**Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1,479 population-based measurement studies with 19.1 million participants**

NCD Risk Factor Collaboration (NCD-RisC)

**Summary**

**Background:** Elevated blood pressure is an important risk factor for cardiovascular diseases and chronic kidney disease. We estimated worldwide trends in mean systolic blood pressure (SBP) and diastolic blood pressure (DBP), and the prevalence of, and number of people with, raised blood pressure defined as SBP ≥140 mmHg or DBP ≥90 mmHg.

**Methods:** We pooled 1,479 population-based studies that had measured blood pressure on 19.1 million adults aged 18 years and older. We used a Bayesian hierarchical model to estimate trends from 1975 to 2015 in mean SBP and DBP, and prevalence of raised blood pressure for 200 countries. We calculated the contributions of changes in prevalence versus population growth and ageing to the increase in the number of adults with raised blood pressure.

**Findings:** Global age-standardised mean SBP in 2015 was 127.0 mmHg (95% credible interval 125.7-128.3) in men and 122.3 mmHg (121.0-123.6) in women; age-standardised mean DBP was 78.7 mmHg (77.9-79.5) for men and 76.7 mmHg (75.9-77.6) for women. Global age-standardised prevalence of raised blood pressure was 24.1% (21.4-27.1) in men and 20.1% (17.8-22.5) in women in 2015. Mean SBP and DBP declined substantially from 1975 to 2015 in high-income western and Asia-Pacific countries, moving them from some of the highest blood pressure levels in 1975 to the lowest in 2015. Mean blood pressure may have also declined among women in central and eastern Europe, Latin America and Caribbean, and, more recently, central Asia, Middle East and north Africa. In contrast, mean blood pressure may have risen in east and southeast Asia, south Asia, Oceania, and sub-Saharan Africa. In 2015, central and eastern Europe, sub-Saharan Africa and south Asia had the highest worldwide blood pressure levels. Prevalence of raised blood pressure declined in high-income and some middle-income countries; it remained unchanged elsewhere. The number of adults with raised blood pressure increased from 594 million in 1975 to 1.13 billion in 2015, with the increase happening largely in low- and middle-income countries. The global increase in the number of adults with raised blood pressure is a net effect of increase due to population growth and ageing, and decrease due to declining age-specific prevalence.

**Interpretation:** Over the past four decades, the highest levels of blood pressure worldwide have shifted from high-income countries to low-income countries in south Asia and sub-Saharan Africa due to opposite trends, while blood pressure has been persistently high in central and eastern Europe.

**Funding:** Wellcome Trust

**Introduction**

Elevated blood pressure (BP) is the leading global risk factor for cardiovascular diseases (CVDs) and chronic kidney disease (CKD).1 One of the global non-communicable disease (NCD) targets adopted by the World Health Assembly in 2013 is to lower the prevalence of raised BP, defined as systolic blood pressure (SBP) ≥140 mmHg or diastolic blood pressure (DBP) ≥90 mmHg, by 25% compared to its 2010 level by 2025.2 Consistent global information is needed to understand how countries compare on BP levels and trends, and where interventions to curtail the rise in BP are most needed.

The prevalence of raised BP measures the number of high-risk people regardless of treatment status, and is the indicator used in the global NCD target. However, the association of BP with CVDs and CKD continues in a log-linear fashion well below the threshold for raised BP, and treatment provides comparable proportional risk reductions regardless of pre-treatment BP level.3,4 Trends in mean population BP measure how BP distribution has shifted over time.

Here, we pooled population-based data to estimate national, regional and global trends from 1975 to 2015 in mean SBP and DBP, and prevalence of raised BP, for adults aged 18 years and older in 200 countries and territories. We also estimated trends in the number of adults with raised BP, and calculated how much these trends are attributable to changes in prevalence versus in population size and age structure.

**Methods**

*Data sources*

We included data collected on samples of a national, sub-national (i.e. covering one or more sub-national regions), or community (one or a small number of communities) population and had measured BP. Our methods for identifying and accessing data sources are described in Appendix 1. When BP was measured more than once on participants (87% of 1,203 studies for which information on number of measurements was available), we discarded the first measurement, and averaged the remainder.

