 2iii). In Chapter 5, I investigate how the change in mean BMI contributes to the change in prevalence of underweight, obesity and severe obesity. For this analysis, I needed the mean BMI and prevalences of BMI, so I could use both data received at summary level as well as data received as individual-level (for which I then calculated mean BMI and prevalences myself; Figure 2iii).

### *3.3.1 Data for characterising the distribution of height and BMI, and their interrelationship*

To estimate national trends of moments describing the distributions of height and BMI and of the correlation coefficient describing the interrelationship between these two anthropometric variables, as presented in Chapter 4, I generated additional summary statistics which had not been requested from collaborators who provided data as aggregated summary statistics (as explained in Section 3.2.4 and shown in Figure 2).

Individual-level data were pooled from 1,282 surveys conducted in the period from 1985 to 2019 with over 11 million participants aged 20 to 79 years (Figure 3). Of the 1,282 data sources with individual-level data, 737 (58%) were nationally representative, 188 (15%) were representative of a subnational population and the remaining 357 (27%) were community samples. A list of the data sources, and their key characteristics, with individual-record data on height and weight measurements for individuals aged 20-79 years between 1985 and 2019 is provided in Appendix Table 2. Data covered 192 of the 200 countries listed in Appendix Table 1, as shown by world maps in Figure 3 for individuals of both sexes aged 20-79 years between 1985 and 2019. For 158 of the countries, at least two data sources were available and for 156 of these the available data were from surveys conducted in different years. Figure 4 shows the availability of data across regions in each year analysed for individuals of both sexes aged 20-

79 years between 1985 and 2019. The high-income Western region and high-income Asia Pacific had the highest number of surveys, with an average of 14 surveys per country among both sexes and all age-groups, whereas Oceania had the lowest, with an average of three surveys per country. 353 (28%) data sources were from years before 2000 and 929 (72%) were from 2000 onwards.

For the analyses in Chapters 4, I only included participants aged 40-49 years, for whom weight loss as a result of pre-existing illness is still uncommon (therefore lower weight is less likely to be associated with worse health); this was also the age group with the most data. Of the 1,282 surveys mentioned earlier, 1,021 surveys had data for over 1.4 million women aged 40-49 years and 815 surveys had over 870,000 men of the same age; for a total of 1,045 surveys with over 2.3 million individuals aged 40-49 years between 1985 and 2019 (Figure 5). A list of these 1,045 data sources, and their key characteristics, is provided in Appendix Table 2. Of these 1,045 data sources, 645 (62%) were nationally representative, 140 (13%) were representative of a subnational population and the remaining 260 (25%) were community samples. Data covered 180 of the 200 countries listed in Appendix Table 1, as shown by the map in Figure 5. For 148 of the countries, at least two data sources were available and for 147 of these the available data were from surveys conducted in different years, which helped estimate trends of summary statistics for the distributions. Figure 6 shows the availability of data across regions in each year analysed for women and men aged 40-49 years. Sub-Saharan Africa had the highest number of surveys, with an average of five surveys per country, whereas Oceania had the lowest, with an average of two surveys per country. 278 (26%) data sources were from years before 2000 and 767 (74%) were from 2000 onwards.

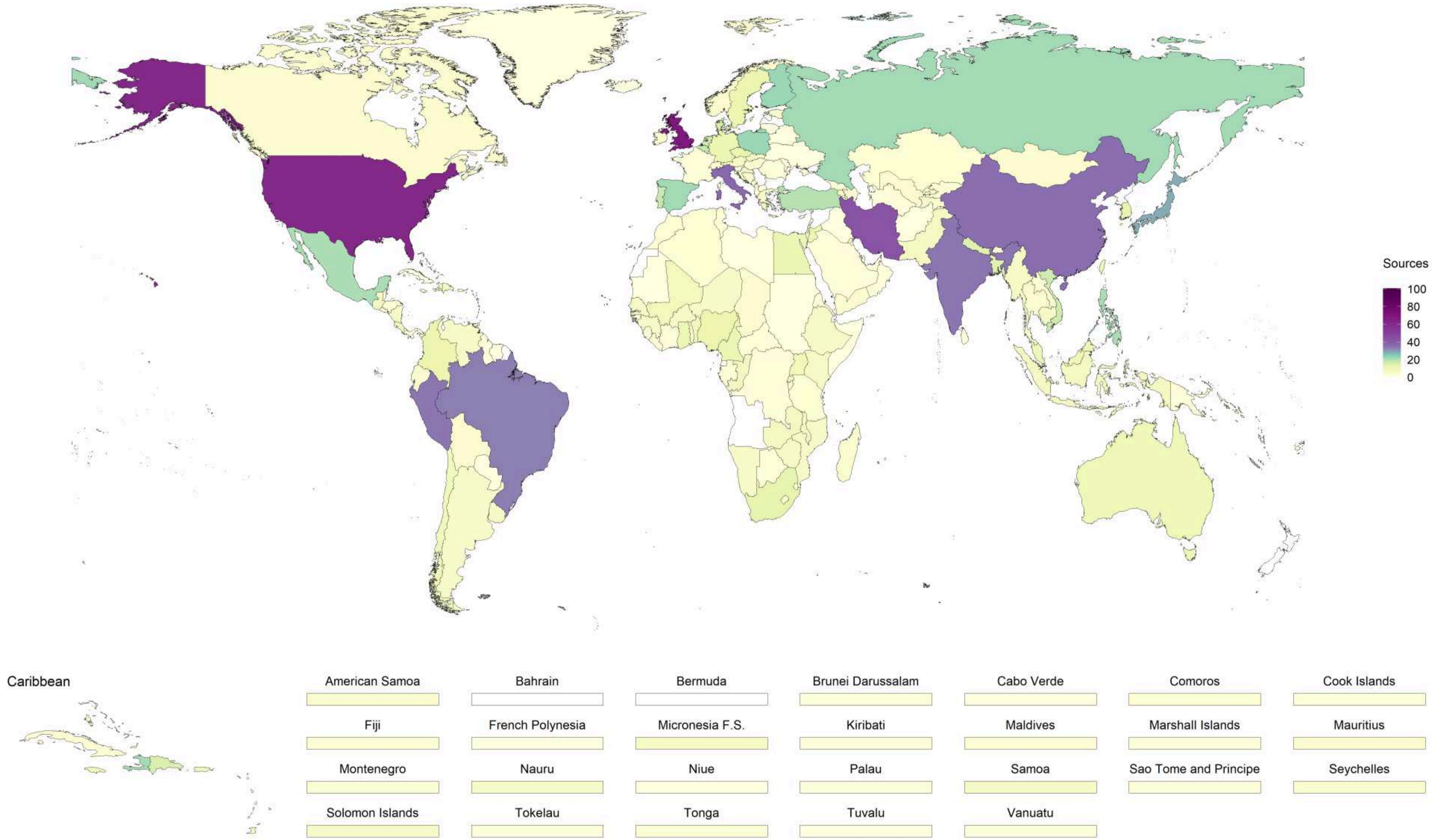


**Figure 3.** Number of individual-level data sources with individuals aged 20-79 years of both sexes between 1985 and 2019, by country.

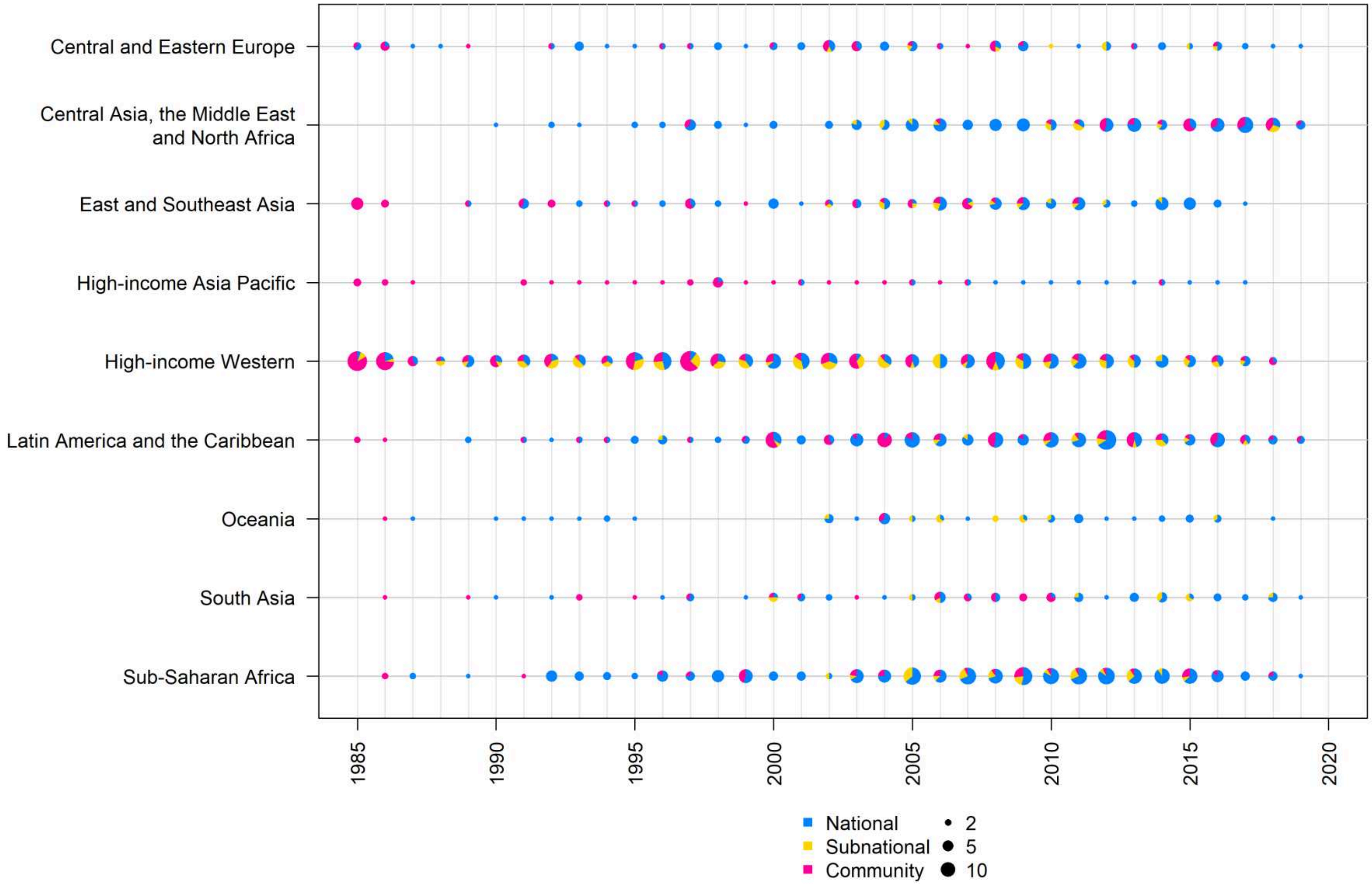


**Figure 4.** Number of individual-level data sources with height and weight measurements for participants of both sexes aged 20-79 years between 1985 and 2019, by region and year.

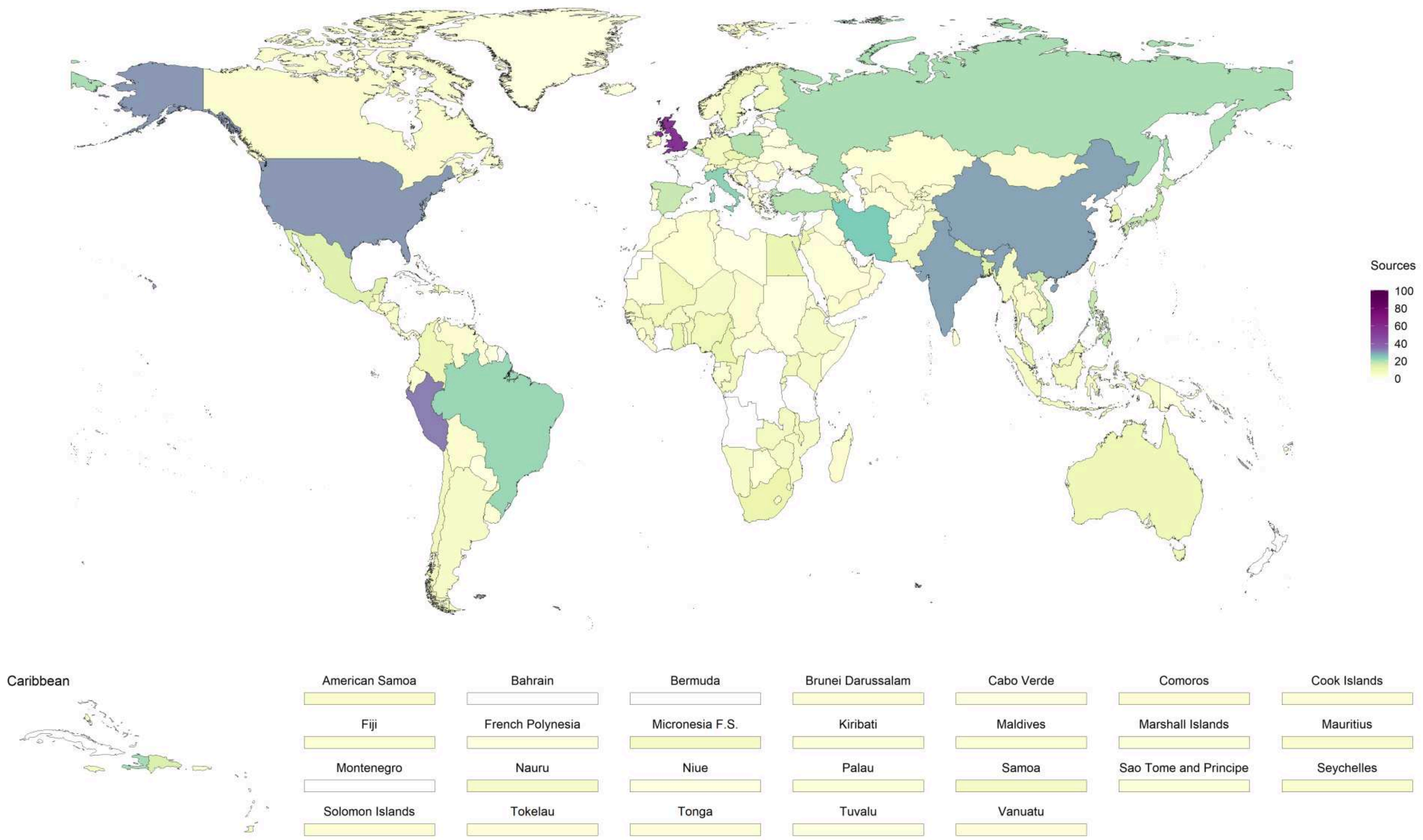


**Figure 5**. Number of individual-level data sources with women and men aged 40-49 years between 1985 and 2019, by country, used for the analyses in Chapter 4 .

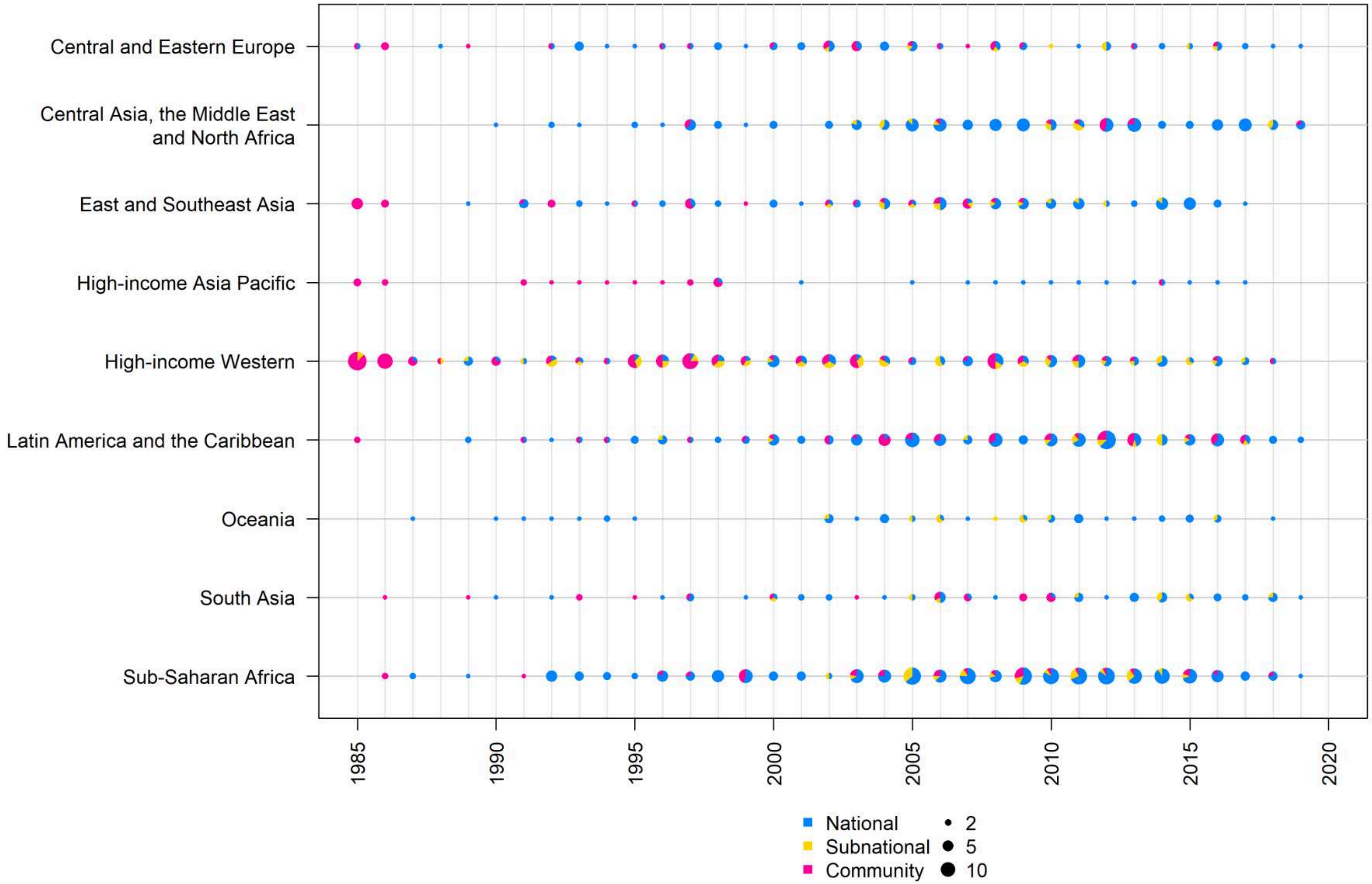


**Figure 6.** Number of individual-level data sources with height and weight measurements for participants of both sexes aged 40-49 years between 1985 and 2019, by region and year, used for the analyses in Chapter 4 .

### *3.3.2 Data for analysing the contribution of change in mean BMI to change in prevalence of underweight, obesity and severe obesity*

For the analysis on the contribution of mean BMI to the change in prevalence of underweight, obesity and severe obesity, as presented in Chapter 5, I used mean BMI and prevalences for women and men aged 20-79 years from 1985 to 2019. At the time of my analysis, the NCD-RisC database contained 2,896 population-based studies conducted from 1985 to 2019 with height and weight measurements of 187 million participants. Of these, 2,033 studies had measurements of height and weight on 132.6 million participants aged 20-79 years; the remaining 863 studies had data only for participants outside this age range. The number of studies ranged from 53 in Oceania to 637 in the high-income Western region. The number of data sources by country is shown in Figure 7. For this analysis, I excluded data that did not cover the complete 10-year age groups, e.g. 25-29 or 60-64 years were excluded; data from study-age-sex strata where the prevalence was either zero or one to allow probit transformation; and sex-age group strata with less than 25 individuals as their summary statistics have larger uncertainties. The final dataset comprised 1,592 studies with 126.4 million participants, which was summarised into 11,652 study-age-sex-specific pairs of mean and prevalence of underweight, obesity, or severe obesity. The list of data sources for this analysis, and their key characteristics, is provided in Appendix Table 2. Of the 1,592 data sources, 823 (52%) were nationally representative, 282 (18%) were representative of a subnational population and the remaining 487 (30%) were community samples. Data covered 186 of the 200 countries listed in Appendix Table 1, and for 161 of the countries at least two data sources were available. Figure 8 shows the availability of data across regions in each year analysed. The high-income Asia Pacific region had the most data, with an average of 29 surveys per country whereas Oceania had the lowest number of data sources per country, with three surveys on average per country. 482 (30%) data sources were from years before 2000 and 1110 (70%) were from 2000 onwards.

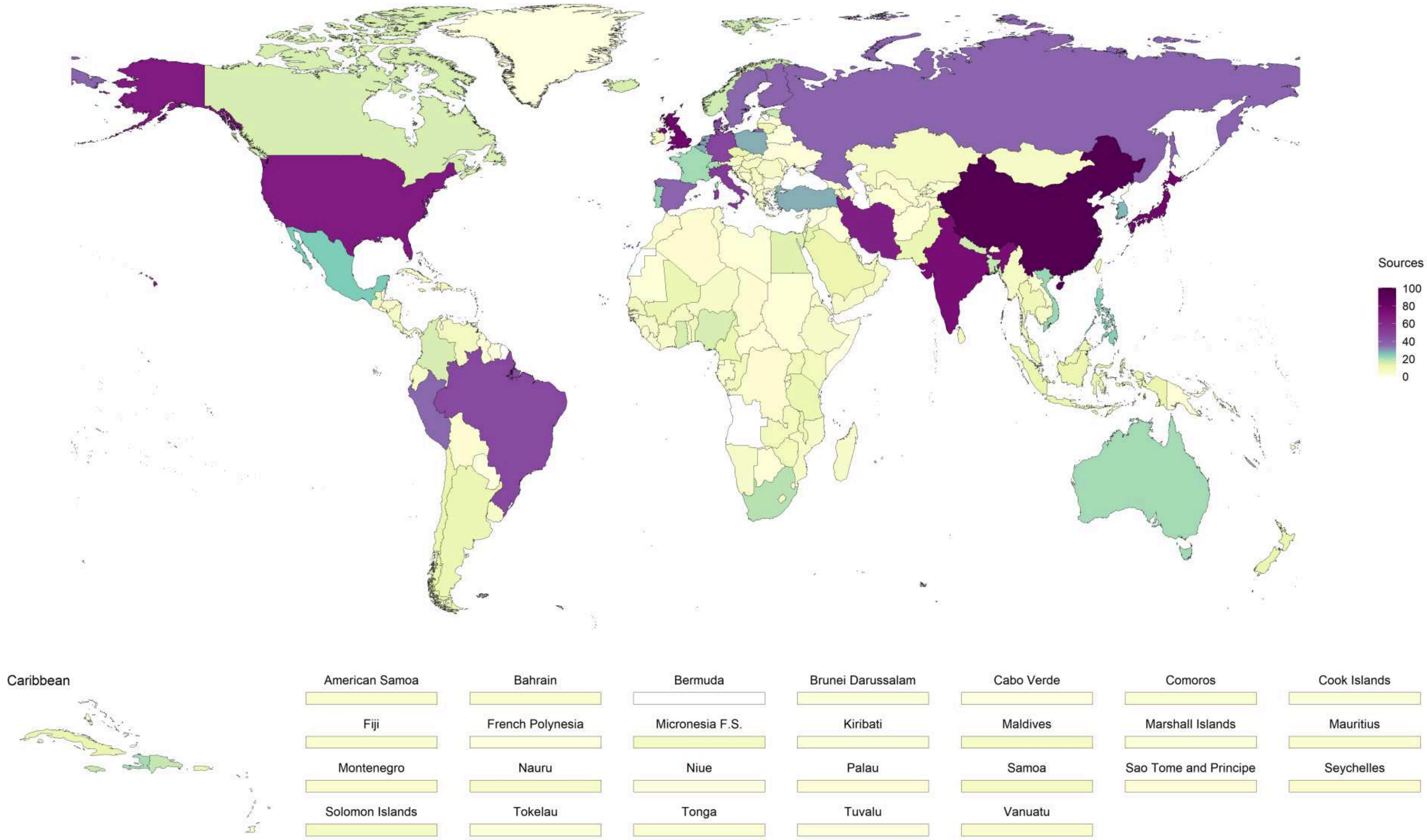


**Figure 7.** Number of data sources of individuals of both sexes aged 20-79 years between 1985 and 2019, by country, used for the analysis in Chapter 5.

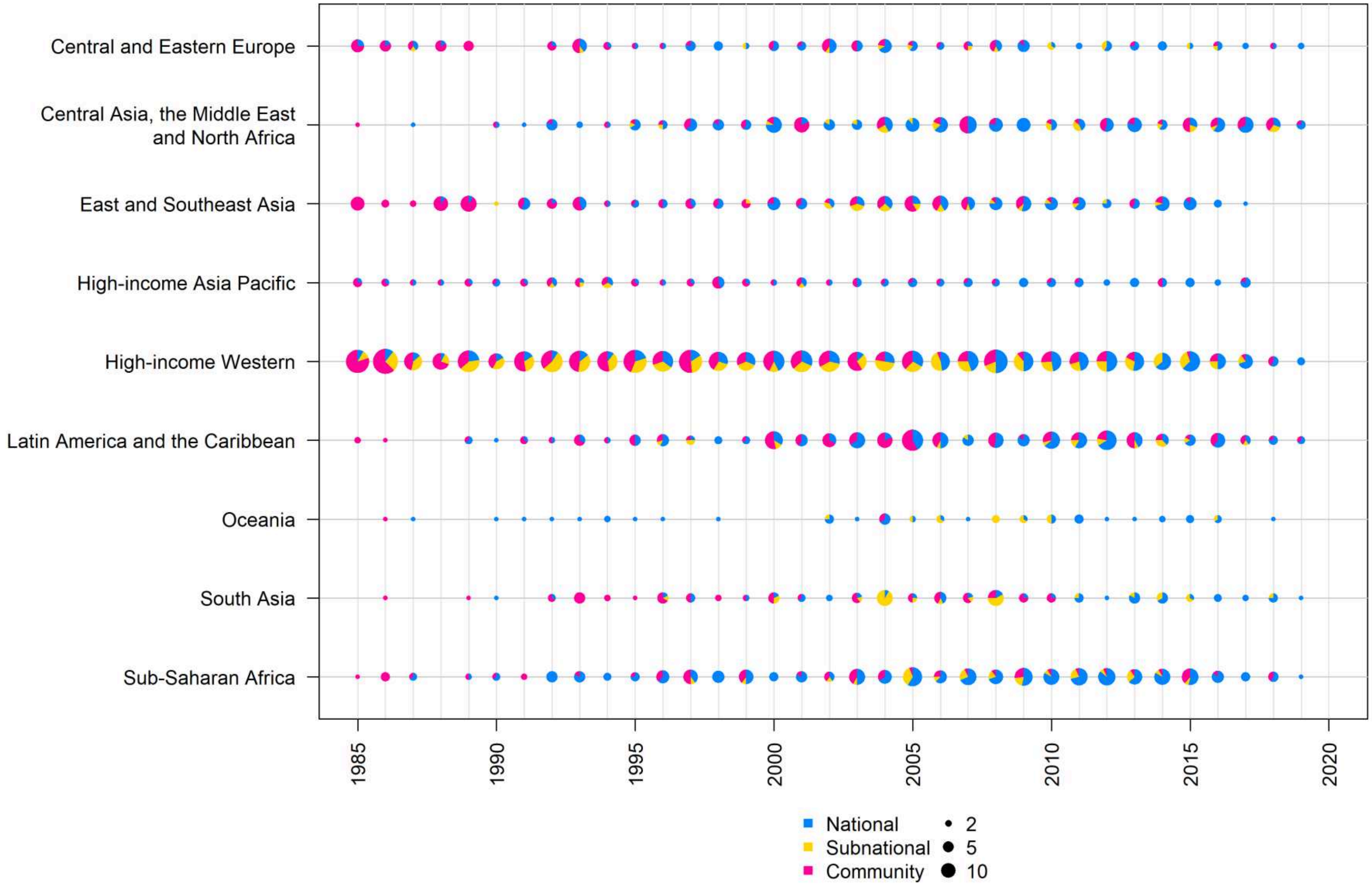


**Figure 8.** Number of data sources with height and weight measurements for participants of both sexes aged 20-79 years between 1985 and 2019, by region and year, used for the analysis in Chapter 5.

## 3.4 Summary

Considerable effort went into identifying, accessing and synthesising data from population-based surveys to enable calculation of summary statistics that characterise the distributions of height and BMI and their interrelationship. Data were accessed from sources that are publicly available and others via the network of collaborators who form NCD-RisC, and population-based measurement studies were systematically collated. Data were checked rigorously against inclusion and exclusion criteria and for quality to ensure the final database included only high-quality data from samples representative of the general population. For my analyses of moments of the distributions of height and BMI and their interrelationship, presented in Chapter 4, I calculated the summary statistics needed on a total of 1,282 surveys conducted in the period 1985 to 2019 with of over 11 million participants aged 20 to 79 years. Of these, I used 1,045 surveys with data on over 1.4 million women aged 40-49 years and 815 surveys had data on over 870,000 men aged 40-49 years. For the analysis on the contribution of mean BMI to the change in prevalence of underweight, obesity and severe obesity, presented in Chapter 5, a total of 2,897 with over 187 million participants with measurements on height and weight were pooled; of those, 2,033 surveys had 132 million individuals aged 20 to 79 years and were conducted in the period 1985 to 2019.

# 4 Characterising the distributions of height and BMI and their interrelationship

## 4.1 Overview

To understand how the distributions of height and BMI have changed over time in different countries, in this chapter I characterise the shape of the distribution of each of these two anthropometric measures using specific summary statistics and model changes in these statistics over time and country. In this chapter, I first use the individual-level data collated in the NCD-RisC database, as outlined in Section 3.3.1, to compute mean, variance, skewness and the correlation coefficient of the distributions of height and BMI, separately by each sex-age group and in each study. I then apply the hierarchical Bayesian models described in Section 4.2.3 to estimate national trends of the first three moments of the distributions of height and BMI and of their correlation coefficient from 1985 to 2019 in women and men aged 40-49 years. To help with interpretation of the estimates of the hierarchical Bayesian models, I also use the moments' estimates to generate densities for height and BMI, as described in Section 4.3.2, to visualise how the distributions of height and BMI changed across regions and globally from 1985 to 2019.

## 4.2 Methods

### *4.2.1 Rationale for a hierarchical Bayesian approach*

To assess national trends of the first three moments of the distributions of height and BMI data would ideally be available from high-quality, nationally-representative studies conducted in each country and in consecutive years for both sexes and all ages. Despite the extensive effort to bring together data, sources covering each of these units, particularly from earlier years, either were not obtainable or in many cases simply do not exist. Furthermore, despite strict application of the inclusion and exclusion criteria to ensure the internal and external validity of all included data sources (i.e., that each provides accurate data on height and BMI of surveyed participants and the sampled population is representative of the general population), studies' characteristics vary. For instance, as explained in Chapter 3, some studies only cover a specific region or community within a country, whilst other are nationally representative. Studies may also include participants in different ranges of ages; for example, some may include participants aged 20 years and older, while others include only those aged 15-49 years. Considering the sparsity and the heterogeneity of the available data, I chose the Bayesian framework which allows the integration of disparate data sources, taking into account all sources of uncertainty, to generate consistent and comparable estimates for all units of analysis, even where data are unavailable. Within the hierarchical Bayesian models, uncertainty propagation was embedded within two hierarchies about geographical representativeness: sampling coverage of the surveys, i.e. whether national, which typically have larger sample sizes and are representative of the whole country, or subnational or community, which have smaller sample sizes and are representative of specific areas within the country; and geographical allocation of the country within regions of the world. This regional grouping of countries is shown in Appendix Table 1 and, as explained in Section 3.2.1, follows geography proximity and national income as well as similar cardiometabolic profiling from previous NCD-RisC publications.[90,95-97,121,128-131] In summary, because of the nature of the data (i.e. the data scarcity for some countries and years strata) the main advantage of the chosen methodological approach was uncertainty propagation as it allowed sharing of information across countries, taking into account their geographical proximity, similar socioeconomic background and cardiometabolic profiles.

I adapted a Bayesian hierarchical model, previously designed to estimate national trends of mean BMI,[132,140] to estimate national trends of the first three moments of the distributions of height and BMI and of their correlation coefficient. In this section, I provide details of the model and its spatiotemporal components together with the computational steps to estimate trends of the moments of the distributions of height and BMI and of their correlation coefficient for each country over consecutive years.

### *4.2.2 Models specifications*

I used the individual-level data collected as reported in Section 3.3.1 and computed moments of the distributions of height and BMI and their correlation coefficient for each study. As explained in Section 3.3.1, I restricted my analysis to individuals aged 40-49 years, as this was the age group with most data and also one where weight loss as a result of pre-existing illness would still be uncommon. This choice also removed the need to model the age patterns of these moments, which should follow in future work.

The models were designed to allow estimates for each country and year to be informed by its own data and, to a variable degree, by data from related units. The extent to which estimates for each country-year were influenced by data from other years and other countries depended on whether data were available; the sample sizes of the data; whether or not they were national; and the within-country and within-region variability of the available data. The sharing of information between units was enabled by the hierarchical structure that arranged all 200 countries of my analysis in nine regions, and all regions in the globe. The regions and their constituent countries are the same from previous analyses of cardiometabolic risk factors,[90,95-97,128-130] and the countries included in those are listed in Appendix Table 1.

The models incorporated country-specific linear time trends, all modelled hierarchically. The model also accounted for the possibility that height and BMI in subnational and community samples might systematically differ from nationally representative ones in terms of their mean, variance and/or skewness, and have larger variation than in national studies.

Each of the three moments of the distributions of height and BMI were modelled separately; age was not included in the model because I only included a narrow age range from 40 to 49 years; and the models were applied separately for men and women.

*4.2.3 Models for estimating the moments of an univariate distribution*

The following models were adapted from a Bayesian hierarchical model previously designed to estimate national trends of mean BMI.[132,140] Let $\hat{\mu}_{X,j[i]}$, $\hat{\sigma}^2_{X,j[i]}$ and $\hat{\gamma}_{X,j[i]}$ denote the estimated first three moments (sample mean, sample variance and sample skewness) of the distribution of $X$, where $X$ is either height or BMI, from the i-th study conducted in the j-th country ($j = 1 \ldots 200$). Note that $j[i] = 1,2, \ldots, N_j$ are the study index for the j-th country and $N_j$ is the number of studies conducted in the j-th country. For each of these studies, I also know the following characteristics:

- $n_{j[i]}$ which is the sample size in the i-th study of the j-th country;
- $I^n_{j[i]}$ which is the indicator of whether the i-th study of the j-th country is national. $I^n_{j[i]} = 1$ if so, and $= 0$ if not. Similarly $I^s_{j[i]}$ and $I^c_{j[i]}$ are indicators for subnational and community studies. Note that $I^n_{j[i]} + I^s_{j[i]} + I^c_{j[i]} = 1$ for any $i$ and $j$;
- $t_{j[i]}$ which is the (corrected) time (year) for the i-th study of the j-th country, defined as $t_{j[i]} = (y_{j[i]} - 2002)/100$, where $y_{j[i]}$ denotes the year of the i-th study of the j-th country.

The likelihood for the model of the first moment can be obtained using the central limit theorem that states that the sample mean $\hat{\mu}_{X,j[i]}$ for the i-th study in country j asymptotically follows a normal distribution centered on the first moment $\mu_{X,j[i]}$ with variance equal to the sample variance $\hat{\sigma}^2_{X,j[i]}$ divided by the study sample size $n_{j[i]}$. As explained in more details in Section 4.2.5, I included an additional variance component $\tau^2_{X_{j[i]}}$ related to the study type. The likelihood is therefore given by:

$$\hat{\mu}_{X,j[i]} \overset{\text{approx}}{\sim} N(\mu_{X,j[i]}, \frac{\hat{\sigma}^2_{X,j[i]}}{n_{j[i]}} + \tau^2_{X_{j[i]}}) \tag{1}$$

Similarly, asymptotically, combining the central theorem and Slutsky's theorem,[141] one can prove that the sample variance $\hat{\sigma}^2_{X,j[i]}$ follows a normal distribution centered around the second moment. The variance of the normal distribution was chosen as follows:[142]

$$\hat{\sigma}^2_{X,j[i]} \sim N(\sigma^2_{X,j[i]}, \frac{\hat{\sigma}^4_{X,j[i]}}{n_{j[i]}}\left((\hat{\kappa}_{X,j[i]} - 1) + \frac{2}{n_{j[i]} - 1}\right) + \tau^2_{X_{j[i]}}) \tag{2}$$

where $\hat{\kappa}_{X,j[i]}$ is the sample kurtosis estimate for the i-th study in country j. Even though the support of the normal distribution includes all real numbers, in practice, the 95% credible interval for the second moment for every country, every representativeness and every year, always only contains strictly positive values.

Similarly, asymptotically the sample skewness $\hat{\gamma}_{X,j[i]}$ follows a normal distribution centered around the third moment:[143]

$$\hat{\gamma}_{X,j[i]} \sim N(\gamma_{X,j[i]}, \frac{6n_{j[i]}(n_{j[i]} - 1)}{(n_{j[i]} - 2)(n_{j[i]} + 1)(n_{j[i]} + 3)} + \tau^2_{X_{j[i]}}) \tag{3}$$

Asymptotically the sample correlation coefficient $\hat{\rho}_{XY,j[i]}$ of the joint distribution of $XY$, where $XY$ are height and BMI, follows a normal distribution:[144]

$$\hat{\rho}_{XY,j[i]} \sim N(\rho_{XY,j[i]}, \frac{(1 - \hat{\rho}^2_{XY,j[i]})^2}{n_{j[i]}} + \tau^2_{XY_{j[i]}}) \tag{4}$$

For all the asymptotical distributions above, the moments mean $\mu_{X,j[i]}$, variance $\sigma^2_{X,j[i]}$, and skewness $\gamma_{X,j[i]}$, and the correlation coefficient $\hat{\rho}_{XY,j[i]}$ are modelled using a liner predictor with similar structures. Here's the one for $\mu_{X,j[i]}$:

$$\mu_{X,j[i]} = \quad a_{X,j} + b_{X,j} t_{j[i]} + \; M_{j[i]}\beta$$

where the linear time component, $a_{X,j} + b_{X,j} t_{j[i]}$, and the geographical representativeness term, $M_{j[i]}\beta$, are described in following sections.

*4.2.4 Linear components of country time trends*

The intercepts ($a$) and slopes ($b$) allow all moments of the distributions of height and BMI to vary between countries and over time in a country-dependent, linear manner. This choice was based on a visual exploration of the empirical data, where I plotted each summary statistic (mean, variance, skewness and correlation coefficient) against time for each country-sex strata and showed a linear time trend. Both $a$ and $b$ are embedded in a hierarchy that reflects the structure of the data, where each study belongs to one country, each country belongs to a world region, and all regions are nested in the globe. This feature of the Bayesian model pooled data from other units at different levels of the hierarchy where the information available was weakly informative, sparse or missing entirely. Country-level effects were taken as the sum of the national, regional and global component estimates. The baseline effect, $a_{X,j}$, and the time effect $b_{X,j}$, have the following hierarchical structure:

$$a_{X,j} = a^g_X + a^r_{X,R_j} + a^c_{X,j}$$

$$b_{X,j} = b^g_X + b^r_{X,R_j} + b^c_{X,j}$$

where the intercept and slope consist of globe (g), region (r), and country (c) components. More precisely, $a_X^g$, $b_X^g$ are global fixed effect; $a_{X,R_j}^r$, $b_{X,R_j}^r$ are regional random effects where $R_j$ is the corresponding region for the j-th country; and $a_{X,j}^c$, $b_{X,j}^c$ are country random effects.

*4.2.5 Study-type effect*

Individual studies may deviate from the expected country-year parameter investigated. This variability occurs especially where studies sample from a subnational or community population due to researchers selecting areas with systematically higher or lower risk factor levels. I introduced a covariate effect, $M_{j[i]}\beta$, that refers to study type which represents the geographical representativeness of a country: national, subnational and community. Non-national studies may be systematically different from national ones and they may have different time trends from national ones:

$$M_{j[i]}\beta = \beta_1 I_{j[i]}^s + \beta_2 I_{j[i]}^s t_{j[i]} + \beta_3 I_{j[i]}^c + \beta_4 I_{j[i]}^c t_{j[i]}$$

where $\beta_1$ and $\beta_2$represents the difference of intercept and slope between subnational studies and national studies; and $\beta_3$ and $\beta_4$between national and community studies. There was more variability in the effects between community and national studies than between subnational and national ones (Figure 9).

*4.2.6 Residual variability of the study-type effect*

The heterogeneity that exists between populations within a country also affects study results. For example, unobserved features of the study design and issues with measurements may influence the results of a study, including the national ones. This may introduce additional variability to the data (i.e., non-sampling variability) beyond the offsets of non-national studies I accounted for earlier. Thus, I included an additional variance component $\tau_{X_{j[i]}}^2$ for each study to capture the residual variability. I also assumed that national studies have less residual variability than subnational studies, which have less residual variability than community studies:

$$\tau^2_{X_{j[i]}} = \tau^2_{X,n} I^n_{j[i]} + \tau^2_{X,s} I^s_{j[i]} + \tau^2_{X,c} I^c_{j[i]}$$

where $\tau^2_{X,n}$, $\tau^2_{X,s}$, $\tau^2_{X,c}$ represent the variance error under national, subnational, community study respectively, with $\tau^2_{X,n} < \tau^2_{X,s} < \tau^2_{X,c}$. There was more residual variability among community studies compared to subnational and national ones (Figure 9).

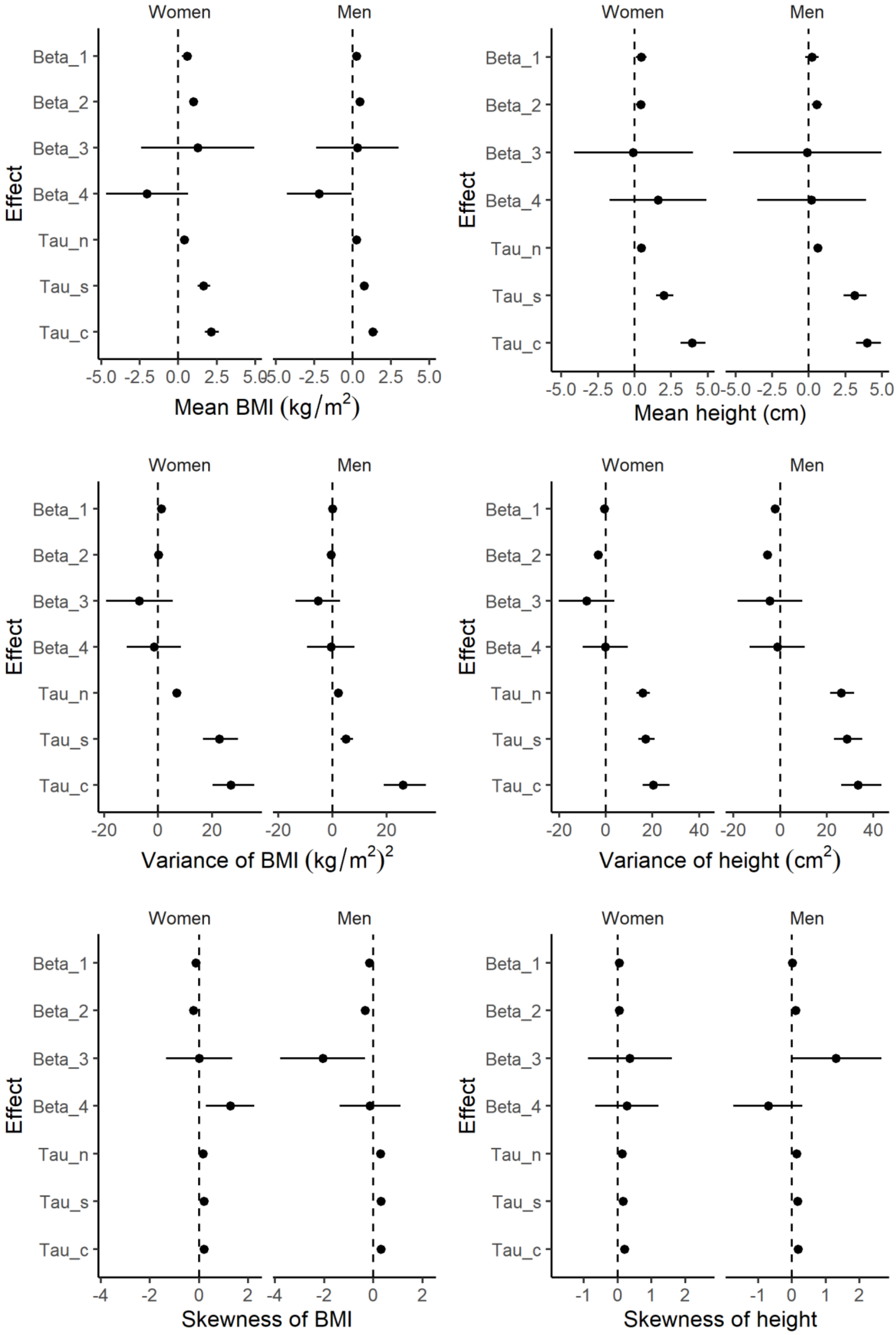


**Figure 9.** The study-type effect and its residual variability, by model and sex.

*4.2.7 Bayesian inference*

Bayesian inference is a statistical method that updates the probability of the hypothesis based on the information provided by the empirical data. Bayesian inference derives the posterior probability distribution via Bayes Theorem which combines prior probabilities with the probability of observing the data as expressed by the likelihood function. Thus, choice of priors, i.e. the initial measure of the belief towards unknown parameters of the model, is an important part of the Bayesian approach. Where information on the values of the parameters is not available, a flat prior is preferred when looking into the spatiotemporal evolution of moments of the distributions of height and BMI, as it was also done in the previous Bayesian hierarchical model these models are based on,[132,140] and in other NCD-RisC adaptations of that same model for height and BMI.[90,95-97,121] For my thesis, I considered the following prior distributions:

$$a_X^g \sim U(-1000,1000) \quad a_{X,R_j}^r \sim N(0, Var(a_X^r)) \quad a_{X,j}^c \sim N(0, Var(a_X^c))$$

$$b_X^g \sim U(-1000,1000) \quad b_{X,R_j}^r \sim N(0, Var(b_X^r)) \quad b_{X,j}^c \sim N(0, Var(b_X^c))$$

$$\sqrt{Var(a_X^r)} \sim U(0,1000) \quad \sqrt{Var(a_X^c)} \sim U(0,1000)$$

$$\sqrt{Var(b_X^r)} \sim U(0,1000) \quad \sqrt{Var(b_X^c)} \sim U(0,1000)$$

$$\beta_1 \sim N(0,10^2) \quad \beta_2 \sim N(0,10^2)$$

$$\beta_3 \sim N(0,10^2) \quad \beta_4 \sim N(0,10^2)$$

$$0 < \tau_{X,n}^2 < \tau_{X,s}^2 < \tau_{X,c}^2 \overset{\text{dependently}}{\sim} flat$$

Generally, let's define a data point or vector of values, $x$; the $\theta$ parameter or vector of parameters of the distribution $x \sim p(x|\theta)$; the hyperparameter $\alpha$ of the parameter distribution $\theta \sim p(\theta|\alpha)$; and the $X$ sample of $n$ observed data points. Considering the prior distribution of the parameters before any observation, $p(\theta|\alpha)$, and the sampling distribution of the observed data conditional on its parameters, $p(X|\ \theta)$, Bayes' rule defines the posterior distribution of the parameters as proportional to the likelihood times the prior: $p(\theta|X,\alpha) \propto\ p(X|\theta,\alpha)p(\theta|\alpha)$.

*4.2.8 Computation and reporting of results*

The statistical model was coded by MSc student in Statistics Haodong Tian, with the Markov chain Monte Carlo (MCMC) algorithm,[145] with the sampler programmed using package RStan for the statistical computing language R.[146] For each analysis, the model was run with four random starting values, and fixed seeds at 123 for the first chain, with other chains having seeds derived from that of the first chain to avoid dependent samples for the random number generation in the MCMC algorithm. Convergence of each model run (referred to as a chain) was monitored. There were 45,000 iterations plus 5,000 burn-in; the final 45,000 post-burn-in iterations were thinned to 5,000 draws, each containing a full set of model parameter estimates. The final set of model parameters were used to obtain 5,000 estimates of the primary outcomes (mean, variance, skewness), which were considered draws from the posterior distributions of these outcomes in order to make inference for each country-year unit. The estimate for each country-year unit was calculated as the average of the 5,000 draws of the posterior distributions and the credible intervals (CrI) represent the 2.5$^{th}$ and the 97.5$^{th}$ percentiles of the posterior distributions. Considering that all trends were linear, I chose to report the absolute difference between the estimate of the moments in 2019 and the initial estimate in 1985 as it best summarised the linear time trends. For each summary statistic, absolute differences were calculated as the 5,000 draws of 2019 minus the 5,000 draws of 1985 for each sex-country strata; from the 5,000 absolute differences, I then calculated the average absolute difference and CrI representing the 2.5$^{th}$ and the 97.5$^{th}$ percentiles of the absolute differences.

## 4.3 Results

### *4.3.1 Moments of the distributions of height and BMI*

#### *4.3.1.1 Moments describing the height distribution*

From 1985 to 2019, mean height increased for both women and men from most countries (Figure 10). The exceptions were women and men from the USA, and men from Mozambique and Benin, where mean height decreases 0.3-0.6 cm; and men from Bangladesh, where there was the largest absolute decrease in mean height, -1.54 (CrI: -2.86, -0.28) cm. The increase in mean height of women was more similar among countries from the same region, irrespective of their mean height level in 1985. Among men, the absolute increase in mean height in 2019 was higher, over five cm, among most countries from Central and Eastern Europe and high-income Western, which were already the taller regions in 1985. The exception to this pattern were men from countries in high-income Asia Pacific, who were average mean height of 172 cm in 2019 but had one of the largest mean height increase of over six cm.

From 1985 to 2019, variance of the height distribution increased for most countries and sexes (Figure 11); it only decreased by 0.05-1.7 $cm^2$ for women and men in South Africa, and men in Seychelles, Tanzania and Mauritius, with the largest decrease of -10.2 (-14.7, -5.6) $cm^2$ in Iran; and it was negligible for men from countries in sub-Saharan Africa. There was no clear pattern of absolute change among women, whereas variance of the height distribution changed similarly among men from countries of the same region, irrespectively of levels of variance in 1985.

From 1985 to 2019, skewness of the height distribution increased for women from 33 countries and men from 64 countries, and it decreased for women from 146 countries and men from 109 countries (Figure 12). There was no clear pattern regarding how this change happened in relation to region or level of skewness of the height distribution in 1985; all values for the skewness of the height distribution were small numbers around zero and the change was negligible. The exceptions were women and men from Sao Tome and Principe, and men from Tokelau, Vanuatu, Nigeria, Iraq, Armenia and Botswana, where skew of the height distribution in 2019 was more negative than minus one.

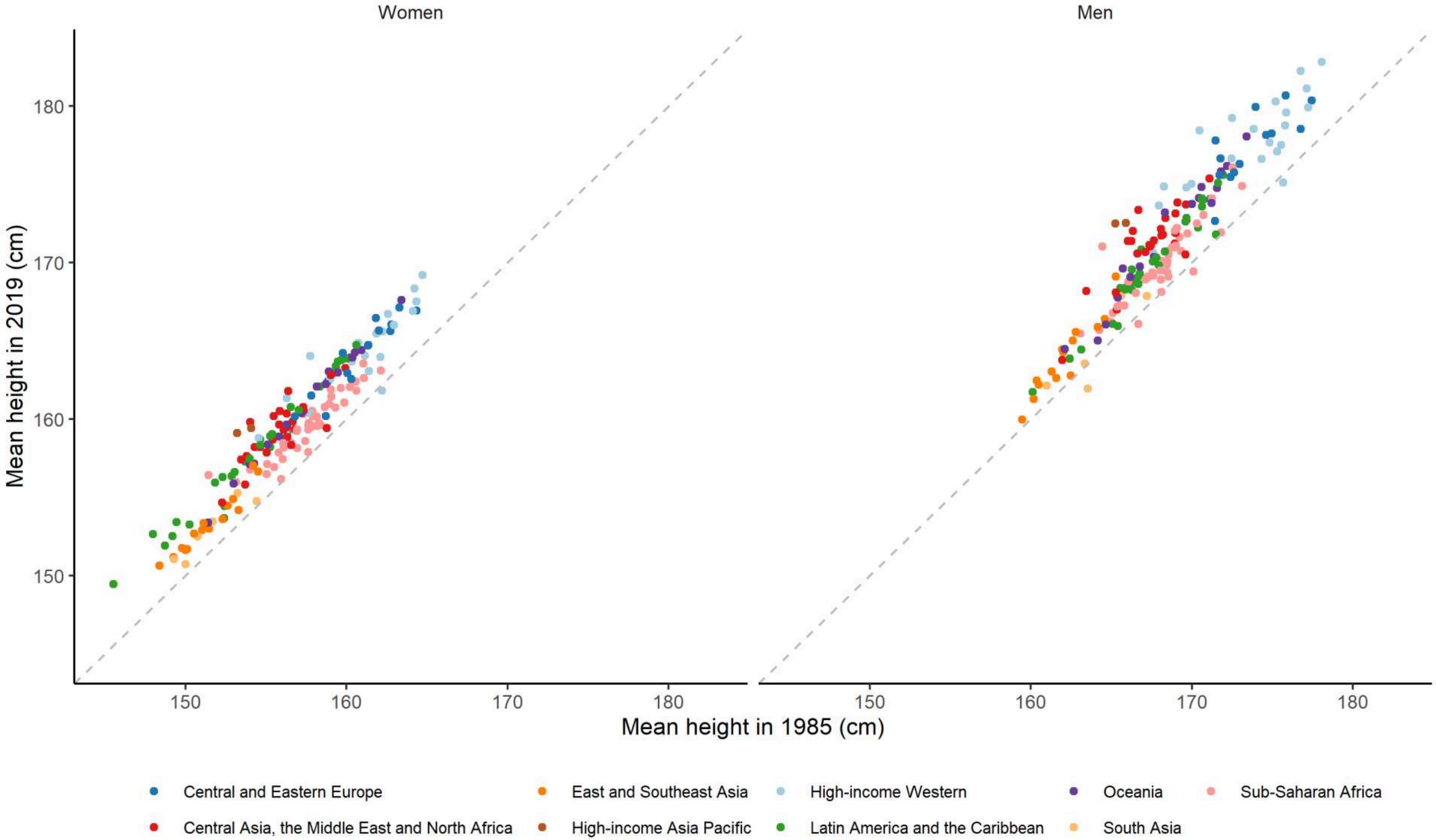


**Figure 10.** Mean height in 1985 and 2019, by sex and region.

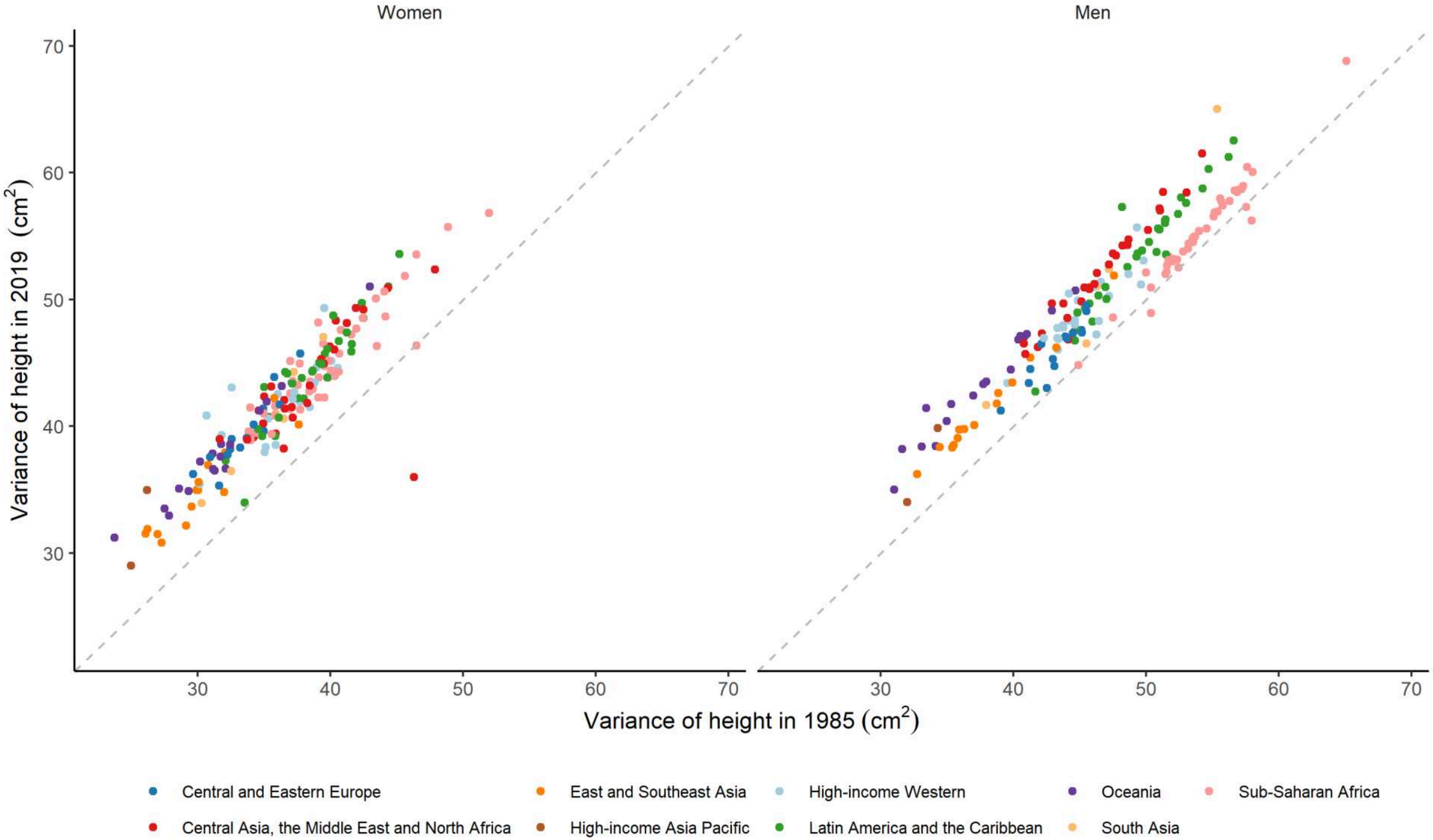


**Figure 11.** Variance of height in 1985 and 2019, by sex and region.

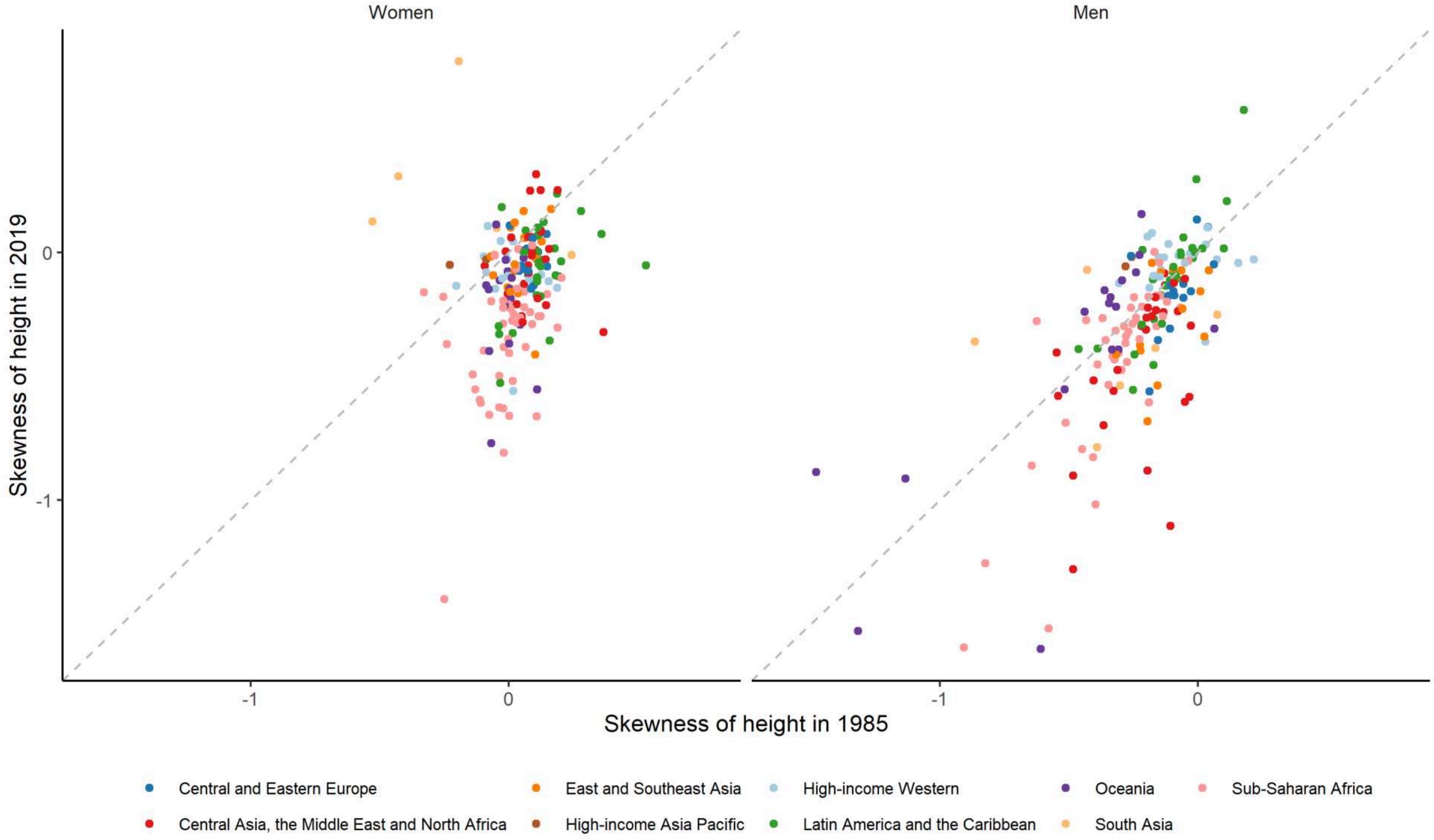


**Figure 12.** Skewness of height in 1985 and 2019, by sex and region.

*4.3.1.2 Moments describing the BMI distribution*

From 1985 to 2019, mean BMI increased by 1.1-6.5 $kg/m^2$ for women from most countries and by 1.5-3.8 $kg/m^2$ for men from all countries (Figure 13). The exceptions were women from Spain, Czech Republic and South Korea, where mean BMI decreased by almost 1 $kg/m^2$; and women from Japan, Jordan and four countries in Central and Eastern Europe, where mean BMI increased by less than 1 $kg/m^2$. Among women, absolute increases of mean BMI from 1985 to 2019 were highest in countries from regions, such as South Asia and sub-Saharan Africa, where mean BMI was among the lowest in 1985. Conversely, other than the exceptions mentioned above, absolute change of mean BMI was lowest for both women in countries from Oceania and high-income Western, where mean BMI was highest in 1985. Absolute increase in mean BMI among men was similar among both countries from the same region and countries with similar levels of mean BMI in 1985.