*Conversion to primary outcomes*

Twenty percent of our data sources (16% of age-sex-study-specific data points), which were from a previous global pooling5 or extracted from publications, did not have data on one or more of our primary outcomes. We used regressions to convert available data in these sources to the missing primary outcomes, because various BP outcomes are correlated.6 Details of conversion (or “cross-walking”) regressions and their coefficients are presented in Appendix 2 and Appendix Table 3.

*Statistical methods*

The statistical model used to estimate means and prevalence by country, year, and age is described in detail in a statistical paper and related substantive papers.5,7,8 In summary, we organised countries into 21 regions, mostly on the basis of geography and national income, themselves aggregated into 9 “super-regions” (Appendix Table 1). The model had a hierarchical structure in which estimates for each country and year were informed by its own data, if available, and by data from other years in the same country and from other countries, especially those in the same region with data for similar time periods. The hierarchical structure shares information to a greater degree when data are non-existent or weakly informative (e.g., have a small sample size or, as described below, are not national), and to a lesser extent for data-rich countries and regions.

The model incorporated non-linear time trends and age patterns. It allowed the age association of BP to vary across populations, and the rise in means and prevalence over age to be steeper where BP is higher.9,10 The model accounted for the possibility that BP in sub-national and community studies might systematically differ from nationally representative ones, and to have larger variation than in national studies; it also accounted for rural-urban differences in BP, and used it to adjust rural-only and urban-only studies. The statistical model included covariates that help predict BP, including average number of years of education, proportion of national population living in urban areas, and a summary measure of availability of different food types for human consumption (see Appendix 3 for details).

We fitted the statistical model with the Markov chain Monte Carlo (MCMC) algorithm, and obtained 5,000 post-burn-in samples from the posterior distribution of model parameters, which were in turn used to obtain the posterior distributions of primary outcomes. The reported credible intervals (CrI) represent the 2.5th-97.5th percentiles of the posterior distributions. Each primary outcome was analysed separately, and all analyses were done separately by sex to allow BP levels, trends, and age associations to differ among outcomes and between men and women.

We calculated average change per decade in mean BP and prevalence of raised BP over the 41 years of analysis (reported as change per decade). We also report the posterior probability (PP) that an estimated trend represents a true increase or decrease. Age-standardised estimates were generated using the WHO standard population,11 by taking weighted means of age-sex-specific estimates, with use of age weights from the standard population. We tested how our statistical model predicted mean BP and the prevalence of raised BP when a country-year did not have data as described in Appendix 4, which showed that it performed well in its predictive validity.

We calculated the contribution of population growth and ageing to the change in the number of adults with raised BP by fixing age-specific prevalence at its 1975 levels while allowing age-specific population to change as it did. The contribution of change in prevalence was calculated by fixing age-specific population at its 1975 level while allowing age-specific prevalence to change as it did. The interaction between the two is the residual change in the number of adults with raised BP after accounting for the two fore-mentioned components.

*Role of funding source*

The funder of the study had no role in study design, data collection, analysis, interpretation, or writing of the report. Country and Regional Data Group members and BZ had full access to the data in the study. The corresponding author had final responsibility for the decision to submit for publication.

**Results**

We used 1,479 population-based measurement surveys and studies, with 19.1 million participants aged 18 years and older for whom BP was measured. We had at least one data source for 174 of the 200 countries we made estimates for, covering 97.5% of the world’s population in 2015 (Appendix Figure 2), and at least two data sources for 122 countries. Of these 1,479 sources, 517 (35.0%) were from national samples, 249 (16.8%) covered one or more sub-national regions, and the remaining 713 (48.2%) were from one or a small number of communities. Regionally, data availability ranged from 0.83 data sources per country in central Africa to 37 sources per country in high-income Asia Pacific. 543 data sources (37%) were from years before 1995 and another 936 (63%) from 1995 and later.