From 1985 to 2019, variance of the BMI distribution increased by 3.6-36.7 $(kg/m^2)^2$ for women from most countries and by 3.0-25.6 $(kg/m^2)^2$ for men from all countries (Figure 14); the only exception were women from Iran where it decreased by -2.2 (-7.0, 2.0) $(kg/m^2)^2$. Among women, the absolute increase of variance of the BMI distribution from 1985 to 2019 was 3-36 $(kg/m^2)^2$, and it was similar among countries from the same region; the exception were women from countries of the high-income Western region where the absolute increase in the variance of the BMI distribution ranged from 8.72 (8.65, 8.72) $(kg/m^2)^2$ in Spain to 36.7 (36.6, 36.8) $(kg/m^2)^2$ in Australia. The range of absolute increase of variance of the BMI distribution from 1985 to 2019 was smaller in men, 3-15 $(kg/m^2)^2$, with the exception of men from Australia, where it was 25.6 (24.8, 26.4) $(kg/m^2)^2$.

From 1985 to 2019, skewness of the BMI distribution of women decreased for 71 countries, of which the majority in sub-Saharan Africa, Latin America and the Caribbean and high-income Western; and it increased for 108 countries, of which the majority in Central Asia, the Middle East and North Africa, Central and Eastern Europe and Oceania (Figure 15). The values of the skewness of the distribution of BMI of women in 2019 were largely around one; the only exception were women from Timor-Leste where skewness of the BMI distribution increased by 0.9 (0.6, 1.3) reaching 2.2 (1.8, 2.8) in 2019. From 1985 to 2019, skewness of the BMI distribution of men increased by 0.08-0.60 among all countries, reaching values 1-2 for most countries in 2019; it was more than two only for seven countries in sub-Saharan Africa and two countries in Oceania (Figure 15).

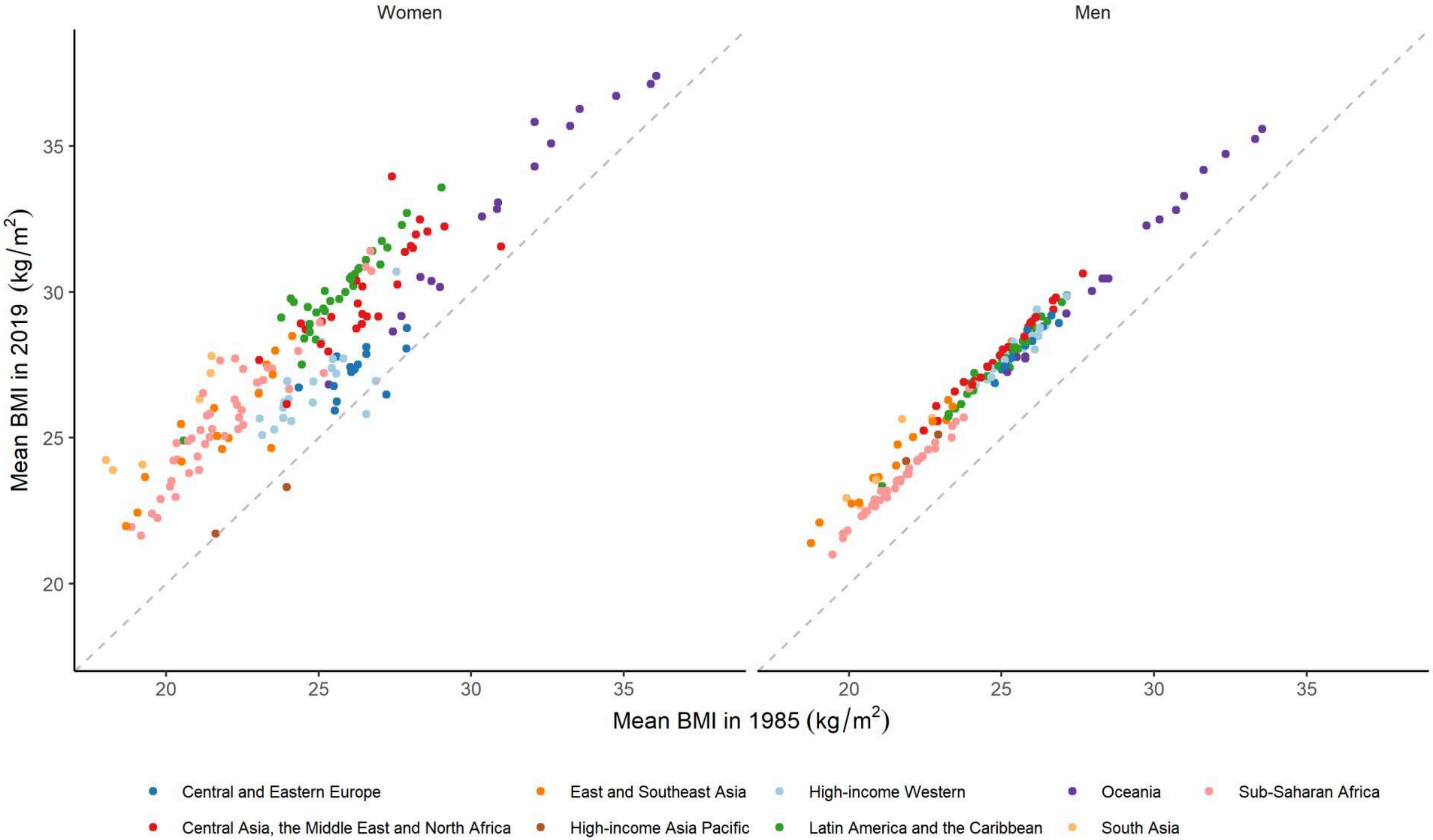


**Figure 13.** Mean BMI in 1985 and 2019, by sex and region.

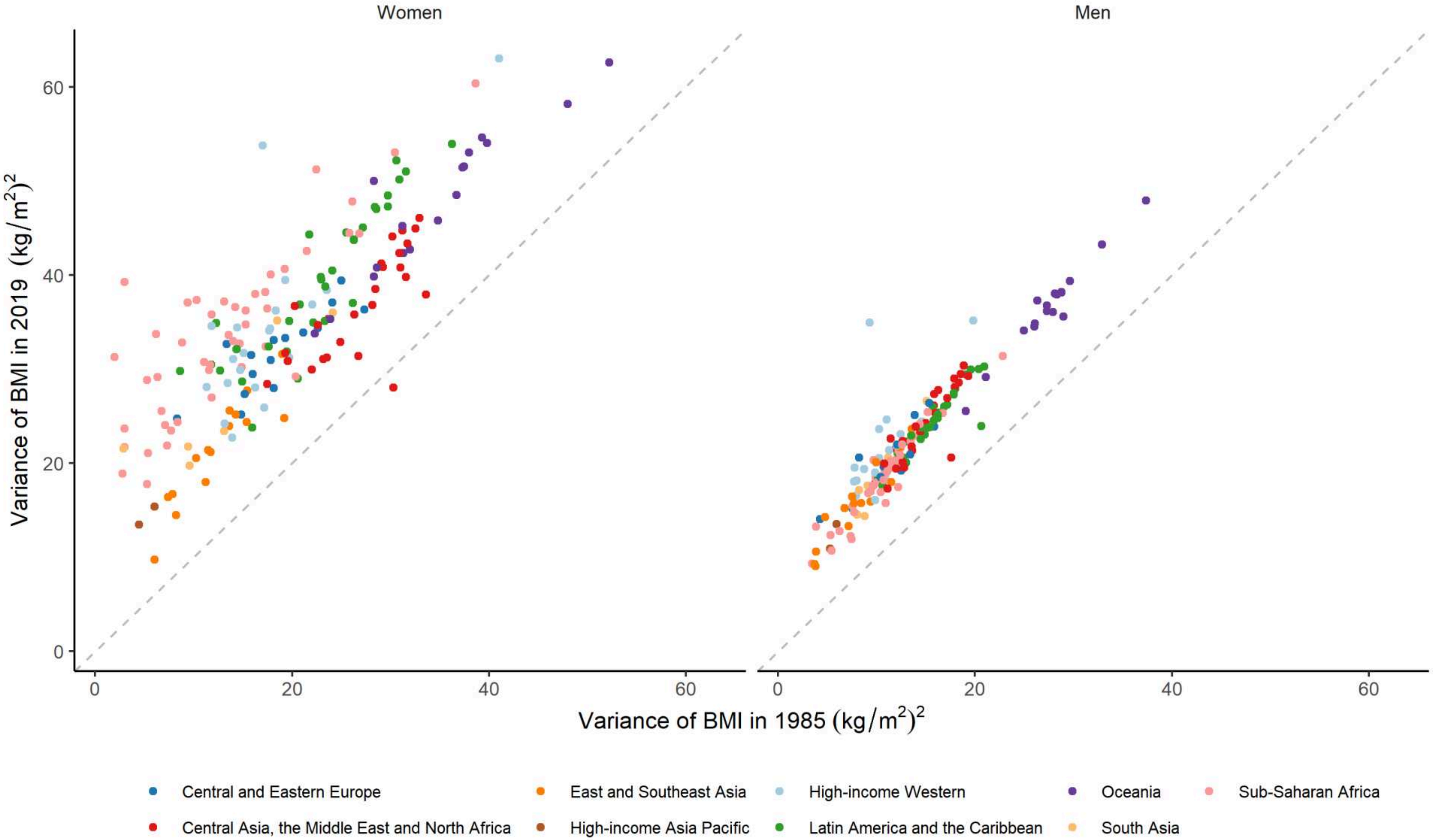


**Figure 14.** Variance of BMI in 1985 and 2019, by sex and region.

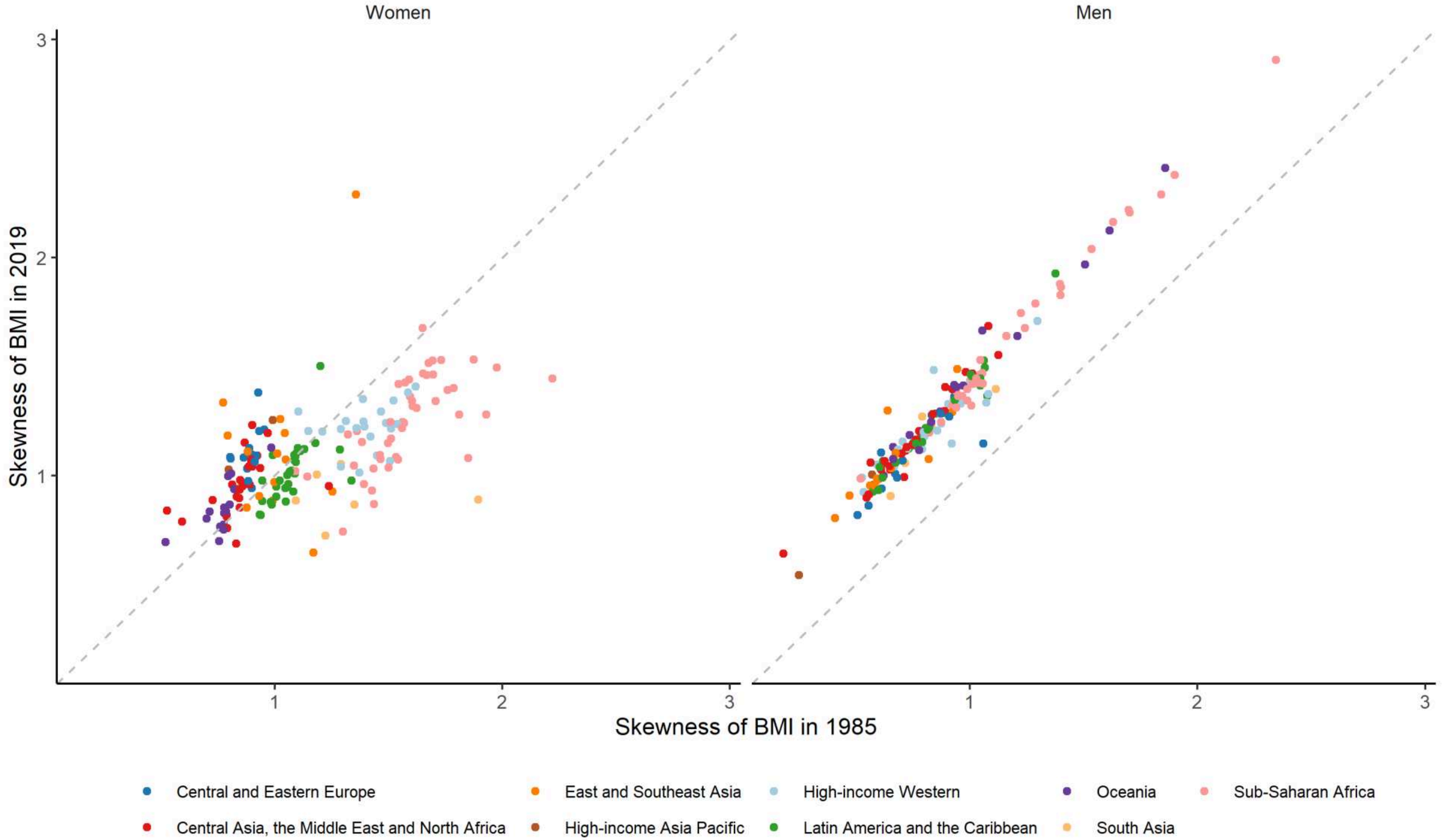


**Figure 15.** Skewness of BMI in 1985 and 2019, by sex and region.

*4.3.2 Implications of the distributional changes of height and BMI*

To draw a picture of what these distributional changes of height and BMI mean within the population, i.e. their health implications, I visualised the outcomes of the models by plotting the densities of height and BMI. Here, to visually interpret the distributional changes of height and BMI, I used the estimates of the hierarchical Bayesian models for the first three moments of the two distributions, as reported in previous section, to draw the densities of these two anthropometric variables in 1985 and 2019.

The objective was to find a candidate distribution that performs well across the entire distributions of height and BMI, particularly at the extremes, across all study-sex-age group strata. Compared to the family of normal distributions, the t distribution allows the tails of the distribution to be thicker.[147] This was an essential characteristic for the nature of the dataset, as clinically relevant categories are identified at the tails of the distribution. The family of skew-t was chosen for its additional parameter that allows to regulate skewness. The skew-t family is parameterised with four parameters: mean, variance, skewness and Mardia's kurtosis. Mardia defined multivariate kurtosis as:[148]

$$M_p = \frac{1}{n}\sum_{i=1}^{n}[(x_i - \overline{x})'S^{-1}(x_i - \overline{x})]^2 \qquad (5)$$

where the subscript $p$ indicates that $M$ is specific to a set of $p$ variables, $x_i$ are $p$ dimensional vectors of random variables and $S$ is the biased sample covariance matrix of $x_i$, defined as:

$$S = \frac{1}{n}\sum_{i=1}^{n}[(x_i - \overline{x})\,(x_i - \overline{x})'] \qquad (6)$$

The expected Mardia's kurtosis for a multivariate normal distribution of $p$ variables is $p(p + 2)$. In the univariate case values smaller that this expectation indicate platykurtism (thinner tails) and values larger than this expectation indicate leptokurtism (thicker tails).

It is important to note that the original parameters, the *direct* parameters, do not hold any traditional meaning within the statistics field; to be able to interpret these parameters, it is essential to convert them to *centred* parameters, which are classically interpretable.[147] Figure 16 illustrates the skew-t distribution and its main properties compared to a normal distribution. A skew-t distribution with skewness of zero and kurtosis approximating zero (dashed red line) is the same as a normal distribution (black line; Figure 16). In all other cases shown, a skew-t distribution shows a mode with higher density compared to a normal distribution (Figure 16a). Kurtosis plays a crucial role in establishing the density around the tails of a distribution: the red, blue and green lines show an increment in kurtosis at the extremes of the distributions, with the skew-t distribution with the highest kurtosis also having the thickest tails (Figure 16b).

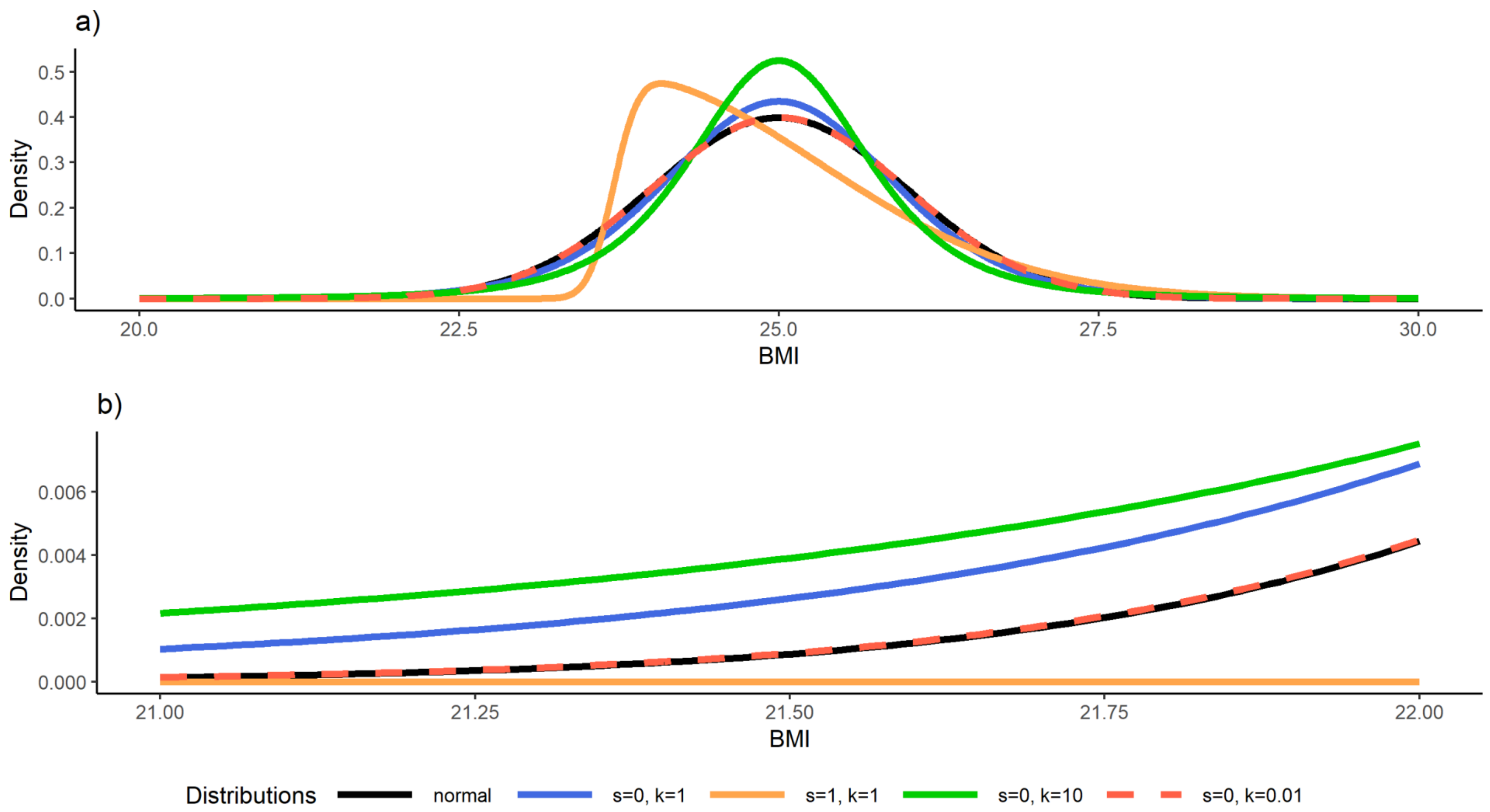


**Figure 16.** Behaviour of the skew-t distribution at different skewness and kurtosis parameterisations.

Density is plotted on the y axis, and BMI on the x axis. The colour legend illustrates the different parameters of skewness (s) and kurtosis (k) used to plot each density. a) illustrates the whole distribution, b) shows the extreme of the left tails.

In this thesis, I use moments estimated by the hierarchical Bayesian models to draw densities of height and BMI using the skew-t distribution. As I did not estimate Mardia's kurtosis, I fixed its value at 23, which was the median of the estimated values of Mardia's kurtosis for each country-year-sex-age-group study using the R Packaged "sn".[149] I consider the densities of height or BMI for a given region as a mixture of the skew-t distributions of all countries within that region, with one skew-t distribution per country and the weight of the mixture given by the population size of each country as standard population weight provided by the United Nations (UN).[150] In following Section 4.3.2.1 and Section 4.3.2.2, I illustrate how the changes observed in moments of the distributions of height and BMI are reflected in their densities respectively; in Section 4.3.2.3 I explain what both of these distributional changes mean for the population.

*4.3.2.1 The meaning of the distributional changes of height*

By comparing the densities of height in 2019 versus 1985 (Figure 17), the height distribution shifted upwards and widened, with less density towards the mode of the distribution, for most regions and sexes. This was reflected by the increase in mean and variance of the height distribution. The height distribution was and stayed symmetrical for most regions and sexes, which was reflected by the skewness values remaining largely around zero. Exceptions were: women and men from East and Southeast Asia, where a symmetric distribution developed a longer left tail; and women from sub-Saharan Africa, and women and men from Latin America and the Caribbean where a distribution with a longer right tail became more symmetrical. The most salient differences were in men and women from high-income Asia Pacific where the overlap between the distributions of height of 1985 and that of 2019 was very little. The distributions of height of 1985 and 2019 overlapped completely in men from South Asia; and we also very close in men from Oceania and women and men from sub-Saharan Africa. Overall, these visualisations of the distribution of height show that height gain happened for most regions and sexes in 2019 compared to 1985, but segments of the population may be benefitting differently from the height gain.

*4.3.2.2 The meaning of the distributional changes of BMI*

By comparing the densities of BMI in 2019 versus 1985, the BMI distribution shifted upwards and widened across most regions and sexes (Figure 18); this is reflected by the increase in mean and variance of the BMI distribution. The exceptions were: women from high-income Asia Pacific, where the distribution of BMI shifted downwards; and women from Central and Eastern Europe and women and men from Oceania, where the shape of the BMI distribution in 1985 was almost the same as 2019. Sub-Saharan Africa was the region with the most striking difference among sexes: although in both cases the distribution of BMI shifted upwards and widened, the distribution of BMI of men developed a longer right-tail whereas the distribution of BMI of women moved closer to symmetry. Although the distribution of BMI was right-skewed in 1985 and 2019 for all regions and sexes, the distribution of women evolved closer to symmetry whereas that of men developed a longer right tail. This may indicate that the increase in BMI occurred more homogenously in women than in men, with segments of the BMI distribution of men affected heterogeneously by the change in BMI. A more homogeneous BMI increase among women means that now over half the population is already at overweight and obesity levels, with the underweight rapidly catching up to the rest of the distribution. Contrary, a more heterogeneous BMI increase among men means that those already at the overweight and obesity levels are even more so, whereas those at underweight levels did not move significantly towards higher and healthier BMI levels.

*4.3.2.3 The meaning of the distributional changes of height and BMI*

When considering the distributional changes in both height and BMI from 1985 to 2019, the healthiest distributional changes were observed in women from Central and Eastern Europe where the distribution of height shifted upwards in 2019 whereas the distribution of BMI in 2019 was almost the same as 1985; this means that women in this region gained height without gaining excessive weight. The worst distributional changes were observed in men from South Asia, where the distribution of BMI shifted upwards, but the distribution of height in 2019 only widened and did not move compared to that of 1985; this means that men of this region gained weight without gaining height. In Oceania, where a large proportion of the population was already obese, the distribution of BMI was almost identical to that of 1985, whereas, although the changes were minimal, the distribution of height shifted upwards with a widening and a formation of longer right tail; these two observations indicate that, although BMI is changing similarly among the population of this region, sub-populations may be present in Oceania that are benefitting differently from the height gain, with the taller population in 1985 becoming even taller in 2019. In both women and men from high-income Asia Pacific, the distribution of height in 2019 showed almost no overlap with that of 1985, which indicates a healthy height gain among the whole population; however, whereas the distribution for BMI also shifted upwards for men signalling a proportional BMI increase, the distribution of BMI of women shifted downwards, showing that a larger portion of the this population is now closer to underweight. Distributions of height and BMI in 1985 compared to 2019 of women and men from Central Asia, the Middle East and North Africa; East and Southeast Asia; high-income Western; Latin America and the Caribbean; and men from sub-Saharan Africa and Central and Eastern Europe; and women from South Asia shifted upwards and widened. This indicates that the changes observed in height and BMI in the listed regions and sexes occurred in a wider range of the population, and that the weight gain might already be in excess of the height gain, with BMI at overweight and obesity levels being no longer the exception but the rule.

When considering the observed distributional changes in height and BMI, at the population level, the difference in the BMI distributions are overall more heterogeneous than those in the height distributions, with sub-populations at the right tail of the BMI distributions being negatively affected by the weight gain and benefitting less from the height increase. This may mean that environmental factors are driving BMI in variable ways across regions, which are less impactful on height. If that is the case, I would expect height and BMI to be unrelated, which is why I next investigate the interrelationship between these two anthropometric variables by looking into the evolution of their correlation coefficient.

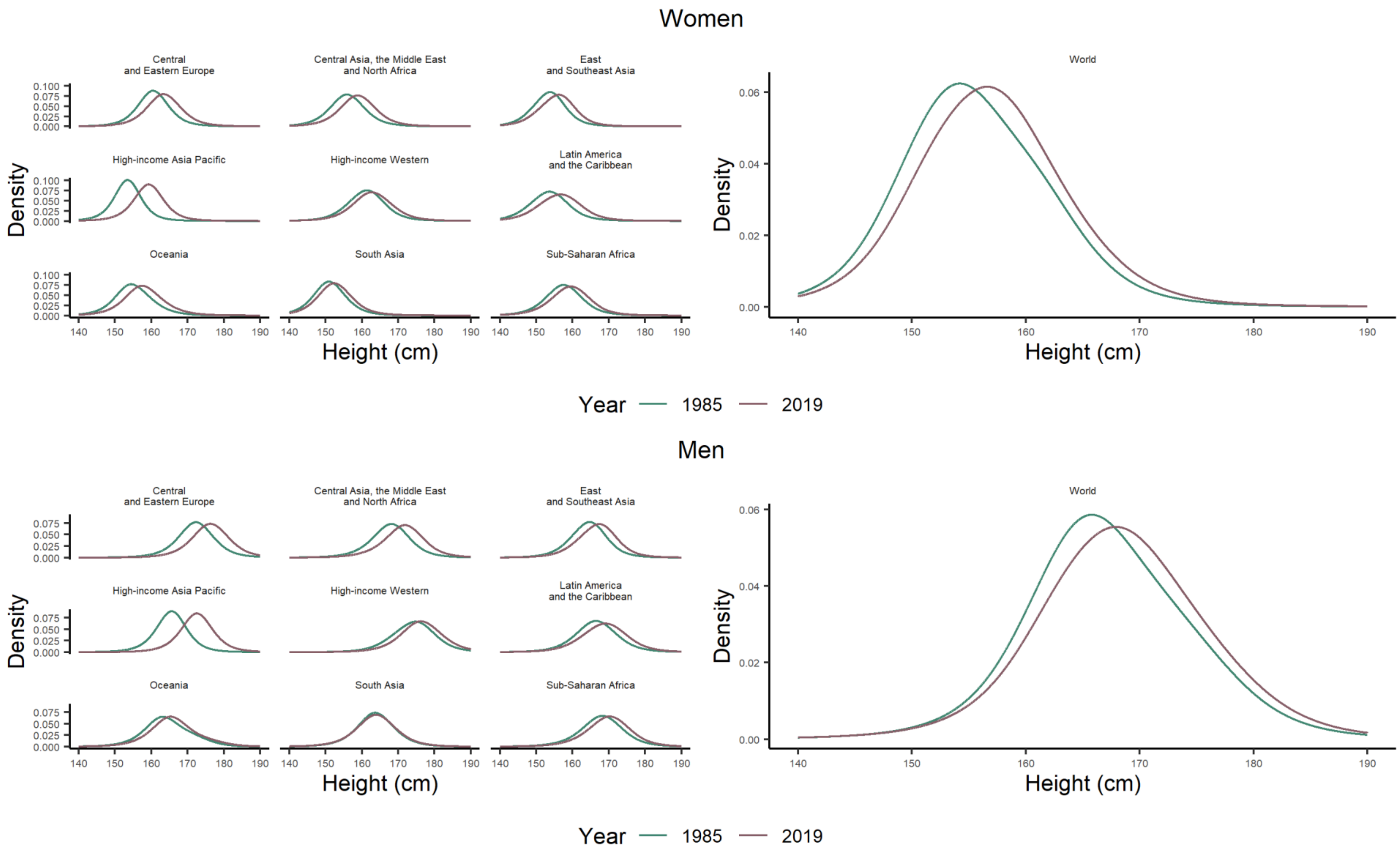


**Figure 17.** Distribution of height in 1985 versus 2019, by sex.

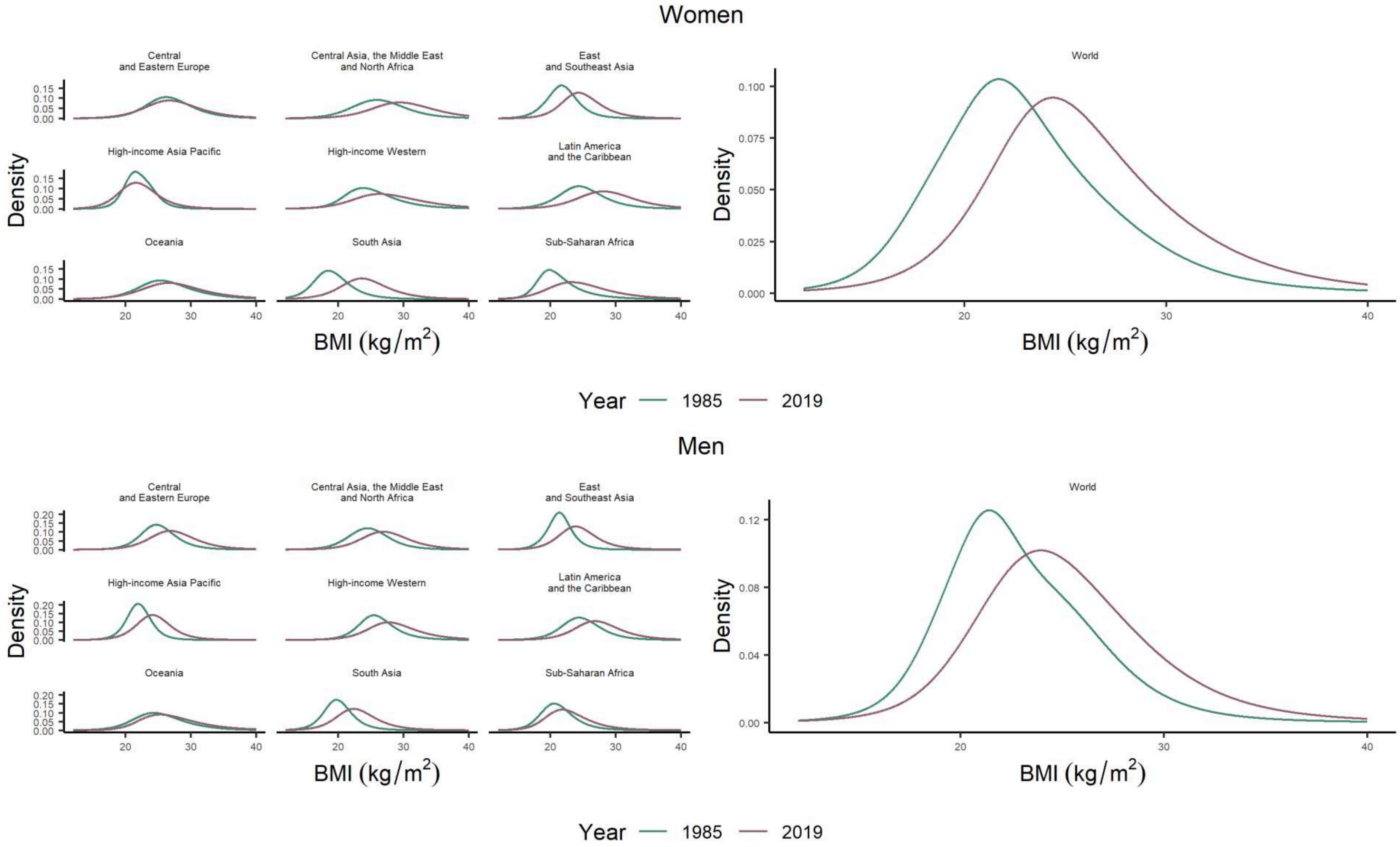


**Figure 18.** Distribution of BMI in 1985 versus 2019, by sex.

### *4.3.3 The correlation coefficient between height and BMI*

From 1985 to 2019, the correlation coefficient between height and BMI increased for women from all countries in high-income Western and South Asia; changed only marginally in countries in sub-Saharan Africa; and it decreased in all other countries, with the absolute decrease over 0.1 only in countries in Oceania and East and Southeast Asia (Figure 19). For men, the correlation coefficient decreased for men from 122 countries, of which the majority in Sub-Saharan Africa, Central Asia, the Middle East and North Africa and Latin America and the Caribbean; and increased for 51 countries, of which the majority in high-income Western and Central and Eastern Europe (Figure 19). In 2019, both women and men from most countries had a small correlation coefficient; the exceptions were six countries from sub-Saharan Africa (of which Sao Tome and Principe for both women and men) and four from Central Asia, the Middle East and North Africa, where the correlation coefficient was more negative than -0.2 (Figure 19). Overall, the very small changes in the correlation coefficient indicate that trends between height and BMI were mostly flat. This means that the relationship between these two anthropometric variables did not change significantly over time, and that, in the majority of countries, it stayed a small negative value, which indicates a weak negative relation.

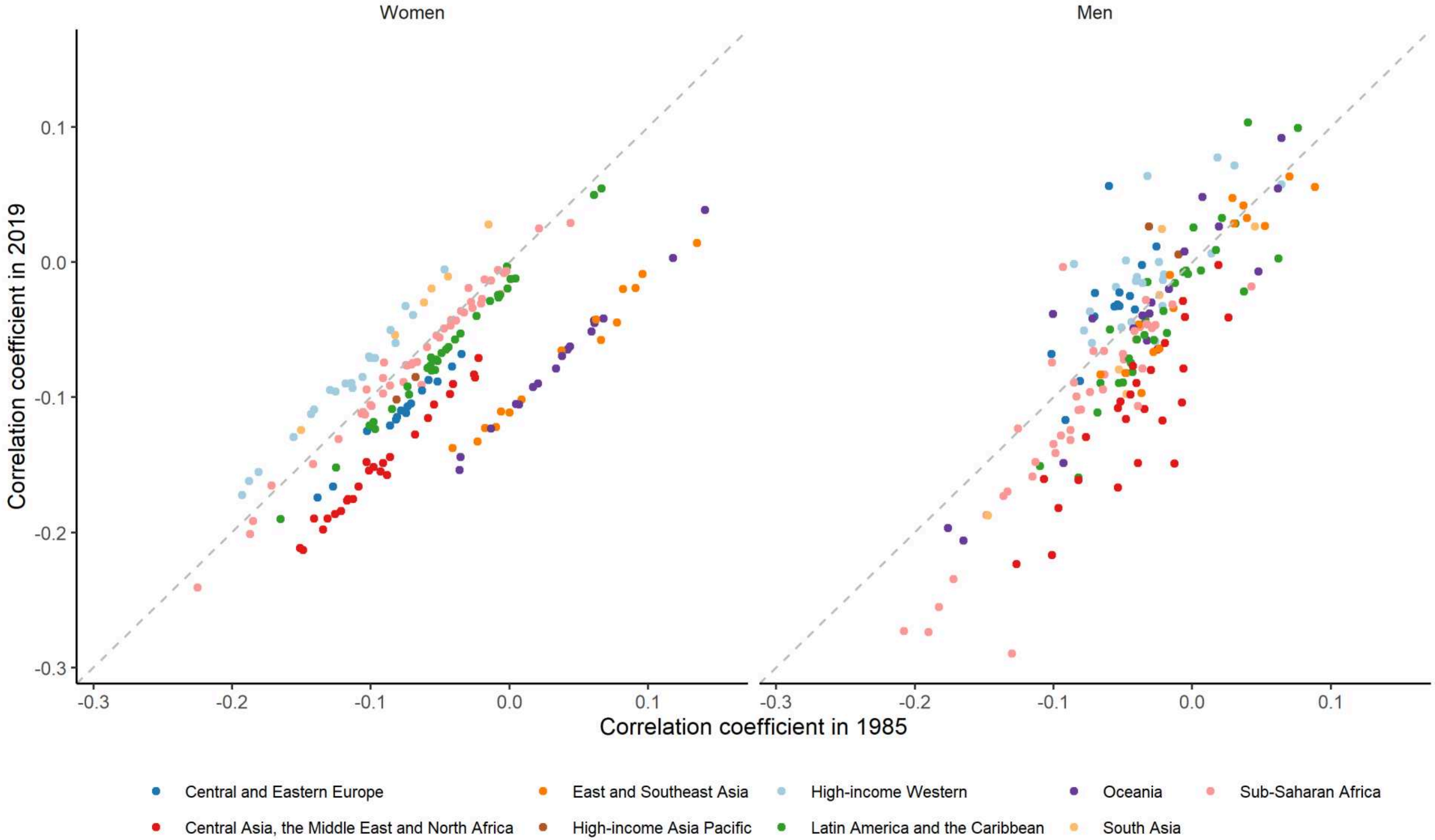


**Figure 19.** Correlation coefficient between height and BMI in 1985 and 2019, by sex and region.

## 4.4 Discussion

### *4.4.1 Comparison to previous literature*

The results on mean height increasing to different degrees in most countries and sexes are consistent with the only previous study with similar geographical and temporal coverage,[90] as well as with other smaller studies reporting secular trends of height.[15,17,18,78-89] Only one previous study investigated change in mean and standard deviation of height, and found that over half of the countries analysed showed no change in standard deviation of height;[91] this is different from the findings of my analysis, where variance increased among almost all countries, but this study presented its results in low and middle income countries and only for women so results are not fully comparable. The results on skewness of height showing that the distribution of height was and stays symmetrical are consistent with smaller previous reports from Switzerland[93] and Italy[94] reporting that that height distribution moved from left-skewness in the 1860s to symmetry after the 1970s.

Results on increasing BMI in most countries with the exception of women from countries in high-income Asia Pacific are consistent with previous studies with the similar global and temporal coverage.[95,96] Results of increasing variance of BMI for all countries and sexes are also consistent with previous smaller studies covering similar periods and age groups in women from low and middle-income countries,[101] and in Canada[105] and China.[103] With the exception of one study,[117] the results on increasing positive skewness among men were consistent with previous smaller studies;[104,112,118] contrary for women, although the results are consistently showing the BMI distribution to be right-skewed, this was decreasing for some countries, which is contrast with previous smaller studies.[104,112,118]

The results of a weak negative correlation coefficient between height and BMI among most countries and sexes partially support what is reported in the literature,[119,122] but in 2019, in the case of eight countries for women and one fifth of countries for men, the correlation coefficient was a positive small number. Results however are not fully comparable as, although the relationship between weight and height is widely studied, the few studies reporting on the interrelationship between height and BMI are limited to one country, age group or time point. Nonetheless, these findings challenge the assumption of previous studies at different times points that the correlation coefficient between height and BMI is expected to be strongly negative.[123-125]

### *4.4.2 Strengths and limitations*

My analysis has strengths in scope, data, and methods: the strengths of my study include presenting the first analysis that characterised the distributions of height and BMI and their interrelationship, using one example age group, to investigate how the distributions of these two anthropometric variables changed in their mean, variance and skewness as well as correlation coefficient. Even in the case of global analyses,[90,95,96,121] these were limited to estimating trend of mean alone. Only one study estimated trends of both mean height and BMI with extensive global and temporal coverage,[121] but this was conducted in children and adolescence only. Other studies on height and BMI were limited to a single country,[119] or to single time points.[122-125]. No previous study assessed trends of moments characterising the distributions of height and BMI and of the correlation coefficient between these two anthropometric variables to characterise their interrelationship for three decades across all regions of the world as I did. I also used an unprecedented amount of data from different countries covering three decades, and used only measured data on height and weight to avoid biases in self-reported data.

My study also has some limitations. Despite using the most comprehensive global collection of population-based studies to date, some regions, specifically Central Asia, the Middle East and North Africa and Oceania, had less data, especially early in my analysis period. This incurred the uncertainty being larger in these regions, which means that, when reporting absolute difference, the average is not as specific as it is for regions with more data (and much smaller uncertainty). Further, given the complexity of the hierarchical Bayesian models adopted, I ran the analysis only on individuals aged 40-49 years old. Finally, there are variations in characteristics such as response rate and measurement protocol across studies. Some of these, such as exclusion of studies with self-reported height and weight, were a part of my inclusion and exclusion criteria. Others may affect population mean, variance, skewness or correlation coefficient.

### *4.4.3 Public health implications*

Mean height and mean BMI had already been shown in previous literature to be increasing; but the additional results on variance and skewness add onto further implications on how the height gain and the BMI increase are affecting the population. The increase of the variance of the height distribution indicates that the height gain happened in a wider range while a no change in the skewness, which was a value around zero, indicates that the height distribution is symmetrical and therefore that the height gain happened similarly among different segments of the height distribution. Contrary, although variance of the BMI distribution is also increasing indicating that the BMI increase happened in a wider range, skewness of the BMI distribution was a positive number, which was increasing for men from all countries and for women from half the countries; this indicates that segments of the BMI distribution are affected differently by the BMI increase. Specifically, overweight and obesity levels of BMI are now the rule among half the population of women for all regions of the world, with high-income Asia Pacific being the only exception; men are also at similar levels of BMI, but there is a subpopulation of men at the higher end of BMI suffering more from the weight gain and benefitting less from the height gain.

Although BMI is linked to height by definition, the weight gain has surpassed the height gain to a point where BMI and height are unrelated. This is shown by the weak correlation coefficient between height and BMI, which supports the idea that the drivers of these two anthropometric variables are different. From an evolutionary perspective, it is theorised that within an environment where resources are finite, each organism allocates these resources to maximise four key functions: maintenance, growth reproduction and defence.[151] While height is a marker of growth, either ongoing or completed, fat-free mass is a marker of all four vital functions.[152] Trade-offs between these vital functions across time and among populations manifest as changes in associations between height, fat mass and fat-free mass, revealing important sub-groups.[119] These results show that the wave of malnutrition may have altered the way in which height growth is correlated with accretion of fat mass and fat-free mass. On these premises, the only countries where height and BMI might still be responding similarly to environmental factors in 2019 are those where the correlation coefficient was highest (more negative than -0.2). Contrary in all other cases, if both the numerator, represented by BMI (fat mass plus fat free mass) and the denominator, represented by height, do not respond similarly to environmental factors, and instead are completely independent from one another, than a single solution tackling all problems that malnutrition causes on both anthropometric variables may not be enough; instead, policy makers and public health practitioners need to address the drivers of these anthropometric variables independently within each population.

Several factors might be responsible for the heterogeneity showed in the distributions of height and BMI.[6] Although genetics is an important component to height[14,153] and, to a lesser extent, to BMI,[154] within populations genetics explains only a small part of the variation across regions or the changes over time, especially for BMI where the weight component is instead highly influenced by environmental factors.[3,155-157] The major role in these heterogeneous trends is played by food and nutrition,[3-5] including energy balance, and adequacy and quality of macro- and micronutrients,[6,7] along with physical activity.[8] Fully establishing the environmental determinants of the observed height and BMI trends requires consistent and comparable data on these drivers in different territories. These findings on the heterogeneous trends of height and BMI in adults raise the need to rethink and revise a key feature of global health and nutrition programmes, which is to overcome the disconnect in research and practice between reducing underweight and stunting (shown by low height and BMI) and preventing and managing overweight and obesity (shown by high BMI), also known as the double-burden of malnutrition.[6,90,95-97,121] An example of this was observed in the difference between men and women of Sub-Saharan Africa: although both sexes benefitted from similar height gain, the increase of BMI in men only happened at the right tail, with a portion of men still underweight; whereas more than half of the women population in this area have now high BMI. In the last 30 years, countries of Sub-Saharan Africa have undergone unprecedented economic growth and significant urbanization, with families moving to the cities where women are left to childcare while men go farming: this means that women started travelling shorter distance, having less physically demanding jobs and also easier access to commercially pre-processed foods.[97] This highlights a clear double burden of malnutrition, i.e. underweight for men and obesity for women, which requires different interventions to tackle segments of the population according to their specific needs.

These findings should encourage policies and interventions by the health system to support healthy population growth within healthier living environments at home, in the workplace and in the community, enhancing nutritional quality and providing high-quality preventive and curative care. There a number measures adopted by agricultural and food system policies[158] that may increase the availability and reduce the cost of nutritious foods: (conditional) cash transfers and food vouchers towards nutrient-rich foods for low-income families; fiscal and regulatory policies that restrict the consumption of unhealthy foods, especially processed carbohydrates; the provision of affordable healthy housing, clean water, and sanitation; and the provision of facilities for play and sports in the community. Taking these actions would enable individuals to grow taller without gaining excessive weight, with lifelong benefits for their health and wellbeing.

## 4.5 Summary

In this chapter, I used hierarchical Bayesian models to estimate trends of moments of the distributions of height and BMI and of their correlation coefficient in individuals aged 40-49 years from 1985 to 2019. Mean and variance of the height distribution increased in most countries and sexes, indicating that the height distribution shifted upwards and the range of values increased. Change in the skewness of the height distribution was small, and the values of the skewness of height in both 1985 and 2019 were consistently around zero indicating that the distribution of height tends to stay symmetrical. Mean BMI increased in most countries and sexes reaching and surpassing overweight levels. Variance of the BMI distribution increased in all countries and sexes, indicating that the range of values increased. Skewness of the BMI distribution increased for men from most countries and for women from half the countries; although the BMI distribution was still right-skewed in 2019 for both women and men, the different directions of change indicate that the BMI distribution moved towards symmetry for some women and developed a longer right tail for all men. Although the correlation coefficient slightly decreased for women and men from most countries, the values of the correlation coefficient were small around zero. This indicates that height and BMI are only weakly related and therefore policy makers and public health practitioners may need to address the challenges tracked by each of these two anthropometric variables individually. Different factors determine the distributional changes of height and BMI, of which nutrition is the main driver. Policy makers and health practitioners need to tackle the double burden of malnutrition by making healthy foods accessible and affordable, while restricting unhealthy foods through fiscal and regulatory restrictions.

# 5 Contribution of mean BMI to change in prevalence of different BMI categories

## 5.1 Overview

In this chapter, I use pre-defined categories of BMI, namely underweight, obesity and severe obesity, to investigate changes in the BMI distribution. A shift in the whole distribution of BMI would simultaneously affect mean BMI as well as the prevalence of BMI categories such as underweight and obesity.[99,160] In contrast, changes in the shape of the BMI distribution – e.g., widening or narrowing of the BMI distribution, becoming more or less skewed, or having a thinner or thicker tail – would affect the prevalence of underweight and obesity with only small impacts on the population mean, as shown schematically in Figure 20. Understanding these two mechanisms is essential as they may require different public health and clinical responses.[161] But it is unclear how much the two mechanisms have contributed to the observed decline in underweight and rise in obesity in different world regions. To understand whether weight gain occurs across all BMI levels or disproportionately affects the underweight or obese segments of the distribution, and how this phenomenon varies geographically, there is a need for a population-based study that simultaneously investigates both underweight and obesity in relation to mean BMI in different regions of the world.

Here, I use the comprehensive NCD-RisC global database reported in Section 3.3.2 to investigate how much the change in mean BMI explains changes in prevalence of underweight, obesity and severe obesity in adults aged 20-79 years over three decades from 1985 to 2016 in different regions of the world.

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Contents of this chapter were published in *eLife*.[152]

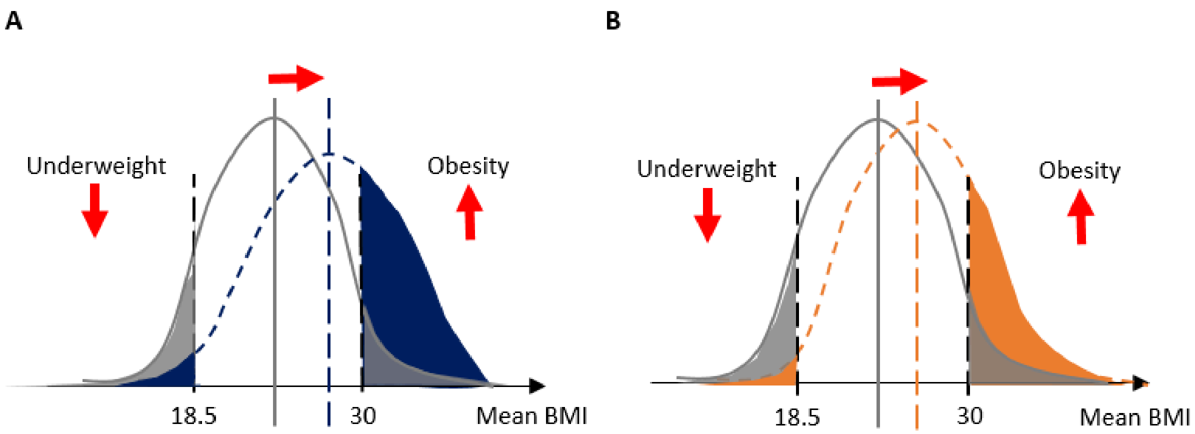


**Figure 20.** Schematic diagram of contribution of change in mean BMI to change of total prevalence of underweight or obesity.

(A) Change in the prevalence of underweight and obesity if the distribution shifts, represented by a change in its mean and its shape. In this example, the change (shown as the difference between blue and grey) results in a small decrease of underweight and a large increase in obesity. (B) Change in the prevalence of underweight and obesity when only mean BMI changes (shown as the difference between orange and grey), without a change in the shape of the distribution.

## 5.2 Methods

### *5.2.1 Study design*

I adapted a method used previously by the NCD-RisC to investigate the contributions of mean blood pressure to worldwide trends and variations in raised blood pressure.[128] In the first step, I used the data described in Section 3.3.2 to estimate the associations of the prevalence of underweight (defined as BMI $\leq$ 18.5 kg/m$^2$), (total) obesity (BMI $\geq$ 30 kg/m$^2$) and severe obesity (BMI $\geq$ 35 kg/m$^2$) with population mean BMI, including how the association varies in relation to age group and region. In the second step, I used regional mean BMI data from a recent comprehensive analysis of worldwide trends in mean BMI from 1985 to 2016,[96] and applied them to the fitted association to estimate expected prevalence given mean BMI levels. I then quantified the contribution of change in the population mean BMI to the change in the prevalence of underweight, obesity or severe obesity in different regions, as described in the next section.

### *5.2.2 Statistical methods*

For the first step of my analysis, I used mean BMI and prevalence of underweight, obesity and severe obesity by sex and age group in each study, excluding study-age-sex groups with less than 25 participants because their means and prevalence have larger uncertainty. The final list of data sources included in the analysis and their characteristics is provided in Appendix Table 2. I estimated the relationship between probit-transformed prevalence of underweight, obesity and severe obesity and mean BMI in a regression model, separately for each of these prevalences. The prevalence of underweight, obesity and severe obesity depends on population mean BMI as well as on age group, region and year. Mathematically, for each age group $a$ from study $i$, the probit-transformed study prevalence is modelled as follows:

$$probit\ (prevalence) = \alpha_0 + \alpha_a + \alpha_{r[i]} + \alpha_{a,r[i]} + \left(\beta_0 + \beta_a + \beta_{r[i]}\right) \cdot study\_mean\_BMI_{a,i} + (\gamma_0 + \gamma_a + \gamma_{r[i]}) \cdot year_i \tag{7}$$

where $r[i]$ is the region of the study, $year_i$ its year, and $study\_mean\_BMI_{a,i}$ the mean BMI at age group $a$ in study $i$.

I chose a probit-transformed prevalence because it changes approximately linearly as the mean changes, thus providing a better fit to the data. The regressions also included age group in 10-year bands, region and the year when the data were collected. The regions and their constituent countries are the same from previous analyses of cardiometabolic risk factors,[90,95-97,128-130] and the countries included in those are listed in Appendix Table 1. The model also included interactions between mean BMI and age group, mean BMI and region, age group and region, age group and year, and year and region. These terms allowed the prevalence-mean association to vary by age group, by region and over time. The models were fitted in statistical software R (version 3.4.2). The coefficients of the regression models are listed in Appendix Table 3 and Appendix Table 4.

I used the fitted regressions to quantify how much of the change over time in the prevalence of underweight, obesity or severe obesity in each region and age group can be explained by the corresponding change in mean BMI. To do so, I first used the region- and age-sex-specific mean BMI in 1985 and 2016 in the fitted association to estimate the expected prevalence given the mean BMI levels, and then calculated the change in the expected prevalence of underweight, obesity or severe obesity by region. Mathematically, for age group $a$ and region $r$, the change in prevalence is defined by:

$$\begin{aligned} & Change\ in\ prevalence = \\ & Probit^{-1}[\alpha_0 + \alpha_a + \alpha_r + \alpha_{a,r} + (\beta_0 + \beta_a + \beta_r) \cdot mean\_BMI_{a,r,2016} \\ & +(\gamma_0 + \gamma_a + \gamma_r) \cdot 2016] - Probit^{-1}[\alpha_0 + \alpha_a + \alpha_r + \alpha_{a,r} \\ & +(\beta_0 + \beta_a + \beta_r) \cdot mean\_BMI_{a,r,1985} + (\gamma_0 + \gamma_a + \gamma_r) \cdot 1985] \end{aligned} \tag{8}$$

where $mean\_BMI_{a,r,2016}$ is the mean BMI in age group a and region r for year 2016, and $mean\_BMI_{a,r,1985}$ is the mean BMI in age group $a$ and region $r$ for year 1985. The mean BMI values were from a recent comprehensive analysis of worldwide trends in mean BMI,[96] and are listed in Appendix Table 5.

I then calculated the contribution of change in mean BMI to the change in prevalence of underweight or obesity by allowing mean BMI for each age group and region to change over time, while keeping year fixed at 1985. Mathematically, for age group $a$ and region $r$, the contribution in change of mean BMI is defined by:

$$Contribution\ to\ change\ in\ mean\ BMI =$$

$$Probit^{-1}[\alpha_0 + \alpha_a + \alpha_r + \alpha_{a,r} + (\beta_0 + \beta_a + \beta_r) \cdot mean\_BMI_{a,r,2016}$$
$$+(\gamma_0 + \gamma_a + \gamma_r) \cdot 1985] - \ Probit^{-1}[\alpha_0 + \alpha_a + \alpha_r + \alpha_{a,r} \quad (9)$$
$$+(\beta_0 + \beta_a + \beta_r) \cdot mean\_BMI_{a,r,1985} + (\gamma_0 + \gamma_a + \gamma_r) \cdot 1985]$$

Results were calculated by 10-year age group and then aggregated into two age bands, 20-49 and 50-79 years, by taking the weighted average of age-specific results using weights from the WHO standard population.[162] All analyses were done separately for men and women.

## 5.3 Results

### *5.3.1 Change in mean BMI and prevalence of underweight, obesity, severe obesity by region*

In 2016, the age-standardised prevalence of underweight was highest (>16% in different sex-age groups) in South Asia; it was less than 2.5% in central and eastern Europe; the high-income Western region; Latin America and the Caribbean; Oceania; and central Asia, the Middle East and North Africa for most age and sex groups. The age-standardised prevalence of obesity was highest (>24%) in these same regions for most age and sex groups. It was lowest (<7%) in men and women from South Asia; the high-income Asia Pacific region; and men from sub-Saharan Africa. The age-standardised prevalence of severe obesity was highest (12-18%) in women aged 50-79 years from central Asia, the Middle East and North Africa; the high-income Western region; central and eastern Europe; and Latin America and the Caribbean. It was lowest (<2%) in South Asia; East and Southeast Asia; the high-income Asia Pacific region; and men in sub-Saharan Africa.

From 1985 to 2016, age-standardised mean BMI increased by 1-4 kg/m$^2$ in all regions, with the exception of women in the high-income Asia Pacific region and central and eastern Europe whose BMI changed by less than 1 $kg/m^2$ (Figure 21). The prevalence of underweight decreased or stayed unchanged and that of obesity and severe obesity increased from 1985 to 2016 in all regions, with the exception of an increase in the prevalence of underweight in younger women in the high-income Asia Pacific region. The largest absolute decrease in underweight prevalence from 1985 to 2016 was seen in South Asia; East and Southeast Asia; and sub-Saharan Africa, where it declined by 14-35 percentage points in different age-sex groups (Figure 22). Nonetheless, underweight prevalence remained higher in these three regions than elsewhere in 2016. Prevalence of underweight changed only marginally in regions such as Central and Eastern Europe and the high-income Western region, where prevalence was already low in 1985.

The largest absolute increase in obesity prevalence from 1985 to 2016 occurred in central Asia, the Middle East and North Africa; the high-income Western region; Latin America and the Caribbean; Oceania (women); and Central and Eastern Europe (men) (Figure 22). Women in these regions also experienced the largest increase in severe obesity prevalence, along with men in the high-income Western region. In these regions and sexes, obesity prevalence increased by 16-24 percentage points in different age groups, and severe obesity increased by 5-13 percentage points. The increase in obesity was less than five percentage points in the high-income Asia Pacific region; South Asia; and in men in sub-Saharan Africa; in the same regions, along with East and Southeast Asia, the increase in severe obesity was less than two percentage points.

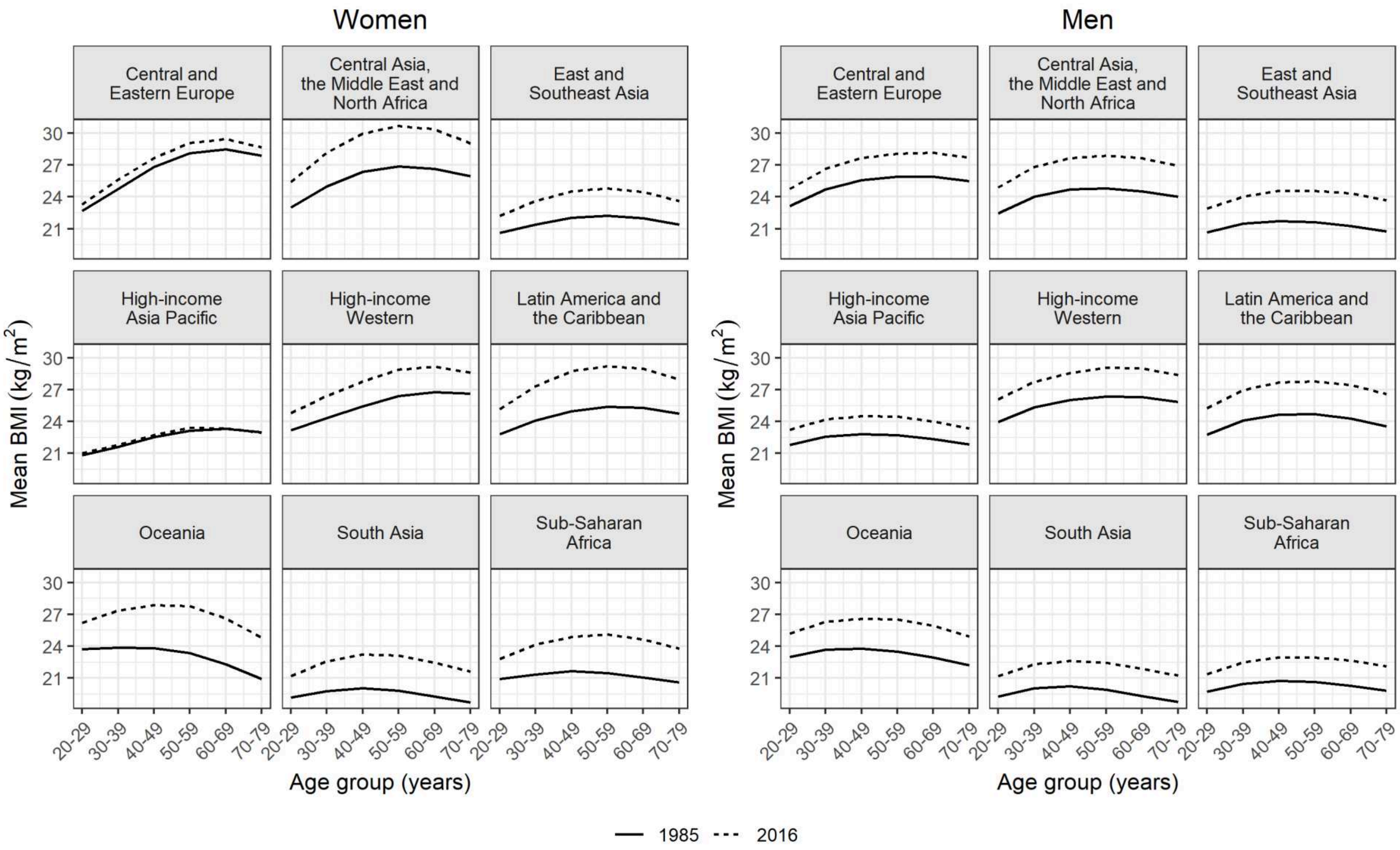


**Figure 21.** Change in mean BMI from 1985 to 2016 by region, sex and age group.

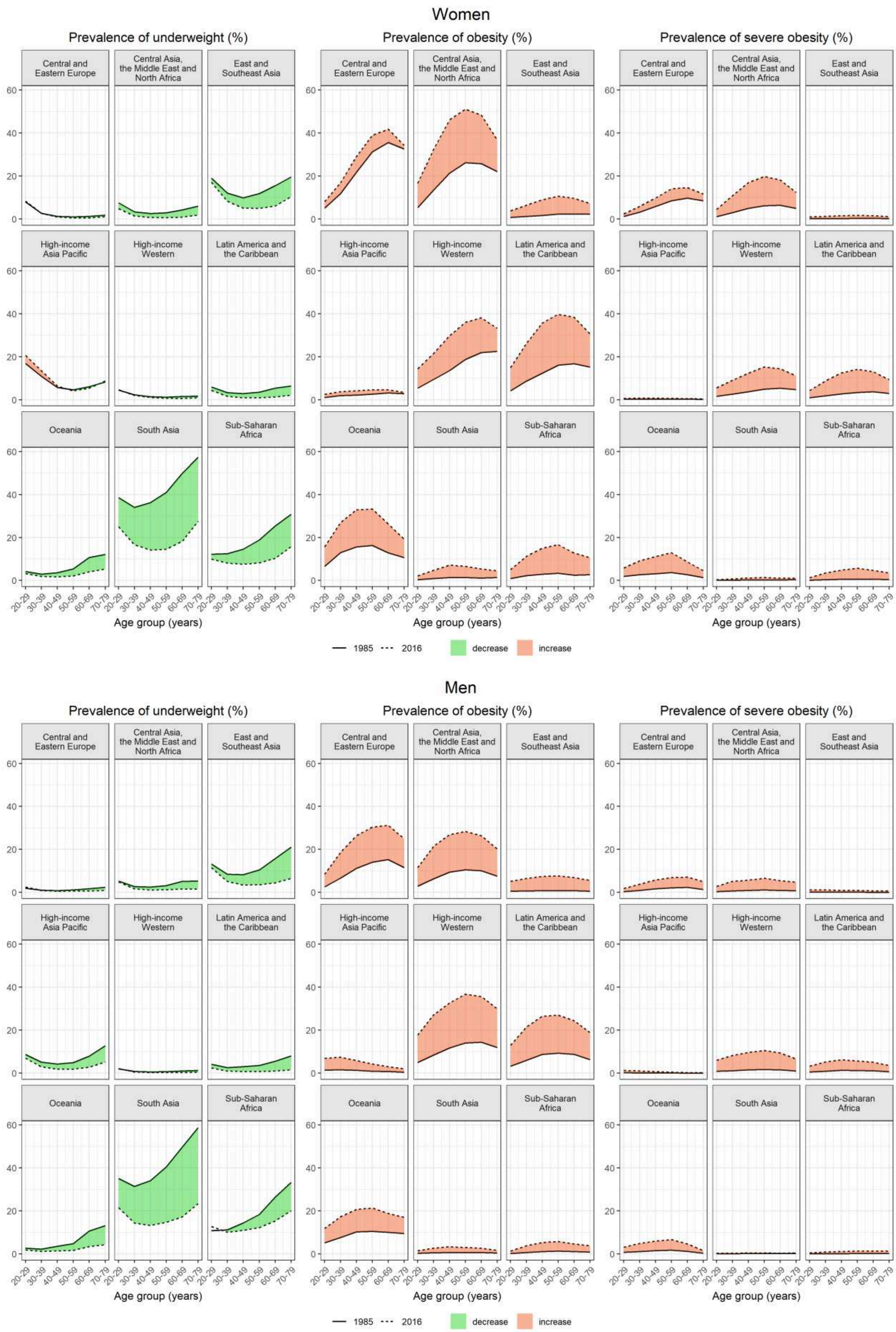


**Figure 22.** Change in prevalence of underweight, obesity and severe obesity from 1985 to 2016 by region, sex and age group.

*5.3.2 Associations of underweight, obesity and severe obesity prevalence with mean BMI*

There was a strong association between the prevalence of underweight, obesity and severe obesity with mean BMI as measured by R-squared of the regressions of prevalence on mean (Appendix Table 3 and Appendix Table 4). These indicate that 93% (men) and 96% (women) of variation in obesity, and between 83% and 92% of variation in underweight and severe obesity were explained by mean BMI and other variables (year, region and age group) in the regression models. The coefficients of the mean BMI terms represent the changes in (probit-transformed) prevalence associated with a unit change in mean BMI, and their interactions with region represent variations in this association across regions. For all three outcomes, the association of prevalence with mean BMI varied across regions. The inter-regional variation in the prevalence-mean association was more pronounced for obesity and severe obesity than underweight, as seen in larger inter-regional range of the interaction terms. The extent to which prevalence changes with any variation in mean BMI in each region is an outcome of the main BMI term and its interaction with region; to be epidemiologically interpretable, this will have to be converted from probit-transformed to original prevalence scale. For example, in the year 2016, for women aged 50-59 years, at a mean BMI of 25 $kg/m^2$ (which was approximately the global age-standardised mean level of BMI),[96] prevalence of underweight would have varied by 7 percentage points across regions, being lowest in central and eastern Europe and highest in sub-Saharan Africa; a unit increase in mean BMI would have been associated with a relative change in prevalence ranging from -49% in the high-income Asia Pacific region to -14% in Oceania. Also for women aged 50-59 years and a mean BMI of 25 $kg/m^2$, the prevalence of obesity and severe obesity would both have been the highest in Oceania and the lowest in the high-income Asia Pacific region, with a difference of 12 and 6 percentage points, respectively, for the two outcomes; a unit increase in mean BMI would have been associated with a relative change ranging from 21% to 46% for obesity and from 30% to 59% for severe obesity, the smallest change for both being in Oceania and the largest in East and Southeast Asia. There was similar inter-regional variation in the other year-age-sex strata.

### *5.3.3 Contribution of mean BMI to changes in underweight and obesity prevalence*

The rise in mean BMI accounted for >82% of the decline in underweight in different age-sex groups in South Asia, where underweight prevalence declined by over 16 percentage points for all age-sex groups (Figure 23). The remainder of the decline was due to change in the shape of the BMI distribution which reduced underweight prevalence beyond the effects of the population mean. In contrast, in sub-Saharan Africa and East and Southeast Asia, the total change in prevalence of underweight (3-12 percentage points) was 20-80% less than what was expected based on the increase in mean BMI (Figure 23). In other words, in these regions the underweight tail of the BMI distribution was left behind as the distribution shifted.

Where obesity increased the most – central Asia, the Middle East and North Africa; Latin America and the Caribbean; and the high-income Western region – the rise in mean BMI accounted for over three quarters of the increase in different age-sex groups (Figure 23). In Oceania, the actual rise in prevalence of obesity (8-14 percentage points for all age-sex groups) was about two thirds to one half of what would have been expected by the observed increase in mean BMI in men and women (Figure 23). Change in mean BMI consistently accounted for a smaller share of the change in severe obesity than it did for change in total obesity. Specifically, in regions where prevalence of severe obesity changed by more than one percentage point, the contribution of change in mean BMI to change in severe obesity in different regions was 53-90% of the corresponding contribution for total obesity (Figure 23). In other regions, the change in the prevalence of underweight, obesity or severe obesity was too small for the contribution of change in mean BMI to be epidemiologically relevant (Figure 23).

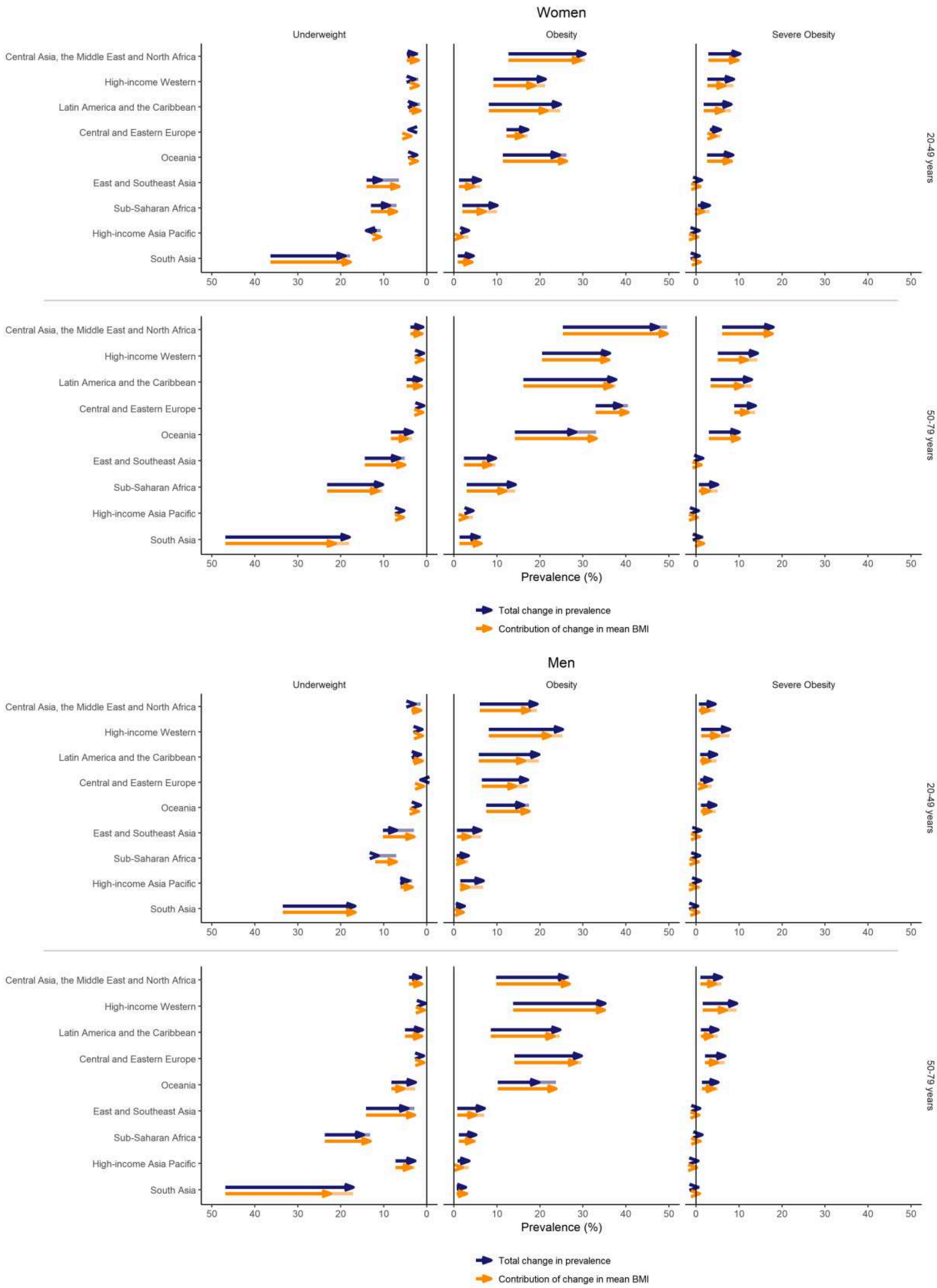


**Figure 23.** Contribution of change in mean BMI to total change from 1985 to 2016 in prevalence of underweight, obesity or severe obesity by region, sex and age group.

Arrows in blue show the total change in prevalence of underweight, obesity, or severe obesity. Arrows in orange show the contribution of change in mean BMI to the change in prevalence. The difference between these two arrows is shown with a line, whose colour follows the shorter arrow.

## 5.4 Discussion

### *5.4.1 Comparison to previous literature*

Previous studies used one or more approaches to investigate changes in population BMI distribution: some analysed percentiles of the BMI distribution,[98,101,104,105,108-110,112,114] others focused on the change in prevalence above or below pre-specified BMI thresholds,[101,103,104,109-111,118] or evaluated how the shape of the BMI distribution has changed via examining metrics such as standard deviation and skewness.[104,105,110-112,118] Most of these studies reached the same conclusion as my study that, as the BMI distribution shifts upwards, the prevalence of underweight declines somewhat more slowly than prevalence of obesity rises. In particular, my results are consistent with a recent cross-sectional study[99] using data from women in low- and middle-income countries that found a strong association between mean BMI and prevalence of obesity, and a moderate association between mean BMI and prevalence of underweight. Being cross-sectional, this study did not consider changes over time, as I did. These results are also consistent with another study which found that changes in median BMI contributed more than 75% to the increase in obesity in the USA from 1980 to 2000.[117]

### *5.4.2 Strengths and limitations*

My analysis has strengths in scope, data, and methods: the strengths of my study include presenting the first global analysis of how much the rise in mean BMI versus changes in the shape of its distribution influenced changes in both underweight and obesity prevalence. I used an unprecedented amount of data from different regions covering three decades, and used only measured data on height and weight to avoid biases in self-reported data.

As all global analyses, my study has some limitations. Despite using the most comprehensive global collection of population-based studies to date, some regions, especially Oceania and sub-Saharan Africa, had less data, especially early in my analysis period. I did not include the uncertainty arising from the geographical representativeness of the surveys, i.e. I did not discriminate between community surveys which usually present larger uncertainties compared to national ones due to e.g. smaller sample sizes. As I chose to model mean and prevalence, I had to consider that both these summary statistics are highly affected by smaller sample sizes. For this reason, I chose to exclude any sample size with less than 25 individuals because of larger uncertainties and less robust prevalences that would attenuate the association between mean and prevalence. By not including this uncertainty, I only focused and reported larger more significant differences among regions, while smaller differences were lost. Further, given the large number of age, sex and region subgroups of population in my analysis, and its long duration, it was not possible to visually explore how the shape of BMI distribution has changed in the underweight and obesity ranges where changes in the mean did not fully explain change in prevalence. Finally, there are variations in characteristics such as response rate and measurement protocol across studies. Some of these, such as exclusion of studies with self-reported height and weight, were a part of my inclusion and exclusion criteria. Others may affect population mean or prevalence.

### *5.4.3 Public health implications*

The finding that the majority of the rise in the prevalence of obesity from 1985 to 2016 is mostly the result of a distributional shift points towards an important role for societal drivers, including lower availability and higher price of healthy and fresh foods compared to caloric-dense and nutrient-deficient foods,[163] and mechanisation of work and motorisation of transport throughout the world that have reduced energy expenditure in populations around the world.[97,164] First, although there is a genetic component to BMI at the individual level,[154,155,165,166] genetics explain only a small part of changes over time, especially when people have access to healthy food and living environment. When the environment becomes more obesogenic, some people or population subgroups may gain more weight than others, implying that the environment remains the main contributor.[155] This interplay of genetic predisposition and changes in the environment might account for some of the excess rise in obesity and severe obesity beyond the effect of distributional shift alone.[155] The exception observed in Oceania is possibly because in 1985 obesity prevalence in this region was already so high[96] that the rise in BMI did not change overall obesity status (but there was a substantial increase in those with severe obesity, mostly accounted for by the change in mean BMI). The smaller decline in underweight than expected in sub-Saharan Africa and East and Southeast Asia may be because underweight is associated with lower socioeconomic status, food insecurity and for sub-Saharan Africa widening difference between rural and urban BMI levels which is different from other regions.[97,155,167-169] If the benefits of economic development do not sufficiently reach the poor, they remain nutritionally vulnerable, as has been seen for height and weight during childhood and adolescence.[121,170-174] Together with the rise in mean BMI and obesity (and short stature which is not a topic of this paper but addressed in other studies)[90,121,174] this creates a double burden of malnutrition.[175]

Overall, I found that the worldwide rise in obesity and the decline in underweight are primarily driven by the shift in the population distribution of BMI. At the same time, there is an evidence of both excess obesity, and especially severe obesity, and persistent underweight beyond the distributional shift in some regions, which may be related to growing social inequalities that restrict access to healthy foods in those at highest risk of undernutrition.[6,175,176] The response to these trends must motivate “double-duty actions” that prevent and tackle all forms of malnutrition through both fiscal and regulatory restrictions on unhealthy foods, and making healthy foods available, accessible and affordable especially to those at high risks of underweight and obesity.[158,177,178]

## 5.5 Summary

In this chapter, I investigated how much change in mean BMI explains changes in the prevalence of underweight, obesity and severe obesity in different regions using data from 2,897 population-based studies with 187 million participants. I used this database to estimate the associations of these prevalences population mean BMI, including how the association varies in relation to age group and region. I then used data from a recent comprehensive analysis of worldwide trends in mean BMI from 1985 to 2016 which had fitted a Bayesian hierarchical model to the NCD-RisC data, and used the fitted association to estimate the contribution of change in the population mean BMI to change in the prevalence of underweight, obesity or severe obesity in different regions. I found that the trends in the prevalence of underweight, total obesity and to a lesser extent severe obesity are largely driven by shifts in the distribution of BMI, with smaller contributions from changes in the shape of the distribution. The notable exceptions to this pattern were the decline in the prevalence of underweight in East and Southeast Asia and sub-Saharan Africa and the rise of obesity in Oceania, which were both smaller than expected based on change in mean BMI. Among its public health implications, I highlighted a need for policies that address all forms of malnutrition by making healthy foods accessible and affordable, while restricting unhealthy foods through fiscal and regulatory restrictions.

# 6 Discussion

## 6.1 Summary of thesis research

In this thesis, I used a comprehensive database of population-based measurement studies on anthropometric measurements of height and BMI: to characterise the distributions of these two anthropometric variables and their interrelationship making consistent and comparable estimates of trends of the first three moments of the distributions of height and BMI and of their correlation coefficient; and also to estimate how much the change in mean BMI contributed to the change in prevalences of underweight, obesity and severe obesity.

Prior to my work reported in this thesis, global analyses these were limited to estimating trend of mean alone and prevalences;[90,95,96,121] and others were limited to groups of low- and middle-income countries,[101,108] or to a single country; to one gender only;[98,100,102,103,105-116,118] specific age groups;[98,100-103,105-118] ethnic groups;[106,107] socioeconomic groups;[113-115] urban or rural populations.[104,114] Only one study estimated trends of both mean height and BMI with extensive global and temporal coverage,[121] but this was conducted in children and adolescents. No previous study assessed trends of moments characterising the distributions of height and BMI, nor the correlation coefficient describing their interrelationship, for three decades across all regions of the world as I did.

The analysis showed that the distribution of height of women and men aged 40-49 years for most countries and sexes in 2019 compared to 1985 increased both in mean height and variance of height, while keeping the skewness around zero. The distribution of BMI of women and men aged 40-49 years for most countries and sexes in 2019 compared to 1985 increased both in mean BMI and variance of BMI, with decreasing positive skewness for women from some countries and increasing positive skewness for men from all countries. Specifically, the change in mean BMI contributed to most of the changes in prevalences of underweight, obesity and severe obesity for most regions and sexes in individuals aged 20-79 years old between 1985 and 2019.

The investigation of moments characterising the distribution of BMI aids to better understand the specific analysis on how much the change in mean BMI contributes to the change of BMI categories by providing an explanation of what other distributional changes happened. Generally, an increase in the variance of the BMI distribution indicates that the BMI increase happened more heterogeneously among a population, i.e. the BMI increase happened at a different rate among different segments of the population; but it is skewness that depicts a clearer picture regarding how exactly this change happened. In South Asia; Sub-Saharan Africa; and East and Southeast Asia, where the decline of underweight was among the highest and mean BMI could only account for one fifth to four fifths of this change, an increase in the positive skewness of the distribution of men shows that men that were already at overweight or obesity levels are becoming even more so whereas men at underweight levels are being left behind. This situation is very different for women, as the decrease of positive skewness indicates that underweight women have benefited more from the BMI increase and are catching up faster to the rest of the population. In Central Asia, the Middle East and North Africa; Latin America and the Caribbean; and the high-income Western region, where obesity increased the most and the rise in mean BMI accounted for the majority of the increase in obesity, skewness changed very little, which is reflect in a distribution that only shifted upwards without major distributional changes. In these cases where mean BMI is sufficient to explain changes in the population, it means that the BMI increase is happening at roughly the same pace among all segments of the population, i.e. underweight is decreasing at the same pace as obesity is increasing. A special case was Oceania, where the high rise in prevalence of obesity was only about two thirds to one half of what would have been expected by the observed increase in mean BMI. This was also the region with the smallest distributional changes because the mean

BMI in this region is already so high that it is physiologically implausible for it to shift any higher, thus the distribution must necessarily stay the same or, ideally, shift downwards towards lower and healthier BMI levels.

The observed distributional changes of height and BMI showed that, at the population levels, BMI increase was in excess of height gain, with the two anthropometric measure being unrelated. Results showed that the relationship between height and BMI did not change significantly between 1985 and 2019, and, in 2019, the correlation coefficient was a small number around zero, which was negative for most countries for women and for four fifths of the countries for men. This means that environmental factors are driving BMI in variable ways across regions but are less impactful on height.

## 6.2 Strengths and limitations

My thesis provided the first consistent and comparable trends of moments characterising the distributions of height and BMI and their interrelationship, as well as a specific investigation into the contribution of change in mean BMI to change in BMI prevalences, for the last three decades across all regions of the world. Taken together, the results of this thesis observed for both height and BMI indicate that the weight gain within the population occurred disproportionately compared to the height gain, with too much weight-for-height gain on the higher end, and too little on the lower end in the majority of territories and sexes. In addition to what was captured by previous literature looking at mean only, this thesis specifically adds onto other distributional changes that highlight segments of the distributions of height and BMI that sit at the extremes. As seen, even in the presence of a healthy height gain, the BMI increase that follows often reaches obesity levels, which are now no longer the exception but the rule for most regions; at the same time, healthy BMI increase among a population that used to be underweight does not necessarily mean a recovery from stunting. Thus, one of the main strengths of my thesis was to show that mean, although remains a good indicator of general distribution trend, is not sufficient to understand the whole population and particularly does in no way capture health-relevant categories which are found at the tails; and also that height analysis in the absence of BMI, and viceversa, cannot fully account for healthy growth among a population.

Other than its novel scope, the main strength of my work lies in the unmatched quantity and quality of anthropometric measurements from population-based studies collated in the NCD-RisC database. The final dataset covered almost all countries worldwide and more than three decades. Characteristics of the data sources were checked extremely carefully against the inclusion and exclusion criteria, and I excluded any data with self-reported height and weight measurements to avoid bias; as well as samples that were not representative of the general population. I summarised the data according to a common protocol shared among all NCD-RisC collaborators to ensure standardisation of the process. A lot of effort went into ensuring data quality and keeping the database consistently up to date. Another key strength was the hierarchical Bayesian model I used, which accounted for key characteristics of the data, namely the linear time trends and the geographical representativeness. The hierarchy guaranteed that data were incorporated from community and subnational populations but also giving more weight to data from nationally-representative sources. This model also enabled the estimation of trends for countries and years where data were unavailable.

Although much effort went into obtaining data from as many countries and years as possible — and the NCD-RisC is indeed the largest of its kind —, very few countries had no data at all or in only a limited number of years or age groups. This was especially true for Oceania, the region with the lowest number of data sources per country and years covered, and for the earlier years in regions such as South Asia and Central Asia, the Middle East and North Africa.

Generally, for all regions fewer data sources were available for the years preceding 2000. This meant that estimates for a country and year where no data were available relied entirely on either data from the same country but different years or data from other countries within the same region. This was particularly relevant for the analyses relying on individual-level data only as not all countries could share such information; for example, although summaries of Japan offer one of the most comprehensive coverage in terms of years and ages in the NCD-RisC database, individual-level data can never leave the country so any analysis' results for the high-income Asia Pacific region at the individual-level relies entirely on the two other countries within that region, South Korea and Singapore, which are then extended to Japan. Nevertheless, the temporal and geographical sparsity of data is well reflected in the uncertainty intervals, which for example are widest for Oceania, and smallest for the high-income Western region. This means that, especially in the case of calculating absolute difference, estimates for regions with smaller confidence intervals are much more reliable than those with larger ones. As all meta-analyses, using the NCD-RisC database also presents some of the classic limitation that come with pooling studies regarding the sampling frames. Although the collective effort we ensured strictly applying the inclusion and exclusion criteria and the attention given to ensure that the sampling frame was random and the sample representative of the whole region, there are some known biases about surveys conducted in areas of the world such as Sub-Saharan Africa. Here, particularly for earlier years, nation-wide sampling frames do to provide adequate coverage for the whole population as censuses failed to track individuals in entire territories[179] and, even when data existed, there were logistic challenges in handling the data and bureaucratic resistance for medical data to leave the country in any form.[180] It follows that surveys in these areas tend to cover specific communities in either rural settings or cities; considering the very different socioeconomic background of these living settings, these data are then likely to capture a very diverse picture which does not reflect the majority of the population at a national nor regional level. Another limitation was the restriction of my analyses to only individuals aged 40-49 years. This age restriction means that, although the 40-49 age group acts as a good proxy as it is an age group where weight loss as a result of pre-existing illness is still uncommon (therefore lower weight is less likely to be associated with worse health) and also the age group with the most data, the results cannot be generalised to all adults. This is especially true a population younger than 25 years, where growth might still be happening, or older than 85 years where illness and old age would already have impacted both weight and height. Due to uneven age structures of the data from disparate studies, inclusion of an age component within the already complex hierarchical Bayesian models chosen would have made the undertaking lengthy and outside the scope of my thesis, but coverage of all adult ages is included in future work. Finally, both my analyses using the hierarchical Bayesian model were restricted to studies within the NCD-RisC database for which data is held at the individual level. This was because no record of skewness and correlation coefficient was available for data held only at the summary level. Both of the last two limitations are further addressed in future work.

## 6.3 Public health implications

The distributional changes observed for both height and BMI indicate that segments of the population benefitted less from the height gain or were negatively affected by the BMI increase, i.e. the weight gain within the population occurred disproportionately compared to the height gain, with too much weight-for-height gain on the higher end, and too little on the lower end in the majority of territories and sexes. This means that for sub-populations at the right tail of the BMI distributions, the BMI increase was in excess of the height gain, thus the portion of the population that was already at obesity levels stayed so, and a bigger segment of the population that was at healthy levels of BMI is now overweight or obese, which effectively makes overweight and obesity levels no longer the exception but the rule. Contrary, for sub-population at the left tail of the BMI distributions, the BMI increase was not sufficient to escape underweight as either the height or the weight gain were not adequate to reach healthy BMI levels. In the presence of an increase in mean height and mean BMI, without significant distributional changes in variance and skewness (i.e. mean BMI accounts for the majority of the distributional shift), height gain and BMI increase occurred similarly among the whole population. This was the case for the high-income Western region; high-income Asia Pacific; Latina America and the Caribbean, Central and Eastern Europe; and Central Asia, the Middle East and North Africa, where all segments of the populations were affected similarly by the change in either height or BMI. Contrary, in the presence of an increase in mean height and mean BMI, with significant distributional changes in variance and skewness (i.e. mean BMI alone cannot fully explain the distributional changes), height gain and BMI increase occurred disproportionately among different segments of the population. This was the case for Sub-Saharan Africa; South Asia; and East and Southeast Asia Here, where the left tail did not gain enough height or their BMI did not increase, and the right tail increased their BMI as their height-to-weight gain was not sufficient or their weight-to-height gain was in excess. These distributional changes point at health inequalities existing within the same populations: a sub-population that was already healthier in terms of both height and BMI is now gaining more height (central segment of the distribution); a sub-population that was already obese is not benefitting from a proportional weight-to-height gain and is now more obese (right segment of the distribution); and a sub-population that was underweight stayed so due to either lack of weight gain or stunting (left segment of the distribution). These dangerous health situations of stunting, underweight and obesity are deeply rooted into health inequalities co-existing within the same populations.

As explained in the background chapter, although height has a main genetic component,[14,153] which is a lot less prominent for BMI,[3,155-157] both weight and height are highly influenced by environmental factors, of which the most important is food and nutrition.[3-5] Increased availability of calorie-dense and nutrient-deficient foods, along with the decrease of the price of such processed foods, increased the spending capacity and energy intake of the population, especially in low-and middle-income countries.[181,182] Processed carbohydrates and packaged foods, including sugar-sweetened beverages,[183] now constitute the largest part of meals in low- and middle-income countries, where a significant share of the income is spent on such foods.[184-193] On top of this, although the contribution of physical activity to overall energy expenditure is unclear given the sparsity and inconsistency of data,[194] the increased use on transportation and general mechanisation of lifestyle have also contributed to a reduction of daily physical activity and overall energy expenditure.[194-197]

Given the key role that nutrition plays in the weight-to-height relationship, the lack of progress in achieving height gain without excessive weight gain is due in part to the reluctance of national and local governments to implement policies to restrict unhealthy foods and improve access to healthy food options. The WHO declared halting obesity by 2025 at 2010 levels one of its targets in the Global Action Plan for the Prevention of Control of NCDs 2013-2020, in an attempt to mitigate the global burden of NCDs.[198] My thesis shows that obesity is not the only concern, and that double-duty actions are necessary to address both forms of malnutrition, undernutrition and overnutrition.[158,199-202] The WHO attempted to change these trends by recommending governments to act on food marketing with e.g. health warning included in advertisement, but very few enforced such regulation and relied too heavily on self-regulation of the food industry.[203] Some countries preferred to adopt non-regulatory actions aimed at changing the individual behaviour, including food labelling regulations[204] and media campaigns with guidelines for healthy eating habits.[205]

The World Cancer Research Fund International NOURISHING framework proposed a holistic approach[206] comprising of both regulatory and non-regulatory set of policies. This was a combination of food programmes and nutritional and behavioural interventions designed to fight an environments full of unhealthy choices, making health ones more available and affordable.[207] Some prevention strategies revolved around reducing consumption of calorie-dense and nutrient-poor foods through regulations of advertisement or increased taxes on purchased of these item. Although this may prevent purchase of such foods, complementary action must be taken for increasing access to and affordability of healthy options so that a transition to healthy diets can effectively happen within a population to achieve the desired outcome on height and BMI.[208-210] Possible strategies are taxes reliefs of purchase of more healthy options, such as fresh vegetables and fruits, as well as food vouchers or work-based programmes promoting healthy-eating.[204,206,211] The NOURSIGHING framework also calls for actions to improve nutrition access and affordability through improvement of different forms of links including, but not restricted to: mobility, food-supply chain, communication, governance; as well as addressing situations of poor sanitation, and healthcare access, quality and quantity.[212]

Eradicating all forms of malnutrition is at the centre of the UN Decade of Action on Nutrition (2016-2025), a movement led by both the WHO and the Food and Agricultural of the UN (FAO).[213,214] The main goal is to accelerate this eradication mobilising governments' commitment to take action through enactment of policies tackling all forms of malnutrition and also promoting monitoring programmes. My work demonstrated that nutritional improvements have not happened uniformly among populations, with some individuals benefitting more from them while others are being left behind. Monitoring trends of moments of the distributions of height and BMI could help test and better the effectiveness of policies targeting directly disadvantaged groups through weight management or reinvigoration. The findings on this thesis support this urgent need and contribute to the assessment of specific needs at national, regional and global level.

## 6.4 Future work

The amount of data that I collected on height and weight measurements for all of my analyses is a major strength of my work; nonetheless, as already highlighted in my limitations, data are missing for some country-year-sex-age groups strata. Thus, more effort must go to keep collecting and collating data for as many countries and years as possible for the years prior 2000 as well as the years to come and integrate these data into the NCD-RisC database. This is particularly true for regions such as Oceania and sub-Saharan Africa where historically fewer studies were conducted, thus current and future investment should be put into monitoring infrastructure that may allow collection of high-quality, nationally-representative surveys. This will only be achieved with the continuous effort of the current NCD-RisC members to identify existing data sources not yet included in the database, reach out to potential new collaborators and keep up the continued international collaboration for researchers and public health practitioners to share these data. In addition, the data I used was only a subset of the NCD-RisC database as I summarised the used metric from data available as individual-record. Future work within the NCD-RisC should therefore aim to increase the amount of individual records and, for those collaborators who cannot share such information, should develop request and protocols to summarise these metrics.

My analyses describe changes of the distributions of height and BMI using the first three moments, and of their interrelationship using the correlation coefficient. However, there are further summary statistics (e.g. fourth moment or kurtosis) that can aid the investigation into the distributions, and future analyses could incorporate these. I also restricted my analyses to individuals aged 40-49 years because for the complexity of the hierarchical Bayesian model; future direction for my own investigation would be to add an age component and incorporate data from all other ages.

More evidence is also needed on the determinants of these trends of height and BMI, of which nutrition is the main driver, to better understand how policy makers and health practitioners can prevent and reverse stunting, underweight and obesity. I have outlined planned strategies for improving nutrition and, as these are implemented, their outcome must be continuously monitored and evaluated against trends of anthropometric indicators. This cross-check across territories will inform regarding the direction of change at the population levels, and whether the actions taken are effective. Particularly, in the background section I highlighted how nutrition is key during growth for both height and BMI, especially considering that, while BMI changes throughout life depending on weight, adult height is achieved during development. Performing the analyses I did on developmental ages of 5-19 years would aid policy makers to target segments of the population which may be suffering more from stunting or obesity. Additionally, nutrition is itself determined by other factors, such as urban or rural living, socioeconomic status or education, so future research may also investigate how each of these determinants are related to the distributions of these two anthropometric variables. For example, as the NCD-RisC database already has stratified data by urban and rural living, an important step for public health would be to understand how much each of these two living situations contributes to the change in each moment across time and different regions of the world.

Finally, although clinically-relevant categories of height have not yet been defined, my investigation indicated presence of subpopulations in some regions within the distribution of height, particularly at the extremes, with the left tail suffering more from stunting and the right tail benefitting more from the height gain. Future research may expand onto the current lacking knowledge of clinical-relevant categories of height by investigating the prevalences of individuals in segments of the joint distribution of height and BMI. For example, an important question to be answered is the role played by height in the context of extreme BMI, i.e. whether, among a population, individuals with a low BMI is determined primarily by their higher stature or by their lower weight; and whether higher BMI is achieved by individuals regardless of their height. In this way, public health would benefit from the individuation of new clinically-relevant categories of height and policy makers would have more specific target subpopulation by both their height and BMI for effective health interventions.

## 6.5 Conclusion

Stunting, underweight and obesity are among the main health challenges of this century and should not be tackled singularly, rather as part of the same problem, malnutrition in all its forms. The independence of height to BMI showed that weight gain is not proportional to height gain, therefore policy makers and health practitioners need to tackle the double burden of malnutrition. Availability and affordability of nutritious foods must be improved and the mentioned policies should be implemented by governments to reinforce environments where the healthy choice is also an easy choice, and to reverse the situation to the ideal where weight gain in a population is proportional to height gain.

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**Appendix Table 1.** List of analysis regions and countries in each region.

| Region (Number of countries) | Countries |
|---|---|
| **Central and Eastern Europe (20)** | Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia (TFYR), Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Ukraine |
| **Central Asia, the Middle East and North Africa (28)** | Algeria, Armenia, Azerbaijan, Bahrain, Egypt, Georgia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Libya, Mongolia, Morocco, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen |
| **East and Southeast Asia (16)** | Brunei Darussalam, Cambodia, China, China (Hong Kong SAR), Indonesia, Lao PDR, Malaysia, Maldives, Myanmar, North Korea, Philippines, Sri Lanka, Taiwan, Thailand, Timor-Leste, Viet Nam |
| **High-income Asia Pacific (3)** | Japan, Singapore, South Korea |
| **High-income Western (27)** | Andorra, Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Greenland, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States of America |
| **Latin America and the Caribbean (35)** | Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela |
| **Oceania (17)** | American Samoa, Cook Islands, Fiji, French Polynesia, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu |
| **South Asia (6)** | Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan |
| **Sub-Saharan Africa (48)** | Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Djibouti, DR Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe |

**Appendix Table 2.** List of data sources used in the analyses.

All data sources were included in the analysis of Chapter 5 on the contribution of change in mean BMI to change in prevalence of underweight, obesity and severe obesity. The last column indicates whether the data sources were also used in the analyses of Chapter 4 (C4) on the characterisation of the distributions of height and BMI and their interrelationship.