Globally, age-standardised adult mean SBP remained virtually unchanged since 1975 among men (126.6 mmHg [95% CrI: 124.0-129.3] in 1975 and 127.0 mmHg [125.7-128.3] in 2015; average increase of 0.07 mmHg/decade [-0.59-0.74]; PP of being an increasing trend = 0.5808) and declined slightly in women (123.9 mmHg [121.3-126.6] in 1975 and 122.3 mmHg [121.0-123.6] in 2015; average decline of 0.47 mmHg/decade [-0.20-1.15]; PP = 0.9210) (Figure 1). Trends in age-standardised mean DBP, which was 78.7 mmHg (77.9-79.5) for men and 76.7 mmHg (75.9-77.6) for women in 2015, were similar (Figure 1).

Mean SBP and DBP declined substantially over these four decades in high-income western and high-income Asia-Pacific super-regions, moving these two super-regions from some of the highest BP levels in 1975 to the lowest in 2015 (Figure 1). The largest decline in mean SBP, which occurred in high-income Asia Pacific, was 3.2 mmHg/decade (2.4-3.9) for women and 2.4 mmHg/decade (1.6-3.1) for men (PP >0.9999). The largest decline in mean DBP, in high-income western super-region, was 1.8 mmHg/decade (1.4-2.3) for women and 1.5 mmHg/decade (1.0-1.9) for men (PP >0.9999). Mean SBP also seems to have declined among women in central and eastern Europe, Latin America and Caribbean, and, more recently, central Asia, Middle East and north Africa, but the estimated trends in these super-regions had larger uncertainty than those in high-income super-regions; mean DBP showed a similar, but less pronounced, decrease in these super-regions (Figure 1). There was no or little change in mean SBP or DBP among men in these super-regions.

In contrast to these declines, mean SBP may have risen among men and women in east and southeast Asia, south Asia, Oceania, and sub-Saharan Africa, with a similar trend in mean DBP (Figure 1). Central and eastern Europe, sub-Saharan Africa, and south Asia had the highest mean BP in 2015.

Age-standardised prevalence of raised BP declined globally, from 29.5% (24.2-35.0) to 24.1% (21.4-27.1) in men (PP = 0.9482) and from 26.1% (21.7-31.1) to 20.1% (17.8-22.5) in women (PP = 0.9884). The largest decline was seen in high-income super-regions, followed by Latin America and Caribbean, central and eastern Europe, and central Asia, Middle East and north Africa (Figure 2). Elsewhere, age-standardised prevalence of raised BP remained unchanged. Crude prevalence declined more slowly than age-standardised prevalence, especially where there has been substantial ageing, e.g., in high-income super-regions and Latin America and Caribbean.

South Korea and Canada had the lowest age-standardised mean SBP in 2015 for both men (117-118 mmHg) and women (~111 mmHg) (Figure 3). The highest mean SBPs in men were seen in some countries in central and eastern Europe (e.g., Slovenia, Lithuania and Croatia), Oceania, central Asia, and sub-Saharan Africa, with age-standardised mean SBP reaching 137.5 mmHg (131.2-143.8) in Slovenia. Women in a few countries in sub-Saharan Africa (e.g., Niger, Guinea, Malawi, and Mozambique) had the highest levels of mean SBP, surpassing 132 mmHg. Countries with the lowest mean DBP were Peru and a number of high-income countries including Canada, Australia, the UK, New Zealand, and Singapore. DBP was high throughout central and eastern Europe, south Asia and sub-Saharan Africa, with age-standardised mean surpassing 85 mmHg in Lithuanian men. Mean SBP and mean DBP were correlated across countries (e.g., correlation coefficient = 0.689 for men and 0.857 for women in 2015). However, men and women in countries in south Asia, central and eastern Europe, and central Asia, Middle East and north Africa had higher DBP than expected based on their SBP level and the SBP-DBP association (Figure 4); the opposite was seen for men and women in Oceania.

South Korea, Canada, the USA, Peru, the UK, Singapore and Australia had the lowest prevalence of raised BP in 2015 for both sexes with age-standardised prevalence <13% in women and <19% in men (Figure 3). At the other extreme, age-standardised prevalence surpassed 35% among men in some countries in central and eastern Europe including Croatia, Latvia, Lithuania, Hungary, and Slovenia; prevalence was >33% among women in a few countries in west Africa.