| | Country | Study years | Survey/Study name/Citation | Level of representativeness | Rural, Urban or Both | Age range as in NCD-RisC | | Sample size (BMI) | | Used in C4 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Male | Female | Male | Female | |
| 1 | Afghanistan | 2013 | National Nutrition Survey | National | Both | | 10-49 | | 18,433 | No |
| 2 | Afghanistan | 2018 | STEPS | National | Both | 18-69 | 18-69 | 1,984 | 1,703 | Yes |
| 3 | Albania | 2001 | Shapo et al., Public Health Nutr 6:471-77, 2003 | Community | Urban | 24+ | 24+ | 535 | 585 | No |
| 4 | Albania | 2008- | DHS | National | Both | 15-49 | 15-49 | 2,978 | 7,386 | Yes |
| 5 | Albania | 2017- | DHS | National | Both | 15-59 | 15-59 | 5,953 | 14,447 | Yes |
| 6 | Algeria | 2003 | STEPS | Subnational | Both | 25-64 | 25-64 | 1,612 | 2,437 | Yes |
| 7 | Algeria | 2005 | Transition and Health Impact in North Africa | National | Both | 35-70 | 35-70 | 2,004 | 2,741 | Yes |
| 8 | Algeria | 2007- | The ISOR (InSulino-resistance in ORan) study | Community | Urban | 30-64 | 30-64 | 378 | 409 | No |
| 9 | Algeria | 2016- | STEPS | National | Both | 18-69 | 18-69 | 2,991 | 3,636 | Yes |
| 10 | American Samoa | 1990 | McGarvey, Pac Health Dialog 8(1):157-62, 2001 | National | Both | 25+ | 25+ | 359 | 484 | Yes |
| 11 | American Samoa | 1992 | McGarvey, Pac Health Dialog 8(1):157-62, 2002 | National | Both | 27+ | 27+ | 232 | 337 | Yes |
| 12 | American Samoa | 1994 | McGarvey, Pac Health Dialog 8(1):157-62, 2001 | National | Both | 29+ | 29+ | 165 | 245 | Yes |
| 13 | American Samoa | 2004 | STEPS | National | Both | 25-64 | 25-64 | 949 | 1,060 | Yes |
| 14 | Argentina | 1985- | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 15 | Argentina | 1995- | de Sereday et al., Diabetes Metab 30:335-9, 2004 | Subnational | Urban | 15-74 | 15-74 | 924 | 1,246 | No |
| 16 | Argentina | 2003 | CEDES-Programa VIGI+A-Banco Mundial, 2004 | Community | Urban | 15-74 | 15-74 | 151 | 176 | No |
| 17 | Argentina | 2005 | Encuensta Nacional de Nutrición y Salud 2005 | National | Both | | 10-49 | | 6,581 | Yes |
| 18 | Argentina | 2004- | Cardiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 733 | 742 | No |
| 19 | Argentina | 2006 | Virasoro Survey | Community | Urban | 15-84 | 15-84 | 261 | 306 | No |
| 20 | Argentina | 2008- | The VELA Project | Community | Rural | 5+ | 5+ | 380 | 543 | No |
| 21 | Argentina | 2011 | Primera Encuesta Alimentaria y Nutricional de la Ciudad Autónoma de Buenos Aires - EAN | Community | Urban | 5-18; | 5-49; | 1,173 | 2,229 | No |
| 22 | Argentina | 2011- | CESCAS Study | Community | Urban | 30-79 | 30-79 | 1,584 | 2,378 | Yes |
| 23 | Argentina | 2012- | Primer estudio sobre el estado nutricional y los hábitos alimentarios de la población adulta de | Community | Urban | 18-70 | 18-70 | 371 | 823 | Yes |
| 24 | Argentina | 2018 | Encuesta Nacional de Factores de Riesgo 2018 | National | Both | 18+ | 18+ | 6,960 | 9,449 | Yes |
| 25 | Armenia | 1998 | The health and nutritional status of children and women in Armenia | National | Both | | 18-45 | | 2,420 | Yes |
| 26 | Armenia | 2000 | DHS | National | Both | | 15-49 | | 5,982 | Yes |
| 27 | Armenia | 2005 | DHS | National | Both | 15-49 | 15-49 | 1,220 | 6,232 | Yes |
| 28 | Armenia | 2015- | DHS | National | Both | | 15-49 | | 5,731 | Yes |
| 29 | Armenia | 2016 | STEPS | National | Both | 18-69 | 18-69 | 604 | 1,447 | Yes |
| 30 | Australia | 1988- | Dubbo Study of Australian Elderly | Community | Urban | 59+ | 59+ | 877 | 1,219 | No |
| 31 | Australia | 1989 | Risk Factor Prevalence Study | National | Urban | 20-69 | 20-69 | 4,497 | 4,678 | Yes |
| 32 | Australia | 1988- | MONICA, Newcastle | Subnational | Urban | 35-64 | 35-64 | 672 | 671 | No |
| 33 | Australia | 1988- | MONICA, Newcastle | Community | Urban | 25-34 | 25-34 | 70 | 84 | No |
| 34 | Australia | 1992- | Australia Longitudinal Study of Ageing | Community | Urban | 65+ | 65+ | 814 | 746 | No |
| 35 | Australia | 1994 | MONICA, Newcastle | Subnational | Urban | 35-64 | 35-64 | 637 | 688 | No |
| 36 | Australia | 1994 | MONICA, Perth inner | Community | Urban | 25-64 | 25-64 | 363 | 349 | No |
| 37 | Australia | 1994 | MONICA, Perth outer | Community | Urban | 25-64 | 25-64 | 373 | 387 | No |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 38 | Australia | 1995 | National Nutrition Survey 1995 | National | Both | 5+ | 5+ | 5,983 | 6,390 | No |
| 39 | Australia | 1996- | Western Australian AAA Screening Program | Community | Urban | 65-84 | | 12,194 | | No |
| 40 | Australia | 1999- | The Australian Diabetes, Obesity and Lifestyle Study 1999-2000 | National | Both | 25+ | 25+ | 4,991 | 6,070 | Yes |
| 41 | Australia | 2000 | Perth children | Community | Both | 25 | 25 | 266 | 334 | No |
| 42 | Australia | 1999- | North West Adelaide Health Study | Community | Urban | 18+ | 18+ | 1,932 | 2,122 | Yes |
| 43 | Australia | 2004- | The Australian Diabetes, Obesity and Lifestyle Study 2004-2005 | National | Both | 30+ | 30+ | 2,874 | 3,472 | Yes |
| 44 | Australia | 2004- | North West Adelaide Health Study | Community | Urban | 20+ | 20+ | 1,523 | 1,679 | Yes |
| 45 | Australia | 2004- | Janus et al., Med J Aust 187:147-52, 2007 | Community | Rural | 25-74 | 25-74 | 383 | 423 | No |
| 46 | Australia | 2007- | National Health Survey | National | Both | 18+ | 18+ | 5,279 | 5,655 | No |
| 47 | Australia | 2008- | North West Adelaide Health Study | Community | Urban | 24+ | 24+ | 1,168 | 1,318 | Yes |
| 48 | Australia | 2012 | The Australian Diabetes, Obesity and Lifestyle Study 2012 | National | Both | 37+ | 37+ | 2,048 | 2,530 | Yes |
| 49 | Australia | 2011- | Australian Health Survey 2011-13 | National | Both | 5+ | 5+ | 12,190 | 13,011 | No |
| 50 | Australia | 2017- | National Health Survey | National | Both | 18+ | 18+ | 7,576 | 8,729 | No |
| 51 | Austria | 1986 | CINDI | Community | Both | 25-64 | 25-64 | 657 | 715 | No |
| 52 | Austria | 1991 | CINDI survey Vorarlberg/Austria | Subnational | Both | 25-64 | 25-64 | 698 | 738 | Yes |
| 53 | Austria | 1992 | Vorarlberg Health Monitoring and Promotion Programme | Subnational | Both | 18+ | 18+ | 14,161 | 18,835 | Yes |
| 54 | Austria | 1998 | Vorarlberg Health Monitoring and Promotion Programme | Subnational | Both | 18+ | 18+ | 16,153 | 20,915 | Yes |
| 55 | Austria | 1998- | CINDI survey Vorarlberg/Austria | Subnational | Both | 25-64 | 25-64 | 409 | 414 | Yes |
| 56 | Austria | 2004 | Vorarlberg Health Monitoring and Promotion Programme | Subnational | Both | 18+ | 18+ | 20,160 | 23,893 | Yes |
| 57 | Austria | 2010- | Austrian Study on Nutritional Status 2012 | National | Both | 6-80 | 6-80 | 363 | 446 | Yes |
| 58 | Azerbaijan | 1996 | Health and Nutrition Survey | National | Both | 19-59 | 19-59 | 121 | 295 | No |
| 59 | Azerbaijan | 2001 | Reproductive Health Survey (RHS) | National | Both | | 15-44 | | 1,726 | No |
| 60 | Azerbaijan | 2006 | DHS | National | Both | 15-59 | 15-49 | 2,493 | 7,868 | Yes |
| 61 | Azerbaijan | 2017 | STEPS | National | Both | 18-69 | 18-69 | 1,117 | 1,577 | Yes |
| 62 | Bahamas | 2011- | STEPS | National | Both | 25-64 | 25-64 | 586 | 938 | Yes |
| 63 | Bahrain | 1991- | al-Mannai et al., J R Soc Health 116:30-2, 7-40, 1996 | Community | Both | 20+ | 20+ | 137 | 153 | No |
| 64 | Bahrain | 1995 | Musaiger et al., Ann Hum Biol 28:346-50, 2001 | Community | Both | 30+ | 30+ | 298 | 216 | No |
| 65 | Bahrain | 1998- | National Nutrition Survey | National | Both | 19+ | 19+ | 1,120 | 1,181 | No |
| 66 | Bahrain | 2007 | STEPS | National | Both | 20-64 | 20-64 | 854 | 858 | No |
| 67 | Bangladesh | 1992 | Rahman et al., Hypertension 33:74-8, 1999 | Community | Rural | 30+ | 30+ | 965 | 643 | No |
| 68 | Bangladesh | 1996- | DHS | National | Both | | 20-49 | | 3,384 | Yes |
| 69 | Bangladesh | 1998 | Zaman et al., J Health Popul Nutr 21:162-63, 2003 | Community | Rural | 20+ | 20+ | 290 | 379 | No |
| 70 | Bangladesh | 1999- | DHS | National | Both | | 20-49 | | 3,887 | Yes |
| 71 | Bangladesh | 1999- | Hussain et al., Eur J Public Health, 17:291-96, 2007 | Community | Rural | 20-59 | 20-59 | 2,037 | 2,720 | No |
| 72 | Bangladesh | 2002 | STEPS | National | Rural | 25-64 | 25-64 | 2,086 | 2,038 | Yes |
| 73 | Bangladesh | 2002 | STEPS | National | Urban | 25-64 | 25-64 | 3,533 | 3,737 | Yes |
| 74 | Bangladesh | 2000- | Nutritional Surveillance Project | National | Rural | | 15-45 | | 224,251 | No |
| 75 | Bangladesh | 2004 | DHS | National | Both | | 20-49 | | 9,165 | Yes |
| 76 | Bangladesh | 2006 | Urban Health Survey | Subnational | Urban | 20-59 | 20-59 | 6,109 | 5,898 | Yes |
| 77 | Bangladesh | 2007 | DHS | National | Both | | 20-49 | | 9,037 | Yes |
| 78 | Bangladesh | 2009- | STEPS | National | Both | 25+ | 25+ | 4,310 | 4,849 | Yes |
| 79 | Bangladesh | 2011 | DHS | National | Both | 15+ | 20+ | 5,254 | 16,679 | Yes |
| 80 | Bangladesh | 2013 | STEPS | National | Both | 25+ | 25+ | 1,812 | 2,261 | Yes |
| 81 | Bangladesh | 2014 | DHS | National | Both | | 20-49 | | 14,963 | Yes |
| 82 | Bangladesh | 2015 | An Assessment of BRAC Health Nutrition and Population Programme and Benchmark Survey | National | Rural | 35+ | 11+ | 5,432 | 18,378 | Yes |
| 83 | Bangladesh | 2018 | STEPS | National | Both | 18-69 | 18-69 | 3,784 | 4,229 | Yes |
| 84 | Bangladesh | 2018- | National Nutrition Surveillence | National | Both | 10+ | 10+ | 12,211 | 12,102 | Yes |
| 85 | Barbados | 1987- | Barbados Eye Study | National | Both | 40-84 | 40-84 | 1,980 | 2,627 | No |
| 86 | Barbados | 1991- | Cooper et al., Am J Public Health 87(2):160-68, 1997 | Community | Urban | 25-100 | 25- | 329 | 482 | No |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 87 | Barbados | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 559 | 866 | No |
| 88 | Barbados | 1997- | The Barbados Incidence Studies of Eye Diseases II | National | Both | 40-84 | 40-84 | 1,004 | 1,441 | No |
| 89 | Barbados | 2011- | Health of the Nation (HotN) | National | Both | 25+ | 25+ | 455 | 703 | Yes |
| 90 | Belarus | 2016- | STEPS | National | Both | 18-69 | 18-69 | 2,085 | 2,894 | Yes |
| 91 | Belgium | 1984- | Belgian Interuniversity Research on Nutrition and Health | National | Both | 25-74 | 25-74 | 5,897 | 5,289 | No |
| 92 | Belgium | 1985- | INTERSALT, Charleroi | Community | Urban | 20-59 | 20-59 | 82 | 75 | Yes |
| 93 | Belgium | 1985- | INTERSALT, Ghent | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 94 | Belgium | 1985- | MONICA, Charleroi | Community | Urban | 25-64 | 25-64 | 347 | 327 | No |
| 95 | Belgium | 1985- | MONICA, Ghent | Community | Urban | 25-64 | 25-64 | 549 | 459 | No |
| 96 | Belgium | 1985- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 20-90 | 20-90 | 656 | 692 | Yes |
| 97 | Belgium | 1987- | MONICA, Charleroi | Community | Urban | 25-64 | 25-64 | 325 | 301 | No |
| 98 | Belgium | 1988- | MONICA, Ghent | Community | Urban | 25-64 | 25-64 | 456 | 449 | No |
| 99 | Belgium | 1990- | MONICA, Charleroi | Community | Urban | 25-64 | 25-64 | 337 | 332 | No |
| 100 | Belgium | 1990- | MONICA, Ghent | Community | Urban | 25-64 | 25-64 | 507 | 475 | No |
| 101 | Belgium | 1991- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 26-88 | 26-88 | 393 | 416 | Yes |
| 102 | Belgium | 1992- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 27-89 | 27-89 | 298 | 312 | Yes |
| 103 | Belgium | 1994- | BIRNH Elderly: Belgian Interuniversity Research on Nutrition and Health in the Elderly | National | Both | 65-89 | 65-89 | 1,142 | 953 | No |
| 104 | Belgium | 1996- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-84 | 10-84 | 404 | 402 | Yes |
| 105 | Belgium | 1998 | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 32-86 | 32-86 | 320 | 359 | Yes |
| 106 | Belgium | 1998- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-80 | 10-80 | 220 | 217 | Yes |
| 107 | Belgium | 1999- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-81 | 10-81 | 232 | 254 | Yes |
| 108 | Belgium | 2001 | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-78 | 10-78 | 242 | 222 | Yes |
| 109 | Belgium | 2002- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-81 | 10-81 | 174 | 197 | Yes |
| 110 | Belgium | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 433 | | Yes |
| 111 | Belgium | 2002- | SPAH | Subnational | Both | 18-75 | 18-75 | 2,595 | 2,308 | No |
| 112 | Belgium | 2002- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-88 | 10-88 | 447 | 462 | Yes |
| 113 | Belgium | 2005- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 10-89 | 10-89 | 462 | 471 | Yes |
| 114 | Belgium | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 383 | | Yes |
| 115 | Belgium | 2009- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 20-88 | 20-88 | 330 | 335 | Yes |
| 116 | Belgium | 2010- | Flemish Study on Environment, Genes and Health Outcomes | Community | Rural | 15-87 | 15-87 | 388 | 410 | Yes |
| 117 | Belgium | 2014- | Food Consumption Survey | National | Urban | 5-64 | 5-64 | 1,481 | 1,491 | No |
| 118 | Belgium | 2018- | European Health Examination Survey | National | Both | 18+ | 18+ | 548 | 604 | No |
| 119 | Belize | 2004- | CAMDI | National | Both | 20+ | 20+ | 599 | 1,018 | Yes |
| 120 | Benin | 1996 | DHS | National | Both | | 20-49 | | 2,137 | Yes |
| 121 | Benin | 2001 | DHS | National | Both | | 15-49 | | 5,449 | Yes |
| 122 | Benin | 2006 | DHS | National | Both | | 15-49 | | 14,891 | Yes |
| 123 | Benin | 2007 | STEPS | Community | Urban | 25-64 | 25-64 | 955 | 1,508 | Yes |
| 124 | Benin | 2008 | STEPS | National | Both | 25-64 | 25-64 | 3,430 | 3,365 | Yes |
| 125 | Benin | 2011- | DHS | National | Both | | 15-49 | | 14,589 | Yes |
| 126 | Benin | 2015 | STEPS | National | Both | 18-69 | 18-69 | 2,304 | 2,543 | Yes |
| 127 | Benin | 2017- | DHS | National | Both | | 15-49 | | 7,180 | Yes |
| 128 | Bhutan | 2007 | STEPS | Community | Urban | 25-74 | 25-74 | 1,125 | 1,322 | Yes |
| 129 | Bhutan | 2014 | STEPS | National | Both | 18-69 | 18-69 | 1,069 | 1,674 | Yes |
| 130 | Bolivia | 1994 | DHS | National | Both | | 20-49 | | 2,128 | Yes |
| 131 | Bolivia | 1998 | DHS | National | Both | | 20-49 | | 3,939 | Yes |
| 132 | Bolivia | 2003 | DHS | National | Both | | 15-49 | | 16,349 | Yes |
| 133 | Bolivia | 2008 | DHS | National | Both | | 15-49 | | 15,543 | Yes |
| 134 | Bosnia and Herzegovina | 2002 | Non-communicable disease risk factor survey, Federation of B&H | Subnational | Both | 25-64 | 25-64 | 1,118 | 1,613 | Yes |
| 135 | Bosnia and Herzegovina | 2012 | Non-communicable disease risk factor survey, Federation of B&H | Subnational | Rural | 18+ | 18+ | 1,191 | 1,274 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 136 | Bosnia and Herzegovina | 2012 | Non-communicable disease risk factor survey, Federation of B&H | Subnational | Urban | 18+ | 18+ | 591 | 697 | Yes |
| 137 | Botswana | 2007 | STEPS | National | Both | 25-64 | 25-64 | 1,243 | 2,577 | Yes |
| 138 | Botswana | 2014 | STEPS | National | Both | 15-69 | 15-69 | 1,298 | 2,602 | Yes |
| 139 | Brazil | 1989 | Pesquisa Nacional sobre Saude e Nutricao | National | Both | 5+ | 5+ | 26,642 | 27,504 | Yes |
| 140 | Brazil | 1990- | Fornes et al., Rev Saude Publica 36:12-8, 2002 | Community | Urban | 20+ | 20+ | 432 | 613 | No |
| 141 | Brazil | 1991- | EPIDOSO | Community | Urban | 65+ | 65+ | 269 | 473 | No |
| 142 | Brazil | 1992- | Moraes et al., Int J Cardiol 90:205-11, 2003 | Community | Urban | 18+ | 18+ | 438 | 543 | No |
| 143 | Brazil | 1995 | Health and Nutrition Survey of Rio de Janeiro | Community | Urban | 60+ | 60+ | 248 | 385 | No |
| 144 | Brazil | 1996 | DHS | National | Both | | 20-49 | | 2,884 | Yes |
| 145 | Brazil | 1996- | Pesquisa sobre Padrões de Vida (PPV) | Subnational | Both | 5+ | 5+ | 7,451 | 8,466 | Yes |
| 146 | Brazil | 1995- | Cohort study from Porto Alegre | Community | Urban | 18+ | 18+ | 489 | 596 | No |
| 147 | Brazil | 1996- | The Bambui Cohort Study of Ageing | Community | Urban | 18+ | 18+ | 931 | 1,335 | Yes |
| 148 | Brazil | 1997 | PPV | Subnational | Both | 20+ | 20+ | 8,063 | 9,121 | No |
| 149 | Brazil | 1999- | Prevalence of Risk Factors for Coronary Artery Disease in the State of Rio Grande do Sul | Subnational | Urban | 20+ | 20+ | 504 | 548 | Yes |
| 150 | Brazil | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 732 | 1,064 | No |
| 151 | Brazil | 1999- | Pelotas cross-sectional survey | Community | Urban | 20-69 | 20-69 | 839 | 1,096 | No |
| 152 | Brazil | 2001 | de Freitas et al., Arq Bras Cardiol 88:191-99 | Community | Urban | 15+ | 15+ | 310 | 331 | No |
| 153 | Brazil | 2001- | Bustos et al., Nutr Metab Cardiovasc Dis 17:581-89, 2007 | Community | Both | 22-28 | 22-28 | 992 | 1,064 | No |
| 154 | Brazil | 2002- | Pesquisa de Orcamentos Familiares | National | Both | 5+ | 5+ | 81,152 | 80,163 | Yes |
| 155 | Brazil | 2003 | PNAFS | Community | Urban | 20+ | 20+ | 1,155 | 1,941 | No |
| 156 | Brazil | 2003 | Women Health in Southern Brazil | Community | Urban | | 20-60 | | 986 | No |
| 157 | Brazil | 2004 | Caju & Virgen das Gracas | Community | Rural | 18+ | 18+ | 291 | 286 | Yes |
| 158 | Brazil | 2002- | Ribeira Preto Birth Cohort | Community | Urban | 22-25 | 22-25 | 1,012 | 1,082 | No |
| 159 | Brazil | 2003- | São Paulo Health and Ageing Study | Community | Urban | 65+ | 65+ | 783 | 1,198 | No |
| 160 | Brazil | 2004- | Hearts of Brazil | National | Urban | 18+ | 18+ | 550 | 626 | Yes |
| 161 | Brazil | 2005 | Syndrome of Obesity and Risk Factors for Cardiovascular Disease Study | Community | Urban | 18-100 | 18- | 739 | 1,094 | Yes |
| 162 | Brazil | 2004- | The 1982 Pelotas (Brazil) Birth Cohort: 23 years follow-up | Community | Urban | 23 | 23 | 2,173 | 1,935 | No |
| 163 | Brazil | 2006 | ATITUDE | Subnational | Both | 14-21 | 14-21 | 2,406 | 3,484 | No |
| 164 | Brazil | 2006 | Pesquisa Nacional de Demografia e Saude 2006 | National | Both | | 15-49 | | 14,783 | Yes |
| 165 | Brazil | 2006 | Krause et al., J Aging Phys Act 17:387-97, 2009 | Community | Urban | 60+ | 60+ | 93 | 1,069 | No |
| 166 | Brazil | 2008 | The Bambui Cohort Study of Ageing | Community | Urban | 71+ | 71+ | 248 | 456 | No |
| 167 | Brazil | 2008 | Caju & Virgen das Gracas | Community | Rural | 18+ | 18+ | 273 | 287 | Yes |
| 168 | Brazil | 2008- | Pesquisa de Orcamentos Familiares | National | Both | 5+ | 5+ | 85,725 | 88,156 | Yes |
| 169 | Brazil | 2009- | EpiFloripa Cohort Study of Ageing - Wave 1 | Community | Urban | 60+ | 60+ | 592 | 1,047 | No |
| 170 | Brazil | 2009- | EpiFloripa Adults Cohort Study (EpiFloripa) | Community | Urban | 20-59 | 20-59 | 755 | 940 | Yes |
| 171 | Brazil | 2010 | San Pedro | Community | Rural | 18+ | 18+ | 153 | 214 | Yes |
| 172 | Brazil | 2012 | EpiFloripa Adults Cohort Study (EpiFloripa) | Community | Urban | 22-62 | 22-62 | 486 | 655 | Yes |
| 173 | Brazil | 2010- | Baependi Heart Study | Community | Rural | 18+ | 18+ | 1,002 | 1,357 | Yes |
| 174 | Brazil | 2013 | Pesquisas Nacional de Saude | National | Both | 18+ | 18+ | 24,918 | 32,351 | Yes |
| 175 | Brazil | 2012- | Prevalence of Leptin Polymorphism Gln223Arg | Community | Urban | 18+ | 18+ | 282 | 523 | Yes |
| 176 | Brazil | 2011- | Profile of risk factors for coronary arterial disease in rio grande do sul - revaluation after 10 | Subnational | Urban | 20+ | 20+ | 364 | 466 | Yes |
| 177 | Brazil | 2012- | The 1982 Pelotas (Brazil) Birth Cohort: 30 years follow-up | Community | Urban | 30 | 30 | 1,753 | 1,798 | No |
| 178 | Brazil | 2013- | EpiFloripa Cohort Study of Ageing - Wave 2 | Community | Urban | 63+ | 63+ | 404 | 744 | No |
| 179 | Brazil | 2014- | EpiFloripa Adults Cohort Study (EpiFloripa) | Community | Urban | 25-65 | 25-65 | 353 | 476 | Yes |
| 180 | Brazil | 2015- | Brazilian Longitudinal Study of the Elderly Health and Wellness | National | Both | 50+ | 50+ | 3,937 | 5,064 | No |
| 181 | Brazil | 2015- | The 1993 Pelotas (Brazil) Birth Cohort: 22 years follow-up | Community | Urban | 21-23 | 21-23 | 1,687 | 1,872 | No |
| 182 | Brazil | 2017 | HealthRise Evaluation | Subnational | Both | 30+ | 30+ | 599 | 1,169 | Yes |
| 183 | Brazil | 2016- | Study in Presidente Prudente | Community | Urban | 18+ | 18+ | 304 | 481 | Yes |
| 184 | Brazil | 2017- | EpiFloripa Cohort Study of Ageing - Wave 3 | Community | Urban | 60+ | 60+ | 361 | 635 | No |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 185 | Brazil | 2018- | Epidemiology in the health (Santo Anastácio Edition) | Community | Urban | 18+ | 18+ | 105 | 145 | No |
| 186 | Brunei Darussalam | 2010- | National Health And Nutritional Status Survey (NHANSS) | National | Both | 5-75 | 5-75 | 1,027 | 1,157 | Yes |
| 187 | Brunei Darussalam | 2015- | National Non-Communicable Diseases Survey (NNCDS) | National | Both | 18-69 | 18-69 | 814 | 1,075 | Yes |
| 188 | Bulgaria | 2004 | National Nutrition Survey | National | Both | 15+ | 15+ | 515 | 515 | No |
| 189 | Burkina Faso | 1992- | DHS | National | Both | | 20-49 | | 3,190 | Yes |
| 190 | Burkina Faso | 1998- | DHS | National | Both | | 20-49 | | 3,114 | Yes |
| 191 | Burkina Faso | 2002 | Vulnérabilité Alimentaire et Sécurité Nutritionnelle dans la Gnagna (VASN-Gnagna) | Subnational | Rural | 5+ | 5+ | 1,471 | 3,522 | Yes |
| 192 | Burkina Faso | 2003 | DHS | National | Both | | 15-49 | | 11,001 | Yes |
| 193 | Burkina Faso | 2004 | Ouedraogo et al., Public Health Nutr 11:1280-87, 2008 | Community | Urban | 35+ | 35+ | 956 | 1,066 | No |
| 194 | Burkina Faso | 2010 | DHS | National | Both | | 15-49 | | 7,755 | Yes |
| 195 | Burkina Faso | 2013 | STEPS | National | Both | 25-64 | 25-64 | 2,223 | 2,250 | Yes |
| 196 | Burundi | 2010 | DHS | National | Both | | 15-49 | | 4,188 | Yes |
| 197 | Burundi | 2016- | DHS | National | Both | | 15-49 | | 7,909 | Yes |
| 198 | Cabo Verde | 2007 | STEPS | National | Both | 25-64 | 25-64 | 658 | 1,066 | Yes |
| 199 | Cambodia | 2000 | DHS | National | Both | | 15-49 | | 6,915 | Yes |
| 200 | Cambodia | 2005 | DHS | National | Both | | 15-49 | | 8,130 | Yes |
| 201 | Cambodia | 2008 | Anthropometrics Survey | National | Both | | 15-49 | | 5,955 | No |
| 202 | Cambodia | 2010 | DHS | National | Both | | 15-49 | | 8,856 | Yes |
| 203 | Cambodia | 2010 | STEPS | National | Both | 25-64 | 25-64 | 1,881 | 3,344 | Yes |
| 204 | Cambodia | 2014 | DHS | National | Both | | 15-49 | | 10,821 | Yes |
| 205 | Cameroon | 1998 | DHS | National | Both | | 20-49 | | 1,429 | Yes |
| 206 | Cameroon | 1998- | ENHIP | Community | Rural | 15+ | 15+ | 523 | 738 | Yes |
| 207 | Cameroon | 1998- | ENHIP | Community | Urban | 15+ | 15+ | 523 | 640 | Yes |
| 208 | Cameroon | 2003 | STEPS | Subnational | Urban | 15+ | 15+ | 3,672 | 5,490 | Yes |
| 209 | Cameroon | 2004 | DHS | National | Both | | 15-49 | | 4,646 | Yes |
| 210 | Cameroon | 2007 | Cameroon Burden of Diabetes - Second Survey | Subnational | Urban | 18+ | 18+ | 3,345 | 4,633 | Yes |
| 211 | Cameroon | 2009 | National Survey of Micronutrient Status and Consumption of Fortifiable Foods | National | Both | | 15-49 | | 816 | Yes |
| 212 | Cameroon | 2011 | DHS | National | Both | | 15-49 | | 7,343 | Yes |
| 213 | Cameroon | 2009- | Anthropologie nutritionnelle des migrants d'Afrique centrale à la ville et en France | Subnational | Both | 18-76 | 18-76 | 528 | 584 | Yes |
| 214 | Cameroon | 2014- | Cardiovascular risk factors screening in urban and rural areas in the Far-North Region | Subnational | Both | 20+ | 20+ | 520 | 369 | Yes |
| 215 | Cameroon | 2018- | DHS | National | Both | | 15-64 | | 6,255 | Yes |
| 216 | Canada | 1985- | INTERSAL, StJohns | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 217 | Canada | 1985- | MONICA, Halifax | Community | Both | 25-64 | 25-64 | 438 | 420 | No |
| 218 | Canada | 1986- | Canada Heart Health Survey | National | Both | 18-74 | 18-74 | 9,644 | 9,777 | Yes |
| 219 | Canada | 1993 | Chen et al., Int J Obes Relat Metab Disord 22:771-77, 1998 | Community | Rural | 18-74 | 18-74 | 803 | 988 | No |
| 220 | Canada | 1995 | MONICA, Halifax | Community | Both | 25-64 | 25-64 | 274 | 287 | No |
| 221 | Canada | 1995- | Canadian Multicentre Osteoporosis Study (CaMos) | Subnational | Both | 35+ | 25+ | 2,616 | 6,343 | Yes |
| 222 | Canada | 1997 | PEI Nutrition Survey | Subnational | Both | 18-74 | 18-74 | 1,000 | 995 | No |
| 223 | Canada | 2005 | CCHS | National | Both | 15+ | 15+ | 1,684 | 2,031 | No |
| 224 | Canada | 2005- | Canadian Multicentre Osteoporosis Study (CaMos) | Subnational | Both | 35+ | 35+ | 1,486 | 3,661 | Yes |
| 225 | Canada | 2008 | CCHS | National | Both | 15+ | 15+ | 1,689 | 1,988 | No |
| 226 | Canada | 2007- | Canadian Health Measures Survey, Cycle 1 | National | Both | 6-79 | 6-79 | 2,703 | 2,864 | No |
| 227 | Canada | 2009- | Canadian Health Measures Survey, Cycle 2 | National | Both | 5-79 | 5-79 | 2,870 | 3,086 | No |
| 228 | Canada | 2012- | Canadian Health Measures Survey, Cycle 3 | National | Both | 5-79 | 5-79 | 2,670 | 2,676 | No |
| 229 | Canada | 2014- | Canadian Health Measures Survey, Cycle 4 | National | Both | 5-79 | 5-79 | 2,697 | 2,674 | No |
| 230 | Canada | 2016- | Canadian Health Measures Survey, Cycle 5 | National | Both | 6-79 | 6-79 | 2,571 | 2,564 | No |
| 231 | Central African Republic | 1994- | DHS | National | Both | | 20-49 | | 1,760 | Yes |
| 232 | Central African Republic | 2010 | STEPS | Subnational | Both | 25-64 | 25-64 | 1,846 | 1,967 | Yes |
| 233 | Chad | 1996- | DHS | National | Both | | 20-49 | | 3,262 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 234 | Chad | 2004 | DHS | National | Both | | 20-49 | | 2,618 | Yes |
| 235 | Chad | 2008 | STEPS | Community | Urban | 25-64 | 25-64 | 995 | 845 | Yes |
| 236 | Chad | 2014- | DHS | National | Both | | 15-49 | | 9,733 | Yes |
| 237 | Chile | 1989 | INCLEN | Community | Urban | 35-65 | | 199 | | No |
| 238 | Chile | 1992- | Miquel et al., Gastroenterology 115: 937-46, 1998 | Community | Urban | 18+ | 18+ | 657 | 1,031 | Yes |
| 239 | Chile | 2000 | Nervi et al., J Hepatol 45: 299 -305, 2006 | Community | Urban | 18+ | 18+ | 335 | 624 | Yes |
| 240 | Chile | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 410 | 806 | No |
| 241 | Chile | 2001- | Bustos et al., Nutr Metab Cardiovasc Dis 17:581-89, 2007 | Community | Both | 22-28 | 22-28 | 436 | 562 | No |
| 242 | Chile | 2003 | Encuesta Nacional de Salud | National | Both | 17+ | 17+ | 1,557 | 1,867 | Yes |
| 243 | Chile | 2005 | Palomo et al., Rev Med Chil 135:904-12, 2007 | Community | Urban | 18-74 | 18-74 | 339 | 668 | No |
| 244 | Chile | 2004- | Cardiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 783 | 865 | No |
| 245 | Chile | 2009- | Encuesta Nacional de Salud | National | Both | 15+ | 15+ | 1,935 | 2,869 | Yes |
| 246 | Chile | 2010- | Encuesta Nacional de Consumo Alimentario | National | Both | 5+ | 5+ | 1,840 | 2,902 | Yes |
| 247 | Chile | 2011- | CESCAS Study | Community | Urban | 30-79 | 30-79 | 922 | 1,020 | Yes |
| 248 | Chile | 2016- | Encuesta Nacional de Salud | National | Both | 15+ | 15+ | 1,977 | 3,420 | Yes |
| 249 | China | 1984- | Sino-MONICA Beijing | Community | Both | 25-64 | 25-64 | 813 | 857 | No |
| 250 | China | 1986 | INTERSALT, Beijing | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 251 | China | 1986 | INTERSALT, Nanning | Community | Both | 20-59 | 20-59 | 100 | 100 | Yes |
| 252 | China | 1986 | INTERSALT, Tianjin | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 253 | China | 1987 | INCLEN | Community | Urban | 35-65 | | 989 | | No |
| 254 | China | 1986- | Ewang et al., Zhonghua Liu Xing Bing Xue Za Zhi 26:394-9, 2005 | Community | Both | 45-64 | | 18,244 | | No |
| 255 | China | 1988 | Sino-MONICA Hebei | Community | Both | 25-64 | | 800 | | No |
| 256 | China | 1988 | Sino-MONICA Heilongjiang | Community | Urban | 25-64 | 25-64 | 800 | 800 | No |
| 257 | China | 1988 | Sino-MONICA Henan | Community | Urban | 25-64 | 25-64 | 345 | 427 | No |
| 258 | China | 1988 | Sino-MONICA Neimenggu | Community | Urban | 25-64 | 25-64 | 396 | 400 | No |
| 259 | China | 1988 | Sino-MONICA Sichuan | Community | Both | 25-64 | 25-64 | 312 | 334 | No |
| 260 | China | 1988 | Sino-MONICA Shandong | Community | Urban | 25-64 | 25-64 | 211 | 225 | No |
| 261 | China | 1986- | Sino-MONICA Shanghai | Community | Rural | 25-64 | 25-64 | 675 | 753 | No |
| 262 | China | 1988- | East Beijing Study 2 | Community | Urban | 20-84 | 20-84 | 135 | 148 | No |
| 263 | China | 1989 | China Health and Nutrition Study | National | Both | 5-45 | 5-45 | 2,554 | 2,717 | Yes |
| 264 | China | 1989 | The Tianjin Project | Community | Urban | 15-64 | 15-64 | 3,894 | 3,971 | No |
| 265 | China | 1988- | Wang et al., Zhonghua Liu Xing Bing Xue Za Zhi 24:272-75, 2003 | Community | Both | 25-64 | 25-64 | 873 | 731 | No |
| 266 | China | 1988- | Sino-MONICA Beijing | Community | Both | 25-64 | 25-64 | 701 | 862 | No |
| 267 | China | 1989 | Sino-MONICA Fujian | Community | Urban | 25-64 | 25-64 | 179 | 191 | No |
| 268 | China | 1988- | Sino-MONICA Jilin | Community | Urban | 25-64 | 25-64 | 380 | 400 | No |
| 269 | China | 1989 | Sino-MONICA Jiangsu | Community | Rural | 25-64 | 25-64 | 398 | 399 | No |
| 270 | China | 1988- | Sino-MONICA Jiangxi | Community | Urban | 25-64 | 25-64 | 379 | 386 | No |
| 271 | China | 1988- | Sino-MONICA Liaoning | Community | Both | 25-64 | 25-64 | 728 | 734 | No |
| 272 | China | 1991 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,584 | 5,922 | Yes |
| 273 | China | 1990- | China Prospective Study | National | Both | 40-79 | | 230,676 | | Yes |
| 274 | China | 1991 | China National Hypertension Survey Epidemiology Follow-up Study | National | Both | 40+ | 40+ | 75,696 | 79,040 | No |
| 275 | China | 1991 | Sino-MONICA Shanghai | Community | Rural | 30-64 | 30-64 | 564 | 624 | No |
| 276 | China | 1992- | Anzhen 02 Cohort Study | Community | Urban | 34-65 | 34-65 | 2,032 | 2,120 | Yes |
| 277 | China | 1991- | Fangshan Cohort Study | Community | Urban | 34-86 | 34-86 | 871 | 1,736 | Yes |
| 278 | China | 1992 | Huashan Study | Community | Urban | 35-75 | 35-75 | 892 | 965 | Yes |
| 279 | China | 1992 | China National Nutrition Survey | National | Both | 5+ | 5+ | 33,714 | 36,271 | No |
| 280 | China | 1992 | Sino-MONICA Sichuan | Community | Both | 25-64 | 25-64 | 608 | 526 | No |
| 281 | China | 1993 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,370 | 5,564 | Yes |
| 282 | China | 1993 | Wang et al., Zhonghua Liu Xing Bing Xue Za Zhi 24:272-75, 2003 | Community | Both | 25-64 | 25-64 | 822 | 617 | No |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 283 | China | 1993 | Sino-MONICA Anhui | Community | Urban | 25-64 | 25-64 | 193 | 195 | No |
| 284 | China | 1993 | Sino-MONICA Beijing | Community | Both | 25-64 | 25-64 | 613 | 816 | No |
| 285 | China | 1993 | Sino-MONICA Jiangsu | Community | Urban | 25-64 | 25-64 | 462 | 365 | No |
| 286 | China | 1993 | Sino-MONICA Liaoning | Community | Both | 25-64 | 25-64 | 493 | 500 | No |
| 287 | China | 1996 | Wang et al., Zhonghua Liu Xing Bing Xue Za Zhi 24:272-75, 2003 | Community | Both | 25-64 | 25-64 | 735 | 721 | No |
| 288 | China | 1996 | The Tianjin Project | Community | Urban | 15-64 | 15-64 | 722 | 717 | No |
| 289 | China | 1997 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,551 | 5,647 | Yes |
| 290 | China | 1997 | INTERMAP, Beijing | Community | Rural | 40-59 | 40-59 | 133 | 139 | Yes |
| 291 | China | 1997 | INTERMAP, Guangxi | Community | Rural | 40-59 | 40-59 | 140 | 138 | Yes |
| 292 | China | 1997 | INTERMAP, Shanxi | Community | Rural | 40-59 | 40-59 | 143 | 146 | Yes |
| 293 | China | 1998 | Shanghai Diabetes Study | Community | Urban | 25+ | 25+ | 1,264 | 1,768 | No |
| 294 | China | 1996- | Shanghai Women's Health Study | Community | Urban | | 40-70 | | 74,915 | No |
| 295 | China | 1999 | Chen et al., Zhonghua Yi Xue Za Zhi 85(40):2830-4, 2005 | Subnational | Both | 35-85 | 35-85 | 13,549 | 10,315 | No |
| 296 | China | 1999 | Wang et al., Zhonghua Liu Xing Bing Xue Za Zhi 24:272-75, 2003 | Community | Both | 25-64 | 25-64 | 818 | 685 | No |
| 297 | China | 1998- | Jia et al., Obes Rev 3:157-65, 2002 | Community | Urban | 20+ | 20+ | 1,106 | 1,670 | No |
| 298 | China | 2000 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,828 | 6,100 | Yes |
| 299 | China | 1996- | Wu et al., Osteoporos Int 15:751-59, 2004 | Community | Urban | | 18+ | | 3,418 | No |
| 300 | China | 1999- | Xu et al., Public Health Nutr 8:47-51, 2005 | Community | Both | 35+ | 35+ | 18,194 | 18,902 | No |
| 301 | China | 2001 | Shanghai Diabetes Study | Community | Urban | 25+ | 25+ | 1,264 | 1,768 | No |
| 302 | China | 2000- | The International Collaborative Study of Cardiovascular Disease in Asia | National | Both | 35-74 | 35-74 | 7,512 | 8,006 | No |
| 303 | China | 2002 | Ma et al., Zhonghua Liu Xing Bing Xue Za Zhi 25:1035-8, 2004 | Subnational | Both | 18+ | 18+ | 7,352 | 7,352 | No |
| 304 | China | 2002 | China National Nutrition and Health Survey | National | Both | 5-101 | 5-101 | 84,194 | 92,687 | No |
| 305 | China | 2002- | Fan et al., J Gastroenterol Hepatol 20:1825-32, 2005 | Community | Urban | 15+ | 15-74 | 5,502 | 7,767 | No |
| 306 | China | 2004 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,228 | 5,517 | Yes |
| 307 | China | 2004 | Tian et al., Prev Med 48:59-63, 2009 | Community | Rural | 15+ | 15+ | 1,022,669 | 1,163,313 | No |
| 308 | China | 2002- | Shanghai Men's Health Study | Community | Urban | 40-74 | | 61,445 | | No |
| 309 | China | 2004- | Pang et al., Intern Med 47:893-97, 2008 | Community | Rural | 35+ | 35+ | 22,963 | 22,962 | No |
| 310 | China | 2005 | Ye et al., J Am Coll Cardiol 49:1798-805, 2007 | Community | Urban | 50-70 | 50-70 | 743 | 906 | No |
| 311 | China | 2004- | Shanghai Women's Health Study | Community | Urban | | 45-80 | | 64,545 | No |
| 312 | China | 2006 | Beijing Eye Study | Community | Both | 45+ | 45+ | 1,394 | 1,820 | Yes |
| 313 | China | 2006 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 4,948 | 5,399 | Yes |
| 314 | China | 2004- | China Kadoorie Biobank baseline survey | Subnational | Rural | 35-74 | 35-74 | 115,792 | 162,848 | Yes |
| 315 | China | 2004- | China Kadoorie Biobank baseline survey | Subnational | Urban | 35-74 | 35-74 | 89,219 | 132,860 | Yes |
| 316 | China | 2005- | Zhou et al., World J Gastroenterol 13:6419-24, 2007 | Community | Urban | 18-79 | 18-79 | 1,101 | 2,063 | No |
| 317 | China | 2004- | Shanghai Men's Health Study | Community | Urban | 41-80 | | 54,800 | | No |
| 318 | China | 2006- | Handan Eye Study | Community | Rural | 30+ | 30+ | 2,995 | 3,456 | Yes |
| 319 | China | 2007- | China National Diabetes & Metabolic Disorders Study | National | Both | 20+ | 20+ | 18,419 | 27,820 | No |
| 320 | China | 2008 | China Health and Retirement Longitudinal Study (CHARLS), pilot survey | Subnational | Both | 45+ | 45+ | 923 | 950 | Yes |
| 321 | China | 2008- | Chinese Longitudinal Healthy Longevity Survey | National | Both | 65+ | 65+ | 6,827 | 8,976 | No |
| 322 | China | 2009 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,176 | 5,489 | Yes |
| 323 | China | 2007- | SAGE | National | Both | 50+ | 50+ | 5,759 | 6,616 | No |
| 324 | China | 2008- | Fangshan Family-based Ischemic Stroke Study in China (FISSIC) program | Community | Rural | 40+ | 40+ | 19,478 | 36,449 | No |
| 325 | China | 2007- | Shanghai Women's Health Study | Community | Urban | | 47-83 | | 52,116 | No |
| 326 | China | 2009- | China National Survey of Chronic Kidney Disease | National | Both | 18+ | 18+ | 20,003 | 26,854 | No |
| 327 | China | 2010 | China Noncommunicable Disease Surveillance | National | Both | 18+ | 18+ | 45,066 | 53,452 | No |
| 328 | China | 2008- | Shanghai Men's Health Study | Community | Urban | 43-84 | | 51,948 | | No |
| 329 | China | 2011 | Beijing Eye Study | Community | Both | 50+ | 50+ | 1,467 | 1,895 | No |
| 330 | China | 2011- | China Health and Retirement Longitudinal Study (CHARLS), baseline survey | National | Both | 45+ | 45+ | 6,337 | 7,003 | Yes |
| 331 | China | 2011 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 6,771 | 7,477 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 332 | China | 2012 | China Health and Retirement Longitudinal Study (CHARLS), wave 2 pilot survey | Subnational | Both | 45+ | 45+ | 856 | 934 | Yes |
| 333 | China | 2011- | Chinese Longitudinal Healthy Longevity Survey | National | Both | 65+ | 65+ | 4,035 | 4,620 | No |
| 334 | China | 2010- | National Free Preconception Health Examination Project | National | Rural | 20-64 | | 16,166,534 | | No |
| 335 | China | 2013 | China Health and Retirement Longitudinal Study (CHARLS), wave 2 survey | National | Both | 45+ | 45+ | 5,898 | 6,582 | Yes |
| 336 | China | 2013 | Gobi Desert Children Eye Study | Community | Urban | 6-21 | 6-21 | 800 | 761 | No |
| 337 | China | 2012- | The Kailuan Study | Community | Urban | 18+ | 18+ | 80,921 | 21,385 | No |
| 338 | China | 2014 | Chinese Longitudinal Healthy Longevity Survey | National | Both | 65+ | 65+ | 2,978 | 3,172 | No |
| 339 | China | 2012- | Shanghai Men's Health Study | Community | Urban | 47-87 | | 40,921 | | No |
| 340 | China | 2012- | Shanghai Women's Health Study | Community | Urban | | 52-88 | | 49,592 | No |
| 341 | China | 2015 | China Health and Retirement Longitudinal Study (CHARLS), wave 4 survey | National | Both | 45+ | 45+ | 7,032 | 7,719 | Yes |
| 342 | China | 2015 | China Health and Nutrition Study | National | Both | 5+ | 5+ | 5,419 | 5,765 | Yes |
| 343 | China | 2014- | The Kailuan Study | Community | Urban | 18+ | 18+ | 73,161 | 18,280 | No |
| 344 | China (Hong Kong SAR) | 1985- | Shatin New Town Study | Community | Urban | 70+ | 70+ | 276 | 669 | No |
| 345 | China (Hong Kong SAR) | 1991 | The Hong Kong study on health, health risk and quality of life in the Chinese elderly cohort | Community | Both | 70+ | 70+ | 943 | 944 | No |
| 346 | China (Hong Kong SAR) | 1995- | Hong Kong Cardiovascular Risk Factor Prevalence Study 1995-1996 | National | Both | 25-74 | 25-74 | 1,412 | 1,478 | Yes |
| 347 | Colombia | 1986 | INTERSALT | Community | Rural | 20-59 | 20-59 | 96 | 95 | No |
| 348 | Colombia | 1995 | DHS | National | Both | | 20-49 | | 3,068 | Yes |
| 349 | Colombia | 2000 | DHS | National | Both | | 20-49 | | 2,929 | Yes |
| 350 | Colombia | 2001 | CINDI/CARMEN - Bucaramaga | Community | Urban | 15-74 | 15-74 | 627 | 1,218 | No |
| 351 | Colombia | 2002 | Factores de riesgo cardiovascular en la localidad de Santa Fe de la ciudad de Bogotá. | Community | Urban | 15-69 | 15-69 | 394 | 684 | Yes |
| 352 | Colombia | 2002 | Factores de riesgo cardiovascular en la localidad de Tunjuelito de la ciudad de Bogotá. | Community | Urban | 15-29 | 15-29 | 208 | 312 | No |
| 353 | Colombia | 2002 | CINDI/CARMEN - Bogota | Community | Urban | 15-74 | 15-74 | 322 | 570 | No |
| 354 | Colombia | 2005 | DHS | National | Both | 5-64 | 5-64 | 43,436 | 57,778 | Yes |
| 355 | Colombia | 2005 | Encuesta Nacional de Situacion Nutricional | National | Both | 5-12 | 5-49 | 2,644 | 6,088 | Yes |
| 356 | Colombia | 2004- | CArdiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 738 | 812 | No |
| 357 | Colombia | 2007 | Encuesta Nacional de Salud | National | Both | 18-69 | 18-69 | 5,462 | 7,686 | Yes |
| 358 | Colombia | 2010 | DHS | National | Both | 5-64 | 5-64 | 65,086 | 76,792 | Yes |
| 359 | Colombia | 2010 | STEPS | Subnational | Both | 15-64 | 15-64 | 1,034 | 1,356 | Yes |
| 360 | Colombia | 2015 | Encuesta Nacional de Situacion Nutricional | National | Both | 5-64 | 5-64 | 4,874 | 5,742 | Yes |
| 361 | Colombia | 2015 | STEPS | Subnational | Both | 15-64 | 15-64 | 979 | 1,181 | Yes |
| 362 | Comoros | 1996 | DHS | National | Both | | 20-49 | | 744 | Yes |
| 363 | Comoros | 2011 | STEPS | National | Both | 25-64 | 25-64 | 1,541 | 3,505 | Yes |
| 364 | Comoros | 2012 | DHS | National | Both | | 15-49 | | 4,845 | Yes |
| 365 | Congo | 1986 | Enquête Brazzaville 1986 | Community | Urban | 5-50 | 5-50 | 129 | 1,079 | Yes |
| 366 | Congo | 1987 | Enquête Nationale Congo 1987 | National | Rural | | 13-49 | | 1,356 | Yes |
| 367 | Congo | 1987 | Maire et al., Rev Epidemiol Sante Publique 40:252-58, 1992 | Community | Rural | | 16-45 | | 750 | No |
| 368 | Congo | 1991 | Enquête Brazzaville 1991 | Community | Urban | 5-90 | 5-90 | 2,393 | 3,149 | Yes |
| 369 | Congo | 1996 | Enquête Brazzaville 1996 | Community | Urban | 5-90 | 5-90 | 2,496 | 3,073 | Yes |
| 370 | Congo | 2004 | STEPS | Community | Urban | 25-64 | 25-64 | 1,013 | 956 | Yes |
| 371 | Congo | 2005 | DHS | National | Both | | 15-49 | | 6,266 | Yes |
| 372 | Congo | 2011- | DHS | National | Both | | 15-49 | | 5,060 | Yes |
| 373 | Cook Islands | 2003 | STEPS | National | Both | 25-64 | 25-64 | 925 | 958 | Yes |
| 374 | Cook Islands | 2013- | STEPS | National | Both | 18-64 | 18-64 | 456 | 469 | Yes |
| 375 | Costa Rica | 2004 | CAMDI | Community | Urban | 20+ | 20+ | 304 | 624 | Yes |
| 376 | Costa Rica | 2004- | Costa Rican Longevity and Healthy Aging Study Pre-1945 Cohort Wave 1 | National | Both | 60+ | 60+ | 1,163 | 1,346 | No |
| 377 | Costa Rica | 2006- | Costa Rican Longevity and Healthy Aging Study Pre-1945 Cohort Wave 2 | National | Both | 62+ | 62+ | 944 | 1,102 | No |
| 378 | Costa Rica | 2009- | Costa Rican Longevity and Healthy Aging Study Pre-1945 Cohort Wave 3 | National | Both | 64+ | 64+ | 737 | 887 | No |
| 379 | Costa Rica | 2008- | Encuesta Nacional de Nutricion 2008-2009 | National | Both | | 45-64 | | 661 | No |
| 380 | Costa Rica | 2010 | Costa Rican National Cardiovascular Risk Factors Survey, 2010 | National | Both | 20+ | 20+ | 778 | 1,958 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 381 | Costa Rica | 2010- | Costa Rican Longevity and Healthy Aging Study 1945-1955 Cohort Wave 1 | National | Both | 54-66 | 54-66 | 1,058 | 1,676 | No |
| 382 | Costa Rica | 2012- | Costa Rican Longevity and Healthy Aging Study 1945-1955 Cohort Wave 2 | National | Both | 56-68 | 56-68 | 867 | 1,470 | No |
| 383 | Costa Rica | 2014 | Costa Rican National Cardiovascular Risk Factors Survey, 2014 | National | Both | 20+ | 20+ | 1,003 | 2,196 | Yes |
| 384 | Cote d'Ivoire | 1994 | DHS | National | Both | | 20-49 | | 2,682 | Yes |
| 385 | Cote d'Ivoire | 1998- | DHS | National | Both | | 15-49 | | 2,740 | Yes |
| 386 | Cote d'Ivoire | 2005 | STEPS | Subnational | Rural | 15-64 | 15-64 | 894 | 1,022 | Yes |
| 387 | Cote d'Ivoire | 2005 | STEPS | Subnational | Urban | 15-64 | 15-64 | 1,071 | 1,437 | Yes |
| 388 | Cote d'Ivoire | 2011- | DHS | National | Both | | 15-49 | | 4,601 | Yes |
| 389 | Croatia | 1997- | Budak A et al., Lijec Vjesn 125(1-2):32-5, 2003 | National | Both | 25-100 | 25- | 1,763 | 2,684 | No |
| 390 | Croatia | 2002- | Epidemiology of arterial hypertension in Croatia (EH-UH) | National | Both | 18+ | 18+ | 505 | 705 | Yes |
| 391 | Croatia | 2005 | Endemic Nephropathy and Arterial hypertension (ENAH) | Subnational | Rural | 18+ | 18+ | 264 | 367 | Yes |
| 392 | Croatia | 2008 | Endemic Nephropathy and Arterial hypertension (ENAH) | Subnational | Rural | 18+ | 18+ | 331 | 527 | Yes |
| 393 | Croatia | 2010 | Endemic Nephropathy and Arterial hypertension (ENAH) | Subnational | Rural | 18+ | 18+ | 252 | 393 | Yes |
| 394 | Croatia | 2015 | Endemic Nephropathy and Arterial hypertension (ENAH) Follow-up Study | Subnational | Rural | 18+ | 18+ | 224 | 460 | Yes |
| 395 | Cuba | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 630 | 1,044 | No |
| 396 | Cuba | 2001- | National Survey of Risk Factors | National | Both | 20-60 | 20-60 | 11,426 | 11,426 | No |
| 397 | Cuba | 2010 | National Risk Factor Survey | National | Both | 15+ | 15+ | 3,344 | 3,868 | No |
| 398 | Cuba | 2011 | Non communicable disease risk factor in Cienfuegos | Community | Urban | 15-80 | 15-80 | 617 | 880 | No |
| 399 | Cyprus | 1999- | Countrywide Integrated Noncommunicable Diseases Intervention Programme Cyprus | National | Both | 25-65 | 25-65 | 457 | 546 | No |
| 400 | Czech Republic | 1985 | Czech-MONICA | National | Both | 25-64 | 25-64 | 1,243 | 1,303 | Yes |
| 401 | Czech Republic | 1988 | Czech-MONICA | National | Both | 25-64 | 25-64 | 1,357 | 1,408 | Yes |
| 402 | Czech Republic | 1992 | Czech-MONICA | National | Both | 25-64 | 25-64 | 1,131 | 1,207 | Yes |
| 403 | Czech Republic | 1997- | Czech post-MONICA | National | Both | 25-64 | 25-64 | 1,527 | 1,665 | Yes |
| 404 | Czech Republic | 1998- | Health, Lifestyle and the Environment | National | Urban | 45-54 | 45-54 | 1,539 | 2,044 | Yes |
| 405 | Czech Republic | 2000- | Czech post-MONICA | National | Both | 25-64 | 25-64 | 1,628 | 1,690 | Yes |
| 406 | Czech Republic | 2002- | Health, Alcohol and Psychosocial Factors In Eastern Europe | Subnational | Urban | 44-72 | 44-72 | 3,321 | 3,935 | No |
| 407 | Czech Republic | 2004- | Health, Lifestyle and the Environment | National | Urban | 45-54 | 45-54 | 775 | 1,072 | Yes |
| 408 | Czech Republic | 2006- | Czech post-MONICA | National | Both | 25-64 | 25-64 | 1,717 | 1,861 | Yes |
| 409 | Czech Republic | 2009 | Health, Lifestyle and the Environment | National | Urban | 45-54 | 45-54 | 307 | 447 | Yes |
| 410 | Czech Republic | 2014- | European Heath Examination Survey | National | Both | 25-64 | 25-64 | 480 | 699 | Yes |
| 411 | Czech Republic | 2015- | MONICA | National | Both | 25-65 | 25-65 | 1,247 | 1,371 | Yes |
| 412 | Denmark | 1985 | INTERSALT | Community | Urban | 20-59 | 20-59 | 99 | 100 | Yes |
| 413 | Denmark | 1984- | The Epidemiology of Gallstones in a 70 Year-Old Danish Population | Community | Both | 70 | 70 | 202 | 172 | No |
| 414 | Denmark | 1986- | MONICA, Glostrup | Community | Urban | 29-61 | 29-61 | 746 | 753 | No |
| 415 | Denmark | 1987 | Nilsson et al., J Intern Med 237:479-86, 1995 | Community | Urban | 51 | | 439 | | No |
| 416 | Denmark | 1987- | MONICA I, 5-years re-examination (semi-MONICA) | Community | Urban | 35-66 | 35-66 | 1,524 | 1,463 | No |
| 417 | Denmark | 1991- | MONICA, Glostrup | Community | Urban | 29-61 | 29-61 | 808 | 816 | No |
| 418 | Denmark | 1991- | Copenhagen City Heart Study | Subnational | Urban | 20+ | 20+ | 4,274 | 5,416 | No |
| 419 | Denmark | 1993- | MONICA 1 - 10 years examination (semi-MONICA) | Community | Urban | 41-72 | 41-72 | 1,333 | 1,323 | No |
| 420 | Denmark | 1993- | EPIC Aarhus | Community | Urban | 50-65 | 50-65 | 8,430 | 8,717 | No |
| 421 | Denmark | 1993- | EPIC Copenhagen | Community | Urban | 50-65 | 50-65 | 18,729 | 21,133 | No |
| 422 | Denmark | 1996- | Drivsholm et al., Diabet Med 18:126-32, 2001 | Subnational | Urban | 60 | 60 | 325 | 370 | No |
| 423 | Denmark | 2001- | Copenhagen City Heart Study | Subnational | Urban | 20+ | 20+ | 2,567 | 3,446 | No |
| 424 | Denmark | 2002- | Odense Androgen Study | Community | Urban | 20-29 | | 783 | | No |
| 425 | Denmark | 2003- | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,828 | 5,397 | No |
| 426 | Denmark | 2005 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 5,171 | 6,023 | No |
| 427 | Denmark | 2006 | Danish Conscript Register | National | Both | 17-26 | | 25,063 | | No |
| 428 | Denmark | 2006 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 5,055 | 4,861 | No |
| 429 | Denmark | 2007 | Danish Conscript Register | National | Both | 17-26 | | 27,194 | | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 430 | Denmark | 2007 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,027 | 6,913 | No |
| 431 | Denmark | 2006- | The Health2006 Cohort | Subnational | Urban | 18-71 | 18-71 | 1,553 | 1,916 | No |
| 432 | Denmark | 2008 | Danish Conscript Register | National | Both | 17-26 | | 24,538 | | No |
| 433 | Denmark | 2007- | The Danish Health Examination Survey 2007-2008 | National | Both | 18+ | 18+ | 7,349 | 10,651 | Yes |
| 434 | Denmark | 2008 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,735 | 6,467 | No |
| 435 | Denmark | 2009 | Danish Conscript Register | National | Both | 17-26 | | 27,093 | | No |
| 436 | Denmark | 2009 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,214 | 5,244 | No |
| 437 | Denmark | 2010 | Danish Conscript Register | National | Both | 17-26 | | 30,814 | | No |
| 438 | Denmark | 2009- | The European Youth Heart Study | Community | Both | 14-28 | 14-28 | 481 | 553 | No |
| 439 | Denmark | 2010 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 3,967 | 4,891 | No |
| 440 | Denmark | 2011 | Danish Conscript Register | National | Both | 17-26 | | 30,719 | | No |
| 441 | Denmark | 2011 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,935 | 5,824 | No |
| 442 | Denmark | 2012 | Danish Conscript Register | National | Both | 17-26 | | 29,651 | | No |
| 443 | Denmark | 2012 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,516 | 5,423 | No |
| 444 | Denmark | 2011- | The Health2006 cohort - 5-year follow-up | Subnational | Urban | 24-76 | 24-76 | 1,057 | 1,249 | No |
| 445 | Denmark | 2013 | Danish Conscript Register | National | Both | 17-26 | | 30,565 | | No |
| 446 | Denmark | 2013 | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 4,001 | 4,703 | No |
| 447 | Denmark | 2014 | Danish Conscript Register | National | Both | 17-26 | | 32,397 | | No |
| 448 | Denmark | 2014 | Copenhagen General Population Study 2 | Subnational | Urban | 20+ | 20+ | 1,391 | 1,782 | No |
| 449 | Denmark | 2012- | The Danish study of Functional Disorders (DanFunD) | Subnational | Urban | 18-72 | 18-72 | 3,451 | 4,034 | No |
| 450 | Denmark | 2015 | Danish Conscript Register | National | Both | 17-26 | | 28,907 | | No |
| 451 | Denmark | 2014- | Copenhagen General Population Study 1 | Subnational | Urban | 20+ | 20+ | 2,245 | 2,837 | No |
| 452 | Denmark | 2015 | Copenhagen General Population Study 2 | Subnational | Urban | 20+ | 20+ | 4,103 | 5,107 | No |
| 453 | Denmark | 2016 | Copenhagen General Population Study 2 | Subnational | Urban | 20+ | 20+ | 4,493 | 5,495 | No |
| 454 | Denmark | 2016 | Conscript | National | Both | 17-29 | | 29,057 | | No |
| 455 | Denmark | 2017 | Copenhagen General Population Study 2 | Subnational | Urban | 20+ | 20+ | 3,182 | 4,395 | No |
| 456 | Denmark | 2017 | Conscript | National | Both | 17-29 | | 31,057 | | No |
| 457 | Denmark | 2018 | Conscript | National | Both | 17-29 | | 27,597 | | No |
| 458 | Denmark | 2019 | Conscript | National | Both | 17-29 | | 25,412 | | No |
| 459 | Dominica | 2007 | STEPS | National | Both | 15-64 | 15-64 | 459 | 568 | Yes |
| 460 | Dominican Republic | 1991 | DHS | National | Both | | 20-49 | | 1,965 | Yes |
| 461 | Dominican Republic | 1993 | Aono et al., J Epidemiol 7(4):238-43, 1997 | National | Both | 20-70 | 20-70 | 767 | 1,149 | No |
| 462 | Dominican Republic | 1996 | DHS | National | Both | | 15-49 | | 7,441 | Yes |
| 463 | Dominican Republic | 1996- | Estudio factores de riesgo cardiovascular y sindrome metabolico en la Republica Dominicana I | National | Both | 18-75 | 18-75 | 2,087 | 4,095 | Yes |
| 464 | Dominican Republic | 2010- | Estudio factores de riesgo cardiovascular y sindrome metabolico en la Republica Dominicana | National | Both | 18-75 | 18-75 | 1,641 | 3,254 | Yes |
| 465 | Dominican Republic | 2013 | DHS | National | Both | 15-59 | 15-49 | 10,433 | 8,960 | Yes |
| 466 | DR Congo | 2001 | Multiple Indicator Cluster Survey Round 2 | National | Both | | 15-49 | | 5,520 | Yes |
| 467 | DR Congo | 2005 | STEPS | Subnational | Urban | 15+ | 15+ | 761 | 1,152 | Yes |
| 468 | DR Congo | 2007 | DHS | National | Both | | 15-49 | | 4,137 | Yes |
| 469 | DR Congo | 2013- | DHS | National | Both | | 15-49 | | 8,163 | Yes |
| 470 | Ecuador | 2004 | Encuesta Demografica y de Salud Materno e Infantil/Reproductive Health Survey | National | Both | | 15-49 | | 3,850 | Yes |
| 471 | Ecuador | 2004- | CArdiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 813 | 814 | No |
| 472 | Ecuador | 2009- | National Survey of Health, Wellbeing, and Aging | National | Both | 60+ | 60+ | 2,341 | 2,592 | No |
| 473 | Ecuador | 2011- | Encuesta Nacional de Salud y Nutrición (ENSANUT) | National | Both | 5-59 | 5-59 | 22,919 | 25,767 | Yes |
| 474 | Ecuador | 2018 | Encuesta Nacional de Salud y Nutrición (ENSANUT) | National | Both | 5+ | 5+ | 63,176 | 65,597 | Yes |
| 475 | Egypt | 1992 | DHS | National | Both | | 20-49 | | 4,654 | Yes |
| 476 | Egypt | 1995 | DHS | National | Both | | 20-49 | | 6,499 | Yes |
| 477 | Egypt | 2000 | DHS | National | Both | | 20-49 | | 13,602 | Yes |
| 478 | Egypt | 2002 | National Survey of Smoking, Obesity, Blood Pressure and Blood Glucose | National | Both | 5+ | 5+ | 4,397 | 5,161 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 479 | Egypt | 2003 | DHS | National | Both | | 20-49 | | 7,930 | Yes |
| 480 | Egypt | 2003- | Marzouk et al., Gut 56(8):1105-10, 2007 | Community | Rural | 25+ | 25+ | 322 | 456 | No |
| 481 | Egypt | 2005 | DHS | National | Both | | 20-49 | | 16,864 | Yes |
| 482 | Egypt | 2005 | STEPS | National | Both | 15-65 | 15-65 | 4,757 | 4,428 | Yes |
| 483 | Egypt | 2008 | DHS | National | Both | 10-59 | 20-49 | 14,261 | 15,242 | Yes |
| 484 | Egypt | 2007- | Mostafa et al., Gut 59(8):1135-40, 2010 | Community | Rural | 35+ | 35+ | 642 | 843 | No |
| 485 | Egypt | 2011 | STEPS | National | Both | 15-65 | 15-65 | 1,761 | 2,977 | Yes |
| 486 | Egypt | 2014 | DHS | National | Both | | 20-49 | | 18,891 | Yes |
| 487 | Egypt | 2015 | DHS | National | Both | 15-59 | 15-59 | 7,235 | 8,471 | Yes |
| 488 | Egypt | 2017 | STEPS | National | Both | 15-69 | 15-69 | 2,273 | 3,692 | Yes |
| 489 | El Salvador | 2002- | Ecuesta Nacional de Salud Familiar | National | Both | | 15-49 | | 3,885 | Yes |
| 490 | El Salvador | 2004 | CAMDI | Community | Urban | 20+ | 20+ | 396 | 811 | Yes |
| 491 | El Salvador | 2008 | Ecuesta Nacional de Salud Familiar | National | Both | | 15-49 | | 6,808 | Yes |
| 492 | El Salvador | 2014- | Encuesta Nacional de Enfermedades Crónicas (ENECA-ELS) | National | Both | 20+ | 20+ | 1,684 | 2,945 | Yes |
| 493 | Equatorial Guinea | 2011 | DHS | National | Both | | 15-49 | | 1,074 | No |
| 494 | Eritrea | 1995 | DHS | National | Both | | 15-49 | | 1,621 | No |
| 495 | Eritrea | 2002 | DHS | National | Both | | 15-49 | | 3,223 | No |
| 496 | Eritrea | 2004 | STEPS | National | Both | 15-64 | 15-64 | 1,113 | 1,089 | Yes |
| 497 | Eritrea | 2010 | STEPS | National | Both | 25-74 | 25-74 | 1,712 | 4,285 | Yes |
| 498 | Estonia | 1984- | Abina et al., Blood Press 12:111-21, 2003 | Community | Urban | 20-54 | 30-54 | 2,477 | 851 | No |
| 499 | Estonia | 1992- | Abina et al., Blood Press 12:111-21, 2003 | Community | Urban | 20-54 | 20-54 | 921 | 678 | No |
| 500 | Estonia | 1997 | Pomerleau et al., Public Health Nutrition 3:3-10, 2000 | National | Both | 19-64 | 19-64 | 525 | 629 | Yes |
| 501 | Estonia | 1999- | Abina et al., Blood Press 12:111-21, 2003 | Community | Urban | 20-54 | 20-54 | 635 | 692 | No |
| 502 | Estonia | 2002 | Estonian Biobank | National | Both | 18+ | 18+ | 89 | 217 | No |
| 503 | Estonia | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 416 | | Yes |
| 504 | Estonia | 2003 | Estonian Biobank | National | Both | 18+ | 18+ | 2,695 | 5,688 | No |
| 505 | Estonia | 2004 | Estonian Biobank | National | Both | 18+ | 18+ | 527 | 947 | No |
| 506 | Estonia | 2007 | Estonian Biobank | National | Both | 18+ | 18+ | 1,000 | 2,187 | No |
| 507 | Estonia | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 305 | | Yes |
| 508 | Estonia | 2008 | Estonian Biobank | National | Both | 18+ | 18+ | 5,147 | 10,990 | No |
| 509 | Estonia | 2009 | Estonian Biobank | National | Both | 18+ | 18+ | 3,963 | 6,493 | No |
| 510 | Estonia | 2010 | Estonian Biobank | National | Both | 18+ | 18+ | 4,052 | 7,045 | No |
| 511 | Estonia | 2011 | Estonian Biobank | National | Both | 18+ | 18+ | 111 | 176 | No |
| 512 | Estonia | 2012 | Estonian Biobank | National | Both | 18+ | 18+ | 85 | 130 | No |
| 513 | Estonia | 2013 | Estonian Biobank | National | Both | 18+ | 18+ | 106 | 143 | No |
| 514 | Estonia | 2013- | National Dietary Survey (RTU) 2014 | National | Both | 5-74 | 5-74 | 1,260 | 2,202 | Yes |
| 515 | Ethiopia | 2000 | DHS | National | Both | | 15-49 | | 13,912 | Yes |
| 516 | Ethiopia | 2005 | DHS | National | Both | | 15-49 | | 6,133 | Yes |
| 517 | Ethiopia | 2006 | STEPS | Subnational | Urban | 25-64 | 25-64 | 1,642 | 2,295 | Yes |
| 518 | Ethiopia | 2011 | DHS | National | Both | 15-59 | 15-49 | 14,329 | 15,111 | Yes |
| 519 | Ethiopia | 2016 | DHS | National | Both | 15-59 | 15-49 | 12,380 | 14,104 | Yes |
| 520 | Fiji | 2002 | STEPS | National | Both | 15-64 | 15-64 | 2,684 | 3,820 | Yes |
| 521 | Fiji | 2007- | Pacific Obesity Prevention in Communities – Healthy Youth Health Communities Study | Subnational | Urban | 13-22 | 13-22 | 1,492 | 1,832 | No |
| 522 | Fiji | 2009 | Fiji Eye Health Survey 2009 | National | Both | 40+ | 40+ | 582 | 776 | Yes |
| 523 | Fiji | 2011 | STEPS | National | Both | 25-64 | 25-64 | 1,123 | 1,417 | Yes |
| 524 | Finland | 1985- | INTERSALT, Joensuu | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 525 | Finland | 1985 | INTERSALT, Turku | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 526 | Finland | 1986 | Young Finns Study 1986 | National | Rural | 9-24 | 9-24 | 594 | 631 | No |
| 527 | Finland | 1986 | Young Finns Study 1986 | National | Urban | 9-24 | 9-24 | 587 | 666 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 528 | Finland | 1987 | MONICA, North Karelia/Kuopio/Turku/Loimaa | Subnational | Both | 25-64 | 25-64 | 2,896 | 3,151 | No |
| 529 | Finland | 1984- | Kuopio Ischaemic Heart Disease Risk Factor Study | Subnational | Both | 42-61 | | 2,670 | | No |
| 530 | Finland | 1989 | Finnish cohort of the FINE study | Community | Rural | 70-89 | | 446 | | No |
| 531 | Finland | 1990- | Oulu 35 Study | Community | Urban | 56-57 | 56-57 | 231 | 326 | No |
| 532 | Finland | 1992 | The National FINRISK Study | Subnational | Both | 25-64 | 25-64 | 2,849 | 3,201 | No |
| 533 | Finland | 1991- | Kuopio Ischaemic Heart Disease Risk Factor Study | Subnational | Both | 46-64 | | 1,037 | | No |
| 534 | Finland | 1994 | Finnish cohort of the FINE study | Community | Rural | 75-94 | | 266 | | No |
| 535 | Finland | 1997 | North Finland Birth Cohort 1966 | Community | Both | 30-31 | 30-31 | 2,770 | 149 | No |
| 536 | Finland | 1996- | Oulu 35 Study | Community | Urban | 60-63 | 60-63 | 242 | 345 | No |
| 537 | Finland | 1996- | Savitaipale Study, Baseline | Community | Rural | 40-66 | 40-66 | 574 | 574 | Yes |
| 538 | Finland | 1997 | The National FINRISK Study | National | Both | 25-74 | 25-74 | 4,128 | 4,131 | No |
| 539 | Finland | 1998- | Kuopio Ischaemic Heart Disease Risk Factor Study | Subnational | Both | 53-73 | 53-73 | 854 | 920 | No |
| 540 | Finland | 2001 | Young Finns Study 2001 | National | Rural | 24-39 | 24-39 | 346 | 393 | No |
| 541 | Finland | 2001 | Young Finns Study 2001 | National | Urban | 24-39 | 24-39 | 658 | 769 | No |
| 542 | Finland | 2000- | Health 2000 Survey | National | Both | 30+ | 30+ | 2,656 | 3,213 | No |
| 543 | Finland | 2001- | Oulu 45 Study | Community | Urban | 55-58 | 55-58 | 426 | 550 | No |
| 544 | Finland | 2002 | The National FINRISK Study | National | Both | 25-74 | 25-74 | 3,299 | 3,826 | No |
| 545 | Finland | 2001- | Helsinki Birth Cohort Study | Community | Urban | 56-69 | 56-69 | 927 | 1,074 | No |
| 546 | Finland | 2004- | FIN-D2D | Subnational | Both | 45-74 | 45-74 | 1,364 | 1,461 | No |
| 547 | Finland | 2005 | Mantyselka et al., Rheumatology (Oxford) 47(8):1235-38, 2008 | Community | Rural | 30-65 | 30-65 | 230 | 241 | No |
| 548 | Finland | 2007 | Oulu 35 Study | Community | Urban | 71-73 | 71-73 | 182 | 271 | No |
| 549 | Finland | 2007 | Young Finns Study 2007 | National | Rural | 30-45 | 30-45 | 374 | 431 | Yes |
| 550 | Finland | 2007 | Young Finns Study 2007 | National | Urban | 30-45 | 30-45 | 602 | 714 | Yes |
| 551 | Finland | 2007 | The National FINRISK Study | National | Both | 25-74 | 25-74 | 2,934 | 3,323 | No |
| 552 | Finland | 2005- | Kuopio Ischaemic Heart Disease Risk Factor Study | Subnational | Both | 62-82 | 60-82 | 1,241 | 634 | No |
| 553 | Finland | 2008 | Control group for Finnish male former elite athletes | National | Both | 61+ | | 206 | | No |
| 554 | Finland | 2007- | Savitaipale Study, Follow-up | Community | Rural | 51-75 | 51-75 | 430 | 483 | No |
| 555 | Finland | 2011 | Young Finns Study 2011 | National | Rural | 34-49 | 34-49 | 364 | 424 | Yes |
| 556 | Finland | 2011 | Young Finns Study 2011 | National | Urban | 34-49 | 34-49 | 506 | 636 | Yes |
| 557 | Finland | 2012 | North Finland Birth Cohort 1966 | Community | Both | 45-47 | 45-47 | 2,547 | 3,238 | Yes |
| 558 | Finland | 2012 | The National FINRISK Study | National | Both | 25-74 | 25-74 | 2,774 | 3,052 | No |
| 559 | Finland | 2011- | Health 2011 Survey | National | Both | 30+ | 30+ | 2,041 | 2,532 | No |
| 560 | Finland | 2017 | The FinHealth Survey | National | Both | 18+ | 18+ | 2,699 | 3,168 | No |
| 561 | France | 1985- | MONICA, Strasbourg | Subnational | Both | 35-64 | 35-64 | 664 | 713 | No |
| 562 | France | 1985- | MONICA, Strasbourg | Community | Both | 25-34 | 25-34 | 65 | 78 | No |
| 563 | France | 1985- | MONICA, Toulouse | Subnational | Both | 35-64 | 35-64 | 675 | 644 | No |
| 564 | France | 1986- | MONICA, Lille | Community | Urban | 25-64 | 25-64 | 878 | 732 | No |
| 565 | France | 1988- | MONICA, Toulouse | Subnational | Both | 35-64 | | 586 | | No |
| 566 | France | 1994- | MONICA, Toulouse | Subnational | Both | 35-64 | 35-64 | 608 | 566 | No |
| 567 | France | 1995- | MONICA, Lille | Community | Urban | 36-67 | 36-67 | 598 | 590 | No |
| 568 | France | 1995- | MONICA, Strasbourg | Subnational | Both | 35-64 | 35-64 | 526 | 523 | No |
| 569 | France | 1999- | The Three City Study | Community | Urban | 65+ | 65+ | 2,423 | 3,778 | No |
| 570 | France | 1996- | Jaquet et al., Diabetologia 48(5):849-55, 2005 | Community | Urban | 15-34 | 15-34 | 173 | 164 | No |
| 571 | France | 2004- | National Monitoring of Arterial Risk in Lille (MONA LISA Lille) | Subnational | Urban | 35-75 | 35-75 | 783 | 795 | No |
| 572 | France | 2005- | National Monitoring of Arterial Risk in Bas-Rhin (MONA LISA Bas-Rhin) | Subnational | Both | 35-74 | 35-74 | 780 | 787 | No |
| 573 | France | 2005- | National Monitoring of Arterial Risk in Toulouse (MONA LISA Toulouse) | Subnational | Both | 35-74 | 35-74 | 829 | 796 | No |
| 574 | France | 2006- | The Three City Study | Community | Urban | 72+ | 72+ | 768 | 1,217 | No |
| 575 | France | 2006- | Etude Nationale Nutrition Santé | National | Both | 5-74 | 5-74 | 1,582 | 2,223 | No |
| 576 | France | 2011- | Enquête LIttorale Souffle Air Biologie EnvironnemenT (ELISABET) Dunkerque | Community | Urban | 40-64 | 40-64 | 761 | 812 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 577 | France | 2011- | Enquête LIttorale Souffle Air Biologie EnvironnemenT (ELISABET) Lille | Community | Urban | 40-64 | 40-64 | 758 | 857 | No |
| 578 | France | 2012- | Cohorte des consultants des Centres d'examens de santé (CONSTANCES) | National | Both | 18-69 | 18-69 | 22,367 | 25,127 | No |
| 579 | France | 2014- | Esteban | National | Both | 6-74 | 6-74 | 1,662 | 1,913 | No |
| 580 | France | 2015- | Cohorte des consultants des Centres d'examens de santé (CONSTANCES) | National | Both | 18-69 | 18-69 | 43,472 | 48,739 | No |
| 581 | France | 2018- | Cohorte des consultants des Centres d'examens de santé (CONSTANCES) | National | Both | 18-69 | 18-69 | 19,614 | 22,539 | No |
| 582 | French Polynesia | 2010 | STEPS | National | Both | 18-64 | 18-64 | 1,458 | 1,916 | Yes |
| 583 | Gabon | 2000 | DHS | National | Both | | 20-49 | | 2,082 | Yes |
| 584 | Gabon | 2009 | STEPS | Subnational | Urban | 15-64 | 15-64 | 1,051 | 1,515 | Yes |
| 585 | Gabon | 2012 | DHS | National | Both | | 15-49 | | 5,066 | Yes |
| 586 | Gambia | 1996- | National Survey of Blindness and Low Vision | National | Both | 16+ | 16+ | 1,733 | 2,071 | No |
| 587 | Gambia | 2003 | Siervo et al., Eur J Clin Nutr 60(4):455-63, 2006 | Community | Urban | 14-50 | 14-50 | 50 | 50 | No |
| 588 | Gambia | 2010 | STEPS | National | Both | 25-64 | 25-64 | 1,610 | 1,919 | Yes |
| 589 | Gambia | 2013 | DHS | National | Both | | 15-49 | | 4,180 | Yes |
| 590 | Georgia | 2010 | STEPS | National | Both | 18-64 | 18-64 | 1,842 | 4,460 | Yes |
| 591 | Georgia | 2016 | STEPS | National | Both | 18-69 | 18-69 | 1,188 | 2,784 | Yes |
| 592 | Germany | 1985- | INTERSALT, Cottbus | Community | Urban | 20-59 | 20-59 | 99 | 99 | Yes |
| 593 | Germany | 1985- | INTERSALT, Heidelberg | Community | Urban | 20-59 | 20-59 | 97 | 99 | Yes |
| 594 | Germany | 1984- | MONICA, Augsburg | Community | Both | 25-64 | 25-64 | 2,005 | 1,961 | No |
| 595 | Germany | 1984- | MONICA, Cottbus County | Community | Urban | 25-64 | 25-64 | 657 | 739 | No |
| 596 | Germany | 1983- | MONICA, Rhein-Neckar Region | Community | Urban | 25-64 | 25-64 | 1,489 | 1,609 | No |
| 597 | Germany | 1985- | INTERSALT, Bernried | Community | Urban | 20-59 | 20-59 | 99 | 98 | Yes |
| 598 | Germany | 1985- | CINDI | Subnational | Both | 25-64 | 25-64 | 1,875 | 1,990 | No |
| 599 | Germany | 1987- | MONICA, Erfurt | Community | Urban | 25-64 | 25-64 | 871 | 909 | No |
| 600 | Germany | 1988 | MONICA, Berlin-Lichtenberg | Community | Urban | 25-64 | 25-64 | 690 | 728 | No |
| 601 | Germany | 1988 | MONICA, Bremen North/West | Community | Urban | 25-69 | 25-69 | 619 | 632 | No |
| 602 | Germany | 1988 | MONICA, Bremen Center/South/East | Community | Urban | 25-69 | 25-69 | 499 | 582 | No |
| 603 | Germany | 1988 | MONICA, Chemnitz | Community | Urban | 25-64 | 25-64 | 288 | 382 | No |
| 604 | Germany | 1988 | MONICA, Zwickau | Community | Urban | 25-64 | 25-64 | 193 | 250 | No |
| 605 | Germany | 1988 | German Cardiovascular Prevention Study (GCP) - National Health Survey 1988 | Subnational | Both | 25-69 | 25-69 | 2,642 | 2,678 | No |
| 606 | Germany | 1989- | MONICA, Cottbus County | Community | Urban | 25-64 | 25-64 | 539 | 529 | No |
| 607 | Germany | 1988- | MONICA, Halle County | Subnational | Urban | 25-64 | 25-64 | 959 | 1,201 | No |
| 608 | Germany | 1988- | MONICA, Rest of Karl-Marx-Stadt County | Subnational | Urban | 25-64 | 25-64 | 541 | 626 | No |
| 609 | Germany | 1988- | CINDI | Subnational | Both | 25-64 | 25-64 | 1,361 | 1,435 | No |
| 610 | Germany | 1989- | MONICA, Augsburg | Community | Both | 25-64 | 25-64 | 1,933 | 1,944 | No |
| 611 | Germany | 1991- | MONICA, Bremen North/West | Community | Urban | 25-69 | 25-69 | 599 | 671 | No |
| 612 | Germany | 1991- | MONICA, Bremen Center/South/East | Community | Urban | 25-69 | 25-69 | 524 | 546 | No |
| 613 | Germany | 1990- | European Community Respiratory Health Survey, Hamburg | Community | Urban | 20-47 | 20-47 | 146 | 138 | No |
| 614 | Germany | 1990- | European Community Respiratory Health Survey, Erfurt | Community | Urban | 20-47 | 20-47 | 146 | 124 | No |
| 615 | Germany | 1991- | MONICA, Erfurt | Community | Urban | 25-64 | 25-64 | 587 | 572 | No |
| 616 | Germany | 1991- | CINDI | Subnational | Both | 25-64 | 25-64 | 1,326 | 1,400 | No |
| 617 | Germany | 1991- | German Cardiovascular Prevention Study (GCP) - National Health Survey 1991 | Subnational | Both | 25-69 | 25-69 | 2,599 | 2,670 | No |
| 618 | Germany | 1991- | First National Examination of Life Conditions, Environment and Health in East Germany | Subnational | Both | 25-69 | 25-69 | 1,042 | 1,155 | No |
| 619 | Germany | 1993- | MONICA, Chemnitz | Community | Urban | 25-64 | 25-64 | 408 | 424 | No |
| 620 | Germany | 1993- | MONICA, Zwickau | Community | Urban | 25-64 | 25-64 | 139 | 186 | No |
| 621 | Germany | 1994- | MONICA, Augsburg | Community | Both | 25-64 | 25-64 | 1,898 | 1,968 | No |
| 622 | Germany | 1994- | EPIC Heidelberg | Community | Urban | 40-64 | 35-64 | 11,680 | 13,458 | Yes |
| 623 | Germany | 1994- | EPIC Potsdam | Community | Urban | 40-64 | 35-64 | 10,224 | 15,995 | Yes |
| 624 | Germany | 1997- | German National Health Interview and Examination Survey (GNHIES98) | National | Both | 18-79 | 18-79 | 3,435 | 3,608 | No |
| 625 | Germany | 1997- | Study of Health in Pomerania (SHIP-0) baseline study | Subnational | Both | 20-80 | 20-80 | 2,111 | 2,187 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 626 | Germany | 1999- | KORA S4 Study: Kooperative Research in the Region of Augsburg Survey 4 | Community | Both | 24-75 | 24-75 | 2,076 | 2,148 | No |
| 627 | Germany | 2000- | Epidemiological study of the chances of prevention, early recognition and optimal treatment of | Subnational | Both | 50-75 | 50-75 | 4,344 | 5,334 | No |
| 628 | Germany | 2000- | European Community Respiratory Health Survey, Hamburg | Community | Urban | 30-57 | 30-57 | 146 | 138 | No |
| 629 | Germany | 2000- | European Community Respiratory Health Survey, Erfurt | Community | Urban | 30-57 | 30-57 | 146 | 124 | No |
| 630 | Germany | 2000- | Heinz Nixdorf Recall Study | Subnational | Urban | 45-75 | 45-75 | 2,380 | 2,401 | Yes |
| 631 | Germany | 2000- | Heinz Nixdorf Recall Study | Community | Urban | 45-74 | 45-74 | 2,375 | 2,393 | No |
| 632 | Germany | 2002 | Echinococcus Multilocularis and Internal Diseases in Leutkirch | Community | Urban | 12-65 | 12-65 | 1,171 | 1,261 | No |
| 633 | Germany | 2002- | Study of Health in Pomerania (SHIP-1) 5-year follow-up | Subnational | Both | 25-85 | 25-85 | 1,583 | 1,707 | No |
| 634 | Germany | 2005- | Heinz Nixdorf Recall Study | Subnational | Both | 50-80 | 50-80 | 2,044 | 2,099 | No |
| 635 | Germany | 2006- | KORA F4 Study: Kooperative Research in the Region of Augsburg Follow-Up of Survey 4 | Community | Both | 31-81 | 31-81 | 1,480 | 1,583 | No |
| 636 | Germany | 2008- | Epidemiological study of the chances of prevention, early recognition and optimal treatment of | Subnational | Both | 58-84 | 58-84 | 1,468 | 1,622 | No |
| 637 | Germany | 2008- | Study of Health in Pomerania, second cohort (SHIP-TREND) | Subnational | Both | 20-79 | 20-79 | 2,099 | 2,232 | Yes |
| 638 | Germany | 2008- | German Health Interview and Examination Survey for adults 2008-11 (DEGS1) | National | Both | 18-79 | 18-79 | 3,389 | 3,650 | No |
| 639 | Germany | 2011- | Heinz Nixdorf Recall Study | Subnational | Both | 56-85 | 56-85 | 1,493 | 1,560 | No |
| 640 | Ghana | 1993 | DHS | National | Both | | 20-49 | | 1,650 | Yes |
| 641 | Ghana | 1997 | Amoah et al., Ethn Dis 13(2 Suppl 2):S97-101, 2003 | Community | Both | 25+ | 25+ | 1,857 | 2,875 | No |
| 642 | Ghana | 1998 | DHS | National | Both | | 20-49 | | 1,979 | Yes |
| 643 | Ghana | 2001 | Addo et al., Ethn Dis 16(4):894-99, 2006 | Community | Rural | 15+ | 15+ | 89 | 206 | No |
| 644 | Ghana | 2002 | Amoah et al., Ethn Dis 13(2 Suppl 2):S97-101, 2003 | Community | Both | 25+ | 25+ | 1,859 | 2,947 | No |
| 645 | Ghana | 2001- | Cappuccio et al., Hypertension 43(5):1017-22, 2004 | Community | Both | 35-84 | 35-84 | 194 | 338 | No |
| 646 | Ghana | 2003 | DHS | National | Both | | 15-49 | | 4,935 | Yes |
| 647 | Ghana | 2003 | Women's Health Study of Accra (WHSA-I) | Community | Urban | | 18+ | | 1,184 | Yes |
| 648 | Ghana | 2006 | STEPS | Community | Urban | 25+ | 25+ | 841 | 1,635 | Yes |
| 649 | Ghana | 2008 | DHS | National | Both | | 15-49 | | 4,455 | Yes |
| 650 | Ghana | 2007- | SAGE | National | Both | 50+ | 50+ | 2,192 | 1,987 | No |
| 651 | Ghana | 2008- | Women's Health Study of Accra (WHSA-II) | Community | Urban | | 18+ | | 2,677 | Yes |
| 652 | Ghana | 2012- | Research on Obesity and Diabetes among African Migrants (RODAM), control group | Subnational | Rural | 25+ | 25+ | 431 | 676 | Yes |
| 653 | Ghana | 2012- | Research on Obesity and Diabetes among African Migrants (RODAM), control group | Subnational | Urban | 25+ | 25+ | 418 | 1,034 | Yes |
| 654 | Ghana | 2014 | DHS | National | Both | 15-59 | 15-49 | 4,416 | 4,486 | Yes |
| 655 | Greece | 1991- | EPIC | National | Both | 19-86 | 19-86 | 11,578 | 16,477 | Yes |
| 656 | Greece | 1997 | The Didima Study | Community | Rural | 18+ | 18+ | 265 | 373 | Yes |
| 657 | Greece | 2000- | Karalis et al., BMC Public Health7:351, 2007 | Community | Rural | 5+ | 5+ | 73 | 87 | No |
| 658 | Greece | 2013- | Hellenic National Nutrition and Health Survey (HNNHS) | National | Both | 5+ | 5+ | 1,781 | 2,420 | Yes |
| 659 | Greece | 2013- | National Survey of Morbidity and Risk Factors | National | Both | 18+ | 18+ | 2,039 | 2,726 | No |
| 660 | Greece | 2016 | SKG-Elderly | Community | Urban | 60+ | 60+ | 51 | 63 | No |
| 661 | Greece | 2018 | STEPS-Thessaloniki | Community | Both | 60+ | 60+ | 353 | 141 | No |
| 662 | Greenland | 2005- | Population Health Survey in Greenland | National | Both | 18+ | 18+ | 1,336 | 1,714 | Yes |
| 663 | Grenada | 2011 | STEPS | National | Both | 25-64 | 25-64 | 438 | 637 | Yes |
| 664 | Guatemala | 1995 | DHS | National | Both | | 20-49 | | 4,547 | Yes |
| 665 | Guatemala | 1998- | DHS | National | Both | | 20-49 | | 2,172 | Yes |
| 666 | Guatemala | 2001- | CAMDI | Community | Urban | 20+ | 20+ | 293 | 638 | Yes |
| 667 | Guatemala | 2002 | Reproducive Health Survey | National | Both | 15-59 | 15-49 | 2,164 | 7,374 | Yes |
| 668 | Guatemala | 2003- | The Institute of Nutrition of Central America and Panama Nutrition Supplementation Trial | Community | Both | 25-41 | 25-41 | 268 | 288 | No |
| 669 | Guatemala | 2008- | Encuesta Nacional de Salud Materno Infantil | National | Both | 15-59 | 15-49 | 6,636 | 15,271 | Yes |
| 670 | Guatemala | 2014- | DHS | National | Both | | 15-49 | | 24,195 | Yes |
| 671 | Guinea | 1999 | DHS | National | Both | | 20-49 | | 2,984 | Yes |
| 672 | Guinea | 2005 | DHS | National | Both | | 15-49 | | 3,574 | Yes |
| 673 | Guinea | 2009 | STEPS | Subnational | Both | 15-64 | 15-64 | 1,124 | 1,232 | Yes |
| 674 | Guinea | 2012 | DHS | National | Both | | 15-49 | | 4,229 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 675 | Guinea | 2018 | DHS | National | Both | | 15-49 | | 4,905 | Yes |
| 676 | Guinea Bissau | 2010 | Multiple Indicator Cluster Survey | National | Both | | 15-49 | | 7,676 | Yes |
| 677 | Guyana | 2009 | DHS | National | Both | 15-49 | 15-49 | 3,412 | 4,575 | Yes |
| 678 | Guyana | 2016 | STEPS | National | Both | 18-69 | 18-69 | 1,060 | 1,571 | Yes |
| 679 | Haiti | 1994- | DHS | National | Both | | 20-49 | | 1,788 | Yes |
| 680 | Haiti | 2000 | DHS | National | Both | | 15-49 | | 9,163 | Yes |
| 681 | Haiti | 2005- | DHS | National | Both | | 15-49 | | 5,011 | Yes |
| 682 | Haiti | 2012 | DHS | National | Both | | 15-49 | | 8,993 | Yes |
| 683 | Haiti | 2015- | Carrefour | Community | Urban | 25-65 | 25-65 | 557 | 835 | Yes |
| 684 | Haiti | 2015- | Thomonde | Community | Rural | 25-65 | 25-65 | 254 | 441 | Yes |
| 685 | Haiti | 2016- | DHS | National | Both | | 15-49 | | 9,049 | Yes |
| 686 | Honduras | 1996 | Honduras National Micronutrient Survey | National | Both | | 20-40 | | 722 | No |
| 687 | Honduras | 2003- | CAMDI | Community | Urban | 20+ | 20+ | 428 | 764 | Yes |
| 688 | Honduras | 2005- | DHS | National | Both | | 15-49 | | 18,125 | Yes |
| 689 | Honduras | 2011- | DHS | National | Both | | 15-49 | | 21,097 | Yes |
| 690 | Hungary | 1985 | INTERSALT | Community | Rural | 20-59 | 20-59 | 100 | 100 | Yes |
| 691 | Hungary | 1985- | First Hungarian Representative Nutrition Survey | National | Both | 15+ | 15+ | 3,079 | 8,916 | No |
| 692 | Hungary | 1987- | MONICA, Budapest | Community | Urban | 25-64 | 25-64 | 1,413 | 1,594 | No |
| 693 | Hungary | 1987- | MONICA, Pecs | Community | Urban | 25-64 | 25-64 | 1,573 | 1,510 | No |
| 694 | Hungary | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 428 | | Yes |
| 695 | Hungary | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 349 | | Yes |
| 696 | Iceland | 1985- | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 697 | Iceland | 1985- | The Reykjavik Study (Men) | Subnational | Urban | 51-79 | | 2,584 | | No |
| 698 | Iceland | 1988- | MONICA, Arnes County | Community | Rural | 25-64 | 25-64 | 385 | 435 | No |
| 699 | Iceland | 1988- | MONICA, Reykjavik | Subnational | Urban | 25-64 | 25-64 | 414 | 443 | No |
| 700 | Iceland | 1987- | The Reykjavik Study (Women) | Subnational | Urban | | 52-82 | | 2,993 | No |
| 701 | Iceland | 1993- | MONICA, Arnes County | Community | Rural | 25-64 | 25-64 | 422 | 484 | No |
| 702 | Iceland | 1993- | MONICA, Reykjavik | Subnational | Urban | 25-64 | 25-64 | 441 | 448 | No |
| 703 | Iceland | 1991- | The Reykjavik Study (Men) | Subnational | Urban | 70-86 | | 797 | | No |
| 704 | Iceland | 1994- | The Reykjavik Study (Women) | Subnational | Urban | | 69-88 | | 1,101 | No |
| 705 | Iceland | 2001- | The Reykjavik Study for the young | Subnational | Urban | 47-62 | 47-62 | 626 | 705 | No |
| 706 | Iceland | 2002- | AGES-Reykjavik Study | Subnational | Urban | 66-96 | 66-96 | 2,413 | 3,272 | No |
| 707 | Iceland | 2005- | Risk Evaluation For INfarct Estimates (REFINE) | Subnational | Urban | 20-73 | 20-73 | 3,402 | 3,525 | No |
| 708 | Iceland | 2007- | AGES-Reykjavik Study - follow up visit | Subnational | Urban | 71-98 | 71-98 | 1,389 | 1,928 | No |
| 709 | Iceland | 2010- | Risk Evaluation For INfarct Estimates (REFINE) follow-up visit (REFINELO) | Subnational | Urban | 26-74 | 26-74 | 653 | 667 | No |
| 710 | Iceland | 2012- | Risk Evaluation For INfarct Estimates (REFINE) - follow-up visit (REFLOCT) | Subnational | Urban | 55-73 | 55-73 | 516 | 561 | No |
| 711 | India | 1986 | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 99 | Yes |
| 712 | India | 1988- | Rmachandran et al., Diabetes Res Clin Pract 58(1):55-60, 2002 | Community | Urban | 20-74 | 20-74 | 455 | 437 | Yes |
| 713 | India | 1990 | National Nutrition Monitoring Bureau Rural Survey | National | Rural | 5+ | 5+ | 7,607 | 9,649 | Yes |
| 714 | India | 1992- | Jaipur Heart Watch 1 | Community | Rural | 20-80 | 20-80 | 1,946 | 1,147 | Yes |
| 715 | India | 1992- | Jaipur Heart Watch 1 | Community | Urban | 20-80 | 20-80 | 1,385 | 782 | Yes |
| 716 | India | 1991- | Reddy et al., Obes Rev 3(3):197-202, 2002 | Community | Rural | 35-64 | 35-64 | 1,070 | 1,332 | No |
| 717 | India | 1991- | Reddy et al., Obes Rev 3(3):197-202, 2002 | Community | Urban | 35-64 | 35-64 | 1,456 | 1,594 | No |
| 718 | India | 1991- | Prabhakaran et al., Chronic Illn 3(1):8-19, 2007 | Community | Rural | 35-64 | 35-64 | 542 | 630 | No |
| 719 | India | 1991- | Prabhakaran et al., Chronic Illn 3(1):8-19, 2007 | Community | Urban | 35-64 | 35-64 | 1,388 | 1,455 | No |
| 720 | India | 1993- | Khongsdier, Eur J Clin Nutr 56(6):484-89, 2002 | Community | Both | 18-59 | | 575 | | No |
| 721 | India | 1991- | Mumbai Cohort Study | Community | Urban | 35+ | 35+ | 88,658 | 59,515 | No |
| 722 | India | 1995 | Shobana et al., Diabetes Res Clin Pract 42(3):181–86, 1998 | Community | Urban | 20-74 | 20-74 | 1,061 | 1,093 | Yes |
| 723 | India | 1995- | Kusuma et al., Ann Hum Biol 29(5):502-12, 2002 | Community | Both | 15-84 | 15-84 | 747 | 737 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 724 | India | 1995- | Aravind Comprehensive Eye Survey | Community | Rural | 40+ | 40+ | 2,308 | 2,830 | No |
| 725 | India | 1995- | Epidemiology of blood pressure across cross-cultural populations of Visakhapatnam district, | Community | Rural | 19-76 | 19-76 | 209 | 228 | No |
| 726 | India | 1995- | Kashmiri Adults | Subnational | Both | 40+ | 40+ | 2,496 | 2,587 | No |
| 727 | India | 1997 | Ramachandran et al., Diabetes Res Clin Pract 44(3):207–13, 1999 | Community | Rural | 20-74 | 20-74 | 738 | 879 | Yes |
| 728 | India | 1996- | National Nutrition Monitoring Bureau Rural Survey | National | Rural | 5+ | 5+ | 22,155 | 27,802 | Yes |
| 729 | India | 1996- | Chennai Urban Population Study | Community | Urban | 20+ | 20+ | 557 | 705 | No |
| 730 | India | 1998- | DHS | National | Both | | 20-49 | | 72,536 | Yes |
| 731 | India | 2000 | Ramachandran et al., Diabet Med, 20(3):220-24, 2003 | Subnational | Urban | 20-75 | 20-75 | 4,640 | 5,257 | Yes |
| 732 | India | 1999- | Jaipur Heart Watch 2 | Community | Urban | 20-75 | 20-75 | 534 | 569 | Yes |
| 733 | India | 1998- | Vellore Birth Cohort | Subnational | Both | 25-31 | 25-31 | 1,160 | 1,050 | No |
| 734 | India | 1998- | Chennai Prospective Study | Community | Urban | 35+ | 35+ | 264,848 | 235,968 | No |
| 735 | India | 1999- | New Delhi Birth Cohort | Community | Urban | 26-33 | 26-33 | 886 | 638 | No |
| 736 | India | 2000- | National Nutrition Monitoring Bureau Rural Survey | National | Rural | 5+ | 5+ | 18,046 | 24,844 | Yes |
| 737 | India | 2001- | Chennai Urban Rural Epidemiology Study | Community | Urban | 20+ | 20+ | 1,094 | 1,254 | Yes |
| 738 | India | 2002- | JHW-3 | Community | Urban | 20-59 | 20-59 | 179 | 195 | No |
| 739 | India | 2002- | Blood pressure epidemiology in tribal, rural and urban communities of Orissa with special | Community | Rural | 18-80 | 18-80 | 200 | 186 | No |
| 740 | India | 2003- | India STEPS Ballabgarh | Subnational | Rural | 15-69 | 15-69 | 1,360 | 1,468 | No |
| 741 | India | 2003- | India STEPS Ballabgarh | Subnational | Urban | 15-69 | 15-69 | 1,263 | 1,294 | No |
| 742 | India | 2003- | India STEPS Chennai | Subnational | Rural | 15-69 | 15-69 | 1,372 | 1,338 | No |
| 743 | India | 2003- | India STEPS Chennai | Subnational | Urban | 15-69 | 15-69 | 1,282 | 1,282 | No |
| 744 | India | 2003- | India STEPS Delhi | Subnational | Urban | 15-69 | 15-69 | 1,250 | 1,265 | No |
| 745 | India | 2003- | India STEPS Dibrugarh | Subnational | Rural | 15-69 | 15-69 | 1,460 | 1,410 | No |
| 746 | India | 2003- | India STEPS Dibrugarh | Subnational | Urban | 15-69 | 15-69 | 1,243 | 1,254 | No |
| 747 | India | 2003- | India STEPS Nagpur | Subnational | Rural | 15-69 | 15-69 | 1,252 | 1,256 | No |
| 748 | India | 2003- | India STEPS Nagpur | Subnational | Urban | 15-69 | 15-69 | 1,252 | 1,261 | No |
| 749 | India | 2003- | India STEPS Trivandrum | Subnational | Rural | 15-69 | 15-69 | 1,199 | 1,324 | No |
| 750 | India | 2003- | India STEPS Trivandrum | Subnational | Urban | 15-69 | 15-69 | 1,250 | 1,252 | No |
| 751 | India | 2004- | JHW-4 | Community | Urban | 20-59 | 20-59 | 413 | 473 | No |
| 752 | India | 2005- | DHS | National | Both | 15-54 | 15-49 | 71,463 | 115,828 | Yes |
| 753 | India | 2006 | Ramachandran et al., Diabetes Care 31(5):893-98, 2008 | Community | Both | 20+ | 20+ | 3,321 | 3,745 | Yes |
| 754 | India | 2005- | Risk factor profile for chronic non-communicable diseases: Results of a community-based | Community | Both | 15-64 | 15-64 | 2,795 | 2,926 | Yes |
| 755 | India | 2005- | National Nutrition Monitoring Bureau Rural Survey | National | Rural | 5+ | 5+ | 20,448 | 25,272 | Yes |
| 756 | India | 2005- | Prevalence of cardiovascular risk factors in rural Tamil Nadu | Community | Rural | 25-65 | 25-65 | 4,927 | 5,573 | No |
| 757 | India | 2006- | Central India Eye and Medical Study | Community | Rural | 30+ | 30+ | 2,190 | 2,518 | Yes |
| 758 | India | 2006- | Kusuma et al., Asia Pac J Public Health 21(4):497-507, 2009 | Community | Urban | 15-74 | 15-74 | 182 | 192 | No |
| 759 | India | 2006- | Kashmiri Young Adults | Subnational | Both | 20-40 | 20-40 | 2,119 | 905 | No |
| 760 | India | 2005- | Bengali School Children | Community | Urban | 7-21 | 7-21 | 847 | 2,180 | No |
| 761 | India | 2006- | New Delhi Birth Cohort | Community | Urban | 33-38 | 33-38 | 650 | 445 | No |
| 762 | India | 2007- | SAGE | National | Both | 50+ | 50+ | 3,213 | 3,147 | No |
| 763 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 2,674 | 3,390 | No |
| 764 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 1,672 | 2,403 | No |
| 765 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 2,797 | 2,862 | No |
| 766 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 3,025 | 2,921 | No |
| 767 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 2,232 | 2,108 | No |
| 768 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 2,039 | 2,928 | No |
| 769 | India | 2007- | Integrated Disease Surveillance Project Non-communicable Disease Risk Factors Survey | Subnational | Both | 15-64 | 15-64 | 2,094 | 3,110 | No |
| 770 | India | 2007- | Prevalence of NCD risk factor in people above 15 year in rural area Nagpur using WHO STEP | Community | Rural | 15+ | 15+ | 1,984 | 1,828 | No |
| 771 | India | 2008- | ICMR India Diabetes Study | National | Both | 20+ | 20+ | 6,953 | 6,889 | No |
| 772 | India | 2010 | Kerala 2010 follow-up | Community | Rural | 21-70 | 21-70 | 214 | 237 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 773 | India | 2009- | Baseline Survey for the assessment of prevalence of risk factors of NCDs in Gandhinagar | Community | Rural | 15-64 | 15-64 | 875 | 774 | Yes |
| 774 | India | 2009- | Baseline Survey for the assessment of prevalence of risk factors of NCDs in Gandhinagar | Community | Urban | 15-64 | 15-64 | 895 | 890 | Yes |
| 775 | India | 2010- | Longitudinal Aging Study in India | Subnational | Both | 45+ | 45+ | 630 | 678 | Yes |
| 776 | India | 2011- | National Nutrition Monitoring Bureau Rural Survey | National | Rural | 5+ | 5+ | 34,447 | 43,063 | Yes |
| 777 | India | 2012- | District Level Household and Facility Survey (DLHS) 4 | National | Both | 5+ | 5+ | 538,808 | 602,926 | Yes |
| 778 | India | 2012- | ICMR-India Diabetes (INDIAB) Study, Phase II | Subnational | Both | 20+ | 20+ | 8,165 | 10,755 | No |
| 779 | India | 2014 | Annual Health Survey-Chemical, Anthropometric | National | Both | 5+ | 5+ | 658,441 | 680,611 | Yes |
| 780 | India | 2013- | Vellore Birth Cohort | Subnational | Both | 39-44 | 39-44 | 580 | 499 | Yes |
| 781 | India | 2012- | ICMR-India Diabetes (INDIAB) Study, North East Phase | National | Both | 20+ | 20+ | 10,334 | 12,649 | No |
| 782 | India | 2015- | DHS | National | Both | 15-54 | 15-49 | 108,751 | 655,681 | Yes |
| 783 | India | 2015- | Diet and nutritional status of urban population and prevalence of hypertension | National | Urban | 5+ | 5+ | 68,893 | 81,999 | Yes |
| 784 | India | 2016- | Vellore Birth Cohort | Subnational | Both | 43-48 | 43-48 | 843 | 758 | Yes |
| 785 | Indonesia | 1983- | Strickland et al., Eur J Clin Nutr 48 Suppl 3: S98-108; discussion S-9, 1994 | Community | Both | 18+ | 18+ | 447 | 564 | No |
| 786 | Indonesia | 1993- | Indonesian Family Life Surveys | National | Both | 5+ | 5+ | 8,889 | 10,205 | Yes |
| 787 | Indonesia | 1997- | Indonesian Family Life Surveys | National | Both | 5+ | 5+ | 12,154 | 13,897 | Yes |
| 788 | Indonesia | 2000- | Indonesian Family Life Surveys | National | Both | 5+ | 5+ | 15,442 | 16,225 | Yes |
| 789 | Indonesia | 2001 | Ng et al., Bull World Health Organ 84(4):305-13, 2006 | Community | Both | 15-74 | 15-74 | 1,261 | 1,234 | No |
| 790 | Indonesia | 2001 | STEPS/SURKESNAS | National | Both | 15-64 | 15-64 | 4,100 | 4,775 | No |
| 791 | Indonesia | 2003 | A genetic-ecological study of the risk foctors for lifestyle-related diseases in Oceanian | Community | Rural | 18-79 | 18-79 | 99 | 103 | Yes |
| 792 | Indonesia | 2003 | A genetic-ecological study of the risk foctors for lifestyle-related diseases in Oceanian | Community | Rural | 18-79 | 18-79 | 100 | 140 | No |
| 793 | Indonesia | 2006 | Jakarta Non Communicable Disease Risk Factor Surveillance | Community | Urban | 25-64 | 25-64 | 641 | 950 | No |
| 794 | Indonesia | 2007- | Indonesian Family Life Surveys | National | Both | 5+ | 5+ | 17,869 | 19,157 | Yes |
| 795 | Indonesia | 2013 | Population Health Basic Health Research 2013 (Riskesdas 2013) | National | Both | 20+ | 20+ | 299,439 | 328,085 | No |
| 796 | Indonesia | 2014- | Indonesian Family Life Surveys | National | Both | 5+ | 5+ | 20,328 | 21,540 | Yes |
| 797 | Iran | 1997- | Khadivzadeh, East Mediterr Health J 8(4-5):612-18, 2002 | Community | Urban | | 15-49 | | 1,513 | No |
| 798 | Iran | 2000 | Asadabadi Study | Community | Urban | 18+ | 18+ | 132 | 168 | No |
| 799 | Iran | 1999- | National Health Survey II | National | Both | 5+ | 5+ | 23,727 | 26,636 | No |
| 800 | Iran | 1999- | Tehran Lipid and Glucose Study | Community | Urban | 5+ | 5+ | 6,339 | 7,988 | No |
| 801 | Iran | 2001 | Isfahan Healthy Heart Program, Arak rural | Community | Rural | 19+ | 19+ | 1,023 | 1,080 | No |
| 802 | Iran | 2001 | Isfahan Healthy Heart Program, Arak urban | Community | Urban | 19+ | 19+ | 2,084 | 2,124 | No |
| 803 | Iran | 2001 | Isfahan Healthy Heart Program, Isfahan rural | Community | Rural | 19+ | 19+ | 232 | 233 | No |
| 804 | Iran | 2001 | Isfahan Healthy Heart Program, Isfahan urban | Community | Urban | 19+ | 19+ | 1,760 | 1,912 | No |
| 805 | Iran | 2001 | Isfahan Healthy Heart Program, Najaf Abad rural | Community | Rural | 19+ | 19+ | 405 | 416 | No |
| 806 | Iran | 2001 | Isfahan Healthy Heart Program, Najaf Abad urban | Community | Urban | 19+ | 19+ | 573 | 571 | No |
| 807 | Iran | 2003- | The Persian Gulf Healthy Heart Study | Subnational | Urban | 25-75 | 25-75 | 1,736 | 1,973 | Yes |
| 808 | Iran | 2004 | Hajian-Tilaki et al., Obes Rev 8(1):3-10, 2007 | Community | Urban | 20-70 | 20-70 | 1,800 | 1,800 | No |
| 809 | Iran | 2002- | Tehran Lipid and Glucose Study | Community | Urban | 5+ | 5+ | 2,736 | 3,388 | No |
| 810 | Iran | 2005 | Dastgiri et al., J Public Health Nutr 2006; 9: 996-1000 | Subnational | Urban | 15-70 | 15-70 | 130 | 167 | Yes |
| 811 | Iran | 2005 | STEPS | National | Both | 15-64 | 15-64 | 40,722 | 39,748 | Yes |
| 812 | Iran | 2004- | Golestan Cohort Study Main Phase | Subnational | Rural | 40-75 | 40-75 | 17,298 | 22,708 | Yes |
| 813 | Iran | 2004- | Golestan Cohort Study Main Phase | Community | Urban | 40-75 | 40-75 | 3,931 | 6,100 | Yes |
| 814 | Iran | 2006 | STEPS | National | Both | 16-65 | 16-65 | 14,885 | 14,617 | Yes |
| 815 | Iran | 2005- | Rashidy-Pour, Obes Rev (1):2-6, 2009 | Subnational | Both | 30-70 | 30-70 | 1,695 | 2,104 | No |
| 816 | Iran | 2007 | STEPS | National | Both | 15-64 | 15-64 | 2,372 | 2,312 | Yes |
| 817 | Iran | 2007 | STEPS | National | Both | 15-64 | 15-64 | 14,867 | 14,550 | Yes |
| 818 | Iran | 2007 | Isfahan Healthy Heart Program, Arak rural | Community | Rural | 19+ | 19+ | 1,028 | 1,024 | No |
| 819 | Iran | 2007 | Isfahan Healthy Heart Program, Arak urban | Community | Urban | 19+ | 19+ | 1,424 | 1,359 | No |
| 820 | Iran | 2007 | Isfahan Healthy Heart Program, Isfahan rural | Community | Rural | 19+ | 19+ | 155 | 151 | No |
| 821 | Iran | 2007 | Isfahan Healthy Heart Program, Isfahan urban | Community | Urban | 19+ | 19+ | 1,309 | 1,302 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 822 | Iran | 2007 | Isfahan Healthy Heart Program, Najaf Abad rural | Community | Rural | 19+ | 19+ | 254 | 253 | No |
| 823 | Iran | 2007 | Isfahan Healthy Heart Program, Najaf Abad urban | Community | Urban | 19+ | 19+ | 494 | 542 | No |
| 824 | Iran | 2005- | Tehran Lipid and Glucose Study | Community | Urban | 5+ | 5+ | 3,104 | 3,808 | No |
| 825 | Iran | 2008 | STEPS | National | Both | 15-64 | 15-64 | 14,757 | 14,353 | Yes |
| 826 | Iran | 2009 | STEPS | National | Both | 15-64 | 15-64 | 14,834 | 14,495 | Yes |
| 827 | Iran | 2009- | The Persian Gulf Healthy Heart Study | Subnational | Urban | 31-79 | 31-79 | 834 | 1,016 | Yes |
| 828 | Iran | 2008- | Tehran Lipid and Glucose Study | Community | Urban | 20+ | 20+ | 4,622 | 5,884 | Yes |
| 829 | Iran | 2010- | Golestan Cohort Study Second Phase | Subnational | Rural | 43-82 | 43-82 | 4,325 | 4,919 | Yes |
| 830 | Iran | 2010- | Golestan Cohort Study Second Phase | Community | Urban | 43-82 | 43-82 | 1,091 | 1,061 | Yes |
| 831 | Iran | 2011 | STEPS | National | Both | 6-69 | 6-69 | 4,903 | 6,548 | Yes |
| 832 | Iran | 2010- | The Yazd Eye Study | Subnational | Both | 40-80 | 40-80 | 876 | 1,012 | Yes |
| 833 | Iran | 2011- | Amol county study | Community | Rural | 10+ | 10+ | 1,862 | 1,098 | Yes |
| 834 | Iran | 2011- | Amol county study | Community | Urban | 10+ | 10+ | 1,624 | 1,548 | Yes |
| 835 | Iran | 2012 | National Integrated Micronutrient Survey (NIMS) 2012 | National | Both | 6-60 | 6-60 | 10,526 | 11,087 | Yes |
| 836 | Iran | 2012- | Tehran City | Community | Urban | 10-90 | 10-90 | 419 | 537 | Yes |
| 837 | Iran | 2012- | Pars Cohort Study | Community | Rural | 40-90 | 40-90 | 4,272 | 4,987 | Yes |
| 838 | Iran | 2012- | Zahedan City | Community | Urban | 10-90 | 10-90 | 1,377 | 1,205 | Yes |
| 839 | Iran | 2013- | Bushehr Elderly Health Program (BEH) | Community | Urban | 60+ | 60+ | 1,437 | 1,514 | No |
| 840 | Iran | 2013- | Gilan Eye Study | Subnational | Both | 50+ | 50+ | 1,059 | 1,439 | No |
| 841 | Iran | 2014- | The PERSIAN Fasa Cohort Study | Community | Both | 35-70 | 35-70 | 4,463 | 5,384 | No |
| 842 | Iran | 2014- | The PERSIAN Guilan Cohort Study | Community | Both | 35-70 | 35-70 | 4,881 | 5,611 | No |
| 843 | Iran | 2014- | The PERSIAN Kermanshah Cohort Study | Community | Both | 35-70 | 35-70 | 4,746 | 5,167 | No |
| 844 | Iran | 2014- | The PERSIAN Kharameh Cohort Study | Community | Both | 35-70 | 35-70 | 4,707 | 5,860 | No |
| 845 | Iran | 2014- | The PERSIAN Tabriz Cohort Study | Community | Both | 35-70 | 35-70 | 6,644 | 8,140 | No |
| 846 | Iran | 2015- | The PERSIAN Mazandaran Cohort Study | Community | Both | 35-70 | 35-70 | 4,115 | 6,029 | No |
| 847 | Iran | 2015- | The PERSIAN Rafsanjan Cohort Study | Community | Both | 35-70 | 35-70 | 5,152 | 5,300 | No |
| 848 | Iran | 2016 | STEPS | National | Both | 18+ | 18+ | 14,080 | 15,036 | Yes |
| 849 | Iran | 2015- | The PERSIAN Yazd Cohort Study | Community | Both | 30-70 | 30-70 | 4,947 | 4,819 | No |
| 850 | Iran | 2016- | The PERSIAN Ahvaz Cohort Study | Community | Both | 35-70 | 35-70 | 3,982 | 5,833 | No |
| 851 | Iran | 2016- | The PERSIAN BandarKong Cohort Study | Community | Both | 35-70 | 35-70 | 1,702 | 2,260 | No |
| 852 | Iran | 2016- | The PERSIAN Urmia Cohort Study | Community | Both | 35-70 | 35-70 | 2,161 | 2,796 | No |
| 853 | Iran | 2015- | The PERSIAN Zahedan Cohort Study | Community | Urban | 35-70 | 35-70 | 3,890 | 6,013 | No |
| 854 | Iran | 2016- | The PERSIAN Ardabil Cohort Study | Community | Both | 35-70 | 35-70 | 6,658 | 7,931 | No |
| 855 | Iran | 2018- | Prevalence of risk factors for cardiovascular disease among a rural population in eastern Iran | Subnational | Rural | 18+ | 18+ | 148 | 146 | Yes |
| 856 | Iran | 2017- | The PERSIAN Kavar Cohort Study | Community | Urban | 35-70 | 35-70 | 2,417 | 2,539 | No |
| 857 | Iran | 2016- | The Khuzestan comprehensive health study: A platform for NCDs, blood borne and mental | Subnational | Both | 20-65 | 20-65 | 10,846 | 19,427 | Yes |
| 858 | Iran | 2017- | The PERSIAN Mashhad Cohort Study | Community | Both | 35-70 | 35-70 | 2,276 | 2,619 | No |
| 859 | Iran | 2017- | PERSIAN elderly component-Iranian Longitudinal Study on Ageing | Subnational | Both | 50-95 | 50-95 | 3,360 | 3,857 | No |
| 860 | Iran | 2016- | The PERSIAN Shahrekord Cohort Study | Community | Both | 35-70 | 35-70 | 4,222 | 4,464 | No |
| 861 | Iraq | 2006 | STEPS | National | Both | 25-64 | 25-64 | 2,251 | 2,252 | No |
| 862 | Iraq | 2015 | STEPS | National | Both | 18+ | 18+ | 1,589 | 2,312 | Yes |
| 863 | Ireland | 1998 | Survey of Lifestyle, Attitudes and Nutritional in Ireland 1998 | National | Both | 18+ | 18+ | 123 | 296 | Yes |
| 864 | Ireland | 1997- | North/South Ireland Food Consumption Survey | National | Both | 18-64 | 18-64 | 613 | 698 | No |
| 865 | Ireland | 2002 | Survey of Lifestyle, Attitudes and Nutritional in Ireland 2002 | National | Both | 18+ | 18+ | 164 | 216 | Yes |
| 866 | Ireland | 2006- | Survey of Lifestyle, Attitudes and Nutritional in Ireland 2006-2007 | National | Both | 18+ | 18+ | 945 | 1,225 | Yes |
| 867 | Ireland | 2008- | National Adult Nutrition Survey | National | Both | 18+ | 18+ | 658 | 696 | No |
| 868 | Ireland | 2009- | The Irish Longitudinal Study on Ageing | National | Both | 50+ | 50+ | 2,693 | 3,170 | No |
| 869 | Israel | 1985- | MONICA, Tel Aviv | Community | Urban | 25-64 | 25-64 | 653 | 685 | No |
| 870 | Israel | 1990- | The Jerusalem Longitudinal Cohort Study | Community | Urban | 69-70 | 69-70 | 245 | 199 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 871 | Israel | 1997- | The Jerusalem Longitudinal Cohort Study | Community | Urban | 76-77 | 76-77 | 422 | 429 | No |
| 872 | Israel | 1999- | Mabat First Israeli National Health and Nutrition Survey | National | Both | 25-64 | 25-64 | 1,371 | 1,410 | No |
| 873 | Israel | 1999- | The Israel Glucose Intolerance, Obesity and Hypertension Study | National | Urban | 58+ | 58+ | 514 | 527 | No |
| 874 | Israel | 2002- | Hadera District Study | Subnational | Urban | 25-78 | 25-78 | 548 | 538 | No |
| 875 | Israel | 2005- | Mabat Zahav First National Health and Nutrition Survey in ages 65 and over | National | Urban | 65+ | 65+ | 743 | 819 | No |
| 876 | Israel | 2014- | Mabat Second Israeli National Health and Nutrition Survey | National | Both | 18-64 | 18-64 | 1,061 | 1,073 | No |
| 877 | Israel | 2014- | Mabat Zahav Second National Health and Nutrition Survey ages in 65 and over | National | Both | 65+ | 65+ | 307 | 318 | No |
| 878 | Italy | 1985 | Finland, Italy, Netherlands, Elderly (Fine-Italy) | Community | Rural | 65-84 | | 650 | | No |
| 879 | Italy | 1985 | INTERSALT, Naples | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 880 | Italy | 1986 | INTERSALT, Bassiano | Community | Urban | 20-59 | 20-59 | 99 | 100 | Yes |
| 881 | Italy | 1986 | INTERSALT, Gubbio | Community | Urban | 20-59 | 20-59 | 99 | 100 | Yes |
| 882 | Italy | 1986 | INTERSALT, Mirano | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 883 | Italy | 1986 | MONICA, Friuli | Subnational | Urban | 25-64 | 25-64 | 921 | 918 | No |
| 884 | Italy | 1986- | Malattie cardiovascolari ATerosclerotiche Istituto Superiore di Sanità (MATISS) | Community | Rural | 19-72 | 19-72 | 1,273 | 1,568 | Yes |
| 885 | Italy | 1985- | Pisa Epidemiological Study - first survey | Community | Urban | 5-90 | 5-90 | 1,834 | 2,019 | Yes |
| 886 | Italy | 1986- | MONICA, Brianza | Subnational | Urban | 25-64 | 25-64 | 814 | 832 | No |
| 887 | Italy | 1989 | MONICA, Friuli | Subnational | Urban | 25-64 | 25-64 | 902 | 900 | No |
| 888 | Italy | 1989 | Ventimiglia Heart Study | Community | Rural | 6+ | 6+ | 602 | 709 | No |
| 889 | Italy | 1990 | Bruneck Study | Community | Rural | 40-79 | 40-79 | 469 | 450 | Yes |
| 890 | Italy | 1988- | Po river delta Epidemiological Study - second survey | Community | Rural | 8-73 | 8-73 | 1,341 | 1,497 | Yes |
| 891 | Italy | 1989- | MONICA, Brianza | Subnational | Urban | 25-64 | 25-64 | 787 | 786 | No |
| 892 | Italy | 1991- | Pisa Epidemiological Study - second survey | Community | Urban | 8-97 | 8-97 | 1,288 | 1,553 | Yes |
| 893 | Italy | 1992- | Italian Longitudinal Study on Aging | National | Both | 65-84 | 65-84 | 1,666 | 1,455 | No |
| 894 | Italy | 1993- | Malattie cardiovascolari ATerosclerotiche Istituto Superiore di Sanità (MATISS) | Community | Rural | 20-77 | 20-77 | 965 | 999 | Yes |
| 895 | Italy | 1994 | MONICA, Friuli | Subnational | Urban | 25-64 | 25-64 | 882 | 888 | No |
| 896 | Italy | 1993- | MONICA, Brianza | Subnational | Urban | 25-64 | 25-64 | 801 | 856 | No |
| 897 | Italy | 1995 | Bruneck Study | Community | Rural | 45-84 | 45-84 | 411 | 408 | Yes |
| 898 | Italy | 1992- | Vobarno Study | Community | Both | 25-64 | 35-64 | 265 | 309 | No |
| 899 | Italy | 1993- | EPIC Florence | Community | Urban | 24-72 | 24-72 | 3,498 | 9,968 | Yes |
| 900 | Italy | 1995- | Friuli Studio Emostatico | Community | Urban | 45-64 | 45-64 | 198 | 198 | Yes |
| 901 | Italy | 1995- | Italian Longitudinal Study on Aging | National | Both | 68-90 | 68-90 | 1,011 | 808 | No |
| 902 | Italy | 1995- | PROgetto Veneto Anziani (PROVA) | Subnational | Both | 65+ | 65+ | 1,187 | 1,722 | No |
| 903 | Italy | 1997- | Lucca CUORE Study | Community | Urban | 15-84 | 15-84 | 897 | 1,123 | No |
| 904 | Italy | 1998- | Progetto VIP | Community | Both | 25-74 | 25-74 | 599 | 600 | Yes |
| 905 | Italy | 1998- | InCHIANTI study | Community | Both | 15+ | 15+ | 560 | 681 | No |
| 906 | Italy | 2000 | Bruneck Study | Community | Rural | 50-89 | 50-89 | 331 | 361 | No |
| 907 | Italy | 1998- | Osservatorio Epidemiologico Cardiovascolare | National | Both | 35-74 | 35-74 | 4,870 | 4,752 | Yes |
| 908 | Italy | 2000- | Italian Longitudinal Study on Aging | National | Both | 73-93 | 73-93 | 557 | 473 | No |
| 909 | Italy | 2000- | PROgetto Veneto Anziani (PROVA) | Subnational | Both | 67+ | 67+ | 795 | 1,331 | No |
| 910 | Italy | 2001- | The Study of Asti | Community | Both | 45-64 | 45-64 | 780 | 878 | No |
| 911 | Italy | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 433 | | Yes |
| 912 | Italy | 2002- | PROgetto Veneto Anziani (PROVA) | Subnational | Both | 68+ | 68+ | 621 | 1,138 | No |
| 913 | Italy | 2005 | Bruneck Study | Community | Rural | 55-93 | 55-93 | 264 | 307 | No |
| 914 | Italy | 2004- | Vobarno study | Community | Rural | 55-74 | 55-74 | 99 | 113 | No |
| 915 | Italy | 2004- | Italian Project on the Epidemiology of Alzheimer's Disease | National | Both | 65-84 | 65-84 | 1,569 | 1,421 | No |
| 916 | Italy | 2005- | Moli-family Study | Subnational | Both | 14+ | 14+ | 243 | 301 | Yes |
| 917 | Italy | 2004- | Cardiolab project | National | Urban | 40+ | 40+ | 19,152 | 14,782 | No |
| 918 | Italy | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 346 | | Yes |
| 919 | Italy | 2005- | Moli-sani Study | Subnational | Both | 35+ | 35+ | 11,694 | 12,614 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 920 | Italy | 2008- | Progetto VIP | Community | Both | 25-74 | 25-74 | 597 | 598 | Yes |
| 921 | Italy | 2010 | Bruneck Study | Community | Rural | 60-98 | 60-98 | 225 | 259 | No |
| 922 | Italy | 2008- | Osservatorio Epidemiologico Cardiovascolare/Health Examination Survey | National | Both | 35-80 | 35-80 | 4,368 | 4,332 | Yes |
| 923 | Italy | 2009- | Pisa Epidemiological Study - third survey (Pisa 3 study) | Community | Urban | 6+ | 6+ | 496 | 574 | Yes |
| 924 | Italy | 2009- | Grosso et al., J Epidemiol 24(4):327-33, 2014 | Community | Both | 19+ | 19+ | 760 | 1,129 | No |
| 925 | Italy | 2010- | CArdiovascular risk MEtabolic syndrome LIver and Autoimmunity diseases (CA.ME.LI.A) | Community | Both | 18-75 | 18-75 | 477 | 515 | Yes |
| 926 | Italy | 2011- | Vobarno study | Community | Rural | 49-62 | 49-62 | 107 | 143 | No |
| 927 | Italy | 2015 | Bruneck Study | Community | Rural | 65-98 | 65-98 | 171 | 169 | No |
| 928 | Italy | 2014- | Mediterranean healthy Eating, Aging and Lifestyles (MEAL) study | Subnational | Urban | 20+ | 20+ | 762 | 762 | No |
| 929 | Italy | 2018- | Progetto VIP | Community | Both | 25-74 | 25-74 | 600 | 598 | Yes |
| 930 | Jamaica | 1993 | Zohoori et al., West Indian Med J 52(2):111-17, 2003 | Community | Urban | 25-74 | 25-74 | 845 | 1,245 | No |
| 931 | Jamaica | 1994- | Cooper et al., Am J Public Health 87(2):160-68, 1997 | Community | Urban | 25-100 | 25- | 597 | 833 | No |
| 932 | Jamaica | 1998 | Ragoobirsingh et al., Diabetes Obes Metab 6(1):23–27, 2004 | National | Both | 15+ | 15+ | 552 | 945 | No |
| 933 | Jamaica | 2000- | Jamaica Health and Lifestyle Survey | National | Both | 15-74 | 15-74 | 653 | 1,281 | Yes |
| 934 | Jamaica | 2007- | Jamaica Health and Lifestyle Survey | National | Both | 15-74 | 15-74 | 862 | 1,904 | Yes |
| 935 | Jamaica | 2012 | Older Persons in Jamaica 2012 | National | Both | 60+ | 60+ | 158 | 205 | No |
| 936 | Japan | 1985 | INTERSALT, Osaka | Community | Urban | 20-59 | 20-59 | 100 | 97 | Yes |
| 937 | Japan | 1985 | INTERSALT, Tochigi | Community | Urban | 20-59 | 20-59 | 95 | 99 | Yes |
| 938 | Japan | 1985 | INTERSALT, Toyama | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 939 | Japan | 1985 | National Nutrition Survey | National | Both | 5+ | 5+ | 7,461 | 8,865 | No |
| 940 | Japan | 1985- | Akabane Study | Community | Urban | 40-69 | 40-69 | 812 | 1,022 | Yes |
| 941 | Japan | 1986 | National Nutrition Survey | National | Both | 5+ | 5+ | 7,280 | 8,635 | No |
| 942 | Japan | 1987 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 70 | 88 | No |
| 943 | Japan | 1987 | National Nutrition Survey | National | Both | 5+ | 5+ | 6,427 | 8,160 | No |
| 944 | Japan | 1988 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 76 | 85 | No |
| 945 | Japan | 1988 | National Nutrition Survey | National | Both | 5+ | 5+ | 6,885 | 8,045 | No |
| 946 | Japan | 1989 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 58 | 63 | No |
| 947 | Japan | 1989 | Aito Town Study | Community | Rural | 5-74 | 5-84 | 529 | 525 | No |
| 948 | Japan | 1989 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,767 | 6,882 | No |
| 949 | Japan | 1990 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 27 | 51 | No |
| 950 | Japan | 1990 | National Nutrition Survey and National Cardiovascular Survey | National | Both | 5+ | 5+ | 6,080 | 7,291 | No |
| 951 | Japan | 1991 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 93 | 116 | Yes |
| 952 | Japan | 1991 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 230 | 319 | Yes |
| 953 | Japan | 1991 | National Nutrition Survey | National | Both | 5+ | 5+ | 6,036 | 7,098 | No |
| 954 | Japan | 1992 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 45 | 47 | No |
| 955 | Japan | 1992 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 288 | 385 | Yes |
| 956 | Japan | 1990- | Japan Public Health Center-based prospective Study (JPHC Study), Cohort I | Subnational | Both | 40-59 | 40-59 | 8,749 | 14,481 | No |
| 957 | Japan | 1992 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,635 | 6,656 | No |
| 958 | Japan | 1993 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 54 | 65 | No |
| 959 | Japan | 1993 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 301 | 452 | Yes |
| 960 | Japan | 1993 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,708 | 6,740 | No |
| 961 | Japan | 1994 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 43 | 59 | No |
| 962 | Japan | 1994 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 251 | 336 | Yes |
| 963 | Japan | 1994 | Japanese Population-Based Osteoporosis Study | Subnational | Both | | 15-79 | | 3,222 | No |
| 964 | Japan | 1993- | Japan Public Health Center-based prospective Study (JPHC Study), Cohort II | Subnational | Both | 40-69 | 40-69 | 8,534 | 16,190 | No |
| 965 | Japan | 1994 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,439 | 6,386 | No |
| 966 | Japan | 1995 | Konan Town Study | Community | Rural | 20-79 | 20-79 | 45 | 61 | No |
| 967 | Japan | 1995 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 300 | 470 | Yes |
| 968 | Japan | 1995 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,480 | 6,365 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 969 | Japan | 1996 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 86 | 152 | Yes |
| 970 | Japan | 1996 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,277 | 6,185 | No |
| 971 | Japan | 1997 | Shigaraki Town Study | Community | Rural | 30-89 | 30-89 | 61 | 100 | Yes |
| 972 | Japan | 1996- | INTERMAP, Aito Town | Community | Rural | 40-59 | 40-59 | 130 | 129 | Yes |
| 973 | Japan | 1997 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,104 | 6,068 | No |
| 974 | Japan | 1997- | INTERMAP, Sapporo | Community | Urban | 40-59 | 40-59 | 149 | 148 | Yes |
| 975 | Japan | 1997- | INTERMAP, Toyama | Community | Urban | 40-59 | 40-59 | 149 | 150 | Yes |
| 976 | Japan | 1997- | INTERMAP, Wakayama | Community | Urban | 40-59 | 40-59 | 146 | 144 | Yes |
| 977 | Japan | 1998 | Niigata Study | Community | Urban | 70 | 70 | 287 | 284 | No |
| 978 | Japan | 1998 | National Nutrition Survey | National | Both | 5+ | 5+ | 5,381 | 6,249 | No |
| 979 | Japan | 1999 | Niigata Study | Community | Urban | 71 | 71 | 245 | 216 | No |
| 980 | Japan | 1997- | Sudo et al., J Orthop Sci 13(5):413-18, 2008 | Community | Rural | 55+ | 45+ | 261 | 785 | No |
| 981 | Japan | 1999 | National Nutrition Survey | National | Both | 5+ | 5+ | 4,367 | 5,333 | No |
| 982 | Japan | 2000 | Niigata Study | Community | Urban | 72 | 72 | 233 | 202 | No |
| 983 | Japan | 2000 | National Nutrition Survey and National Cardiovascular Survey | National | Both | 5+ | 5+ | 4,665 | 5,430 | No |
| 984 | Japan | 2001 | Niigata Study | Community | Urban | 73 | 73 | 235 | 201 | No |
| 985 | Japan | 2001 | The Japan Association of Health Service Database | Subnational | Both | 20+ | 20+ | 1,471,868 | 1,231,378 | No |
| 986 | Japan | 2001 | National Nutrition Survey | National | Both | 5+ | 5+ | 4,527 | 5,448 | No |
| 987 | Japan | 2002 | Niigata Study | Community | Urban | 74 | 74 | 228 | 202 | No |
| 988 | Japan | 2002 | National Nutrition Survey | National | Both | 5+ | 5+ | 4,104 | 4,941 | No |
| 989 | Japan | 2003 | Niigata Study | Community | Urban | 75 | 75 | 215 | 189 | No |
| 990 | Japan | 2002- | The Hisayama Study | Community | Rural | 40+ | 40+ | 1,414 | 1,884 | No |
| 991 | Japan | 2003 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 4,035 | 4,920 | No |
| 992 | Japan | 2004 | Niigata Study | Community | Urban | 76 | 76 | 215 | 185 | No |
| 993 | Japan | 2004 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,384 | 3,952 | No |
| 994 | Japan | 2005 | Niigata Study | Community | Urban | 77 | 77 | 203 | 184 | No |
| 995 | Japan | 2005 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,154 | 3,802 | No |
| 996 | Japan | 2006 | Niigata Study | Community | Urban | 78 | 78 | 199 | 194 | No |
| 997 | Japan | 2006 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,522 | 4,165 | No |
| 998 | Japan | 2007 | Niigata Study | Community | Urban | 79 | 79 | 183 | 192 | No |
| 999 | Japan | 2007 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,520 | 4,154 | No |
| 1000 | Japan | 2008 | Resident in Kanazawa City (age 40+) | Community | Urban | 40+ | 40+ | 6,562 | 11,944 | No |
| 1001 | Japan | 2008 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,518 | 4,190 | No |
| 1002 | Japan | 2009 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,486 | 4,197 | No |
| 1003 | Japan | 2010 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,218 | 3,822 | No |
| 1004 | Japan | 2011 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,020 | 3,586 | No |
| 1005 | Japan | 2011 | The Tokyo Health Service Association Database | Community | Urban | 20+ | 20+ | 82,453 | 54,028 | No |
| 1006 | Japan | 2012 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 11,298 | 13,674 | No |
| 1007 | Japan | 2013 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,198 | 3,637 | No |
| 1008 | Japan | 2014- | Nagaoka Health Screening | Community | Both | 20-89 | 20-89 | 4,938 | 4,298 | Yes |
| 1009 | Japan | 2012- | The Nagahama study | Community | Rural | 35-80 | 35-80 | 3,206 | 6,620 | No |
| 1010 | Japan | 2014 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 3,208 | 3,657 | No |
| 1011 | Japan | 2015 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 2,914 | 3,457 | No |
| 1012 | Japan | 2016 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 9,814 | 11,638 | No |
| 1013 | Japan | 2017 | National Health and Nutrition Survey | National | Both | 5+ | 5+ | 2,662 | 3,057 | No |
| 1014 | Japan | 2017 | The Tokyo Health Service Association Database | Community | Urban | 20+ | 20+ | 63,713 | 47,577 | No |
| 1015 | Jordan | 1994- | Ajlouni, Int J Obes Relat Metab Disord 22(7), 1998 | Subnational | Both | 25+ | 25+ | 1,047 | 1,787 | No |
| 1016 | Jordan | 1997 | DHS | National | Both | | 20-49 | | 3,002 | Yes |
| 1017 | Jordan | 2002 | DHS | National | Both | | 20-49 | | 4,839 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1018 | Jordan | 2004 | Behavioural Risk Factor Surveillence Survey | National | Rural | 18+ | 18+ | 236 | 473 | Yes |
| 1019 | Jordan | 2004 | Khader et al., Metab Syndr Relat Disord 6(2):113-20, 2008 | Community | Both | 25+ | 25-59 | 394 | 548 | No |
| 1020 | Jordan | 2007 | DHS | National | Both | | 20-49 | | 4,451 | Yes |
| 1021 | Jordan | 2007 | Behavioural Risk Factor Surveillence Survey | National | Both | 18+ | 18+ | 332 | 433 | Yes |
| 1022 | Jordan | 2009 | DHS | National | Both | | 20-49 | | 4,054 | Yes |
| 1023 | Jordan | 2009 | Metablic abnomalities and vitamin D study | National | Both | 7+ | 7+ | 1,601 | 3,863 | Yes |
| 1024 | Jordan | 2012 | DHS | National | Both | | 20-49 | | 6,357 | Yes |
| 1025 | Jordan | 2016- | National Cardiovascular Diseases and Diabetes Study (NCDDS) | National | Both | 18+ | 18+ | 1,187 | 2,745 | Yes |
| 1026 | Jordan | 2017- | DHS | National | Both | | 15-49 | | 6,261 | Yes |
| 1027 | Jordan | 2019 | STEPS | National | Both | 18-69 | 18-69 | 2,009 | 3,084 | Yes |
| 1028 | Kazakhstan | 1985 | Balakhmetova et l., Ter Arkh 63(1):17-20, 1991 | Community | Urban | 20-54 | | 2,886 | | No |
| 1029 | Kazakhstan | 1995 | DHS | National | Both | | 15-49 | | 3,542 | Yes |
| 1030 | Kazakhstan | 1999 | DHS | National | Both | | 15-49 | | 2,227 | Yes |
| 1031 | Kazakhstan | 2015 | Almaty STEPS | Subnational | Both | 18-69 | 18-69 | 385 | 1,145 | No |
| 1032 | Kazakhstan | 2015 | Shymkent STEPS | Subnational | Both | 18-69 | 18-69 | 400 | 808 | No |
| 1033 | Kazakhstan | 2015- | Aktobe STEPS | Subnational | Both | 18-69 | 18-69 | 348 | 1,153 | No |
| 1034 | Kazakhstan | 2019 | A health status assessment of a population of Karaganda urban region | Community | Urban | 18+ | 18+ | 324 | 670 | Yes |
| 1035 | Kenya | 1985 | INTERSALT | Community | Rural | 20-59 | 20-59 | 90 | 86 | No |
| 1036 | Kenya | 1993 | DHS | National | Both | | 20-49 | | 3,113 | Yes |
| 1037 | Kenya | 1998 | DHS | National | Both | | 20-49 | | 3,009 | Yes |
| 1038 | Kenya | 2003 | DHS | National | Both | | 15-49 | | 7,189 | Yes |
| 1039 | Kenya | 2008- | DHS | National | Both | | 15-49 | | 7,827 | Yes |
| 1040 | Kenya | 2014 | DHS | National | Both | | 15-49 | | 13,469 | Yes |
| 1041 | Kenya | 2015 | STEPS | National | Both | 18-69 | 18-69 | 1,751 | 2,514 | Yes |
| 1042 | Kenya | 2018 | Assessing the gaps in healthcare and determining the feasibility for the setup of a social | Community | Urban | 19-73 | 19-73 | 153 | 143 | No |
| 1043 | Kiribati | 2004 | STEPS | National | Both | 15-64 | 15-64 | 779 | 939 | Yes |
| 1044 | Kiribati | 2015- | STEPS | National | Both | 18-69 | 18-69 | 557 | 694 | Yes |
| 1045 | Kuwait | 1993- | al-Isa, Ann Nutr Metab 41(5):307-14, 1997 | Community | Both | 18+ | | 1,730 | | No |
| 1046 | Kuwait | 1995- | Abdella et al., Diabetes Res and Clin Pract 42(3):187–196, 1998 | Subnational | Both | 20-84 | 20-84 | 1,099 | 1,892 | No |
| 1047 | Kuwait | 1998 | Abiaka et al., , Biol Trace Elem Res 91(1):33-43, 2003 | National | Both | 15-80 | 15-80 | 178 | 233 | No |
| 1048 | Kuwait | 2006 | STEPS | National | Both | 20-64 | 20-64 | 918 | 1,298 | Yes |
| 1049 | Kuwait | 2008- | Gulf Cooperation Council World Health Survey | National | Both | 18+ | 18+ | 1,598 | 1,782 | Yes |
| 1050 | Kuwait | 2008- | National Nutrition Program for the State of Kuwait | National | Urban | 5+ | 5+ | 772 | 830 | No |
| 1051 | Kuwait | 2011- | Kuwait Diabetes Epidemiology Program | National | Urban | 18-82 | 18-82 | 3,007 | 2,242 | Yes |
| 1052 | Kuwait | 2014 | STEPS | National | Both | 18-69 | 18-69 | 1,382 | 2,212 | Yes |
| 1053 | Kyrgyzstan | 1993 | KyrgyzstanMultipurpose  Poverty Surveys | National | Both | 18-60 | 18-60 | 2,457 | 2,457 | No |
| 1054 | Kyrgyzstan | 1997 | DHS | National | Both | | 15-49 | | 3,570 | Yes |
| 1055 | Kyrgyzstan | 2012 | DHS | National | Both | | 15-49 | | 7,516 | Yes |
| 1056 | Kyrgyzstan | 2013 | STEPS | National | Both | 25-64 | 25-64 | 942 | 1,600 | Yes |
| 1057 | Lao PDR | 2006 | Multiple Indicator Cluster Survey 3 | National | Both | | 15-49 | | 807 | Yes |
| 1058 | Lao PDR | 2008 | STEPS | Community | Both | 25-64 | 25-64 | 1,568 | 2,353 | Yes |
| 1059 | Lao PDR | 2013 | STEPS | National | Both | 18-64 | 18-64 | 984 | 1,461 | Yes |
| 1060 | Latvia | 1997 | Nutrition and lifestyle in the baltic republics, WHO, 1997 | National | Both | 19-50 | 19-50 | 703 | 732 | No |
| 1061 | Latvia | 2008- | Cardiovascular risk factor study | National | Both | 25-74 | 25-74 | 1,362 | 2,398 | No |
| 1062 | Lebanon | 1997 | Obesity in Lebanon: National Survey | National | Both | 5+ | 5+ | 871 | 1,164 | Yes |
| 1063 | Lebanon | 2008- | STEPS | National | Both | 5+ | 5+ | 1,721 | 1,886 | Yes |
| 1064 | Lebanon | 2017 | STEPS | National | Both | 18-69 | 18-69 | 729 | 983 | Yes |
| 1065 | Lesotho | 1993 | National survey on iodine, vitamin A and iron status of women and children in Lesotho | National | Both | | 20-65 | | 792 | No |
| 1066 | Lesotho | 2004- | DHS | National | Both | | 15-49 | | 3,206 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1067 | Lesotho | 2009- | DHS | National | Both | 15-59 | 15-49 | 3,216 | 3,781 | Yes |
| 1068 | Lesotho | 2012 | STEPS | National | Both | 25-64 | 25-64 | 726 | 1,442 | Yes |
| 1069 | Lesotho | 2014 | DHS | National | Both | 15-59 | 15-49 | 2,860 | 3,244 | Yes |
| 1070 | Liberia | 2006- | DHS | National | Both | | 15-49 | | 6,419 | Yes |
| 1071 | Liberia | 2011 | STEPS | National | Both | 25-64 | 25-64 | 998 | 1,254 | Yes |
| 1072 | Liberia | 2013 | DHS | National | Both | 15-49 | 15-49 | 4,235 | 4,718 | Yes |
| 1073 | Libya | 1998- | Kadiki et al., Diabetes Metab 27(6):647-54, 2001 | Community | Both | 15+ | 15+ | 228 | 398 | No |
| 1074 | Libya | 2009 | STEPS | National | Both | 25-64 | 25-64 | 1,678 | 1,564 | Yes |
| 1075 | Lithuania | 1986- | MONICA, Kaunas | Community | Urban | 35-64 | 35-64 | 894 | 868 | No |
| 1076 | Lithuania | 1987 | Countrywide Integrated Noncommunicable Diseases Intervention Programme | Subnational | Rural | 25-64 | 25-64 | 1,220 | 1,434 | No |
| 1077 | Lithuania | 1992- | MONICA, Kaunas | Community | Urban | 35-64 | 35-64 | 610 | 621 | No |
| 1078 | Lithuania | 1992- | Countrywide Integrated Noncommunicable Diseases Intervention Programme | Subnational | Rural | 25-64 | 25-64 | 617 | 798 | No |
| 1079 | Lithuania | 1997 | Pomerleau, 2000 | National | Both | 19+ | 19+ | 966 | 1,130 | No |
| 1080 | Lithuania | 1998- | Countrywide Integrated Noncommunicable Diseases Intervention Programme | Subnational | Rural | 25-64 | 25-64 | 816 | 1,021 | No |
| 1081 | Lithuania | 2002 | Pomerleau et al., Public Health Nutrition 3: 3-10, 2000 | National | Both | 24-70 | 24-70 | 977 | 928 | Yes |
| 1082 | Lithuania | 2001- | MONICA4 | Community | Urban | 35-64 | 35-64 | 625 | 776 | No |
| 1083 | Lithuania | 2006- | Countrywide Integrated Noncommunicable Diseases Intervention Programme | Subnational | Rural | 25-64 | 25-64 | 718 | 972 | No |
| 1084 | Lithuania | 2006- | Health, Alcohol and Psychosocial Factors In Eastern Europe | Community | Urban | 45-75 | 45-75 | 3,231 | 3,874 | No |
| 1085 | Luxembourg | 2007- | Observation of cardiovascular risk factors in Luxembourg (ORISCAV-LUX) | National | Both | 18-69 | 18-69 | 696 | 735 | No |
| 1086 | Luxembourg | 2013- | European Health Examination Survey | National | Both | 25-64 | 25-64 | 721 | 785 | No |
| 1087 | Luxembourg | 2016- | Observation of cardiovascular risk factors in Luxembourg (ORISCAV-LUX2) | National | Both | 25-79 | 25-79 | 670 | 763 | No |
| 1088 | Macedonia (TFYR) | 1999 | Multiple Indicator Cluster Survey | National | Both | | 15-45 | | 1,038 | Yes |
| 1089 | Madagascar | 1997 | DHS | National | Both | | 20-49 | | 2,253 | Yes |
| 1090 | Madagascar | 1997 | Mauny et al., Ann Trop Med Parasitol 97(6):645-54, 2003 | Community | Both | 15+ | 15+ | 248 | 283 | No |
| 1091 | Madagascar | 2003- | DHS | National | Both | | 15-49 | | 7,155 | Yes |
| 1092 | Madagascar | 2005 | STEPS | Subnational | Both | 25-64 | 25-64 | 2,596 | 2,494 | Yes |
| 1093 | Madagascar | 2008- | DHS | National | Both | | 15-49 | | 7,869 | Yes |
| 1094 | Malawi | 1992 | DHS | National | Both | | 20-49 | | 2,102 | Yes |
| 1095 | Malawi | 1996 | Chilima et al., Eur J Clin Nutr 52(9):643-9 | Community | Rural | 55-94 | 55-94 | 86 | 185 | No |
| 1096 | Malawi | 2000 | DHS | National | Both | | 15-49 | | 11,491 | Yes |
| 1097 | Malawi | 2004 | DHS | National | Both | | 15-49 | | 9,751 | Yes |
| 1098 | Malawi | 2009 | STEPS | National | Both | 25-64 | 25-64 | 1,666 | 3,189 | Yes |
| 1099 | Malawi | 2010 | DHS | National | Both | | 15-49 | | 7,118 | Yes |
| 1100 | Malawi | 2013- | NCD Survey Malawi Epidemiology and Intervention Research Unit | Community | Rural | 18+ | 18+ | 5,849 | 7,507 | No |
| 1101 | Malawi | 2013- | NCD Survey Malawi Epidemiology and Intervention Research Unit | Community | Urban | 18+ | 18+ | 5,802 | 10,291 | No |
| 1102 | Malawi | 2015- | DHS | National | Both | | 15-49 | | 7,415 | Yes |
| 1103 | Malawi | 2017 | STEPS | National | Both | 18-69 | 18-69 | 1,478 | 2,534 | Yes |
| 1104 | Malaysia | 1996 | National Health and Morbidity Survey (NHMS) | National | Both | 18+ | 18+ | 14,520 | 16,244 | Yes |
| 1105 | Malaysia | 2002- | Malaysian Adult Nutrition Survey | National | Both | 18-59 | 18-59 | 1,286 | 966 | Yes |
| 1106 | Malaysia | 2004 | Rampal et al., Public Health 2008; 122: 11-8 | National | Both | 15+ | 15+ | 6,834 | 9,293 | Yes |
| 1107 | Malaysia | 2005 | STEPS | National | Both | 25-64 | 25-64 | 1,286 | 1,286 | No |
| 1108 | Malaysia | 2006 | National Health and Morbidity Survey (NHMS) | National | Both | 5+ | 5+ | 22,970 | 25,508 | Yes |
| 1109 | Malaysia | 2008 | Metabolic Syndrome Study in Malaysia | National | Rural | 18+ | 18+ | 753 | 1,368 | Yes |
| 1110 | Malaysia | 2008 | Metabolic Syndrome Study in Malaysia | National | Urban | 18+ | 18+ | 769 | 1,446 | Yes |
| 1111 | Malaysia | 2011 | National Health and Morbidity Survey (NHMS) | National | Both | 5+ | 5+ | 8,033 | 8,780 | Yes |
| 1112 | Malaysia | 2014 | Malaysian Adult Nutrition Survey | National | Both | 18-59 | 18-59 | 1,328 | 1,495 | Yes |
| 1113 | Malaysia | 2015 | National Health and Morbidity Survey (NHMS) | National | Both | 18+ | 18+ | 8,916 | 9,581 | Yes |
| 1114 | Maldives | 2001 | Multiple Indicator Cluster Survey | National | Both | | 15-50 | | 1,145 | No |
| 1115 | Maldives | 2004 | STEPS | Subnational | Urban | 25-64 | 25-64 | 933 | 1,086 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1116 | Maldives | 2009 | DHS | National | Both | | 20-49 | | 5,139 | Yes |
| 1117 | Maldives | 2011 | STEPS | Subnational | Urban | 15-64 | 15-64 | 660 | 1,060 | Yes |
| 1118 | Maldives | 2016- | DHS | National | Both | 15-49 | 15-49 | 3,831 | 6,839 | Yes |
| 1119 | Mali | 1995- | DHS | National | Both | | 20-49 | | 3,789 | Yes |
| 1120 | Mali | 1997 | Programme Intégré de Développement de Bafoulabé | Community | Rural | 15-45 | 15-45 | 425 | 716 | Yes |
| 1121 | Mali | 1997 | Torheim et al., Eur J Clin Nutr 58(4):594-604, 2004 | Subnational | Rural | 15-44 | 15-44 | 237 | 337 | No |
| 1122 | Mali | 1999- | Bafoulabe Iodine Study | Community | Rural | | 15-45 | | 365 | Yes |
| 1123 | Mali | 1999 | Torheim et al., Public Health Nutr 8(4):387-94, 2005 | Subnational | Rural | | 15-44 | | 191 | No |
| 1124 | Mali | 2001 | DHS | National | Both | | 15-49 | | 10,526 | Yes |
| 1125 | Mali | 2006 | DHS | National | Both | | 15-49 | | 12,512 | Yes |
| 1126 | Mali | 2007 | STEPS | Subnational | Both | 15-64 | 15-64 | 1,036 | 1,494 | Yes |
| 1127 | Mali | 2012- | DHS | National | Both | | 15-49 | | 4,646 | Yes |
| 1128 | Mali | 2013 | Santé Nutritionnelle à Assise Comunautaire dans la région de Kayes (SNACK) | Subnational | Rural | | 20-68 | | 4,595 | Yes |
| 1129 | Mali | 2018 | DHS | National | Both | | 15-49 | | 4,576 | Yes |
| 1130 | Malta | 1986 | INTERSALT | Community | Rural | 20-59 | 20-59 | 100 | 100 | Yes |
| 1131 | Marshall Islands | 2002 | STEPS | National | Both | 15-64 | 15-64 | 772 | 1,195 | Yes |
| 1132 | Marshall Islands | 2017- | STEPS | National | Both | 18+ | 18+ | 1,246 | 1,392 | Yes |
| 1133 | Mauritania | 2000- | DHS | National | Both | | 15-49 | | 2,635 | No |
| 1134 | Mauritania | 2006 | STEPS | Community | Urban | 15-64 | 15-64 | 1,132 | 1,300 | Yes |
| 1135 | Mauritius | 1987 | Mauritius Noncommunicable Disease Survey | National | Both | 25-74 | 25-74 | 2,347 | 2,653 | Yes |
| 1136 | Mauritius | 1992 | Mauritius Noncommunicable Disease Survey | National | Both | 25-74 | 25-74 | 2,985 | 3,477 | Yes |
| 1137 | Mauritius | 1998 | Mauritius Noncommunicable Disease Survey | National | Both | 25-74 | 25-74 | 2,566 | 3,248 | Yes |
| 1138 | Mauritius | 2009 | Mauritius Noncommunicable Disease Survey | National | Both | 19-74 | 19-74 | 2,859 | 3,391 | Yes |
| 1139 | Mexico | 1988- | Encuesta Nacional de Nutricion | National | Both | | 12-49 | | 16,617 | Yes |
| 1140 | Mexico | 1990- | Mexico City Diabetes Study | Community | Urban | 30+ | 30+ | 941 | 1,341 | Yes |
| 1141 | Mexico | 1992- | Encuesta Nacional de Enfermedades Cronicas | National | Urban | 20-69 | 20-69 | 6,040 | 8,298 | Yes |
| 1142 | Mexico | 1993- | Mexico City Diabetes Study | Community | Urban | 34+ | 34+ | 707 | 1,033 | Yes |
| 1143 | Mexico | 1996 | Sanchez-Castillo et al., Eur J Clin Nutr 55(10):833-40, 2001 | Community | Rural | 18+ | 18+ | 104 | 149 | No |
| 1144 | Mexico | 1998- | Encuesta Nacional de Nutricion | National | Both | | 12-49 | | 17,892 | Yes |
| 1145 | Mexico | 1997- | Mexico City Diabetes Study | Community | Urban | 37+ | 37+ | 701 | 980 | Yes |
| 1146 | Mexico | 2000 | Encuesta Nacional de Salud | National | Both | 10+ | 10+ | 22,554 | 39,204 | Yes |
| 1147 | Mexico | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 359 | 548 | No |
| 1148 | Mexico | 2001 | The Mexican Health and Aging Study | National | Both | 50+ | 50+ | 1,030 | 1,224 | No |
| 1149 | Mexico | 1998- | Mexico City Prospective Study | Community | Urban | 35-84 | 35-84 | 51,768 | 105,313 | No |
| 1150 | Mexico | 2002 | Encuesta Nacional Sobre Niveles de vida de los Hogares | National | Both | 5+ | 5+ | 11,606 | 13,614 | Yes |
| 1151 | Mexico | 2003 | The Mexican Health and Aging Study | National | Both | 50+ | 50+ | 893 | 1,162 | No |
| 1152 | Mexico | 2005 | Encuesta Nacional Sobre Niveles de vida de los Hogares | National | Both | 5+ | 5+ | 11,696 | 13,211 | Yes |
| 1153 | Mexico | 2004- | Cardiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 833 | 894 | No |
| 1154 | Mexico | 2006 | Encuesta Nacional de Salud y Nutrición | National | Both | 5+ | 5+ | 27,848 | 34,909 | Yes |
| 1155 | Mexico | 2006 | PREVENIMSS National Coverage Surveys | National | Urban | 20+ | 20+ | 8,715 | 11,315 | No |
| 1156 | Mexico | 2007- | Mexico City Diabetes Study | Community | Urban | 51+ | 51+ | 460 | 711 | No |
| 1157 | Mexico | 2009- | SAGE | National | Both | 50+ | 50+ | 796 | 1,236 | No |
| 1158 | Mexico | 2010 | PREVENIMSS National Coverage Surveys | National | Urban | 20+ | 20+ | 6,238 | 6,003 | No |
| 1159 | Mexico | 2009- | Encuesta Nacional Sobre Niveles de vida de los Hogares | National | Both | 5+ | 5+ | 4,908 | 4,697 | Yes |
| 1160 | Mexico | 2011- | Encuesta Nacional de Salud Y Nutricion | National | Both | 5+ | 5+ | 31,293 | 36,834 | Yes |
| 1161 | Mexico | 2012 | The Mexican Health and Aging Study | National | Both | 50+ | 50+ | 786 | 1,106 | No |
| 1162 | Mexico | 2016 | Encuesta Nacional de Salud Y Nutricion | National | Both | 5+ | 5+ | 5,660 | 8,429 | Yes |
| 1163 | Mexico | 2018- | Encuesta Nacional de Salud Y Nutricion | National | Both | 5+ | 5+ | 4,154 | 5,835 | Yes |
| 1164 | Micronesia (Federated States | 2002 | STEPS | Subnational | Both | 25-64 | 25-64 | 591 | 893 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1165 | Micronesia (Federated States | 2006 | STEPS | Subnational | Both | 15-64 | 15-64 | 918 | 1,553 | Yes |
| 1166 | Micronesia (Federated States | 2008 | STEPS | Subnational | Both | 25-64 | 25-64 | 875 | 1,266 | Yes |
| 1167 | Micronesia (Federated States | 2009 | STEPS, Kosrae | Subnational | Both | 15-64 | 15-64 | 208 | 413 | Yes |
| 1168 | Micronesia (Federated States | 2009 | STEPS, Yap | Subnational | Both | 15-64 | 15-64 | 405 | 521 | Yes |
| 1169 | Micronesia (Federated States | 2016 | STEPS | Subnational | Both | 18-69 | 18-69 | 516 | 818 | Yes |
| 1170 | Moldova | 2005 | DHS | National | Both | | 15-49 | | 7,076 | Yes |
| 1171 | Moldova | 2013 | STEPS | National | Both | 18-69 | 18-69 | 1,712 | 2,777 | Yes |
| 1172 | Mongolia | 1999 | National Nutrition Survey | National | Both | 35-65 | 35-65 | 907 | 1,317 | No |
| 1173 | Mongolia | 2004 | National Nutrition Survey | National | Both | 15-74 | 15-74 | 248 | 360 | No |
| 1174 | Mongolia | 2005 | STEPS | National | Both | 15-64 | 15-64 | 1,669 | 1,717 | Yes |
| 1175 | Mongolia | 2009 | STEPS | National | Both | 15-64 | 15-64 | 2,197 | 3,117 | Yes |
| 1176 | Mongolia | 2013 | STEPS | National | Both | 15-64 | 15-64 | 2,698 | 3,167 | Yes |
| 1177 | Mongolia | 2019 | STEPS | National | Both | 15-69 | 15-69 | 2,926 | 3,543 | Yes |
| 1178 | Montenegro | 1985 | Anthropometric Characteristics of Montenegrin Recruiters from '70 and 80's | National | Both | 17-28 | | 9,722 | | No |
| 1179 | Montenegro | 1986 | Anthropometric Characteristics of Montenegrin Recruiters from '70 and 80's | National | Both | 17-28 | | 9,961 | | No |
| 1180 | Montenegro | 1987 | Anthropometric Characteristics of Montenegrin Recruiters from '70 and 80's | National | Both | 17-28 | | 10,230 | | No |
| 1181 | Montenegro | 2019 | Body Composition of high school students in Montenegro and its relationship with their eating | National | Both | 18-20 | 18-20 | 504 | 497 | No |
| 1182 | Morocco | 1992 | DHS | National | Both | | 20-49 | | 2,804 | Yes |
| 1183 | Morocco | 2000 | National Survey 2000 | National | Both | 20+ | 20+ | 755 | 1,047 | No |
| 1184 | Morocco | 2003- | DHS | National | Both | | 15-49 | | 15,944 | Yes |
| 1185 | Morocco | 2017 | STEPS | National | Both | 18+ | 18+ | 1,871 | 3,390 | Yes |
| 1186 | Mozambique | 1997 | DHS | National | Both | | 20-49 | | 2,824 | Yes |
| 1187 | Mozambique | 2003 | DHS | National | Both | | 15-49 | | 10,535 | Yes |
| 1188 | Mozambique | 2005 | STEPS | National | Both | 25-64 | 25-64 | 1,276 | 1,689 | Yes |
| 1189 | Mozambique | 2011 | DHS | National | Both | | 15-49 | | 12,201 | Yes |
| 1190 | Mozambique | 2014- | STEPS | National | Both | 15-64 | 15-64 | 1,147 | 1,684 | Yes |
| 1191 | Myanmar | 2003- | STEPS | Subnational | Both | 25-74 | 25-74 | 1,990 | 2,449 | Yes |
| 1192 | Myanmar | 2009 | STEPS | National | Both | 15-64 | 15-64 | 2,826 | 4,421 | Yes |
| 1193 | Myanmar | 2011 | Underweight prevalence among young adults from rural areas, Salin Township, Magwe | Community | Rural | 15-35 | 15-35 | 156 | 233 | No |
| 1194 | Myanmar | 2014 | STEPS | National | Both | 25-64 | 25-64 | 2,947 | 5,444 | Yes |
| 1195 | Myanmar | 2013- | STEPS 2013-2014 Yangon | Subnational | Both | 25-74 | 25-74 | 745 | 740 | Yes |
| 1196 | Myanmar | 2015- | DHS | National | Both | | 15-49 | | 12,163 | Yes |
| 1197 | Namibia | 1992 | DHS | National | Both | | 20-49 | | 2,062 | Yes |
| 1198 | Namibia | 2005 | STEPS | National | Both | 25-64 | 25-64 | 1,390 | 1,778 | Yes |
| 1199 | Namibia | 2006- | DHS | National | Both | | 15-49 | | 8,968 | Yes |
| 1200 | Namibia | 2009 | Okambilimbili Survey | Community | Urban | 5+ | 5+ | 962 | 1,167 | Yes |
| 1201 | Namibia | 2013 | DHS | National | Both | | 15-64 | | 5,111 | Yes |
| 1202 | Nauru | 1987 | Trends in the prevalence and incidence of non-insulin-dependent diabetes mellitus and | National | Both | 20+ | 20+ | 555 | 667 | Yes |
| 1203 | Nauru | 1994 | Trends in the prevalence and incidence of non-insulin-dependent diabetes mellitus and | National | Both | 25+ | 25+ | 647 | 731 | Yes |
| 1204 | Nauru | 2004 | STEPS | National | Both | 15-64 | 15-64 | 1,082 | 1,149 | Yes |
| 1205 | Nauru | 2006 | STEPS | National | Both | 16-65 | 16-65 | 255 | 236 | Yes |
| 1206 | Nauru | 2015 | STEPS | National | Rural | 18-69 | 18-69 | 505 | 540 | Yes |
| 1207 | Nepal | 1996 | DHS | National | Both | | 20-49 | | 3,068 | Yes |
| 1208 | Nepal | 1997 | Ohno et al., Asia Pac J Public Health 18(3):20-9, 2006 | Community | Rural | 17-75 | 17-75 | 36 | 41 | No |
| 1209 | Nepal | 2001 | DHS | National | Both | | 20-49 | | 7,216 | Yes |
| 1210 | Nepal | 2003 | STEPS | Subnational | Both | 25-64 | 25-64 | 1,010 | 996 | No |
| 1211 | Nepal | 2005 | STEPS | Subnational | Both | 15-64 | 15-64 | 3,634 | 3,998 | Yes |
| 1212 | Nepal | 2006 | DHS | National | Both | | 15-49 | | 10,117 | Yes |
| 1213 | Nepal | 2007- | STEPS | National | Both | 15-64 | 15-64 | 1,889 | 2,348 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1214 | Nepal | 2006- | Early detection and management of Kidney disease, Hypertension, Diabetes and | Community | Rural | 18+ | 18+ | 1,175 | 2,350 | Yes |
| 1215 | Nepal | 2006- | Early detection and management of Kidney disease, Hypertension, Diabetes and | Community | Urban | 18+ | 18+ | 1,095 | 1,576 | Yes |
| 1216 | Nepal | 2006- | Early detection and management of Kidney disease, Hypertension, Diabetes and | Community | Urban | 18+ | 18+ | 4,130 | 6,126 | Yes |
| 1217 | Nepal | 2011 | DHS | National | Both | | 15-49 | | 5,848 | Yes |
| 1218 | Nepal | 2012- | STEPS | National | Both | 15-69 | 15-69 | 1,326 | 2,763 | Yes |
| 1219 | Nepal | 2015 | Community based intervention for prevention and control of non-communicable diseases risk | Subnational | Rural | 15-69 | 15-69 | 555 | 781 | Yes |
| 1220 | Nepal | 2015 | Community based intervention for prevention and control of non-communicable diseases risk | Subnational | Rural | 15-69 | 15-69 | 546 | 721 | Yes |
| 1221 | Nepal | 2016 | DHS | National | Both | 15-49 | 15-49 | 4,035 | 6,165 | Yes |
| 1222 | Nepal | 2016- | The Population Based Prevalence of Selected Non-Communicable Diseases In Nepal | National | Both | 20+ | 20+ | 4,907 | 7,529 | Yes |
| 1223 | Netherlands | 1985 | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 99 | Yes |
| 1224 | Netherlands | 1985 | Zutphen Elderly Study | Community | Urban | 65-85 | | 886 | | No |
| 1225 | Netherlands | 1990 | Zutphen Elderly Study | Community | Urban | 69-90 | | 552 | | No |
| 1226 | Netherlands | 1989- | The Rotterdam Study, first subcohort | Community | Urban | 55+ | 55+ | 2,807 | 4,103 | No |
| 1227 | Netherlands | 1992- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 55-85 | 55-85 | 1,266 | 1,308 | No |
| 1228 | Netherlands | 1993- | The Rotterdam Study, first subcohort | Community | Urban | 56+ | 56+ | 2,214 | 3,105 | No |
| 1229 | Netherlands | 1993- | EPIC Bilthoven | Community | Urban | 20-59 | 20-59 | 9,941 | 12,021 | Yes |
| 1230 | Netherlands | 1993- | EPIC Utrecht | Community | Both | | 49-70 | | 17,335 | Yes |
| 1231 | Netherlands | 1995- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 65-88 | 65-88 | 714 | 764 | No |
| 1232 | Netherlands | 1997- | The Rotterdam Study, first subcohort | Community | Urban | 61+ | 61+ | 1,718 | 2,361 | No |
| 1233 | Netherlands | 1998- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 61-91 | 61-91 | 604 | 743 | No |
| 1234 | Netherlands | 1998- | Regenboog Project | National | Both | 12-89 | 12-89 | 2,714 | 2,643 | Yes |
| 1235 | Netherlands | 2000- | The Rotterdam Study, second subcohort | Community | Urban | 55+ | 55+ | 1,210 | 1,468 | No |
| 1236 | Netherlands | 2001- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 64-94 | 64-94 | 577 | 690 | No |
| 1237 | Netherlands | 2001- | Surinamese in the Netherlands: Study on Ethnicity and Health (SUNSET) | Community | Urban | 35-60 | 35-60 | 251 | 257 | Yes |
| 1238 | Netherlands | 2002- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 54-65 | 54-65 | 431 | 482 | No |
| 1239 | Netherlands | 2002- | The Rotterdam Study, first subcohort | Community | Urban | 64+ | 64+ | 1,206 | 1,708 | No |
| 1240 | Netherlands | 2003- | Doetinchem Cohort Study (4th measurement) | Subnational | Urban | 36-74 | 36-74 | 2,125 | 2,352 | No |
| 1241 | Netherlands | 2004- | The Rotterdam Study, second subcohort | Community | Urban | 58+ | 58+ | 964 | 1,244 | No |
| 1242 | Netherlands | 2005- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 57-97 | 57-97 | 789 | 958 | No |
| 1243 | Netherlands | 2006- | The Rotterdam Study, third subcohort | Community | Urban | 45+ | 45+ | 1,547 | 2,029 | No |
| 1244 | Netherlands | 2008- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 60-100 | 60- | 642 | 789 | No |
| 1245 | Netherlands | 2009- | Measuring the Netherlands (NL de Maat) | Subnational | Both | 30-70 | 30-70 | 1,781 | 2,014 | No |
| 1246 | Netherlands | 2009- | The Rotterdam Study, first subcohort | Community | Urban | 72+ | 72+ | 690 | 1,006 | No |
| 1247 | Netherlands | 2011- | The Rotterdam Study, second subcohort | Community | Urban | 65+ | 65+ | 735 | 934 | No |
| 1248 | Netherlands | 2011- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 63-104 | 63- | 532 | 653 | No |
| 1249 | Netherlands | 2012- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 55-65 | 55-65 | 426 | 448 | No |
| 1250 | Netherlands | 2011- | Healthy Life in an Urban Setting (HELIUS) | Community | Urban | 18-71 | 18-71 | 2,088 | 2,473 | No |
| 1251 | Netherlands | 2012- | The Rotterdam Study, third subcohort | Community | Urban | 52+ | 52+ | 1,256 | 1,639 | No |
| 1252 | Netherlands | 2015- | The Longitudinal Aging Study Amsterdam (LASA) | Subnational | Both | 58+ | 58+ | 759 | 857 | No |
| 1253 | New Zealand | 1989 | The Life in New Zealand Survey | National | Both | 15+ | 15+ | 1,418 | 1,571 | No |
| 1254 | New Zealand | 1990- | Williams, N Z Med J 113(1114):308-11, 2000 | Community | Both | 18-21 | 18-21 | 932 | 859 | No |
| 1255 | New Zealand | 1993- | MONICA, Auckland | Community | Urban | 35-64 | 35-64 | 723 | 674 | No |
| 1256 | New Zealand | 1996- | National Nutrition Survey | National | Both | 15+ | 15+ | 1,857 | 2,522 | No |
| 1257 | New Zealand | 2002- | New Zealand Health Survey | National | Both | 15+ | 15+ | 4,594 | 6,729 | No |
| 1258 | New Zealand | 2006- | New Zealand Health Survey | National | Both | 5+ | 5+ | 6,766 | 8,032 | No |
| 1259 | New Zealand | 2008- | New Zealand Adult Nutrition Survey | National | Both | 15+ | 15+ | 2,003 | 2,500 | No |
| 1260 | New Zealand | 2011- | New Zealand Health Survey | National | Both | 5+ | 5+ | 5,783 | 7,220 | No |
| 1261 | New Zealand | 2012- | New Zealand Health Survey | National | Both | 5+ | 5+ | 6,409 | 7,926 | No |
| 1262 | New Zealand | 2013- | New Zealand Health Survey | National | Both | 5+ | 5+ | 6,971 | 8,310 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1263 | New Zealand | 2014- | New Zealand Health Survey | National | Both | 5+ | 5+ | 7,128 | 8,437 | No |
| 1264 | New Zealand | 2015- | New Zealand Health Survey | National | Both | 5+ | 5+ | 7,258 | 8,451 | No |
| 1265 | Nicaragua | 1997- | DHS | National | Both | | 15-49 | | 12,257 | Yes |
| 1266 | Nicaragua | 2001 | DHS | National | Both | | 15-49 | | 11,940 | Yes |
| 1267 | Nicaragua | 2003- | CAMDI | Community | Urban | 20+ | 20+ | 773 | 916 | Yes |
| 1268 | Nicaragua | 2003- | Sistema Integrado de Vigilancia de Intervenciones Nutricionales (SIVIN) | National | Both | | 15-50 | | 1,115 | No |
| 1269 | Nicaragua | 2006- | Encuesta Nicaraguense de Demografia y Salud | National | Both | | 15-49 | | 13,216 | Yes |
| 1270 | Nicaragua | 2011- | Encuesta Nicaraguense de Demografia y Salud | National | Both | | 15-49 | | 14,318 | Yes |
| 1271 | Niger | 1992 | DHS | National | Both | | 20-49 | | 2,993 | Yes |
| 1272 | Niger | 1998 | DHS | National | Both | | 20-49 | | 2,958 | Yes |
| 1273 | Niger | 2006 | DHS | National | Both | | 15-49 | | 4,151 | Yes |
| 1274 | Niger | 2007 | STEPS | National | Both | 15-64 | 15-64 | 1,430 | 1,215 | Yes |
| 1275 | Niger | 2012 | DHS | National | Both | | 15-49 | | 4,429 | Yes |
| 1276 | Nigeria | 1990 | Non-communicable Diseases National Survey | National | Rural | 15+ | 15+ | 3,619 | 3,682 | No |
| 1277 | Nigeria | 1990 | Non-communicable Diseases National Survey | National | Urban | 15+ | 15+ | 1,617 | 1,645 | No |
| 1278 | Nigeria | 1991- | Cooper et al., Am J Public Health 87(2):160-68, 1997 | Community | Both | 20-100 | 20- | 910 | 1,080 | No |
| 1279 | Nigeria | 1999 | DHS | National | Both | | 20-49 | | 2,004 | Yes |
| 1280 | Nigeria | 2003 | DHS | National | Both | | 15-49 | | 6,605 | Yes |
| 1281 | Nigeria | 1999- | Prostate cancer dietary risk factors study | Subnational | Both | 35+ | | 627 | | Yes |
| 1282 | Nigeria | 2007 | Ibadan Study of Ageing | Subnational | Both | 60+ | 60+ | 642 | 914 | No |
| 1283 | Nigeria | 2008 | DHS | National | Both | | 15-49 | | 28,973 | Yes |
| 1284 | Nigeria | 2008 | Ibadan Study of Ageing | Subnational | Both | 61+ | 61+ | 453 | 656 | No |
| 1285 | Nigeria | 2009 | Ibadan Study of Ageing | Subnational | Both | 62+ | 62+ | 420 | 619 | No |
| 1286 | Nigeria | 2009 | Community Health Plan - Kwara Central Survey | Community | Rural | 5+ | 5+ | 2,264 | 2,354 | Yes |
| 1287 | Nigeria | 2011 | Community Health Plan - Kwara Central Survey | Community | Rural | 5+ | 5+ | 791 | 853 | Yes |
| 1288 | Nigeria | 2013 | DHS | National | Both | | 15-49 | | 33,943 | Yes |
| 1289 | Nigeria | 2013 | Community Health Plan - Kwara Central Survey | Community | Rural | 5+ | 5+ | 714 | 754 | Yes |
| 1290 | Nigeria | 2018 | Hypertension Prevalence, Awareness, Treatment and Control in Rural Area, Nigeria | Community | Rural | 18+ | 18+ | 189 | 202 | Yes |
| 1291 | Niue | 2011 | STEPS | National | Both | 15+ | 15+ | 407 | 478 | Yes |
| 1292 | Norway | 1984- | HUNT1 Study | Subnational | Rural | 20+ | 20+ | 36,517 | 37,811 | No |
| 1293 | Norway | 1986- | The Tromsø Study: Tromsø 3 | Community | Both | 20-61 | 20-56 | 10,374 | 9,804 | Yes |
| 1294 | Norway | 1992- | The Hordaland Health Study (HUSK) 1925-1927 birth cohort | Community | Urban | 65-67 | 65-67 | 2,123 | 2,630 | No |
| 1295 | Norway | 1992- | The Hordaland Health Study (HUSK) 1928-1949 birth cohort | Community | Urban | 43-64 | 43-64 | 335 | 348 | No |
| 1296 | Norway | 1992- | The Hordaland Health Study (HUSK) 1950-1952 birth cohort | Subnational | Both | 40-42 | 40-42 | 6,103 | 6,475 | No |
| 1297 | Norway | 1994- | The Tromsø Study: Tromsø 4 | Community | Both | 25+ | 25+ | 12,782 | 13,836 | Yes |
| 1298 | Norway | 1995- | HUNT2 study | Subnational | Rural | 20+ | 20+ | 30,285 | 33,599 | No |
| 1299 | Norway | 1995- | Young-HUNT1 Study | Subnational | Rural | 12-21 | 12-21 | 4,203 | 4,253 | No |
| 1300 | Norway | 1997- | The Hordaland Health Study (HUSK) 1925-27 birth cohort | Community | Urban | 70-74 | 70-74 | 1,465 | 1,839 | No |
| 1301 | Norway | 1997- | The Hordaland Health Study (HUSK) 1950-1957 birth cohort | Subnational | Both | 40-47 | 40-47 | 10,180 | 11,928 | No |
| 1302 | Norway | 2000- | Young-HUNT2 Study | Subnational | Rural | 16-21 | 16-21 | 764 | 901 | No |
| 1303 | Norway | 2001- | The Tromsø Study: Tromsø 5, Tromsø Study Panel | Community | Both | 30-89 | 30-89 | 2,525 | 3,579 | Yes |
| 1304 | Norway | 2000- | The Oslo cohort (HUBRO), the Oppland and Hedmark cohort (OPPHED), and the Troms and | Subnational | Both | 30-76 | 30-76 | 16,825 | 20,592 | No |
| 1305 | Norway | 2006- | HUNT3 Study | Subnational | Rural | 20+ | 20+ | 22,860 | 27,553 | No |
| 1306 | Norway | 2006- | Young-HUNT3 Study | Subnational | Rural | 12-21 | 12-21 | 3,807 | 3,792 | No |
| 1307 | Norway | 2007- | The Tromsø Study: Tromsø 6 | Community | Both | 30-87 | 30-87 | 6,048 | 6,889 | Yes |
| 1308 | Occupied Palestinian Territory | 1996 | Stene et al., Eur J Clin Nutr 55(9):805-11, 2001 | Community | Rural | 30-65 | 30-65 | 208 | 269 | No |
| 1309 | Occupied Palestinian Territory | 1996- | Kobar, rural | Community | Rural | 15-64 | 15-64 | 206 | 482 | Yes |
| 1310 | Occupied Palestinian Territory | 1996- | Old Ramallah, urban | Community | Urban | 15-64 | 15-64 | 182 | 493 | Yes |
| 1311 | Occupied Palestinian Territory | 1999- | The First National Health and Nutrition Survey | National | Both | 18-64 | 18-64 | 1,736 | 1,869 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1312 | Occupied Palestinian Territory | 2010 | STEPS | National | Both | 15-64 | 15-64 | 2,578 | 4,052 | Yes |
| 1313 | Oman | 1991 | Oman National Health Survey | National | Both | 20+ | 20+ | 2,128 | 2,958 | No |
| 1314 | Oman | 2000 | Oman National Health Survey | National | Both | 20+ | 20+ | 3,069 | 3,331 | No |
| 1315 | Oman | 2001 | Al-Lawati et al., Diabetes Care 26(6):1781-85, 2003 | Community | Urban | 20+ | 20+ | 755 | 756 | No |
| 1316 | Oman | 2006 | STEPS | Community | Urban | 20-59 | 20-59 | 540 | 732 | No |
| 1317 | Oman | 2008 | Gulf Cooperation Council World Health Survey | National | Both | 18+ | 18+ | 2,389 | 2,112 | Yes |
| 1318 | Oman | 2017 | STEPS | National | Both | 15+ | 15+ | 3,405 | 3,034 | Yes |
| 1319 | Pakistan | 1990- | National Health Survey Of Pakistan 1990-1994 | National | Both | 5+ | 5+ | 7,110 | 7,405 | Yes |
| 1320 | Pakistan | 1990- | MHS | Community | Urban | 18+ | 18+ | 432 | 478 | No |
| 1321 | Pakistan | 1996 | Gupta et al., Int J Cardiol 97(2):257-61, 2004 | Community | Urban | 20+ | 20+ | 523 | 559 | No |
| 1322 | Pakistan | 1999 | Shah et al., Trop Med Int Health 9(4):526-32, 2004 | Community | Both | 18+ | 18+ | 1,391 | 2,754 | No |
| 1323 | Pakistan | 2005 | STEPS | National | Both | 25-65 | 25-65 | 787 | 1,071 | Yes |
| 1324 | Pakistan | 2004- | COBRA-1 | Community | Urban | 40+ | 40+ | 1,500 | 1,635 | No |
| 1325 | Pakistan | 2011 | National Nutrition Survey | National | Both | 5-49 | 5-49 | 21,461 | 48,503 | Yes |
| 1326 | Pakistan | 2012- | DHS | National | Both | | 20-49 | | 3,968 | Yes |
| 1327 | Pakistan | 2014 | STEPS | Subnational | Both | 18-69 | 18-69 | 2,964 | 3,674 | Yes |
| 1328 | Pakistan | 2016- | National Diabetes Survey of Pakistan | National | Both | 20+ | 20+ | 3,771 | 4,647 | Yes |
| 1329 | Pakistan | 2017- | DHS | National | Both | | 15-49 | | 4,493 | Yes |
| 1330 | Palau | 2011- | STEPS | National | Both | 25-64 | 25-64 | 1,031 | 1,124 | Yes |
| 1331 | Palau | 2016 | STEPS | National | Both | 18+ | 18+ | 713 | 711 | Yes |
| 1332 | Panama | 2003 | Encuesta de Niveles de Vida | National | Both | 5+ | 5+ | 10,808 | 11,133 | Yes |
| 1333 | Panama | 2003 | Second Living Standards Survey | National | Both | 18-75 | 18-75 | 6,844 | 7,100 | No |
| 1334 | Panama | 2010- | Prevalencia de factores de riesgo asociados a enfermedad cardiovascular 2010-2011 | Subnational | Both | 18+ | 18+ | 1,067 | 2,469 | Yes |
| 1335 | Papua New Guinea | 1985- | INTERSALT | Community | Rural | 20-59 | 20-59 | 88 | 74 | No |
| 1336 | Papua New Guinea | 2007 | STEPS | National | Both | 15-64 | 15-64 | 1,401 | 1,440 | Yes |
| 1337 | Paraguay | 2011 | Primera Encuesta Nacional de Factores de Riesgo de Enfermedades No Transmisibles en | National | Both | 15-75 | 15-75 | 931 | 1,574 | Yes |
| 1338 | Peru | 1991- | DHS | National | Both | | 15-49 | | 4,887 | Yes |
| 1339 | Peru | 1996 | DHS | National | Both | | 20-49 | | 10,125 | Yes |
| 1340 | Peru | 2000 | DHS | National | Both | | 15-49 | | 25,508 | Yes |
| 1341 | Peru | 2003 | Factores de Riesgo de Enfermedades No Transmisibles | Community | Urban | 16+ | 16+ | 327 | 503 | Yes |
| 1342 | Peru | 2004 | Factores de Riesgo de Enfermedades No Transmisibles | Community | Urban | 15+ | 15+ | 218 | 445 | Yes |
| 1343 | Peru | 2004- | DHS | National | Both | | 15-49 | | 5,798 | Yes |
| 1344 | Peru | 2004- | Encuesta Nacional de Indicadores Nutricionales, Bioquímicos, Socioeconómicos y Culturales | National | Both | 20+ | 20+ | 2,087 | 2,095 | Yes |
| 1345 | Peru | 2005 | Factores de Riesgo de Enfermedades No Transmisibles | Community | Urban | 15+ | 15+ | 209 | 550 | Yes |
| 1346 | Peru | 2004- | PREVENCION Study | Community | Urban | 20-80 | 20-80 | 867 | 1,011 | No |
| 1347 | Peru | 2004- | CArdiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 769 | 876 | No |
| 1348 | Peru | 2006 | Factores de Riesgo de Enfermedades No Transmisibles | Community | Urban | 15+ | 15+ | 662 | 1,101 | Yes |
| 1349 | Peru | 2007- | DHS | National | Both | | 15-49 | | 20,918 | Yes |
| 1350 | Peru | 2007- | Monitoreo de Indicadores Nutricionales en la ENAHO 2007-2008 | National | Both | 5+ | 5+ | 15,041 | 16,282 | Yes |
| 1351 | Peru | 2007- | Monitoreo Nacional de Indicadores Nutricionales | National | Both | | 12-49 | | 3,874 | Yes |
| 1352 | Peru | 2007- | PERU MIGRANT Study | Community | Both | 30+ | 30+ | 464 | 522 | Yes |
| 1353 | Peru | 2009 | DHS | National | Both | | 15-49 | | 23,034 | Yes |
| 1354 | Peru | 2010 | DHS | National | Both | | 15-49 | | 22,425 | Yes |
| 1355 | Peru | 2009- | Monitoreo de Indicadores Nutricionales en la ENAHO 2009-2010 | National | Both | 5+ | 5+ | 27,753 | 31,269 | Yes |
| 1356 | Peru | 2011 | DHS | National | Both | | 15-49 | | 22,215 | Yes |
| 1357 | Peru | 2009- | CRONICAS Cohort Study | Subnational | Both | 35+ | 35+ | 1,557 | 1,660 | Yes |
| 1358 | Peru | 2012 | DHS | National | Both | | 15-49 | | 23,724 | Yes |
| 1359 | Peru | 2011- | Monitoreo de Indicadores Nutricionales en la ENAHO 2011 | National | Both | 5+ | 5+ | 7,424 | 8,424 | Yes |
| 1360 | Peru | 2010- | CRONICAS Cohort Study | Subnational | Both | 35+ | 35+ | 1,379 | 1,468 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1361 | Peru | 2013 | DHS | National | Both | 15+ | 15+ | 2,932 | 23,784 | Yes |
| 1362 | Peru | 2013 | Clinical functional and sociofamilial profiles of the elderly from a community in a district of | Community | Urban | 60+ | 60+ | 185 | 309 | No |
| 1363 | Peru | 2012- | PERU MIGRANT Study | Community | Both | 35+ | 35+ | 339 | 427 | Yes |
| 1364 | Peru | 2013- | CRONICAS Cohort Study | Subnational | Both | 36+ | 36+ | 1,292 | 1,361 | Yes |
| 1365 | Peru | 2014 | DHS | National | Both | 15+ | 15+ | 12,670 | 28,582 | Yes |
| 1366 | Peru | 2014 | Launching a salt substitute to reduce blood pressure at the population level: a cluster | Subnational | Both | 18+ | 18+ | 1,149 | 1,166 | Yes |
| 1367 | Peru | 2015 | DHS | National | Both | 15+ | 15+ | 14,744 | 38,415 | Yes |
| 1368 | Peru | 2016 | DHS | National | Both | 15+ | 15+ | 14,037 | 35,999 | Yes |
| 1369 | Peru | 2015- | PERU MIGRANT Study | Community | Both | 38+ | 38+ | 324 | 414 | Yes |
| 1370 | Peru | 2017 | DHS | National | Both | 15+ | 15+ | 14,340 | 37,386 | Yes |
| 1371 | Peru | 2016- | Sceening of T2DM | Community | Urban | 30-70 | 30-70 | 798 | 809 | Yes |
| 1372 | Peru | 2018 | DHS | National | Both | 15+ | 15+ | 14,600 | 39,575 | Yes |
| 1373 | Peru | 2019 | DHS | National | Both | 15+ | 15+ | 14,200 | 37,943 | Yes |
| 1374 | Philippines | 1985- | Cebu Longitudinal Health and Nutrition Survey Baseline 20-Month Follow-up | Community | Both | | 15-50 | | 2,047 | Yes |
| 1375 | Philippines | 1985- | Cebu Longitudinal Health and Nutrition Survey Baseline 22-Month Follow-up | Community | Both | | 15-50 | | 2,017 | Yes |
| 1376 | Philippines | 1985- | Cebu Longitudinal Health and Nutrition Survey Baseline 24-Month Follow-up | Community | Both | | 15-50 | | 2,022 | Yes |
| 1377 | Philippines | 1984- | Cebu Longitudinal Health and Nutrition Survey Baseline 16-Month Follow-up | Community | Both | | 15-50 | | 2,129 | Yes |
| 1378 | Philippines | 1984- | Cebu Longitudinal Health and Nutrition Survey Baseline 18-Month Follow-up | Community | Both | | 15-50 | | 2,079 | Yes |
| 1379 | Philippines | 1988 | INCLEN | Community | Rural | 35-65 | | 274 | | No |
| 1380 | Philippines | 1991- | Cebu Longitudinal Health and Nutrition Survey 1991 Mother Follow-up | Community | Both | | 22-55 | | 2,195 | Yes |
| 1381 | Philippines | 1993 | 4th National Nutrition Survey Philippine | National | Both | 20-70 | 20-70 | 4,383 | 4,754 | No |
| 1382 | Philippines | 1993 | National Safe Motherhood Survey | National | Both | | 15-49 | | 7,181 | No |
| 1383 | Philippines | 1994- | Cebu Longitudinal Health and Nutrition Survey 1994-1995 Mother Follow-up | Community | Both | | 15-59 | | 2,692 | Yes |
| 1384 | Philippines | 1998 | 5th National Nutrition Survey Philippine | National | Both | 20-60 | 20-60 | 1,323 | 1,340 | No |
| 1385 | Philippines | 1998- | Cebu Longitudinal Health and Nutrition Survey 1998-1999 Mother Follow-up | Community | Both | | 15-59 | | 1,911 | Yes |
| 1386 | Philippines | 2002 | Cebu Longitudinal Health and Nutrition Survey 2002 Mother Follow-up | Community | Both | | 32-66 | | 2,080 | Yes |
| 1387 | Philippines | 2003 | 6th National Nutrition Survey Philippine | National | Both | 5+ | 5+ | 10,686 | 11,131 | Yes |
| 1388 | Philippines | 2003- | National Nutrition and Health Survey | National | Both | 15+ | 15+ | 30,231 | 33,295 | No |
| 1389 | Philippines | 2005 | Cebu Longitudinal Health and Nutrition Survey 2005 Child Follow-up | Community | Both | 20-22 | 20-22 | 1,006 | 831 | No |
| 1390 | Philippines | 2005 | Cebu Longitudinal Health and Nutrition Survey 2005 Mother Follow-up | Community | Both | | 35-69 | | 2,001 | Yes |
| 1391 | Philippines | 2007 | Cebu Longitudinal Health and Nutrition Survey 2007 Child Follow-up | Community | Both | 23-24 | 23-24 | 937 | 751 | No |
| 1392 | Philippines | 2007 | Cebu Longitudinal Health and Nutrition Survey 2007 Mother Follow-up | Community | Both | | 38-71 | | 1,925 | Yes |
| 1393 | Philippines | 2008 | 7th National Nutrition Survey | National | Both | 5+ | 5+ | 64,001 | 63,616 | Yes |
| 1394 | Philippines | 2009 | Cebu Longitudinal Health and Nutrition Survey 2009 Child Follow-up | Community | Both | 24-26 | 24-26 | 864 | 718 | No |
| 1395 | Philippines | 2011 | 2011 Updating of Nutritional Status of Filipino Children | National | Both | 5+ | 5+ | 63,654 | 66,866 | Yes |
| 1396 | Philippines | 2013- | 8th National Nutrition Survey | National | Both | 5+ | 5+ | 57,432 | 61,620 | Yes |
| 1397 | Philippines | 2015 | 2015 Updating of Nutritional Status of Filipino Children and Other Population Groups | National | Both | 5+ | 5+ | 69,309 | 73,250 | Yes |
| 1398 | Poland | 1986 | INTERSALT, Krakow | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 1399 | Poland | 1986 | INTERSALT, Warsaw | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 1400 | Poland | 1987- | MONICA, Tarnobrzeg Voivodship | Community | Rural | 35-64 | 35-64 | 616 | 672 | No |
| 1401 | Poland | 1988- | MONICA, Warsaw | Community | Urban | 35-64 | 35-64 | 705 | 713 | No |
| 1402 | Poland | 1989- | Polish Program CINDI (CINDI Lodz 1989-1990) | Community | Urban | 25-64 | 25-64 | 831 | 957 | Yes |
| 1403 | Poland | 1992- | MONICA, Tarnobrzeg Voivodship | Community | Rural | 35-64 | 35-64 | 618 | 692 | No |
| 1404 | Poland | 1993 | MONICA, Warsaw | Community | Urban | 35-64 | 35-64 | 751 | 763 | No |
| 1405 | Poland | 1995- | Polish Program CINDI (CINDI Lodz 1995) | Community | Urban | 17-64 | 17-64 | 997 | 1,459 | Yes |
| 1406 | Poland | 2000 | The health status, risk factors of chronic diseases and health behaviors of residents of Torun | Community | Urban | 16-83 | 16-83 | 989 | 1,054 | Yes |
| 1407 | Poland | 2000- | Household Food Consumption and Anthropometric Survey | National | Both | 5+ | 5+ | 1,766 | 2,107 | Yes |
| 1408 | Poland | 2001- | The health status, risk factors of chronic diseases and health behaviors of residents of Lodz | Community | Urban | 18-64 | 18-64 | 1,000 | 840 | Yes |
| 1409 | Poland | 2002 | The health status, risk factors of chronic diseases and health behaviors of residents of Lodz - | Community | Urban | 65+ | 65+ | 285 | 532 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1410 | Poland | 2002 | NATPOL | National | Both | 18+ | 18+ | 1,018 | 1,301 | Yes |
| 1411 | Poland | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 406 | | Yes |
| 1412 | Poland | 2004 | LIPIDOGRAM2004 Study - National epidemiological study of lipid disorders and selected | National | Both | 30+ | 30+ | 6,673 | 9,920 | Yes |
| 1413 | Poland | 2003- | National Multicenter Health Survey in Poland. Project WOBASZ | National | Both | 20-74 | 20-74 | 6,245 | 6,910 | Yes |
| 1414 | Poland | 2002- | Health, Alcohol and Psychosocial Factors In Eastern Europe | Community | Urban | 45-70 | 45-70 | 4,502 | 4,752 | No |
| 1415 | Poland | 2003- | Mogielica Human Ecology Study Site | Community | Rural | 18+ | 18+ | 119 | 321 | Yes |
| 1416 | Poland | 2006 | The health, risk factors for chronic diseases, attitudes and behaviors of health residents of | Community | Urban | 15-65 | 15-65 | 790 | 1,147 | Yes |
| 1417 | Poland | 2006 | LIPIDOGRAM2006 Study - National epidemiological study of lipid disorders and selected | National | Both | 32+ | 32+ | 6,441 | 10,640 | Yes |
| 1418 | Poland | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 310 | | No |
| 1419 | Poland | 2007- | Mogielica Human Ecology Study Site | Community | Rural | 18+ | 18+ | 133 | 290 | Yes |
| 1420 | Poland | 2007- | Medical, psychological and socioeconomic aspects of aging in Poland | National | Both | 55+ | 55+ | 2,750 | 2,582 | No |
| 1421 | Poland | 2011 | NATPOL | National | Both | 18-79 | 18-79 | 1,158 | 1,235 | Yes |
| 1422 | Poland | 2011- | Mogielica Human Ecology Study Site | Community | Rural | 18+ | 18+ | 142 | 418 | Yes |
| 1423 | Poland | 2013- | National Multicenter Health Survey in Poland. Project WOBASZ II | National | Both | 20+ | 20+ | 2,626 | 3,198 | Yes |
| 1424 | Poland | 2015- | LIPIDOGRAM2015 & LIPIDOGEN2015 Study - National epidemiological study of lipid | National | Both | 18+ | 18+ | 5,034 | 8,690 | Yes |
| 1425 | Poland | 2018 | Mogielica Human Ecology Study Site | Community | Rural | 18+ | 18+ | 30 | 95 | No |
| 1426 | Portugal | 1985 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 29,420 | | No |
| 1427 | Portugal | 1986 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 70,504 | | No |
| 1428 | Portugal | 1986 | INTERSALT | Community | Rural | 20-59 | 20-59 | 99 | 99 | Yes |
| 1429 | Portugal | 1987 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 68,079 | | No |
| 1430 | Portugal | 1988 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 67,573 | | No |
| 1431 | Portugal | 1989 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 68,827 | | No |
| 1432 | Portugal | 1990 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 44,359 | | No |
| 1433 | Portugal | 1991 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 19,552 | | No |
| 1434 | Portugal | 1992 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 52,393 | | No |
| 1435 | Portugal | 1993 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 59,780 | | No |
| 1436 | Portugal | 1994 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 55,511 | | No |
| 1437 | Portugal | 1995 | Body Mass Index of Portuguese Conscripts | National | Both | 18-20 | | 68,221 | | No |
| 1438 | Portugal | 1996 | Body Mass Index of Portuguese Conscripts | National | Both | 18-21 | | 106,097 | | No |
| 1439 | Portugal | 1997 | Body Mass Index of Portuguese Conscripts | National | Both | 18-21 | | 61,215 | | No |
| 1440 | Portugal | 1998 | Body Mass Index of Portuguese Conscripts | National | Both | 18-21 | | 41,027 | | No |
| 1441 | Portugal | 1999 | Body Mass Index of Portuguese Conscripts | National | Both | 18-21 | | 54,187 | | No |
| 1442 | Portugal | 2000 | Body Mass Index of Portuguese Conscripts | National | Both | 18-21 | | 53,326 | | No |
| 1443 | Portugal | 1999- | EPIPorto Study | Community | Urban | 18+ | 18+ | 932 | 1,507 | No |
| 1444 | Portugal | 2003- | Estudo de Prevalência da Obesidade e Consumos Alimentares em Portugal | National | Both | 18-64 | 18-64 | 3,796 | 4,320 | No |
| 1445 | Portugal | 2007- | Portuguese National Survey of Physical Activity and Physical Fitness | National | Both | 9+ | 9+ | 14,914 | 18,025 | No |
| 1446 | Portugal | 2010- | Exercise for Elderly | Community | Urban | 60-84 | 60-84 | 48 | 104 | No |
| 1447 | Portugal | 2011- | EPITeen - Epidemiological Health Investigation of Teenagers in Porto | Community | Urban | 20-23 | 20-23 | 854 | 895 | No |
| 1448 | Puerto Rico | 2002- | Puerto Rican Elderly: Health Conditions | National | Both | 60+ | 60+ | 1,914 | 2,850 | No |
| 1449 | Puerto Rico | 2005- | Perez et al., Ethn Dis 18(4):434-41, 2008 | Community | Urban | 15-84 | 15-84 | 275 | 529 | No |
| 1450 | Puerto Rico | 2006- | Puerto Rican Elderly: Health Conditions | National | Both | 60+ | 60+ | 1,056 | 1,669 | No |
| 1451 | Puerto Rico | 2010- | HPV Infection in a Population-Based Sample of Puerto Rican Women | Subnational | Both | | 16-64 | | 563 | Yes |
| 1452 | Qatar | 2006 | World Health Survey | National | Both | 18+ | 18+ | 1,859 | 2,018 | Yes |
| 1453 | Qatar | 2012 | STEPS | National | Both | 18-64 | 18-64 | 1,034 | 1,353 | Yes |
| 1454 | Romania | 1986- | MONICA, Bucharest | Community | Urban | 25-64 | 25-64 | 702 | 873 | No |
| 1455 | Romania | 1997 | Somatometria | National | Both | 15-75 | 15-75 | 3,142 | 4,063 | No |
| 1456 | Romania | 2009- | Study on children in Dolj County, South Romania | Subnational | Both | 5-21 | 5-21 | 746 | 672 | No |
| 1457 | Romania | 2011- | Study for the Evaluation of Prevalence of Hypertension and cArdiovascular Risk among the | National | Both | 18-80 | 18-80 | 927 | 1,023 | Yes |
| 1458 | Romania | 2015- | Study for the Evaluation of Prevalence of Hypertension and cArdiovascular Risk among the | National | Both | 18-80 | 18-80 | 936 | 1,034 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1459 | Russian Federation | 1984- | MONICA, Moscow (control) | Community | Urban | 35-64 | 35-64 | 774 | 642 | No |
| 1460 | Russian Federation | 1984- | MONICA, Moscow, Leninsky district | Community | Urban | 35-64 | 35-64 | 553 | 622 | No |
| 1461 | Russian Federation | 1984- | MONICA, Moscow, Cheremushkinsky district | Community | Urban | 35-64 | 35-64 | 580 | 579 | No |
| 1462 | Russian Federation | 1985 | MONICA, Novosibirsk (intervention) | Community | Urban | 25-64 | 25-64 | 797 | 818 | No |
| 1463 | Russian Federation | 1986 | INTERSALT | Community | Urban | 20-59 | 20-59 | 97 | 97 | Yes |
| 1464 | Russian Federation | 1985- | MONICA, Novosibirsk, Kirowsky district | Community | Urban | 25-64 | 25-64 | 758 | 774 | No |
| 1465 | Russian Federation | 1985- | MONICA, Novosibirsk, Leninsky district | Community | Urban | 25-64 | 25-64 | 624 | 624 | No |
| 1466 | Russian Federation | 1988 | MONICA, Novosibirsk (intervention) | Community | Urban | 25-64 | 25-64 | 837 | 852 | No |
| 1467 | Russian Federation | 1988- | MONICA, Moscow (control) | Community | Urban | 35-64 | 35-64 | 620 | 581 | No |
| 1468 | Russian Federation | 1988- | MONICA, Moscow, Leninsky district | Community | Urban | 35-64 | 35-64 | 597 | 612 | No |
| 1469 | Russian Federation | 1988- | MONICA, Novosibirsk, Kirowsky district | Community | Urban | 25-64 | 25-64 | 871 | 705 | No |
| 1470 | Russian Federation | 1992 | Russian Karelia Survey in Pitkaranta | Community | Both | 25-64 | 25-64 | 380 | 455 | Yes |
| 1471 | Russian Federation | 1992 | CINDI | Community | Rural | 25-64 | 25-64 | 377 | 453 | No |
| 1472 | Russian Federation | 1992- | Russia Longitudinal Monitoring Survey-Higher School of Economics Round II | National | Both | 5+ | 5+ | 4,764 | 6,348 | Yes |
| 1473 | Russian Federation | 1993 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round III | National | Both | 5+ | 5+ | 6,009 | 7,685 | Yes |
| 1474 | Russian Federation | 1993- | Russia Longitudinal Monitoring Survey-Higher School of Economics Round IV | National | Both | 5+ | 5+ | 5,519 | 7,094 | Yes |
| 1475 | Russian Federation | 1992- | MONICA, Moscow (control) | Community | Urban | 35-64 | 35-64 | 556 | 527 | No |
| 1476 | Russian Federation | 1992- | MONICA, Moscow, Leninsky district | Community | Urban | 35-64 | 35-64 | 538 | 858 | No |
| 1477 | Russian Federation | 1994 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round V | National | Both | 5+ | 5+ | 4,726 | 5,788 | Yes |
| 1478 | Russian Federation | 1994- | MONICA, Novosibirsk (intervention) | Community | Urban | 25-64 | 25-64 | 820 | 860 | No |
| 1479 | Russian Federation | 1995 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round VI | National | Both | 5+ | 5+ | 4,463 | 5,509 | Yes |
| 1480 | Russian Federation | 1995 | MONICA, Novosibirsk, Kirowsky district | Community | Urban | 25-64 | 25-64 | 771 | 787 | No |
| 1481 | Russian Federation | 1996 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round VII | National | Both | 5+ | 5+ | 4,377 | 5,456 | Yes |
| 1482 | Russian Federation | 1997 | Russian Karelia Survey in Pitkaranta | Community | Both | 25-64 | 25-64 | 309 | 440 | Yes |
| 1483 | Russian Federation | 1998- | Russia Longitudinal Monitoring Survey-Higher School of Economics Round VIII | National | Both | 5+ | 5+ | 4,497 | 5,590 | Yes |
| 1484 | Russian Federation | 2000 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round IX | National | Both | 5+ | 5+ | 4,600 | 5,760 | Yes |
| 1485 | Russian Federation | 2001 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round X | National | Both | 5+ | 5+ | 5,023 | 6,440 | Yes |
| 1486 | Russian Federation | 2002 | Russian Karelia Survey in Pitkaranta | Community | Both | 25-64 | 25-64 | 251 | 334 | Yes |
| 1487 | Russian Federation | 2002 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round XI | National | Both | 5+ | 5+ | 5,199 | 6,604 | Yes |
| 1488 | Russian Federation | 2003 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round XII | National | Both | 5+ | 5+ | 5,250 | 6,674 | Yes |
| 1489 | Russian Federation | 2004 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round XIII | National | Both | 5+ | 5+ | 5,219 | 6,668 | Yes |
| 1490 | Russian Federation | 2002- | Health, Alcohol and Psychosocial Factors In Eastern Europe | Community | Urban | 43-73 | 43-73 | 4,259 | 5,086 | No |
| 1491 | Russian Federation | 2005 | Russia Longitudinal Monitoring Survey-Higher School of Economics Round XIV | National | Both | 5+ | 5+ | 5,027 | 6,453 | Yes |
| 1492 | Russian Federation | 2007 | Russian Karelia Survey in Pitkaranta | Community | Both | 25-64 | 25-64 | 176 | 276 | Yes |
| 1493 | Russian Federation | 2007- | SAGE | National | Both | 50+ | 50+ | 1,254 | 2,251 | No |
| 1494 | Russian Federation | 2015- | Ural Eye and Medical Study (UEMS) | Subnational | Rural | 40+ | 40+ | 1,530 | 1,870 | Yes |
| 1495 | Russian Federation | 2015- | Ural Eye and Medical Study (UEMS) | Community | Urban | 40+ | 40+ | 1,050 | 1,449 | Yes |
| 1496 | Rwanda | 2000 | DHS | National | Both | | 15-49 | | 9,175 | Yes |
| 1497 | Rwanda | 2005 | DHS | National | Both | | 15-49 | | 5,211 | Yes |
| 1498 | Rwanda | 2010 | DHS | National | Both | 15-59 | 15-49 | 6,472 | 6,572 | Yes |
| 1499 | Rwanda | 2012 | STEPS | National | Both | 15-64 | 15-64 | 2,644 | 4,243 | Yes |
| 1500 | Rwanda | 2014- | DHS | National | Both | 15-59 | 15-49 | 6,366 | 6,313 | Yes |
| 1501 | Saint Kitts and Nevis | 2007 | STEPS | Subnational | Both | 25-64 | 25-64 | 510 | 852 | Yes |
| 1502 | Saint Lucia | 1991- | Cooper et al., Am J Public Health 87(2):160-68, 1997 | Community | Urban | 25-100 | 25- | 491 | 593 | No |
| 1503 | Saint Lucia | 2012 | STEPS | National | Both | 25-64 | 25-64 | 665 | 1,097 | Yes |
| 1504 | Saint Vincent and the | 2013- | STEPS | National | Both | 18-69 | 18-69 | 1,524 | 1,897 | Yes |
| 1505 | Samoa | 1991 | McGarvey, Pac Health Dialog 8(1):157-62, 2001 | National | Both | 25+ | 25+ | 347 | 381 | Yes |
| 1506 | Samoa | 1993 | McGarvey, Pac Health Dialog 8(1):157-62, 2002 | National | Both | 27+ | 27+ | 285 | 336 | Yes |
| 1507 | Samoa | 1995 | McGarvey, Pac Health Dialog 8(1):157-62, 2001 | National | Both | 29+ | 29+ | 156 | 157 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1508 | Samoa | 2002 | STEPS | National | Both | 25-64 | 25-64 | 1,181 | 1,334 | Yes |
| 1509 | Samoa | 2010 | Samoan Genome-Wide Association Study | National | Both | 24-65 | 24-65 | 1,402 | 2,061 | Yes |
| 1510 | Samoa | 2013 | STEPS | National | Both | 18-64 | 18-64 | 605 | 918 | Yes |
| 1511 | Sao Tome and Principe | 2008- | DHS | National | Both | 15-59 | 15-49 | 2,173 | 2,238 | Yes |
| 1512 | Sao Tome and Principe | 2009 | STEPS | National | Both | 25-64 | 25-64 | 998 | 1,286 | Yes |
| 1513 | Saudi Arabia | 1985- | National Nutrition Survey | National | Both | 5-75 | 5-75 | 4,356 | 5,944 | No |
| 1514 | Saudi Arabia | 1990- | National Epidemiological Household Survey | National | Both | 15-60 | 15-60 | 4,882 | 4,509 | No |
| 1515 | Saudi Arabia | 1989- | National Nutrition Survey | National | Both | 18-40 | 18-40 | 2,481 | 3,294 | No |
| 1516 | Saudi Arabia | 1990- | Saudi National Survey | National | Both | 30-70 | 30-70 | 1,612 | 1,648 | No |
| 1517 | Saudi Arabia | 1992- | Saudi Health Information Survey | National | Both | 14-50 | 14-50 | 4,830 | 7,707 | No |
| 1518 | Saudi Arabia | 1995 | National Household Survey | National | Both | 20-70 | 20-70 | 7,121 | 7,074 | No |
| 1519 | Saudi Arabia | 1995- | National Epidemiological Health Survey | National | Both | 30-70 | 30-70 | 8,215 | 9,008 | No |
| 1520 | Saudi Arabia | 2004- | Al-Baghli et al., Saudi Med J 29(9):1319-25, 2008 | Subnational | Both | 30+ | 30+ | 97,254 | 97,254 | No |
| 1521 | Saudi Arabia | 2005 | STEPS | National | Both | 15-64 | 15-64 | 2,245 | 2,345 | No |
| 1522 | Saudi Arabia | 2007 | Gulf Cooperation Council World Health Survey | National | Both | 18+ | 18+ | 4,854 | 3,610 | Yes |
| 1523 | Saudi Arabia | 2011- | Jeddah City Study | Community | Urban | 5+ | 5+ | 957 | 867 | Yes |
| 1524 | Saudi Arabia | 2013 | Saudi Health Information Survey | National | Both | 15+ | 15+ | 5,088 | 5,249 | No |
| 1525 | Senegal | 1986 | Astagneau et al., J Hypertens 10(9):1095-101, 1992 | Community | Urban | 15+ | 15+ | 651 | 707 | No |
| 1526 | Senegal | 1986 | Maire et al., Rev Epidemiol Sante Publique 40:252-58, 1992 | Community | Urban | | 16-45 | | 616 | No |
| 1527 | Senegal | 1992- | DHS | National | Both | | 20-49 | | 2,713 | Yes |
| 1528 | Senegal | 2003 | Perceptions of healthy and desirable body size in urban Senegalese women | Community | Urban | | 20-50 | | 287 | Yes |
| 1529 | Senegal | 2005 | DHS | National | Both | | 15-49 | | 4,166 | Yes |
| 1530 | Senegal | 2010- | DHS | National | Both | 15-59 | 15-49 | 4,715 | 5,497 | Yes |
| 1531 | Senegal | 2010- | Biocultural determinants of overweight and obesity in the context of nutrition transition in | Subnational | Both | 18+ | 18+ | 280 | 307 | Yes |
| 1532 | Senegal | 2015 | Les maladies chroniques au Sénégal: Une écologie de la santé comparative entre Dakar et | Community | Both | 20-100 | 20- | 734 | 765 | Yes |
| 1533 | Serbia | 1988- | MONICA, Novi Sad | Community | Urban | 25-64 | 25-64 | 778 | 791 | No |
| 1534 | Serbia | 1994- | MONICA, Novi Sad | Community | Urban | 25-64 | 25-64 | 600 | 670 | No |
| 1535 | Serbia | 2000 | Health Status, Health Needs and Utilization of Health Care of the Population of Serbia | National | Both | 7+ | 7+ | 5,079 | 6,189 | No |
| 1536 | Serbia | 2006 | The 2006 National Health Survey for the Population of Serbia | National | Both | 7+ | 7+ | 7,888 | 8,558 | No |
| 1537 | Serbia | 2013 | The National Health Survey of the Republic of Serbia, 2013 | National | Both | 7+ | 7+ | 7,205 | 8,140 | No |
| 1538 | Serbia | 2013- | Stay Fit for Lifelong Health; the Prevalence of Lifestyle Health Conditions in Serbian | National | Urban | 18-65 | | 1,366 | | No |
| 1539 | Seychelles | 1989 | Seychelles Heart Survey I | National | Both | 25-64 | 25-64 | 513 | 568 | Yes |
| 1540 | Seychelles | 1994 | Seychelles Heart Survey II | National | Both | 25-64 | 25-64 | 499 | 563 | Yes |
| 1541 | Seychelles | 2004 | Seychelles Heart Survey III | National | Both | 25-64 | 25-64 | 568 | 687 | Yes |
| 1542 | Seychelles | 2013- | Seychelles Heart Survey IV | National | Both | 25-64 | 25-64 | 531 | 699 | Yes |
| 1543 | Sierra Leone | 2008 | DHS | National | Both | | 15-49 | | 3,274 | Yes |
| 1544 | Sierra Leone | 2009 | STEPS | National | Both | 25-64 | 25-64 | 2,200 | 2,319 | Yes |
| 1545 | Sierra Leone | 2013 | DHS | National | Both | 15-59 | 15-49 | 7,037 | 7,459 | Yes |
| 1546 | Singapore | 1992 | National Health Survey 1992 | National | Both | 18-64 | 18-64 | 1,743 | 1,704 | No |
| 1547 | Singapore | 1993- | NUH Heart Study | National | Both | 26-89 | 26-89 | 498 | 484 | No |
| 1548 | Singapore | 1998 | National Health Survey 1998 | National | Both | 18-69 | 18-69 | 2,284 | 2,265 | No |
| 1549 | Singapore | 2004 | National Health Survey 2004 | National | Both | 18-74 | 18-74 | 2,059 | 2,095 | No |
| 1550 | Singapore | 2004- | Combined follow up of Singapore Cardiovascular Cohort Study and Singapore Prospective | National | Both | 24+ | 24+ | 2,471 | 2,686 | No |
| 1551 | Singapore | 2009 | Social Isolation, Health and Lifestyles Survey (SIHLS) 2009 | National | Both | 60+ | 60+ | 2,038 | 2,382 | No |
| 1552 | Singapore | 2009- | The Singapore Chinese Eye Study | Community | Both | 40-80 | 40-80 | 1,652 | 1,679 | No |
| 1553 | Singapore | 2012- | Singapore Health Study 2012 | National | Both | 18-79 | 18-79 | 956 | 1,026 | No |
| 1554 | Singapore | 2014- | Singapore Health 2 | National | Urban | 18-80 | 18-80 | 781 | 970 | No |
| 1555 | Singapore | 2016- | Transitions in Health, Employment, Social Engagement and Inter-generational Transfers in | National | Urban | 60+ | 60+ | 1,723 | 2,131 | No |
| 1556 | Slovakia | 1993 | Countrywide Integrated Noncommunicable Diseases Intervention Programme | National | Both | 15-64 | 15-64 | 876 | 1,293 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1557 | Slovakia | 1998 | Countrywide Integrated Noncommunicable Diseases Intervention Programme | National | Both | 15-64 | 15-64 | 923 | 1,122 | Yes |
| 1558 | Slovakia | 2003 | Countrywide Integrated Noncommunicable Diseases Intervention Programme | National | Both | 15-64 | 15-64 | 664 | 905 | Yes |
| 1559 | Slovakia | 2008 | Countrywide Integrated Noncommunicable Diseases Intervention Programme | National | Both | 15-64 | 15-64 | 412 | 584 | Yes |
| 1560 | Slovakia | 2011- | European Health Examination Survey | National | Both | 18-64 | 18-64 | 884 | 1,080 | Yes |
| 1561 | Slovenia | 2014 | the SLOFIT monitoring system | National | Both | 6-21 | 6-21 | 102,790 | 97,859 | No |
| 1562 | Solomon Islands | 2004 | A genetic-ecological study of the risk factors for lifestyle-related diseases in Oceanian | Community | Rural | 18-74 | 18-74 | 106 | 109 | No |
| 1563 | Solomon Islands | 2004 | A genetic-ecological study of the risk factors for lifestyle-related diseases in Oceanian | Community | Urban | 18-79 | 18-79 | 91 | 95 | No |
| 1564 | Solomon Islands | 2006 | STEPS | Subnational | Both | 15-64 | 15-64 | 1,031 | 1,375 | Yes |
| 1565 | Solomon Islands | 2009- | Furusawa et al., N Z Med J 124(1333):17-28, 2011 | Subnational | Rural | 5+ | 5+ | 256 | 317 | Yes |
| 1566 | Solomon Islands | 2009- | Furusawa et al., N Z Med J 124(1333):17-28, 2011 | Subnational | Urban | 5-70 | 5-70 | 78 | 118 | No |
| 1567 | Solomon Islands | 2015 | STEPS | National | Both | 18-69 | 18-69 | 816 | 978 | Yes |
| 1568 | Somalia | 2016 | The prevalence of selected risk factors for non-communicable diseases in Hargeisa, | Community | Urban | 20-69 | 20-69 | 145 | 955 | Yes |
| 1569 | South Africa | 1989 | Temple et al., Ethn Dis 11(3):431-7, 2001 | Community | Both | 15+ | 15+ | 457 | 614 | No |
| 1570 | South Africa | 1990 | Steyn et al., East Afr Med J 75(1):35-40, 1998 | Community | Urban | 15-64 | 15-64 | 292 | 373 | No |
| 1571 | South Africa | 1996 | Temple et al., Ethn Dis 11(3):431-7, 2001 | Community | Both | 15+ | 15+ | 302 | 406 | No |
| 1572 | South Africa | 1998 | DHS | National | Both | 15+ | 15+ | 5,645 | 7,757 | Yes |
| 1573 | South Africa | 2003 | DHS | National | Both | 15+ | 15+ | 3,200 | 4,497 | Yes |
| 1574 | South Africa | 2002- | SASPI | Community | Rural | 35+ | 35+ | 80 | 275 | No |
| 1575 | South Africa | 2003- | Africa Centre Biomeasure Survey | Community | Rural | 25-49 | 25-49 | 778 | 1,693 | Yes |
| 1576 | South Africa | 2004- | Li et al., Curationis 30(4):79-87, 2007 | Community | Both | 18-40 | 18-40 | 334 | 270 | No |
| 1577 | South Africa | 2008 | National Income Dynamics Study Wave I | National | Both | 5+ | 5+ | 8,131 | 10,624 | Yes |
| 1578 | South Africa | 2007- | SAGE | National | Both | 50+ | 50+ | 1,541 | 2,059 | No |
| 1579 | South Africa | 2008- | Cape Town Bellville South Cohort Study - Baseline evaluation I | Community | Urban | 35-65 | 35-65 | 142 | 499 | Yes |
| 1580 | South Africa | 2010 | Africa Centre Biomeasure Survey | Community | Rural | 15+ | 15+ | 2,933 | 6,364 | Yes |
| 1581 | South Africa | 2010- | National Income Dynamics Study Wave II | National | Both | 5+ | 5+ | 8,383 | 10,996 | Yes |
| 1582 | South Africa | 2012 | National Income Dynamics Study Wave III | National | Both | 5+ | 5+ | 10,956 | 14,118 | Yes |
| 1583 | South Africa | 2012 | South African National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 2,274 | 4,320 | No |
| 1584 | South Africa | 2014- | Health and Aging in Africa: A Longitudinal Study of an INDEPTH Community in South | Community | Rural | 40+ | 40+ | 2,141 | 2,502 | Yes |
| 1585 | South Africa | 2014- | National Income Dynamics Study Wave IV | National | Both | 5+ | 5+ | 13,548 | 16,775 | Yes |
| 1586 | South Africa | 2016 | DHS | National | Both | 15-59 | 15-49 | 2,807 | 3,263 | Yes |
| 1587 | South Africa | 2017 | National Income Dynamics Study Wave V | National | Both | 5+ | 5+ | 13,997 | 17,688 | Yes |
| 1588 | South Korea | 1986 | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 98 | Yes |
| 1589 | South Korea | 1990 | Korean National Blood Pressure Survey | National | Both | 30+ | 30+ | 9,734 | 12,620 | No |
| 1590 | South Korea | 1992- | Park et al., Diabetes Res Clin Pract 34 Suppl:S65-72, 1996 | Subnational | Both | 30-89 | 30+ | 1,077 | 1,392 | No |
| 1591 | South Korea | 1998 | Korea National Health and Nutrition Examination Survey | National | Both | 10+ | 10+ | 4,514 | 5,193 | Yes |
| 1592 | South Korea | 2001 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 4,150 | 4,815 | Yes |
| 1593 | South Korea | 2001 | Kim et al., Br J Psychiatry 185:102-7, 2004 | Community | Both | 65+ | 65+ | 300 | 432 | No |
| 1594 | South Korea | 2002- | Korean National Health Insurance | National | Both | 40+ | 40+ | 2,993,634 | 2,483,306 | No |
| 1595 | South Korea | 2005 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,183 | 3,896 | Yes |
| 1596 | South Korea | 2004- | Korean National Health Insurance | National | Both | 40+ | 40+ | 3,604,097 | 3,261,164 | No |
| 1597 | South Korea | 2007 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 1,753 | 2,174 | Yes |
| 1598 | South Korea | 2006- | Korean National Health Insurance | National | Both | 40+ | 40+ | 4,569,655 | 4,613,826 | No |
| 1599 | South Korea | 2008 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,849 | 4,824 | Yes |
| 1600 | South Korea | 2009 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 4,288 | 5,182 | Yes |
| 1601 | South Korea | 2008- | Korean National Health Insurance | National | Both | 40+ | 40+ | 5,763,909 | 6,089,441 | No |
| 1602 | South Korea | 2010 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,583 | 4,312 | Yes |
| 1603 | South Korea | 2010 | Korea National School Health Examination Survey (KNSHES) | National | Both | 6-20 | 6-20 | 56,933 | 46,295 | No |
| 1604 | South Korea | 2011 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,363 | 4,193 | Yes |
| 1605 | South Korea | 2010- | Korean National Health Insurance | National | Both | 40+ | 40+ | 6,671,572 | 7,127,111 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1606 | South Korea | 2012 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,194 | 4,030 | Yes |
| 1607 | South Korea | 2013 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,211 | 3,934 | Yes |
| 1608 | South Korea | 2012- | Korean National Health Insurance | National | Both | 40+ | 40+ | 7,256,898 | 7,782,621 | No |
| 1609 | South Korea | 2014 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 2,966 | 3,769 | Yes |
| 1610 | South Korea | 2015 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,022 | 3,640 | Yes |
| 1611 | South Korea | 2014- | Korean National Health Insurance | National | Both | 40+ | 40+ | 7,869,485 | 8,354,998 | No |
| 1612 | South Korea | 2016 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,288 | 4,042 | Yes |
| 1613 | South Korea | 2017 | Korea National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,341 | 3,986 | Yes |
| 1614 | South Korea | 2016- | Korean National Health Insurance | National | Both | 40+ | 40+ | 8,534,031 | 9,071,978 | No |
| 1615 | Spain | 1985 | INTERSALT, Manresa | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 1616 | Spain | 1986 | INTERSALT, Torrejo | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 1617 | Spain | 1986- | MONICA, Catalonia | Subnational | Both | 25-64 | 25-64 | 1,251 | 1,271 | No |
| 1618 | Spain | 1989 | Cardiovascular Risk Factors Study in Catalonia | Subnational | Both | 15+ | 15+ | 330 | 375 | No |
| 1619 | Spain | 1990 | Banegas et al., Hypertension 32(6):998-1002, 1998 | National | Both | 35-65 | 35-65 | 810 | 1,203 | Yes |
| 1620 | Spain | 1990- | MONICA, Catalonia | Subnational | Both | 25-64 | 25-64 | 1,719 | 1,191 | No |
| 1621 | Spain | 1991- | Encuesta de Factores de Riesgo Cardiovascular en la Región de Murcia (Cardiovascular Risk | Subnational | Both | 18-69 | 18-69 | 1,512 | 1,562 | Yes |
| 1622 | Spain | 1992 | CINDI | Subnational | Both | 25-64 | 25-64 | 1,194 | 1,454 | No |
| 1623 | Spain | 1989- | SEEDO | Subnational | Both | 25-60 | 25-60 | 2,533 | 2,855 | No |
| 1624 | Spain | 1992 | ENCAT | Community | Both | 15-80 | 15-80 | 786 | 952 | No |
| 1625 | Spain | 1994- | Encuesta de Nutrición y Salud Comunidad Valenciana 1994-95 (ENCV) | Subnational | Urban | 15+ | 15+ | 830 | 959 | Yes |
| 1626 | Spain | 1994- | MONICA, Catalonia | Subnational | Both | 25-64 | 25-64 | 1,800 | 1,628 | No |
| 1627 | Spain | 1990- | SEEDO | Subnational | Both | 25-60 | 25-60 | 4,707 | 5,178 | No |
| 1628 | Spain | 1996 | Guía Study | Community | Urban | 30+ | 30+ | 305 | 384 | No |
| 1629 | Spain | 1997 | Soriguer et al., Eur J Epidemiol 19(1):33-40, 2004 | Community | Rural | 18-65 | 18-65 | 613 | 613 | No |
| 1630 | Spain | 1996- | Castells et al., J Epidemiol Community Health 60(4):316-21, 2006 | Community | Urban | | 50-69 | | 26,963 | No |
| 1631 | Spain | 1998- | EnKID study | National | Both | 5-24 | 5-24 | 1,452 | 1,730 | No |
| 1632 | Spain | 1999- | ENIB | Community | Both | 20-60 | 20-60 | 498 | 702 | No |
| 1633 | Spain | 1999- | Factores de riesgo en las islas Baleares: Estudio CORSAIB | Subnational | Both | 35-74 | 35-74 | 811 | 864 | No |
| 1634 | Spain | 2000- | Regidor et al., J Hum Hypertens 20(1):73-82, 2006 | National | Both | 60+ | 60+ | 1,318 | 2,281 | No |
| 1635 | Spain | 2000- | EUREYE Study | Subnational | Both | 65+ | 65+ | 274 | 324 | No |
| 1636 | Spain | 2001- | Catalan Health Interview Survey | Subnational | Both | 18-74 | 18-74 | 597 | 745 | Yes |
| 1637 | Spain | 2001- | DIabetes, Nutrición y Obesidad en la población adulta de la Región de Murcia (DINO) | Subnational | Both | 20+ | 20+ | 715 | 828 | Yes |
| 1638 | Spain | 2000- | CDC of the Canary Islands | Subnational | Both | 18-75 | 18-75 | 2,878 | 3,719 | Yes |
| 1639 | Spain | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 405 | | Yes |
| 1640 | Spain | 2002- | ENCAT | Community | Both | 15-80 | 15-80 | 712 | 813 | No |
| 1641 | Spain | 2004 | Vioque J et al. Obesity 16:664-70, 2008 | Community | Urban | 24+ | 24+ | 87 | 115 | No |
| 1642 | Spain | 2004 | Cardiovascular Risk Study in Castilla y León (RECCyL) | Subnational | Both | 15+ | 15+ | 1,903 | 2,077 | Yes |
| 1643 | Spain | 2003- | Registre Gironi del Cor (REGICOR) | Subnational | Both | 35-79 | 35-79 | 2,951 | 3,266 | Yes |
| 1644 | Spain | 2004- | PREVICTUS | National | Both | 60+ | 60+ | 3,193 | 3,640 | No |
| 1645 | Spain | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 272 | | Yes |
| 1646 | Spain | 2007- | Harmonizing Equation of Risk in Mediterraneon countries Extremadura | Subnational | Both | 25-79 | 25-79 | 1,298 | 1,498 | Yes |
| 1647 | Spain | 2008- | Study on Nutrition and Cardiovascular Risk in Spain | National | Both | 18+ | 18+ | 5,756 | 6,397 | Yes |
| 1648 | Spain | 2009 | Cardiovascular Risk Study in Castilla y León (RECCyL) | Subnational | Both | 20+ | 20+ | 1,315 | 1,590 | Yes |
| 1649 | Spain | 2013 | ANIBES Study | National | Both | 9-75 | 9-75 | 1,160 | 1,125 | Yes |
| 1650 | Spain | 2014 | Cardiovascular Risk Study in Castilla y León (RECCyL) | Subnational | Both | 20+ | 20+ | 1,215 | 1,475 | Yes |
| 1651 | Spain | 2015 | Study on Nutrition and Cardiovascular Risk in Spain (ENRICA) | National | Both | 65+ | 65+ | 711 | 770 | No |
| 1652 | Sri Lanka | 2003 | Wijewardene et al., Ceylon Med J 50:62-70, 2005 | Subnational | Both | 30-65 | 30-65 | 275 | 296 | No |
| 1653 | Sri Lanka | 2003 | Wijewardene et al., Ceylon Med J 50:62-70, 2005 | Subnational | Both | 30-65 | 30-65 | 139 | 192 | No |
| 1654 | Sri Lanka | 2003 | Wijewardene et al., Ceylon Med J 50:62-70, 2005 | Subnational | Both | 30-65 | 30-65 | 1,891 | 2,410 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1655 | Sri Lanka | 2003 | Wijewardene et al., Ceylon Med J 50:62-70, 2005 | Subnational | Both | 30-65 | 30-65 | 387 | 457 | No |
| 1656 | Sri Lanka | 2006 | STEPS | National | Both | 15-64 | 15-64 | 6,140 | 6,213 | Yes |
| 1657 | Sri Lanka | 2006- | DHS | National | Both | | 15-49 | | 12,539 | No |
| 1658 | Sri Lanka | 2014 | STEPS | National | Both | 18-69 | 18-69 | 1,863 | 2,893 | Yes |
| 1659 | Sudan | 2005 | STEPS | Subnational | Both | 25-64 | 25-64 | 626 | 881 | No |
| 1660 | Sudan | 2016 | STEPS | National | Both | 18-69 | 18-69 | 2,661 | 4,544 | Yes |
| 1661 | Suriname | 2013- | The Healthy Life in Suriname Study (HELISUR) | Subnational | Urban | 18-70 | 18-70 | 424 | 722 | Yes |
| 1662 | Swaziland | 2006- | DHS | National | Both | 15-49 | 15-49 | 4,074 | 4,714 | Yes |
| 1663 | Swaziland | 2007 | STEPS | National | Both | 25-64 | 25-64 | 433 | 827 | Yes |
| 1664 | Swaziland | 2014 | STEPS | National | Both | 15-69 | 15-69 | 1,102 | 1,976 | Yes |
| 1665 | Sweden | 1985 | MONICA Gothenburg | Community | Urban | 25-64 | 25-64 | 666 | 702 | Yes |
| 1666 | Sweden | 1986 | MONICA Northern Sweden | Subnational | Both | 25-64 | 25-64 | 822 | 798 | No |
| 1667 | Sweden | 1985- | Västerbotten Intervention Project | Subnational | Both | 25-64 | 25-64 | 1,676 | 1,554 | No |
| 1668 | Sweden | 1990 | MONICA Gothenburg | Community | Urban | 25-64 | 25-64 | 775 | 775 | Yes |
| 1669 | Sweden | 1990 | MONICA Northern Sweden | Subnational | Both | 25-64 | 25-64 | 773 | 806 | No |
| 1670 | Sweden | 1990- | Västerbotten Intervention Project | Subnational | Both | 25-64 | 25-64 | 7,263 | 7,804 | No |
| 1671 | Sweden | 1985- | EPIC Umea | Subnational | Both | 24-72 | 24-72 | 12,359 | 13,217 | Yes |
| 1672 | Sweden | 1992- | Population Study of Women in Gothenburg | Community | Urban | | 62-84 | | 802 | No |
| 1673 | Sweden | 1991- | Uppsala Longitudinal Study of Adult Men | Community | Both | 70 | | 1,215 | | No |
| 1674 | Sweden | 1993- | Västerbotten Intervention Project | Subnational | Both | 25-64 | 25-64 | 9,804 | 10,727 | No |
| 1675 | Sweden | 1994 | Helicobacter Pylori | Community | Urban | 56-65 | 56-65 | 170 | 217 | No |
| 1676 | Sweden | 1991- | Malmö Diet and Cancer | Community | Urban | 45-73 | 45-73 | 12,096 | 18,293 | No |
| 1677 | Sweden | 1994 | MONICA Northern Sweden | Subnational | Both | 25-74 | 25-74 | 940 | 961 | No |
| 1678 | Sweden | 1995 | MONICA Gothenburg | Community | Urban | 25-64 | 25-64 | 745 | 867 | Yes |
| 1679 | Sweden | 1996- | Västerbotten Intervention Project | Subnational | Both | 25-64 | 25-64 | 8,327 | 8,893 | No |
| 1680 | Sweden | 1999 | MONICA Northern Sweden | Subnational | Both | 25-74 | 25-74 | 889 | 920 | No |
| 1681 | Sweden | 1997- | Uppsala Longitudinal Study of Adult Men | Community | Both | 77 | | 783 | | No |
| 1682 | Sweden | 1998- | The Kalixanda study | Community | Both | 20+ | 20+ | 508 | 483 | No |
| 1683 | Sweden | 1999- | Västerbotten Intervention Project | Subnational | Both | 25-64 | 25-64 | 6,354 | 6,384 | No |
| 1684 | Sweden | 2000- | H70 Study | Community | Urban | 70 | 70 | 242 | 270 | No |
| 1685 | Sweden | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 396 | | Yes |
| 1686 | Sweden | 2001- | Swedish INTERGENE Cohort Study | Subnational | Both | 24-76 | 24-76 | 1,694 | 1,906 | Yes |
| 1687 | Sweden | 2001- | Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS) | Community | Both | 70 | 70 | 507 | 509 | No |
| 1688 | Sweden | 2003- | Welin et al., BMC Public Health 8:403, 2008 | Community | Urban | 50 | 50 | 595 | 655 | No |
| 1689 | Sweden | 2003- | Welin et al., BMC Public Health 8:403, 2008 | Community | Urban | 60 | | 667 | | No |
| 1690 | Sweden | 2004 | MONICA Northern Sweden | Subnational | Both | 26-75 | 26-75 | 926 | 964 | No |
| 1691 | Sweden | 2004- | European Youth Heart Study (EYHS) II | Subnational | Urban | 15-21 | 15-21 | 196 | 262 | No |
| 1692 | Sweden | 2004- | Population Study of Women in Gothenburg | Community | Urban | | 38-50 | | 494 | No |
| 1693 | Sweden | 2005- | H70 Study | Community | Urban | 75 | 75 | 320 | 422 | No |
| 1694 | Sweden | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 353 | | Yes |
| 1695 | Sweden | 2006- | Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS) | Community | Both | 75 | 75 | 407 | 419 | No |
| 1696 | Sweden | 2009 | MONICA Northern Sweden | Subnational | Both | 25-74 | 25-74 | 849 | 857 | No |
| 1697 | Sweden | 2011- | EpiHealth | National | Both | 45-75 | 45-75 | 4,731 | 6,054 | No |
| 1698 | Sweden | 2014 | MONICA Northern Sweden | Subnational | Both | 25-74 | 25-74 | 753 | 795 | No |
| 1699 | Sweden | 2014- | Swedish INTERGENE Cohort Study | Subnational | Urban | 37-88 | 37-88 | 602 | 653 | Yes |
| 1700 | Sweden | 2016- | Population Study of Women in Gothenburg | Community | Urban | | 38-50 | | 570 | No |
| 1701 | Switzerland | 1984- | The Swiss MONICA Study Wave I | Subnational | Both | 25-74 | 25-74 | 1,744 | 1,689 | Yes |
| 1702 | Switzerland | 1988- | The Swiss MONICA Study Wave II | Subnational | Both | 25-74 | 25-74 | 1,778 | 1,684 | Yes |
| 1703 | Switzerland | 1992- | The Swiss MONICA Study Wave III | Subnational | Both | 25-74 | 25-74 | 1,577 | 1,672 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1704 | Switzerland | 2004 | The Swiss Conscription Database | National | Both | 18-20 | | 20,491 | | No |
| 1705 | Switzerland | 2003- | Cohorte Lausannoise | Community | Urban | 35-75 | 35-75 | 3,186 | 3,536 | No |
| 1706 | Switzerland | 2005 | The Swiss Conscription Database | National | Both | 18-20 | | 32,131 | | No |
| 1707 | Switzerland | 2006 | The Swiss Conscription Database | National | Both | 18-20 | | 34,530 | | No |
| 1708 | Switzerland | 2007 | The Swiss Conscription Database | National | Both | 18-20 | | 36,194 | | No |
| 1709 | Switzerland | 2008 | The Swiss Conscription Database | National | Both | 18-20 | | 34,497 | | No |
| 1710 | Switzerland | 2009 | The Swiss Conscription Database | National | Both | 18-20 | | 34,896 | | No |
| 1711 | Switzerland | 2007- | Bus Santé Study | Subnational | Urban | 20-80 | 20-80 | 1,884 | 1,911 | No |
| 1712 | Switzerland | 2010 | The Swiss Conscription Database | National | Both | 18-20 | | 37,214 | | No |
| 1713 | Switzerland | 2009- | Cohorte Lausannoise | Community | Urban | 40-81 | 40-81 | 2,176 | 2,494 | No |
| 1714 | Switzerland | 2011 | The Swiss Conscription Database | National | Both | 18-20 | | 38,108 | | No |
| 1715 | Switzerland | 2012 | The Swiss Conscription Database | National | Both | 18-20 | | 36,938 | | No |
| 1716 | Switzerland | 2013 | The Swiss Conscription Database | National | Both | 18-20 | | 32,890 | | No |
| 1717 | Switzerland | 2014 | The Swiss Conscription Database | National | Both | 18-20 | | 32,691 | | No |
| 1718 | Switzerland | 2013- | Bus Santé Study | Subnational | Urban | 20-74 | 20-74 | 2,022 | 2,186 | No |
| 1719 | Switzerland | 2015 | The Swiss Conscription Database | National | Both | 18-20 | | 32,616 | | No |
| 1720 | Switzerland | 2014- | Cohorte Lausannoise | Community | Urban | 45-87 | 45-87 | 2,008 | 2,473 | No |
| 1721 | Syrian Arab Republic | 2002 | National survey on non-communicable diseases and factors affecting their development | National | Both | 15-64 | 15-64 | 3,155 | 4,045 | No |
| 1722 | Taiwan | 1985 | INTERSALT | Community | Rural | 20-59 | 20-59 | 89 | 92 | Yes |
| 1723 | Taiwan | 1989- | Chiu et al., J Gerontol A Biol Sci Med Sci 55(11):M684-90, 2000 | Subnational | Both | 65+ | 65+ | 1,322 | 1,308 | No |
| 1724 | Taiwan | 1993- | The Kinmen Neurological Disorders Survey | Community | Urban | 50+ | 50+ | 672 | 593 | No |
| 1725 | Taiwan | 1993- | Nutrition and Health Survey in Taiwan 1993-1996 | National | Both | 5+ | 5+ | 2,959 | 3,216 | Yes |
| 1726 | Taiwan | 1999- | Nutrition and Health Survey in Taiwan 1999-2000 | National | Both | 65+ | 65+ | 1,271 | 1,202 | No |
| 1727 | Taiwan | 2000 | Social Environment and Biomarkers of Aging Study | National | Both | 50+ | 50+ | 590 | 433 | No |
| 1728 | Taiwan | 2004- | TCHS | Community | Urban | 40+ | 40+ | 1,147 | 1,212 | No |
| 1729 | Taiwan | 2006 | Social Environment and Biomarkers of Aging Study | National | Both | 53+ | 53+ | 548 | 476 | No |
| 1730 | Taiwan | 2005- | Nutrition and Health Survey in Taiwan 2005-2008 | National | Both | 19+ | 19+ | 1,311 | 1,355 | Yes |
| 1731 | Taiwan | 2007 | Taiwanese Survey on Hypertension, Hyperglycemia and Hyperlipidemia | National | Both | 20+ | 20+ | 2,155 | 2,469 | No |
| 1732 | Taiwan | 2013- | Nutrition and Health Survey in Taiwan | National | Both | 5+ | 5+ | 2,556 | 2,672 | Yes |
| 1733 | Tajikistan | 2003 | Micronutrient Status Survey | National | Both | | 15-49 | | 2,044 | Yes |
| 1734 | Tajikistan | 2012 | DHS | National | Both | | 15-49 | | 8,930 | Yes |
| 1735 | Tajikistan | 2016 | STEPS | National | Both | 18-69 | 18-69 | 1,091 | 1,553 | Yes |
| 1736 | Tajikistan | 2017 | DHS | National | Both | | 15-49 | | 9,922 | Yes |
| 1737 | Tanzania | 1991- | DHS | National | Both | | 20-49 | | 4,039 | Yes |
| 1738 | Tanzania | 1996 | DHS | National | Both | | 20-49 | | 3,512 | Yes |
| 1739 | Tanzania | 1996- | Aspray et al., Trans R Soc Trop Med Hyg 94:637-44, 2000 | Community | Rural | 15+ | 15+ | 251 | 324 | No |
| 1740 | Tanzania | 1996- | Aspray et al., Trans R Soc Trop Med Hyg 94:637-44, 2000 | Community | Urban | 15+ | 15+ | 117 | 118 | No |
| 1741 | Tanzania | 1998- | Bovet et al., Int J Epidemiol 31(1):240-7, 2002 | Community | Urban | 25-64 | 25-64 | 3,593 | 5,646 | Yes |
| 1742 | Tanzania | 2004- | DHS | National | Both | | 15-49 | | 9,160 | Yes |
| 1743 | Tanzania | 2010 | DHS | National | Both | | 15-49 | | 9,099 | Yes |
| 1744 | Tanzania | 2011 | STEPS | Subnational | Both | 25-64 | 25-64 | 1,008 | 1,517 | Yes |
| 1745 | Tanzania | 2012 | STEPS | National | Both | 25-64 | 25-64 | 2,581 | 2,827 | Yes |
| 1746 | Tanzania | 2014 | Dar es Salaam Urban Cohort Hypertension Study | Community | Urban | 40+ | 40+ | 965 | 1,266 | No |
| 1747 | Tanzania | 2015- | DHS | National | Both | | 15-49 | | 12,036 | Yes |
| 1748 | Thailand | 1987 | INCLEN | Community | Rural | 35-65 | | 244 | | No |
| 1749 | Thailand | 1989 | INCLEN | Community | Rural | 35-65 | | 209 | | No |
| 1750 | Thailand | 1989 | INCLEN | Community | Urban | 35-65 | | 207 | | No |
| 1751 | Thailand | 1991 | Thailand National Health Examination Survey I | National | Both | 5+ | 5+ | 8,698 | 11,027 | Yes |
| 1752 | Thailand | 1995 | The Fourth National Nutrition Survey of Thailand- 1995 | National | Both | 20-60 | 20-60 | 1,405 | 3,631 | No |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1753 | Thailand | 1997 | Thailand National Health Examination Survey II | National | Both | 5-59 | 5-59 | 4,117 | 4,876 | Yes |
| 1754 | Thailand | 2000 | InterASIA | National | Both | 35+ | 35+ | 2,092 | 3,211 | Yes |
| 1755 | Thailand | 2004 | Thailand National Health Examination Survey III | National | Both | 15+ | 15+ | 18,819 | 20,143 | Yes |
| 1756 | Thailand | 2003- | The Fifth National Nutrition Survey of Thailand | National | Both | 19+ | 19+ | 1,961 | 3,366 | No |
| 1757 | Thailand | 2009 | Thailand National Health Examination Survey IV | National | Both | 5+ | 5+ | 12,972 | 13,848 | No |
| 1758 | Timor-Leste | 2009- | DHS | National | Both | | 15-49 | | 11,983 | Yes |
| 1759 | Timor-Leste | 2009- | Timor-Leste Eye Health Survey | Subnational | Both | 40+ | 40+ | 245 | 247 | Yes |
| 1760 | Timor-Leste | 2014 | STEPS | National | Both | 18-69 | 18-69 | 1,048 | 1,437 | Yes |
| 1761 | Timor-Leste | 2016 | DHS | National | Both | 15-59 | 15-49 | 4,556 | 11,823 | Yes |
| 1762 | Togo | 1998 | DHS | National | Both | | 20-49 | | 3,114 | Yes |
| 1763 | Togo | 2010 | STEPS | National | Both | 15-64 | 15-64 | 2,063 | 2,095 | Yes |
| 1764 | Togo | 2013- | DHS | National | Both | | 15-49 | | 4,398 | Yes |
| 1765 | Togo | 2014 | Impact evaluation of a cash transfer program in North Togo | Subnational | Rural | | 20-65 | | 3,588 | Yes |
| 1766 | Tokelau | 2005 | STEPS | National | Both | 15-64 | 15-64 | 270 | 296 | Yes |
| 1767 | Tokelau | 2014 | STEPS | National | Both | 18-64 | 18-64 | 261 | 276 | Yes |
| 1768 | Tonga | 2004 | STEPS | National | Both | 15-64 | 15-64 | 403 | 552 | Yes |
| 1769 | Tonga | 2007- | Pacific Obesity Prevention in Communities - Ma'alahi Youth Project | Subnational | Rural | 13-22 | 13-22 | 434 | 579 | No |
| 1770 | Tonga | 2011 | STEPS | National | Both | 15-64 | 15-64 | 878 | 1,401 | Yes |
| 1771 | Trinidad and Tobago | 1985 | INTERSALT | Community | Urban | 20-59 | 20-59 | 84 | 92 | Yes |
| 1772 | Trinidad and Tobago | 2001 | Adult Survey | National | Rural | 25+ | 25+ | 198 | 267 | Yes |
| 1773 | Tunisia | 1996- | Tunisian National Nutrition Survey 1996-1997 | National | Both | 5+ | 5+ | 2,724 | 4,125 | Yes |
| 1774 | Tunisia | 1996- | Ariana Healthy Project 1997 | Community | Both | 35-65 | 35-65 | 2,664 | 2,711 | No |
| 1775 | Tunisia | 2005 | Tunisian National Survey | National | Both | 35-71 | 35-71 | 3,417 | 4,590 | Yes |
| 1776 | Tunisia | 2009- | ObeMaghreb | Subnational | Urban | 5-49 | 5-49 | 1,841 | 1,601 | Yes |
| 1777 | Turkey | 1990 | Turkish Adult Risk Factor Study | National | Both | 20+ | 20+ | 1,338 | 1,369 | Yes |
| 1778 | Turkey | 1993 | DHS | National | Both | | 20-49 | | 2,294 | Yes |
| 1779 | Turkey | 1995 | Turkish Adult Risk Factor Study | National | Both | 25+ | 25+ | 855 | 878 | No |
| 1780 | Turkey | 1998 | DHS | National | Both | | 20-49 | | 2,210 | Yes |
| 1781 | Turkey | 1998 | Turkish Adult Risk Factor Study | National | Both | 28+ | 28+ | 877 | 909 | Yes |
| 1782 | Turkey | 1998- | Erem et al., Diabetes Res Clin Pract 54(3):203-08, 2001 | Community | Urban | 20+ | 20+ | 1,324 | 1,322 | No |
| 1783 | Turkey | 2000 | Turkish Adult Risk Factor Study | National | Both | 30+ | 30+ | 890 | 938 | Yes |
| 1784 | Turkey | 2000 | MDHS | Subnational | Urban | | 15-49 | | 1,420 | No |
| 1785 | Turkey | 2001 | Yumuk et al., Diabetes Res Clin Pract 70(2):151-58, 2005 | Community | Urban | 20+ | 20+ | 1,042 | 1,789 | No |
| 1786 | Turkey | 2000- | The Healthy Nutrition for Healthy Heart Study | National | Both | 25-84 | 25-84 | 4,718 | 10,631 | No |
| 1787 | Turkey | 2001- | Turkish Adult Risk Factor Study | National | Both | 32+ | 32+ | 1,098 | 1,209 | Yes |
| 1788 | Turkey | 2002 | Onal et al., Blood Press 13(1):31-6, 2004 | Subnational | Urban | 25+ | 25+ | 67 | 355 | No |
| 1789 | Turkey | 2003 | DHS | National | Both | | 20-49 | | 2,934 | Yes |
| 1790 | Turkey | 2003 | Prevalence, awareness, treatment and control of hypertension in Turkey in 2003 | National | Both | 18+ | 18+ | 1,988 | 2,847 | Yes |
| 1791 | Turkey | 2003- | Turkish Adult Risk Factor Study | National | Both | 34+ | 34+ | 1,097 | 1,130 | Yes |
| 1792 | Turkey | 2003- | Prevalence of prehypertension and associated risk factors among Turkish adults: Trabzon | Subnational | Both | 20+ | 20+ | 2,208 | 2,601 | Yes |
| 1793 | Turkey | 2004 | Nationally Representative Cross-sectional Survey | National | Both | 20+ | 20+ | 2,110 | 2,154 | No |
| 1794 | Turkey | 2005- | Turkish Adult Risk Factor Study | National | Both | 35+ | 35+ | 965 | 1,029 | Yes |
| 1795 | Turkey | 2007 | Natinal Household survey | National | Both | 20-85 | 20-85 | 2,263 | 1,842 | No |
| 1796 | Turkey | 2008 | DHS | National | Both | | 15-49 | | 6,167 | Yes |
| 1797 | Turkey | 2007- | Turkish Adult Risk Factor Study | National | Both | 37+ | 37+ | 1,048 | 1,070 | Yes |
| 1798 | Turkey | 2009- | Turkish Adult Risk Factor Study | National | Both | 39+ | 39+ | 462 | 501 | Yes |
| 1799 | Turkey | 2009- | Prevalence of diabetes and associated risk factors among adult population in Trabzon city | Subnational | Both | 20+ | 20+ | 1,570 | 2,124 | Yes |
| 1800 | Turkey | 2011 | Chronic Diseases and Risk Factors Survey in Turkey | National | Both | 15+ | 15+ | 8,061 | 8,924 | No |
| 1801 | Turkey | 2013 | DHS | National | Both | | 15-49 | | 8,270 | Yes |