In 2015, men had higher age-standardised mean SBP than women in most countries (Figure 5). Men also had higher DBP and prevalence of raised BP than women in most countries, except in sub-Saharan Africa, where the sex pattern was reversed in most countries, and a few countries in Oceania and Asia. The male-female differences in age-standardised means and prevalence were virtually all due to differences below 50 years of age; among those aged 50 years and older, on average men and women had similar mean SBP and DBP and prevalence of raised BP, with countries divided into some with lower and others with higher male BP (results not shown). The male-female difference in BP in 2015 was largest in high-income countries and those in central and eastern Europe. Compared to 1975, the male excess in mean BP increased in high-income super-regions, central and eastern Europe, Latin America and the Caribbean, and central Asia, Middle East and north Africa but declined (and in the case of DBP reversed) in sub-Saharan Africa, Oceania and south Asia (results not shown).

The estimated number of adults with raised BP increased from 594 million in 1975 to 1.13 billion in 2015 (Figure 6), comprising 597 million men and 529 million women. At the global level, this increase was attributable to population growth and ageing, offset partly by falling age-specific prevalence. In the high-income western super-region, the absolute number of people with raised BP has declined steadily since 1975 because the steep decline in prevalence outweighed the effect of population growth and ageing. Nonetheless, 141 million adults in this super-region had raised BP in 2015. Similar to the high-income western super-region, in central and eastern Europe, the number of people with raised BP peaked in 1988 and went below its 1975 levels in 2002 driven by declining prevalence. In high-income Asia Pacific, the number of people with raised BP has declined since 2007 but is still higher than it was in 1975. In other low- and middle-income super-regions, the number of people with raised BP is still increasing. In Latin America and the Caribbean and central Asia, Middle East and north Africa, this rise is a net effect of increase due to population growth and ageing and decline due to lower age-specific prevalence. In Oceania, south Asia, east and southeast Asia, and sub-Saharan Africa, three quarters or more of the rise is attributable to population growth and ageing, and the remainder due to increase in prevalence. In 2015, 258 million (23%) of 1.13 billion adults with raised BP lived in south Asia (199 million of whom in India) and another 235 million (21%) in east Asia (226 million of whom in China).

**Discussion**

Elevated BP has transitioned from a condition largely affecting high-income countries to one that is most prevalent in low-income countries in south Asia and sub-Saharan Africa, while being a persistent health issue in central and eastern Europe. While favourable trends continue in high-income countries, and may also be happening in some middle-income regions, other low- and middle-income regions are affected by rising or at best stable BP levels. The number of people with raised BP in the world has increased by ninety percent over these four decades, with most of the increase occurring in low- and middle-income countries, and largely driven by the growth and ageing of the population.

At the global level, we estimated lower mean SBP in the 1980s, and hence a smaller decline over time, than reported by Danaei *et al*,5 possibly because we had more data than the earlier analysis. At the regional level, having additional data from low- and middle-income countries gave more confidence to the observed rise in mean SBP in Asia and sub-Saharan Africa in our work than those estimated by Danaei *et al*.5 Our results cannot be directly compared with the studies by Kearney *et al*12 and Mills *et al*13 because these studies included people who used antihypertensive medicines when calculating prevalence. Despite this difference in the reported metric, there is broad consistency in identifying central and eastern Europe, central Asia, and sub-Saharan Africa as regions at the highest risk. Lawes *et al*14 also reported the highest mean SBP in central and eastern Europe and central Asia, as we did, but unlike our study they found lower mean SBP in south Asia than most regions. This difference is largely because BP in south Asia has increased since 2000, the reporting year of Lawes *et al* study; it may also be because we had substantially more data from south Asia than Lawes *et al*.