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|---|---|---|---|---|---|---|---|---|---|---|
| 1802 | Turkey | 2012- | Turkish Adult Risk Factor Study | National | Both | 37+ | 37+ | 1,012 | 1,087 | Yes |
| 1803 | Turkey | 2014- | Turkish Adult Risk Factor Study | National | Both | 44+ | 44+ | 437 | 484 | Yes |
| 1804 | Turkey | 2017 | STEPS | National | Both | 15+ | 15+ | 2,306 | 3,426 | Yes |
| 1805 | Turkmenistan | 2000 | DHS | National | Both | | 15-49 | | 2,084 | No |
| 1806 | Turkmenistan | 2013 | STEPS | National | Both | 18-64 | 18-64 | 1,879 | 2,741 | Yes |
| 1807 | Turkmenistan | 2018 | STEPS | National | Both | 18-69 | 18-69 | 1,713 | 2,236 | Yes |
| 1808 | Tuvalu | 2015 | STEPS | National | Both | 18-69 | 18-69 | 478 | 550 | Yes |
| 1809 | Uganda | 1995 | DHS | National | Both | | 20-49 | | 2,831 | Yes |
| 1810 | Uganda | 2000- | DHS | National | Both | | 15-49 | | 5,829 | Yes |
| 1811 | Uganda | 2006 | DHS | National | Both | 15-54 | 15-49 | 2,475 | 2,538 | Yes |
| 1812 | Uganda | 2011 | DHS | National | Both | 15-54 | 15-49 | 2,361 | 2,501 | Yes |
| 1813 | Uganda | 2011- | Gulu Health and Demographic Surveillance Site (HDSS) | Community | Rural | 5+ | 5+ | 3,938 | 4,820 | Yes |
| 1814 | Uganda | 2011- | The Prevalence and Distribution of Non-communicable Diseases and Their Risk Factors in | Subnational | Both | 25-79 | 25-79 | 277 | 221 | Yes |
| 1815 | Uganda | 2014 | STEPS | National | Both | 18-69 | 18-69 | 1,560 | 2,120 | Yes |
| 1816 | Uganda | 2014- | Gulu Health and Demographic Surveillance Site (HDSS) | Community | Rural | 15-24 | 15-24 | 671 | 517 | No |
| 1817 | Uganda | 2016 | DHS | National | Both | 15-54 | 15-54 | 5,191 | 5,415 | Yes |
| 1818 | Ukraine | 2002 | National Micronutrient Survey | National | Both | | 15-50 | | 816 | No |
| 1819 | Ukraine | 2019 | STEPS | National | Both | 18-69 | 18-69 | 1,569 | 2,600 | Yes |
| 1820 | United Arab Emirates | 1989- | el Mugamer et al., J Trop Med Hyg 98(6):407-15, 1995 | Community | Both | 20+ | 20+ | 123 | 199 | No |
| 1821 | United Arab Emirates | 1999- | Emirates National Diabetes and Coronary Artery Disease Risk Factor Study | National | Both | 20-80 | 20-80 | 2,822 | 3,743 | No |
| 1822 | United Arab Emirates | 2000- | Carter et al., J Health Popul Nutr 22(1):75-83, 2004 | Community | Both | | 20-79 | | 521 | No |
| 1823 | United Arab Emirates | 2009 | Gulf Cooperation Council World Health Survey | National | Both | 18+ | 18+ | 605 | 645 | Yes |
| 1824 | United Arab Emirates | 2017- | STEPS | National | Both | 18+ | 18+ | 2,148 | 2,324 | Yes |
| 1825 | United Kingdom | 1985- | INTERSALT, Belfast | Community | Urban | 20-59 | 20-59 | 99 | 100 | Yes |
| 1826 | United Kingdom | 1985 | INTERSALT, Birmingham | Community | Urban | 20-59 | 20-59 | 100 | 100 | Yes |
| 1827 | United Kingdom | 1985 | INTERSALT, Wales | Community | Urban | 20-59 | 20-59 | 100 | 99 | Yes |
| 1828 | United Kingdom | 1984- | Scottish Heart Health Survey | Subnational | Both | 40-59 | 40-59 | 4,364 | 4,465 | Yes |
| 1829 | United Kingdom | 1986- | Dietary and Nutritional Survey of British Adults 1986-1987 | National | Both | 16-64 | 16-64 | 1,158 | 1,161 | Yes |
| 1830 | United Kingdom | 1986- | MONICA, Belfast | Subnational | Both | 25-64 | 25-64 | 1,155 | 1,185 | No |
| 1831 | United Kingdom | 1987- | Edinburgh Artery Study | Community | Urban | 54-75 | 54-75 | 808 | 783 | No |
| 1832 | United Kingdom | 1989 | MRC National Survey of Health and Development | National | Both | 42-44 | 42-44 | 1,617 | 1,608 | Yes |
| 1833 | United Kingdom | 1991 | National Child Development Study (1958 British Cohort Study) | National | Both | 33 | 33 | 5,426 | 5,605 | No |
| 1834 | United Kingdom | 1991- | Health Survey for England | National | Both | 16+ | 16+ | 3,114 | 3,430 | Yes |
| 1835 | United Kingdom | 1991- | MONICA, Belfast | Subnational | Both | 25-64 | 25-64 | 998 | 996 | No |
| 1836 | United Kingdom | 1992 | MONICA, Glasgow | Community | Urban | 25-64 | 25-64 | 696 | 775 | No |
| 1837 | United Kingdom | 1993 | Health Survey for England | National | Both | 16+ | 16+ | 7,461 | 8,297 | Yes |
| 1838 | United Kingdom | 1992- | Whickham Survey | Community | Urban | 35+ | 35+ | 676 | 784 | No |
| 1839 | United Kingdom | 1992- | Edinburgh Artery Study | Community | Urban | 60-81 | 60-81 | 580 | 582 | No |
| 1840 | United Kingdom | 1994 | Health Survey for England | National | Both | 16+ | 16+ | 6,825 | 7,939 | Yes |
| 1841 | United Kingdom | 1993- | EPIC Norfolk | Subnational | Both | 40-79 | 40-79 | 11,574 | 13,995 | Yes |
| 1842 | United Kingdom | 1994- | Hertfordshire Ageing Study | Subnational | Both | 63-73 | 63-73 | 411 | 304 | No |
| 1843 | United Kingdom | 1995 | Health Survey for England | National | Both | 5+ | 5+ | 8,038 | 9,027 | Yes |
| 1844 | United Kingdom | 1994- | National Diet and Nutrition Survey (NDNS) | National | Both | 65+ | 65+ | 701 | 687 | No |
| 1845 | United Kingdom | 1995 | Scottish Health Survey (SHeS) | Subnational | Both | 16-64 | 16-64 | 3,303 | 4,005 | Yes |
| 1846 | United Kingdom | 1995 | MONICA, Glasgow | Community | Urban | 25-64 | 25-64 | 855 | 958 | No |
| 1847 | United Kingdom | 1996 | British Cohort Study 1970 | National | Both | 26 | 26 | 81 | 78 | No |
| 1848 | United Kingdom | 1996 | Health Survey for England | National | Both | 5+ | 5+ | 8,469 | 9,461 | Yes |
| 1849 | United Kingdom | 1993- | EPIC Oxford | Subnational | Both | 20-98 | 20-98 | 10,851 | 37,605 | Yes |
| 1850 | United Kingdom | 1997 | Health Survey for England | National | Both | 5+ | 5+ | 6,285 | 6,841 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1851 | United Kingdom | 1998 | Health Survey for England | National | Both | 5+ | 5+ | 7,980 | 9,047 | Yes |
| 1852 | United Kingdom | 1998- | INTERMAP, Belfast | Community | Urban | 40-59 | 40-59 | 125 | 97 | Yes |
| 1853 | United Kingdom | 1997- | INTERMAP, WestBromwich | Community | Urban | 40-59 | 40-59 | 141 | 138 | Yes |
| 1854 | United Kingdom | 1998 | Scottish Health Survey (SHeS) | Subnational | Both | 5-74 | 5-74 | 5,047 | 5,908 | Yes |
| 1855 | United Kingdom | 1998- | The British Regional Heart Study | National | Urban | 60-79 | | 4,138 | | No |
| 1856 | United Kingdom | 1999 | Health Survey for England | National | Both | 5+ | 5+ | 3,880 | 4,304 | Yes |
| 1857 | United Kingdom | 1999 | MRC National Survey of Health and Development | National | Both | 53-54 | 53-54 | 1,452 | 1,496 | No |
| 1858 | United Kingdom | 1999- | British Women's Heart and Health Study | National | Both | | 60-79 | | 3,677 | No |
| 1859 | United Kingdom | 2000 | Health Survey for England | National | Both | 5+ | 5+ | 4,073 | 4,607 | Yes |
| 1860 | United Kingdom | 1999- | Edinburgh Artery Study | Community | Urban | 66-87 | 66-87 | 373 | 404 | No |
| 1861 | United Kingdom | 1999- | Hertfordshire Cohort Study | Subnational | Both | 59-73 | 59-73 | 1,571 | 1,416 | No |
| 1862 | United Kingdom | 2001 | Health Survey for England | National | Both | 5+ | 5+ | 7,463 | 8,657 | Yes |
| 1863 | United Kingdom | 2000- | National Diet and Nutrition Survey 2000-2001 | National | Both | 19-64 | 19-64 | 807 | 973 | Yes |
| 1864 | United Kingdom | 2002 | Health Survey for England | National | Both | 5+ | 5+ | 6,797 | 7,578 | Yes |
| 1865 | United Kingdom | 2003 | The European Male Ageing Study | Community | Both | 40+ | | 394 | | Yes |
| 1866 | United Kingdom | 2003 | Health Survey for England | National | Both | 5+ | 5+ | 7,136 | 8,268 | Yes |
| 1867 | United Kingdom | 2003 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 3,988 | 4,687 | Yes |
| 1868 | United Kingdom | 2003- | Hertfordshire Ageing Study | Subnational | Both | 72-82 | 72-82 | 171 | 119 | No |
| 1869 | United Kingdom | 2004 | Health Survey for England | National | Both | 5+ | 5+ | 2,975 | 3,608 | Yes |
| 1870 | United Kingdom | 2004- | English Longitudinal Study of Ageing Wave 2 2004-2005 | National | Both | 52+ | 52+ | 3,259 | 3,966 | No |
| 1871 | United Kingdom | 2005 | Health Survey for England | National | Both | 5+ | 5+ | 4,839 | 5,503 | Yes |
| 1872 | United Kingdom | 2006 | Health Survey for England | National | Both | 5+ | 5+ | 8,005 | 8,912 | Yes |
| 1873 | United Kingdom | 2007 | Health Survey for England | National | Both | 5+ | 5+ | 5,354 | 5,708 | Yes |
| 1874 | United Kingdom | 2008 | The European Male Ageing Study | Community | Both | 40+ | | 301 | | Yes |
| 1875 | United Kingdom | 2008 | Health Survey for England | National | Both | 5+ | 5+ | 8,317 | 9,472 | Yes |
| 1876 | United Kingdom | 2008 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,970 | 3,533 | Yes |
| 1877 | United Kingdom | 2008- | English Longitudinal Study of Ageing Wave 4 2008-2009 | National | Both | 50+ | 50+ | 3,540 | 4,296 | No |
| 1878 | United Kingdom | 2009 | Health Survey for England | National | Both | 5+ | 5+ | 3,242 | 3,384 | Yes |
| 1879 | United Kingdom | 2006- | MRC National Survey of Health and Development | National | Both | 60-65 | 60-65 | 1,061 | 1,156 | No |
| 1880 | United Kingdom | 2009 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 3,621 | 4,168 | Yes |
| 1881 | United Kingdom | 2010 | Health Survey for England | National | Both | 5+ | 5+ | 4,959 | 5,547 | Yes |
| 1882 | United Kingdom | 2008- | National Diet and Nutrition Survey (NDNS) | National | Both | 5+ | 5+ | 2,580 | 3,094 | Yes |
| 1883 | United Kingdom | 2010 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 3,206 | 3,767 | Yes |
| 1884 | United Kingdom | 2011 | Health Survey for England | National | Both | 5+ | 5+ | 3,680 | 4,404 | Yes |
| 1885 | United Kingdom | 2011 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 3,253 | 3,862 | Yes |
| 1886 | United Kingdom | 2012 | Health Survey for England | National | Both | 5+ | 5+ | 3,648 | 4,278 | Yes |
| 1887 | United Kingdom | 2012 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,378 | 2,734 | Yes |
| 1888 | United Kingdom | 2012- | English Longitudinal Study of Ageing Wave 6 2012-2013 | National | Both | 50+ | 50+ | 3,257 | 4,015 | No |
| 1889 | United Kingdom | 2013 | Health Survey for England | National | Both | 5+ | 5+ | 3,910 | 4,577 | Yes |
| 1890 | United Kingdom | 2013 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,340 | 2,747 | Yes |
| 1891 | United Kingdom | 2014 | Health Survey for England | National | Both | 5+ | 5+ | 3,712 | 4,332 | Yes |
| 1892 | United Kingdom | 2013- | National Diet and Nutrition Survey (NDNS) | National | Both | 5+ | 5+ | 940 | 1,194 | Yes |
| 1893 | United Kingdom | 2014 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,248 | 2,675 | Yes |
| 1894 | United Kingdom | 2015 | Health Survey for England | National | Both | 5+ | 5+ | 4,837 | 5,491 | Yes |
| 1895 | United Kingdom | 2015 | MRC National Survey of Health and Development | National | Both | 69-70 | 69-70 | 1,040 | 1,082 | No |
| 1896 | United Kingdom | 2015 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,264 | 2,530 | Yes |
| 1897 | United Kingdom | 2016 | Health Survey for England | National | Both | 5+ | 5+ | 3,432 | 4,098 | Yes |
| 1898 | United Kingdom | 2015- | National Diet and Nutrition Survey (NDNS) | National | Both | 5+ | 5+ | 1,021 | 1,188 | Yes |
| 1899 | United Kingdom | 2016 | Scottish Health Survey (SHeS) | Subnational | Both | 5+ | 5+ | 2,041 | 2,395 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1900 | United Kingdom | 2017 | Health Survey for England | National | Both | 5+ | 5+ | 3,393 | 4,151 | Yes |
| 1901 | United Kingdom | 2016- | National Diet and Nutrition Survey (NDNS) | National | Both | 5+ | 5+ | 468 | 545 | Yes |
| 1902 | United Kingdom | 2017 | Scottish Health Survey | Subnational | Both | 5+ | 5+ | 1,734 | 2,056 | Yes |
| 1903 | United States of America | 1985- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 18-30 | 18-30 | 2,321 | 2,775 | No |
| 1904 | United States of America | 1985- | INTERSALT,  Chicago | Community | Urban | 20-59 | 20-59 | 97 | 99 | Yes |
| 1905 | United States of America | 1986 | INTERSALT, Goodman | Community | Urban | 20-59 | 20-59 | 192 | 192 | Yes |
| 1906 | United States of America | 1985- | MONICA, Stanford | Subnational | Urban | 25-64 | 25-64 | 713 | 848 | No |
| 1907 | United States of America | 1985- | The Minnesota Heart Survey | Community | Both | 25-75 | 25-75 | 5,220 | 2,421 | No |
| 1908 | United States of America | 1987- | Atherosclerosis Risk in Communities Study | Subnational | Both | 44-66 | 44-66 | 5,041 | 6,213 | Yes |
| 1909 | United States of America | 1987- | The Bogalusa Heart Study | Community | Rural | 5-22 | 5-22 | 1,685 | 1,616 | No |
| 1910 | United States of America | 1987- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 20-32 | 20-32 | 2,082 | 2,506 | No |
| 1911 | United States of America | 1989- | Cardiovascular Health Study | Subnational | Both | 65+ | 65+ | 2,458 | 3,318 | No |
| 1912 | United States of America | 1989- | MONICA, Stanford | Subnational | Urban | 25-64 | 25-64 | 720 | 842 | No |
| 1913 | United States of America | 1990- | Atherosclerosis Risk in Communities Study | Subnational | Both | 46-70 | 46-70 | 4,537 | 5,624 | No |
| 1914 | United States of America | 1990- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 23-35 | 23-35 | 1,945 | 2,382 | No |
| 1915 | United States of America | 1990- | Cardiovascular Health Study | Subnational | Both | 65+ | 65+ | 2,070 | 2,707 | No |
| 1916 | United States of America | 1988- | US NHANES III | National | Both | 5+ | 5+ | 11,567 | 12,524 | Yes |
| 1917 | United States of America | 1991- | Cardiovascular Health Study | Subnational | Both | 65+ | 65+ | 1,919 | 2,563 | No |
| 1918 | United States of America | 1992- | The Bogalusa Heart Study | Community | Rural | 5-21 | 5-21 | 1,578 | 1,627 | No |
| 1919 | United States of America | 1992- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 25-37 | 25-37 | 1,823 | 2,163 | No |
| 1920 | United States of America | 1992- | Cardiovascular Health Study | Subnational | Both | 65+ | 65+ | 1,985 | 2,764 | No |
| 1921 | United States of America | 1993- | Atherosclerosis Risk in Communities Study | Subnational | Both | 48-73 | 48-73 | 4,000 | 5,015 | No |
| 1922 | United States of America | 1993- | Cardiovascular Health Study | Subnational | Both | 65+ | 65+ | 1,751 | 2,471 | No |
| 1923 | United States of America | 1994- | Cardiovascular Health Study | Subnational | Both | 66+ | 66+ | 1,617 | 2,354 | No |
| 1924 | United States of America | 1996 | National Longitudinal Study of Adolescent Health Wave II | National | Both | 11-21 | 11-21 | 2,287 | 2,459 | No |
| 1925 | United States of America | 1995- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 28-40 | 28-40 | 1,739 | 2,145 | Yes |
| 1926 | United States of America | 1995- | Cardiovascular Health Study | Subnational | Both | 66+ | 66+ | 1,478 | 2,194 | No |
| 1927 | United States of America | 1993- | Women's Health Initiative - Observational Study | National | Both | | 49-81 | | 92,697 | No |
| 1928 | United States of America | 1996- | Atherosclerosis Risk in Communities Study | Subnational | Both | 50-75 | 50-75 | 3,550 | 4,485 | No |
| 1929 | United States of America | 1996- | Cardiovascular Health Study | Subnational | Both | 67+ | 67+ | 1,356 | 2,043 | No |
| 1930 | United States of America | 1996- | INTERMAP, Baltimore | Community | Urban | 40-59 | 40-59 | 146 | 134 | Yes |
| 1931 | United States of America | 1997- | INTERMAP, CC | Community | Urban | 40-59 | 40-59 | 271 | 276 | Yes |
| 1932 | United States of America | 1997- | INTERMAP, Chicago | Community | Urban | 40-59 | 40-59 | 156 | 159 | Yes |
| 1933 | United States of America | 1996- | INTERMAP, Jackson | Community | Urban | 40-59 | 40-59 | 132 | 134 | Yes |
| 1934 | United States of America | 1996- | INTERMAP, Minneapolis | Community | Urban | 40-59 | 40-59 | 130 | 130 | Yes |
| 1935 | United States of America | 1996- | INTERMAP, Pittsburgh | Community | Urban | 40-59 | 40-59 | 132 | 128 | Yes |
| 1936 | United States of America | 1996- | Study of Women's Health Across the Nation | Subnational | Both | | 40-55 | | 3,200 | Yes |
| 1937 | United States of America | 1997- | Cardiovascular Health Study | Subnational | Both | 68+ | 68+ | 1,172 | 1,801 | No |
| 1938 | United States of America | 1997- | Study of Women's Health Across the Nation | Subnational | Both | | 40-55 | | 2,761 | Yes |
| 1939 | United States of America | 1998- | Cardiovascular Health Study | Subnational | Both | 69+ | 69+ | 1,092 | 1,684 | No |
| 1940 | United States of America | 1998- | Study of Women's Health Across the Nation | Subnational | Both | | 40-55 | | 2,596 | Yes |
| 1941 | United States of America | 1999- | US NHANES 1999-2000 | National | Both | 5+ | 5+ | 3,809 | 3,791 | Yes |
| 1942 | United States of America | 1999- | Study of Women's Health Across the Nation | Subnational | Both | | 40-56 | | 2,507 | Yes |
| 1943 | United States of America | 2000- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 33-45 | 33-45 | 1,570 | 1,949 | Yes |
| 1944 | United States of America | 2000- | Study of Women's Health Across the Nation | Subnational | Both | | 40-57 | | 2,441 | Yes |
| 1945 | United States of America | 2001- | National Longitudinal Study of Adolescent Health Wave III | National | Both | 18-28 | 18-28 | 2,139 | 2,443 | No |
| 1946 | United States of America | 2001- | US NHANES 2001-2002 | National | Both | 5+ | 5+ | 4,045 | 4,006 | Yes |
| 1947 | United States of America | 2004 | Health and Retirement Study | National | Both | 24+ | 24+ | 241 | 262 | No |
| 1948 | United States of America | 2003- | US NHANES 2003-2004 | National | Both | 5+ | 5+ | 3,938 | 3,838 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1949 | United States of America | 2005- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 38-50 | 38-50 | 1,528 | 2,000 | Yes |
| 1950 | United States of America | 2005- | Cardiovascular Health Study | Subnational | Both | 70+ | 70+ | 375 | 684 | No |
| 1951 | United States of America | 2006 | Health and Retirement Study | National | Both | 53+ | 53+ | 2,834 | 3,822 | No |
| 1952 | United States of America | 2005- | US NHANES 2005-2006 | National | Both | 5+ | 5+ | 3,984 | 3,835 | Yes |
| 1953 | United States of America | 2005- | National Social Life Health and Aging Project | National | Both | 57-85 | 57-85 | 1,355 | 1,435 | No |
| 1954 | United States of America | 2008 | Health and Retirement Study | National | Both | 55+ | 55+ | 2,494 | 3,493 | No |
| 1955 | United States of America | 2007- | US NHANES 2007-2008 | National | Both | 5+ | 5+ | 4,086 | 4,038 | Yes |
| 1956 | United States of America | 2008- | National Longitudinal Study of Adolescent Health Wave IV | National | Both | 24-34 | 24-34 | 2,317 | 2,725 | No |
| 1957 | United States of America | 2009- | US NHANES 2009-2010 | National | Both | 5+ | 5+ | 4,291 | 4,332 | Yes |
| 1958 | United States of America | 2010- | Coronary Artery Risk Development in Young Adults (CARDIA) | Subnational | Urban | 43-55 | 43-55 | 1,513 | 1,976 | Yes |
| 1959 | United States of America | 2010- | Health and Retirement Study | National | Both | 57+ | 57+ | 2,535 | 3,465 | No |
| 1960 | United States of America | 2010- | National Social Life Health and Aging Project | National | Both | 36-99 | 36-99 | 1,452 | 1,736 | No |
| 1961 | United States of America | 2011- | Atherosclerosis Risk in Communities Study | Subnational | Both | 67-90 | 67-90 | 1,787 | 2,431 | No |
| 1962 | United States of America | 2012 | Health and Retirement Study | National | Both | 59+ | 59+ | 2,294 | 3,095 | No |
| 1963 | United States of America | 2011- | US NHANES 2011-2012 | National | Both | 5+ | 5+ | 3,951 | 3,887 | Yes |
| 1964 | United States of America | 2014 | Health and Retirement Study | National | Both | 61+ | 61+ | 2,152 | 2,972 | No |
| 1965 | United States of America | 2013- | US NHANES 2013-2014 | National | Both | 5+ | 5+ | 4,105 | 4,225 | Yes |
| 1966 | United States of America | 2015- | US NHANES 2015-2016 | National | Both | 5+ | 5+ | 3,959 | 4,091 | Yes |
| 1967 | United States of America | 2015- | National Social Life Health and Aging Project | Community | Both | 24-99 | 24-99 | 1,995 | 2,490 | Yes |
| 1968 | United States of America | 2016- | Health and Retirement Study | National | Both | 63+ | 63+ | 1,638 | 2,321 | No |
| 1969 | United States of America | 2017- | National Health and Nutrition Examination Survey | National | Both | 5+ | 5+ | 3,642 | 3,784 | Yes |
| 1970 | Uruguay | 1999- | The Survey on Health, Well-Being, and Aging in Latin America and the Caribbean (SABE) | Community | Urban | 60+ | 60+ | 492 | 828 | No |
| 1971 | Uruguay | 2006 | STEPS | National | Both | 25-64 | 25-64 | 261 | 641 | Yes |
| 1972 | Uruguay | 2011- | CESCAS Study | Community | Urban | 30-79 | 30-79 | 650 | 921 | Yes |
| 1973 | Uruguay | 2013 | STEPS | National | Urban | 15-64 | 15-64 | 821 | 1,400 | Yes |
| 1974 | Uruguay | 2012- | Genotype, Phenotype and Environment of Hypertension in Uruguay (GEFA-HT-UY) | Community | Urban | 19+ | 19+ | 124 | 189 | No |
| 1975 | Uzbekistan | 1996 | DHS | National | Both | | 15-49 | | 4,082 | Yes |
| 1976 | Uzbekistan | 2002 | DHS | National | Both | 15-59 | 15-49 | 2,331 | 5,275 | Yes |
| 1977 | Uzbekistan | 2014 | STEPS | National | Both | 18-64 | 18-64 | 1,533 | 2,164 | Yes |
| 1978 | Uzbekistan | 2019 | STEPS | National | Both | 18-69 | 18-69 | 1,462 | 2,226 | Yes |
| 1979 | Vanuatu | 1996 | Second National Nutrition Survey | National | Both | | 15-50 | | 1,353 | No |
| 1980 | Vanuatu | 1998 | Vanuatu Non-comunicable Disease Survey | National | Both | 20-60 | 20-60 | 533 | 730 | No |
| 1981 | Vanuatu | 2005 | STEPS | Subnational | Both | 15-60 | 15-60 | 626 | 759 | Yes |
| 1982 | Vanuatu | 2011 | STEPS | National | Both | 25-64 | 25-64 | 2,251 | 2,183 | Yes |
| 1983 | Venezuela | 1999- | Florez et al., Diabetes Res Clin Pract 69(1):63-77, 2005 | Subnational | Both | 15+ | 15+ | 1,134 | 2,599 | No |
| 1984 | Venezuela | 2004- | Cardiovascular Risk factors Multiple Evaluation in Latin America | Community | Urban | 25-64 | 25-64 | 713 | 1,123 | No |
| 1985 | Venezuela | 2005- | Brajkovich et al., Rev Ven Endoc Metab 4(3):31-32, 2006 | Community | Urban | 20-65 | 20-65 | 205 | 439 | Yes |
| 1986 | Venezuela | 2007- | Venezuelan Study of Metabolic Syndrome, Obesity and Lifestyle (VEMSOLS) | Community | Urban | 20+ | 20+ | 107 | 230 | Yes |
| 1987 | Venezuela | 2008- | Venezuelan Study of Metabolic Syndrome, Obesity and Lifestyle (VEMSOLS) | Community | Rural | 20+ | 20+ | 51 | 89 | No |
| 1988 | Venezuela | 2010- | Venezuelan Study of Metabolic Syndrome, Obesity and Lifestyle (VEMSOLS) | Community | Urban | 20+ | 20+ | 66 | 193 | Yes |
| 1989 | Venezuela | 2015- | Cardio-Metabolic Health Venezuelan Study (EVESCAM) | National | Both | 20+ | 20+ | 1,056 | 2,346 | Yes |
| 1990 | Viet Nam | 1987- | General Nutrition Survey | National | Both | 15-70 | 15-70 | 16,012 | 19,574 | No |
| 1991 | Viet Nam | 1992- | Living Standard Survey | National | Both | 5+ | 5+ | 9,418 | 10,209 | Yes |
| 1992 | Viet Nam | 1997- | Living Standard Survey | National | Both | 5+ | 5+ | 12,052 | 13,118 | Yes |
| 1993 | Viet Nam | 2000 | National Nutrition Survey | National | Both | 20+ | 20+ | 8,985 | 9,464 | No |
| 1994 | Viet Nam | 2001- | The National Epidemiological Survey on Hypertension and Its Risk Factors (North) | Subnational | Both | 25-74 | 25-74 | 2,386 | 3,604 | Yes |
| 1995 | Viet Nam | 2001- | Viet Nam National Health Survey 2001-2002 | National | Both | 5+ | 5+ | 66,723 | 71,616 | Yes |
| 1996 | Viet Nam | 2003- | The Survey on Heart Failure and Its Risk Factors | Subnational | Both | 25-74 | 25-74 | 1,853 | 2,636 | Yes |
| 1997 | Viet Nam | 2004 | The Hypertension Management Programme in Rural Communes (Hanoi) | Community | Rural | 25-74 | 25-74 | 855 | 1,288 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1998 | Viet Nam | 2004 | Cuong et al., Eur J Clin Nutr 61(5):673-81, 2007 | Community | Urban | 20-60 | 20-60 | 717 | 771 | No |
| 1999 | Viet Nam | 2005 | The Survey on Non-Communicable Disease Risk Factors | Subnational | Both | 25-74 | 25-74 | 1,136 | 1,220 | Yes |
| 2000 | Viet Nam | 2005 | STEPS Bavi district | Subnational | Rural | 25-64 | 25-64 | 987 | 997 | No |
| 2001 | Viet Nam | 2005 | National Adult Overweight Survey | National | Both | 25-64 | 25-64 | 8,474 | 8,725 | No |
| 2002 | Viet Nam | 2005 | Non-communicable disease risk factors in Ho Chi Minh City | Community | Urban | 25-64 | 25-64 | 908 | 1,063 | No |
| 2003 | Viet Nam | 2006 | The Hypertension Management Programme in Rural Communes (Bavi) | Community | Rural | 25-74 | 25-74 | 395 | 643 | Yes |
| 2004 | Viet Nam | 2007 | The Hypertension Management Programme in Rural Communes (Phu Phuong) | Community | Rural | 25-74 | 25-74 | 364 | 616 | Yes |
| 2005 | Viet Nam | 2006- | The National Epidemiological Survey on Hypertension and Its Risk Factors (South) | Subnational | Both | 25-74 | 25-74 | 1,310 | 2,078 | Yes |
| 2006 | Viet Nam | 2009 | STEPS | National | Both | 25-64 | 25-64 | 6,738 | 7,805 | Yes |
| 2007 | Viet Nam | 2008- | The Survey on Diabetes and Its Risk Factors | Subnational | Both | 25+ | 25+ | 830 | 1,446 | Yes |
| 2008 | Viet Nam | 2009 | The Hypertension Management Programme in Rural Communes (Phu Cuong) | Community | Rural | 25-74 | 25-74 | 362 | 677 | Yes |
| 2009 | Viet Nam | 2009- | Vietnam National Nutrition Survey 2009-2010 | National | Both | 5+ | 5+ | 16,036 | 16,619 | Yes |
| 2010 | Viet Nam | 2012 | National Survey of Diabetes in Vietnam | National | Both | 30-69 | 30-69 | 5,319 | 5,855 | Yes |
| 2011 | Viet Nam | 2015 | STEPS | National | Both | 18-69 | 18-69 | 1,316 | 1,722 | Yes |
| 2012 | Yemen | 1997 | DHS | National | Both | | 15-49 | | 5,123 | No |
| 2013 | Yemen | 2005- | Yemen Household Budget Survey 2005-2006 | National | Both | 5+ | 5+ | 3,290 | 3,307 | Yes |
| 2014 | Yemen | 2007- | Hypertension and Diabetes in Yemen (HYDY) | National | Rural | 6-70 | 6-70 | 3,023 | 3,065 | Yes |
| 2015 | Yemen | 2007- | Hypertension and Diabetes in Yemen (HYDY) | National | Urban | 6-70 | 6-70 | 2,996 | 3,077 | Yes |
| 2016 | Yemen | 2013 | DHS | National | Both | | 15-49 | | 22,527 | Yes |
| 2017 | Zambia | 1992 | DHS | National | Both | | 20-49 | | 2,829 | Yes |
| 2018 | Zambia | 1996 | DHS | National | Both | | 20-49 | | 3,485 | Yes |
| 2019 | Zambia | 2001- | DHS | National | Both | | 15-49 | | 6,732 | Yes |
| 2020 | Zambia | 2003 | Kelly et al., Am J Clin Nut 88(4):1010-17, 2008 | Community | Urban | 15-74 | 15-84 | 132 | 217 | No |
| 2021 | Zambia | 2007 | DHS | National | Both | | 15-49 | | 6,378 | Yes |
| 2022 | Zambia | 2008 | STEPS | Subnational | Urban | 25+ | 25+ | 626 | 1,214 | Yes |
| 2023 | Zambia | 2013- | DHS | National | Both | | 15-49 | | 14,837 | Yes |
| 2024 | Zambia | 2017 | STEPS | National | Both | 18-69 | 18-69 | 1,565 | 2,439 | Yes |
| 2025 | Zimbabwe | 1985- | INTERSALT | Community | Urban | 20-59 | 20-59 | 100 | 95 | Yes |
| 2026 | Zimbabwe | 1991 | Zinyowera et al., Cent Afr J Med 40(2):33-8, 1994 | Community | Both | 18+ | 18+ | 775 | 734 | No |
| 2027 | Zimbabwe | 1994 | DHS | National | Both | | 20-49 | | 1,776 | Yes |
| 2028 | Zimbabwe | 1995 | Mufunda et al., J Hum Hypertens 14(1):65-73, 2000 | Community | Urban | 25+ | 25+ | 384 | 391 | No |
| 2029 | Zimbabwe | 1999 | DHS | National | Both | | 15-49 | | 5,169 | Yes |
| 2030 | Zimbabwe | 2005 | STEPS | National | Both | 25+ | 25+ | 569 | 1,808 | No |
| 2031 | Zimbabwe | 2005- | DHS | National | Both | | 15-49 | | 8,186 | Yes |
| 2032 | Zimbabwe | 2010- | DHS | National | Both | 15-54 | 15-49 | 7,383 | 8,329 | Yes |
| 2033 | Zimbabwe | 2015 | DHS | National | Both | 15-54 | 15-49 | 8,386 | 9,396 | Yes |

**Appendix Table 3.** Coefficients of the regression of probit-transformed prevalence of underweight, obesity and severe obesity in women on mean BMI.

| Variable | Coefficient for underweight | Coefficient for obesity | Coefficient for severe obesity |
|---|---|---|---|
| Intercept# | -1.6 (-1.7, -1.5)*** | -0.74 (-0.79, -0.68)*** | -1.4 (-1.4, -1.3)*** |
| Mean BMI (per one more unit kg/m$^2$)# | -0.089 (-0.12, -0.06)*** | 0.27 (0.26, 0.29)*** | 0.24 (0.22, 0.26)*** |
| Age group (years)# | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.34 (-0.45, -0.24)*** | -0.18 (-0.24, -0.13)*** | -0.15 (-0.23, -0.073)*** |
| 40-49 | -0.5 (-0.65, -0.36)*** | -0.23 (-0.31, -0.16)*** | -0.3 (-0.4, -0.2)*** |
| 50-59 | -0.54 (-0.72, -0.35)*** | -0.22 (-0.32, -0.13)*** | -0.34 (-0.46, -0.21)*** |
| 60-69 | -0.43 (-0.64, -0.22)*** | -0.22 (-0.32, -0.11)*** | -0.34 (-0.48, -0.2)*** |
| 70-79 | -0.28 (-0.47, -0.084)** | -0.21 (-0.3, -0.11)*** | -0.33 (-0.46, -0.2)*** |
| Year (per one more recent year since 1985)# | 0.0025 (-0.0011, 0.006) | 0.0024 (0.00062, 0.0042)** | 0.0035 (0.001, 0.006)** |
| Region# | | | |
| Central and Eastern Europe | Reference | Reference | Reference |
| Central Asia, the Middle East and North Africa | -0.1 (-0.21, 0.0043) | -0.16 (-0.22, -0.1)*** | -0.2 (-0.28, -0.12)*** |
| East and Southeast Asia | -0.21 (-0.32, -0.091)*** | 0.0075 (-0.059, 0.074) | -0.03 (-0.13, 0.07) |
| High-income Asia Pacific | -0.45 (-0.63, -0.27)*** | -0.12 (-0.23, -0.014)* | -0.34 (-0.5, -0.18)*** |
| High-income Western | -0.19 (-0.3, -0.091)*** | -0.11 (-0.17, -0.058)*** | 0.018 (-0.062, 0.098) |
| Latin America and the Caribbean | -0.24 (-0.34, -0.13)*** | -0.21 (-0.27, -0.15)*** | -0.23 (-0.31, -0.15)*** |
| Oceania | -0.21 (-0.4, -0.012)* | -0.34 (-0.43, -0.25)*** | -0.24 (-0.36, -0.11)*** |
| South Asia | -0.019 (-0.15, 0.11) | -0.013 (-0.086, 0.059) | -0.062 (-0.17, 0.043) |
| Sub-Saharan Africa | -0.077 (-0.18, 0.026) | -0.21 (-0.27, -0.16)*** | -0.22 (-0.3, -0.14)*** |
| Region × mean BMI (per one more unit kg/m$^2$) | | | |
| Central and Eastern Europe | Reference | Reference | Reference |
| Central Asia, the Middle East and North Africa | -0.05 (-0.079, -0.022)*** | -0.031 (-0.045, -0.018)*** | -0.018 (-0.036, 0.0003) |
| East and Southeast Asia | -0.14 (-0.17, -0.11)*** | 0.04 (0.026, 0.054)*** | 0.015 (-0.0051, 0.035) |
| High-income Asia Pacific | -0.17 (-0.21, -0.13)*** | -0.016 (-0.038, 0.0054) | -0.061 (-0.091, -0.031)*** |

| | | | |
|---|---|---|---|
| High-income Western | 0.0062 (-0.022, 0.035) | -0.013 (-0.026, 0.00096) | 0.0057 (-0.012, 0.024) |
| Latin America and the Caribbean | -0.064 (-0.094, -0.035)*** | -0.034 (-0.048, -0.02)*** | -0.03 (-0.049, -0.011)** |
| Oceania | 0.023 (-0.0091, 0.054) | -0.063 (-0.077, -0.048)*** | -0.047 (-0.066, -0.028)*** |
| South Asia | -0.13 (-0.16, -0.1)*** | 0.0067 (-0.0079, 0.021) | -0.00092 (-0.021, 0.019) |
| Sub-Saharan Africa | -0.043 (-0.071, -0.016)** | -0.0087 (-0.022, 0.0045) | -0.0094 (-0.027, 0.0084) |
| Region × age group (years) | | | |
| Central and Eastern Europe | Reference | Reference | Reference |
| Central Asia, the Middle East and North Africa | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.22 (0.094, 0.34)*** | 0.15 (0.086, 0.22)*** | 0.066 (-0.022, 0.15) |
| 40-49 | 0.41 (0.25, 0.58)*** | 0.25 (0.17, 0.34)*** | 0.19 (0.076, 0.3)*** |
| 50-59 | 0.53 (0.33, 0.73)*** | 0.29 (0.19, 0.39)*** | 0.24 (0.11, 0.38)*** |
| 60-69 | 0.54 (0.32, 0.76)*** | 0.28 (0.17, 0.39)*** | 0.29 (0.14, 0.44)*** |
| 70-79 | 0.5 (0.29, 0.71)*** | 0.26 (0.15, 0.36)*** | 0.26 (0.12, 0.4)*** |
| East and Southeast Asia | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.23 (0.11, 0.36)*** | -0.07 (-0.14, -0.0016)* | -0.2 (-0.3, -0.1)*** |
| 40-49 | 0.38 (0.22, 0.54)*** | -0.12 (-0.21, -0.041)** | -0.19 (-0.31, -0.077)** |
| 50-59 | 0.52 (0.32, 0.72)*** | -0.091 (-0.19, 0.0097) | -0.19 (-0.33, -0.053)** |
| 60-69 | 0.46 (0.23, 0.69)*** | -0.04 (-0.15, 0.074) | -0.15 (-0.31, 0.0041) |
| 70-79 | 0.34 (0.12, 0.56)** | 0.058 (-0.052, 0.17) | -0.11 (-0.26, 0.04) |
| High-income Asia Pacific | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.28 (0.14, 0.42)*** | -0.00047 (-0.078, 0.077) | -0.091 (-0.2, 0.016) |
| 40-49 | 0.29 (0.11, 0.46)** | -0.15 (-0.25, -0.058)** | -0.12 (-0.25, 0.0044) |
| 50-59 | 0.34 (0.12, 0.56)** | -0.23 (-0.34, -0.12)*** | -0.23 (-0.38, -0.073)** |
| 60-69 | 0.36 (0.11, 0.6)** | -0.21 (-0.33, -0.08)** | -0.31 (-0.49, -0.14)*** |
| 70-79 | 0.3 (0.071, 0.54)* | -0.24 (-0.36, -0.12)*** | -0.32 (-0.49, -0.16)*** |
| High-income Western | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.13 (0.013, 0.24)* | 0.084 (0.025, 0.14)** | 0.019 (-0.063, 0.1) |
| 40-49 | 0.16 (0.0059, 0.31)* | 0.11 (0.034, 0.19)** | 0.07 (-0.033, 0.17) |
| 50-59 | 0.17 (-0.022, 0.36) | 0.098 (0.0037, 0.19)* | 0.047 (-0.081, 0.18) |
| 60-69 | 0.15 (-0.062, 0.37) | 0.1 (-0.0029, 0.21) | -0.0028 (-0.14, 0.14) |
| 70-79 | 0.072 (-0.13, 0.27) | 0.11 (0.015, 0.21)* | -0.063 (-0.19, 0.068) |
| Latin America and the Caribbean | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.26 (0.14, 0.38)*** | 0.15 (0.089, 0.22)*** | 0.092 (0.0047, 0.18)* |

| | | | |
|---|---|---|---|
| 40-49 | 0.46 (0.3, 0.61)*** | 0.23 (0.15, 0.31)*** | 0.22 (0.11, 0.33)*** |
| 50-59 | 0.61 (0.41, 0.81)*** | 0.28 (0.18, 0.38)*** | 0.28 (0.15, 0.42)*** |
| 60-69 | 0.66 (0.44, 0.87)*** | 0.3 (0.19, 0.41)*** | 0.32 (0.17, 0.46)*** |
| 70-79 | 0.53 (0.32, 0.73)*** | 0.29 (0.19, 0.39)*** | 0.27 (0.13, 0.41)*** |
| Oceania | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.2 (0.00064, 0.4)* | 0.42 (0.32, 0.52)*** | 0.2 (0.065, 0.34)** |
| 40-49 | 0.4 (0.18, 0.62)*** | 0.58 (0.47, 0.69)*** | 0.4 (0.25, 0.54)*** |
| 50-59 | 0.55 (0.31, 0.8)*** | 0.63 (0.51, 0.76)*** | 0.56 (0.39, 0.72)*** |
| 60-69 | 0.68 (0.35, 1)*** | 0.62 (0.47, 0.76)*** | 0.53 (0.34, 0.72)*** |
| 70-79 | 0.51 (0.15, 0.87)** | 0.68 (0.49, 0.87)*** | 0.45 (0.19, 0.71)*** |
| South Asia | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.36 (0.23, 0.49)*** | 0.023 (-0.048, 0.094) | -0.078 (-0.18, 0.02) |
| 40-49 | 0.59 (0.43, 0.76)*** | 0.079 (-0.0065, 0.16) | 0.077 (-0.04, 0.19) |
| 50-59 | 0.66 (0.45, 0.87)*** | 0.059 (-0.045, 0.16) | 0.18 (0.041, 0.32)* |
| 60-69 | 0.56 (0.32, 0.79)*** | 0.13 (0.014, 0.25)* | 0.21 (0.047, 0.37)* |
| 70-79 | 0.47 (0.23, 0.71)*** | 0.26 (0.14, 0.38)*** | 0.4 (0.23, 0.57)*** |
| Sub-Saharan Africa | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.41 (0.3, 0.53)*** | 0.21 (0.15, 0.27)*** | 0.18 (0.097, 0.26)*** |
| 40-49 | 0.67 (0.52, 0.82)*** | 0.25 (0.17, 0.33)*** | 0.32 (0.21, 0.42)*** |
| 50-59 | 0.82 (0.62, 1)*** | 0.28 (0.19, 0.38)*** | 0.4 (0.27, 0.53)*** |
| 60-69 | 0.8 (0.58, 1)*** | 0.23 (0.12, 0.34)*** | 0.4 (0.25, 0.55)*** |
| 70-79 | 0.75 (0.53, 0.96)*** | 0.32 (0.21, 0.43)*** | 0.42 (0.27, 0.57)*** |
| Age group (years) × mean BMI (per one more unit kg/m$^2$) | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.00087 (-0.014, 0.016) | -0.043 (-0.051, -0.035)*** | -0.031 (-0.042, -0.02)*** |
| 40-49 | -0.00078 (-0.015, 0.013) | -0.058 (-0.065, -0.05)*** | -0.043 (-0.053, -0.033)*** |
| 50-59 | 0.0012 (-0.014, 0.016) | -0.064 (-0.072, -0.057)*** | -0.052 (-0.062, -0.041)*** |
| 60-69 | -0.0088 (-0.025, 0.0071) | -0.061 (-0.069, -0.052)*** | -0.057 (-0.069, -0.045)*** |
| 70-79 | -0.015 (-0.033, 0.0038) | -0.06 (-0.07, -0.05)*** | -0.054 (-0.068, -0.04)*** |
| Age group (years) × year (per one more recent year since 1985) | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.00032 (-0.0031, 0.0024) | -0.0016 (-0.0031, -0.00016)* | -0.000072 (-0.0022, 0.002) |
| 40-49 | -0.0026 (-0.0053, 0.000063) | -0.00088 (-0.0023, 0.00055) | -0.000028 (-0.0021, 0.002) |
| 50-59 | -0.0053 (-0.0081, -0.0025)*** | -0.0024 (-0.0039, -0.00098)** | -0.00024 (-0.0023, 0.0018) |
| 60-69 | -0.0074 (-0.011, -0.0043)*** | -0.0041 (-0.0057, -0.0024)*** | -0.0015 (-0.0039, 0.0008) |
| 70-79 | -0.0054 (-0.009, -0.0019)** | -0.0062 (-0.0081, -0.0043)*** | -0.0024 (-0.0051, 0.00026) |
| Region × year (per one more recent year since 1985) | | | |
| Central and Eastern Europe | Reference | Reference | Reference |

| | | | |
|---|---|---|---|
| Central Asia, the Middle East and North Africa | 0.0012 (-0.0028, 0.0053) | -0.00044 (-0.0025, 0.0016) | -0.0024 (-0.0051, 0.00039) |
| East and Southeast Asia | 0.007 (0.0033, 0.011)*** | 0.0033 (0.0014, 0.0052)*** | 0.0012 (-0.0017, 0.004) |
| High-income Asia Pacific | 0.0035 (-0.00025, 0.0073) | 0.0066 (0.0047, 0.0086)*** | 0.0051 (0.0023, 0.0078)*** |
| High-income Western | 0.0026 (-0.00064, 0.0058) | 0.0014 (-0.00016, 0.003) | 0.0011 (-0.0011, 0.0032) |
| Latin America and the Caribbean | 0.0044 (0.00042, 0.0083)* | 0.002 (-0.000032, 0.004) | 0.00086 (-0.0018, 0.0036) |
| Oceania | -0.00084 (-0.011, 0.0095) | -0.0033 (-0.0062, -0.00034)* | -0.0028 (-0.0068, 0.0011) |
| South Asia | -0.0002 (-0.0047, 0.0042) | -0.00026 (-0.0026, 0.0021) | -0.0074 (-0.011, -0.004)*** |
| Sub-Saharan Africa | 0.002 (-0.0018, 0.0058) | 0.0045 (0.0026, 0.0065)*** | 0.0047 (0.002, 0.0073)*** |

**Appendix Table 4.** Coefficients of the regression of probit-transformed prevalence of underweight, obesity and severe obesity in men on mean BMI.

| Variable | Coefficient for underweight | Coefficient for obesity | Coefficient for severe obesity |
|---|---|---|---|
| Intercept[#] | -2.2 (-2.3, -2.1)*** | -1.2 (-1.2, -1.1)*** | -1.9 (-2, -1.8)*** |
| Mean BMI (per one more unit $kg/m^2$)[#] | -0.12 (-0.16, -0.076)*** | 0.26 (0.24, 0.28)*** | 0.21 (0.18, 0.24)*** |
| Age group (years)[#] | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.1 (-0.22, 0.022) | 0.013 (-0.05, 0.077) | -0.054 (-0.16, 0.049) |
| 40-49 | -0.098 (-0.24, 0.046) | 0.061 (-0.01, 0.13) | -0.018 (-0.13, 0.096) |
| 50-59 | 0.052 (-0.11, 0.21) | 0.1 (0.023, 0.18)* | 0.018 (-0.11, 0.14) |
| 60-69 | 0.14 (-0.017, 0.3) | 0.13 (0.053, 0.21)** | 0.022 (-0.1, 0.15) |
| 70-79 | 0.24 (0.093, 0.39)** | 0.046 (-0.03, 0.12) | -0.078 (-0.2, 0.042) |
| Year (per one more recent year since 1985)[#] | 0.0095 (0.0045, 0.014)*** | 0.0043 (0.0019, 0.0068)*** | 0.0067 (0.0028, 0.011)*** |
| Region[#] | | | |
| Central and Eastern Europe | Reference | Reference | Reference |
| Central Asia, the Middle East and North Africa | 0.3 (0.19, 0.41)*** | 0.16 (0.099, 0.23)*** | 0.22 (0.12, 0.33)*** |
| East and Southeast Asia | 0.14 (0.011, 0.27)* | 0.25 (0.17, 0.32)*** | 0.31 (0.18, 0.44)*** |
| High-income Asia Pacific | 0.25 (0.056, 0.45)* | 0.11 (-0.027, 0.25) | -0.15 (-0.4, 0.094) |
| High-income Western | 0.14 (0.039, 0.24)** | 0.12 (0.059, 0.17)*** | 0.27 (0.17, 0.37)*** |
| Latin America and the Caribbean | 0.11 (0.00037, 0.22)* | 0.1 (0.041, 0.17)** | 0.15 (0.048, 0.26)** |
| Oceania | 0.12 (-0.073, 0.31) | 0.14 (0.047, 0.23)** | 0.18 (0.033, 0.32)* |
| South Asia | 0.34 (0.19, 0.49)*** | 0.23 (0.13, 0.32)*** | 0.35 (0.19, 0.5)*** |
| Sub-Saharan Africa | 0.3 (0.16, 0.44)*** | 0.13 (0.049, 0.21)** | 0.35 (0.21, 0.48)*** |
| Region × mean BMI (per one more unit $kg/m^2$) | | | |
| Central and Eastern Europe | Reference | Reference | Reference |
| Central Asia, the Middle East and North Africa | -0.03 (-0.069, 0.0099) | -0.012 (-0.03, 0.0066) | 0.033 (0.0055, 0.061)* |
| East and Southeast Asia | -0.13 (-0.17, -0.093)*** | 0.028 (0.009, 0.046)** | 0.017 (-0.014, 0.047) |
| High-income Asia Pacific | -0.066 (-0.13, 0.00039) | -0.028 (-0.068, 0.013) | -0.08 (-0.15, -0.013)* |

| | | | |
|---|---|---|---|
| High-income Western | 0.087 (0.047, 0.13)*** | 0.032 (0.014, 0.051)*** | 0.083 (0.055, 0.11)*** |
| Latin America and the Caribbean | -0.053 (-0.093, -0.013)** | -0.027 (-0.046, -0.0087)** | -0.013 (-0.042, 0.016) |
| Oceania | 0.069 (0.027, 0.11)** | -0.046 (-0.065, -0.028)*** | -0.012 (-0.04, 0.016) |
| South Asia | -0.13 (-0.17, -0.089)*** | 0.0095 (-0.01, 0.029) | 0.011 (-0.02, 0.043) |
| Sub-Saharan Africa | -0.029 (-0.069, 0.01) | 0.02 (0.00087, 0.039)* | 0.031 (0.0021, 0.06)* |
| Region × age group (years) | | | |
| Central and Eastern Europe Central Asia, the Middle East and North Africa | Reference | Reference | Reference |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.028 (-0.17, 0.11) | -0.073 (-0.15, 0.003) | -0.14 (-0.25, -0.018)* |
| 40-49 | 0.0013 (-0.16, 0.16) | -0.1 (-0.18, -0.02)* | -0.28 (-0.4, -0.15)*** |
| 50-59 | -0.052 (-0.23, 0.12) | -0.12 (-0.21, -0.034)** | -0.26 (-0.39, -0.12)*** |
| 60-69 | -0.02 (-0.2, 0.16) | -0.14 (-0.23, -0.048)** | -0.3 (-0.44, -0.16)*** |
| 70-79 | -0.22 (-0.39, -0.042)* | -0.099 (-0.19, -0.0093)* | -0.13 (-0.27, 0.0092) |
| East and Southeast Asia | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.0069 (-0.16, 0.15) | -0.25 (-0.33, -0.16)*** | -0.23 (-0.36, -0.089)** |
| 40-49 | -0.035 (-0.21, 0.14) | -0.37 (-0.46, -0.28)*** | -0.44 (-0.59, -0.3)*** |
| 50-59 | -0.14 (-0.33, 0.04) | -0.38 (-0.48, -0.28)*** | -0.51 (-0.66, -0.36)*** |
| 60-69 | -0.14 (-0.33, 0.05) | -0.39 (-0.49, -0.29)*** | -0.54 (-0.7, -0.38)*** |
| 70-79 | -0.27 (-0.47, -0.082)** | -0.21 (-0.32, -0.11)*** | -0.37 (-0.54, -0.2)*** |
| High-income Asia Pacific | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.075 (-0.24, 0.091) | -0.23 (-0.32, -0.13)*** | -0.16 (-0.31, -0.013)* |
| 40-49 | -0.19 (-0.38, -0.0074)* | -0.45 (-0.55, -0.35)*** | -0.41 (-0.57, -0.25)*** |
| 50-59 | -0.34 (-0.53, -0.15)*** | -0.63 (-0.73, -0.52)*** | -0.59 (-0.75, -0.42)*** |
| 60-69 | -0.32 (-0.51, -0.13)** | -0.7 (-0.81, -0.6)*** | -0.65 (-0.82, -0.48)*** |
| 70-79 | -0.32 (-0.5, -0.13)*** | -0.63 (-0.73, -0.52)*** | -0.57 (-0.75, -0.39)*** |
| High-income Western | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.28 (-0.41, -0.14)*** | -0.15 (-0.22, -0.085)*** | -0.25 (-0.36, -0.14)*** |
| 40-49 | -0.36 (-0.52, -0.2)*** | -0.22 (-0.29, -0.14)*** | -0.37 (-0.49, -0.25)*** |
| 50-59 | -0.47 (-0.64, -0.3)*** | -0.26 (-0.34, -0.18)*** | -0.46 (-0.59, -0.33)*** |
| 60-69 | -0.49 (-0.66, -0.32)*** | -0.27 (-0.36, -0.19)*** | -0.52 (-0.65, -0.39)*** |
| 70-79 | -0.48 (-0.65, -0.32)*** | -0.19 (-0.27, -0.11)*** | -0.46 (-0.58, -0.33)*** |
| Latin America and the Caribbean | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.068 (-0.077, 0.21) | -0.062 (-0.14, 0.014) | -0.054 (-0.17, 0.064) |

| | | | |
|---|---|---|---|
| 40-49 | 0.18 (0.019, 0.35)* | -0.063 (-0.15, 0.02) | -0.1 (-0.23, 0.027) |
| 50-59 | 0.091 (-0.084, 0.27) | -0.087 (-0.18, 0.0017) | -0.18 (-0.32, -0.044)** |
| 60-69 | 0.074 (-0.1, 0.25) | -0.1 (-0.19, -0.013)* | -0.16 (-0.3, -0.022)* |
| 70-79 | -0.00097 (-0.17, 0.17) | -0.032 (-0.12, 0.055) | -0.12 (-0.25, 0.02) |
| Oceania | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.021 (-0.21, 0.25) | -0.0016 (-0.11, 0.11) | 0.042 (-0.12, 0.21) |
| 40-49 | 0.17 (-0.069, 0.41) | 0.049 (-0.064, 0.16) | 0.081 (-0.092, 0.25) |
| 50-59 | 0.099 (-0.14, 0.34) | 0.058 (-0.057, 0.17) | 0.11 (-0.072, 0.28) |
| 60-69 | 0.33 (0.034, 0.63)* | 0.068 (-0.074, 0.21) | 0.061 (-0.15, 0.27) |
| 70-79 | 0.25 (-0.17, 0.66) | 0.29 (0.089, 0.49)** | -0.21 (-0.55, 0.14) |
| South Asia | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.15 (-0.018, 0.32) | -0.15 (-0.24, -0.055)** | -0.21 (-0.36, -0.053)** |
| 40-49 | 0.17 (-0.018, 0.36) | -0.2 (-0.3, -0.1)*** | -0.24 (-0.4, -0.084)** |
| 50-59 | 0.032 (-0.17, 0.23) | -0.19 (-0.3, -0.09)*** | -0.29 (-0.46, -0.12)*** |
| 60-69 | -0.05 (-0.26, 0.16) | -0.16 (-0.27, -0.046)** | -0.15 (-0.33, 0.038) |
| 70-79 | -0.21 (-0.43, 0.017) | -0.049 (-0.18, 0.079) | 0.047 (-0.17, 0.27) |
| Sub-Saharan Africa | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.18 (0.017, 0.34)* | 0.05 (-0.038, 0.14) | -0.01 (-0.15, 0.13) |
| 40-49 | 0.27 (0.097, 0.45)** | 0.032 (-0.062, 0.13) | -0.1 (-0.25, 0.041) |
| 50-59 | 0.21 (0.016, 0.39)* | 0.052 (-0.048, 0.15) | -0.11 (-0.26, 0.047) |
| 60-69 | 0.26 (0.058, 0.46)* | -0.0056 (-0.11, 0.1) | 0.012 (-0.16, 0.18) |
| 70-79 | 0.17 (-0.041, 0.37) | 0.16 (0.049, 0.28)** | 0.16 (-0.024, 0.34) |
| Age group (years) × mean BMI (per one more unit kg/m$^2$) | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | 0.00034 (-0.022, 0.023) | -0.018 (-0.03, -0.0059)** | -0.014 (-0.032, 0.005) |
| 40-49 | -0.014 (-0.036, 0.0084) | -0.03 (-0.042, -0.018)*** | -0.025 (-0.043, -0.007)** |
| 50-59 | -0.022 (-0.044, -0.00065)* | -0.029 (-0.04, -0.017)*** | -0.039 (-0.057, -0.02)*** |
| 60-69 | -0.025 (-0.048, -0.0014)* | -0.034 (-0.047, -0.021)*** | -0.024 (-0.045, -0.0039)* |
| 70-79 | -0.047 (-0.074, -0.021)*** | -0.024 (-0.039, -0.0094)** | -0.036 (-0.061, -0.012)** |
| Age group (years) × year (per one more recent year since 1985) | | | |
| 20-29 | Reference | Reference | Reference |
| 30-39 | -0.0031 (-0.0066, 0.00048) | 0.0000041 (-0.0019, 0.0019) | 0.00012 (-0.0031, 0.0034) |
| 40-49 | -0.005 (-0.0085, -0.0015)** | -0.0012 (-0.0031, 0.00064) | -0.0013 (-0.0045, 0.0018) |
| 50-59 | -0.0066 (-0.01, -0.0032)*** | -0.0026 (-0.0044, -0.00071)** | -0.001 (-0.0042, 0.0021) |
| 60-69 | -0.01 (-0.014, -0.0064)*** | -0.0038 (-0.0059, -0.0016)*** | -0.0032 (-0.0067, 0.00026) |
| 70-79 | -0.0095 (-0.014, -0.0052)*** | -0.0045 (-0.0069, -0.0021)*** | -0.0013 (-0.0054, 0.0029) |
| Region × year (per one more recent year since 1985) | | | |
| Central and Eastern Europe | Reference | Reference | Reference |

| | | | |
|---|---|---|---|
| Central Asia, the Middle East and North Africa | 0.0011 (-0.0044, 0.0066) | -0.0017 (-0.0045, 0.001) | -0.00077 (-0.0049, 0.0034) |
| East and Southeast Asia | 0.0057 (0.00072, 0.011)* | 0.0042 (0.0016, 0.0067)** | -0.0022 (-0.0068, 0.0023) |
| High-income Asia Pacific | -0.0046 (-0.01, 0.0013) | 0.0068 (0.0036, 0.0099)*** | 0.0068 (0.0015, 0.012)* |
| High-income Western | -0.0067 (-0.011, -0.002)** | -0.00094 (-0.003, 0.0012) | 0.0002 (-0.003, 0.0034) |
| Latin America and the Caribbean | -0.0032 (-0.0087, 0.0023) | 0.00031 (-0.0023, 0.0029) | -0.00036 (-0.0044, 0.0037) |
| Oceania | -0.011 (-0.021, -0.00058)* | -0.0055 (-0.0091, -0.002)** | -0.0021 (-0.0073, 0.0031) |
| South Asia | -0.0072 (-0.013, -0.0015)* | -0.0023 (-0.0053, 0.00075) | -0.013 (-0.018, -0.0076)*** |
| Sub-Saharan Africa | 0.0013 (-0.0043, 0.0069) | 0.00059 (-0.0024, 0.0036) | 0.00096 (-0.0039, 0.0058) |

**Appendix Table 5.** Mean BMI estimates (kg/m$^2$) in 1985 and 2016 stratified by region, gender and age group.

| Sex | Year | Mean BMI (kg/m$^2$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 |
| Central and Eastern Europe | | | | | | | |
| Women | 1985 | 22.7 | 24.8 | 26.8 | 28.1 | 28.5 | 27.9 |
| | 2016 | 23.3 | 25.6 | 27.7 | 29.1 | 29.5 | 28.7 |
| Men | 1985 | 23.1 | 24.7 | 25.6 | 25.9 | 25.9 | 25.5 |
| | 2016 | 24.8 | 26.6 | 27.7 | 28.1 | 28.2 | 27.7 |
| Central Asia, the Middle East and North Africa | | | | | | | |
| Women | 1985 | 23.0 | 25.0 | 26.4 | 26.9 | 26.7 | 25.9 |
| | 2016 | 25.4 | 28.2 | 30.0 | 30.7 | 30.4 | 29.0 |
| Men | 1985 | 22.4 | 24.0 | 24.7 | 24.8 | 24.5 | 24.0 |
| | 2016 | 24.9 | 26.8 | 27.7 | 27.9 | 27.6 | 26.9 |
| East and Southeast Asia | | | | | | | |
| Women | 1985 | 20.6 | 21.4 | 22.1 | 22.2 | 22.0 | 21.4 |
| | 2016 | 22.2 | 23.6 | 24.5 | 24.8 | 24.5 | 23.6 |
| Men | 1985 | 20.7 | 21.5 | 21.7 | 21.6 | 21.3 | 20.7 |
| | 2016 | 22.9 | 24.0 | 24.6 | 24.6 | 24.3 | 23.7 |
| High-income Asia Pacific | | | | | | | |
| Women | 1985 | 20.8 | 21.6 | 22.5 | 23.1 | 23.3 | 23.0 |
| | 2016 | 21.0 | 21.8 | 22.7 | 23.4 | 23.4 | 23.0 |
| Men | 1985 | 21.8 | 22.6 | 22.8 | 22.7 | 22.3 | 21.8 |
| | 2016 | 23.2 | 24.2 | 24.5 | 24.5 | 24.0 | 23.3 |
| High-income Western | | | | | | | |
| Women | 1985 | 23.2 | 24.3 | 25.4 | 26.4 | 26.8 | 26.6 |
| | 2016 | 24.8 | 26.4 | 27.8 | 28.9 | 29.2 | 28.6 |
| Men | 1985 | 24.0 | 25.3 | 26.0 | 26.4 | 26.3 | 25.9 |
| | 2016 | 26.1 | 27.7 | 28.6 | 29.1 | 29.0 | 28.4 |
| Latin America and the Caribbean | | | | | | | |
| Women | 1985 | 22.8 | 24.1 | 25.0 | 25.4 | 25.3 | 24.7 |
| | 2016 | 25.2 | 27.3 | 28.7 | 29.2 | 29.0 | 28.0 |
| Men | 1985 | 22.8 | 24.1 | 24.7 | 24.7 | 24.3 | 23.6 |
| | 2016 | 25.2 | 27.0 | 27.7 | 27.8 | 27.4 | 26.6 |
| Oceania | | | | | | | |
| Women | 1985 | 23.7 | 23.9 | 23.8 | 23.4 | 22.3 | 20.9 |
| | 2016 | 26.2 | 27.4 | 27.9 | 27.8 | 26.6 | 24.8 |
| Men | 1985 | 23.0 | 23.7 | 23.8 | 23.5 | 22.9 | 22.2 |
| | 2016 | 25.2 | 26.3 | 26.6 | 26.5 | 25.9 | 24.9 |
| South Asia | | | | | | | |
| Women | 1985 | 19.2 | 19.8 | 20.1 | 19.8 | 19.2 | 18.7 |
| | 2016 | 21.2 | 22.6 | 23.2 | 23.1 | 22.5 | 21.6 |
| Men | 1985 | 19.3 | 20.0 | 20.2 | 19.9 | 19.3 | 18.8 |
| | 2016 | 21.2 | 22.3 | 22.6 | 22.4 | 21.9 | 21.2 |

| Sub-Saharan Africa | | | | | | | |
|---|---|---|---|---|---|---|---|
| Women | 1985 | 20.9 | 21.3 | 21.6 | 21.5 | 21.1 | 20.6 |
| | 2016 | 22.8 | 24.2 | 24.9 | 25.1 | 24.7 | 23.8 |
| Men | 1985 | 19.7 | 20.5 | 20.8 | 20.7 | 20.3 | 19.8 |
| | 2016 | 21.4 | 22.5 | 22.9 | 23.0 | 22.7 | 22.1 |