The estimated decline in BP in high-income countries in our work is consistent with findings of country studies and the MONICA Project.15-34 Fewer studies have analysed BP trends in low- and middle-income countries. The few available studies indicate reductions in BP in central and possibly eastern Europe,35-38 Middle East and north Africa,39 and Latin America,40 and increases in south Asia and sub-Saharan Africa,41-43 and possibly in east and southeast Asia.44,45

We also found raised BP declined in some regions where mean did not change, and remained unchanged where mean increased. Some other studies have also found a larger decline in the upper tail of BP distribution than its mean.32,46 In the MONICA Project, the upper percentiles of BP distribution declined more than the mean in some sites but not in others.16 Although the changing shape of the distribution is partly due to antihypertensive medication, it has also occurred in younger adult ages when medication use is uncommon.32,46 Investigating its drivers requires historical data on multiple determinants of BP throughout the life-course. Finally, our finding on a higher mean BP in men than women, especially in pre-menopause ages, is consistent with prior studies.47

The strengths of our study include its scope in making consistent and comparable estimates of trends in both mean and raised BP over four decades for all the countries in the world. We used a large amount of population-based data covering countries in which >97% of the global adult population lives. We used only data from studies that had measured BP to avoid bias in self-reported data. Data were analysed according to a common protocol, and the characteristics of data from each country were verified through repeated checks by NCD-RisC members. We pooled data using a statistical model that took into account the epidemiological features of BP, including non-linear time trends and age associations. Our statistical model used all available data while giving more weight to national data than to sub-national and community sources.

Similar to all global analyses, our study is affected by some limitations. First, some countries had no or few data sources, especially those in sub-Saharan Africa and the Caribbean. Estimates for these countries relied mostly or entirely on the statistical model. The absence or scarcity of data is reflected in wider uncertainty intervals of our estimates for these countries and regions, emphasising the importance of national NCD-oriented surveillance. Second, we had fewer data sources prior to 1990 in most regions, reflected in the larger uncertainty for these years. In a sensitivity analysis, we analysed trends starting 1990 with an identical model, and compared the post-1990 estimates with those from the main analysis (which included data from 1975 onwards). The estimates were very similar with correlation coefficients between the estimates from the main and sensitivity analysis being ≥0.94 in 1990 and ≥0.98 in 2015 (Appendix Figure 4). Third, only 53% of sources included people older than 70 years, necessitating the use of data in older ages elsewhere to infer an age pattern and make estimates in older ages. Given the ageing trends throughout the world, inclusion of older people in health surveys should be emphasised. Fourth, our model accounted and adjusted for systematic and random errors in sub-national and community data. However, the adjustments are not country-specific because estimating country-specific adjustments would require national and sub-national/community data in the same country and year. Therefore, the correction for each single country remains uncertain. Fifth, although data held by NCD-RisC members were analysed to provide all the primary outcomes, individual participant data could not be accessed for 20% of data sources. To overcome this issue, we systematically used the reported metrics to estimate all of our primary outcomes; the cross-walking regressions used for this purpose had good predictive accuracy but increased the uncertainty of our estimates. Sixth, over time, standard mercury sphygmomanometers have been replaced by random-zero sphygmomanometers and more recently digital oscillometric devices in health surveys. Similarly, studies differed on whether they used multiple cuff sizes or one cuff size. We note that the effect of measurement device and protocol on population mean and prevalence depend on the circumstances of each survey. For example, an automated digital device with a standard cuff, although not the traditional “gold-standard” in a clinical setting, avoids observer bias and increases compliance, and possibly even response rate, compared to a standard mercury sphygmomanometer with multiple cuffs.48 Nonetheless, measurements from different devices are not fully comparable,49-51 which may have affected the estimated trends. When we included device type as a study-level covariate in our statistical model, studies using random-zero sphygmomanometer, which was used commonly in the late 1980s and 1990s, had lower mean BP (by ~4.5 mmHg for SBP and ~3 mmHg for DBP) and prevalence of raised BP than those using standard mercury sphygmomanometers. The average difference between studies using digital device and mercury sphygmomanometer was ~2 mmHg for SBP and ~0.2 mmHg for DBP. Finally, BP had been measured only once in some of our data sources. In those sources with multiple measurements, the median difference between the first measurement and the average of subsequent ones was 1.5 mmHg for SBP and 0.0 mmHg for DBP indicating that mean BP and prevalence of raised BP may be slightly overestimated in some of our sources.

BP is a multi-faceted trait, affected by nutrition, environment and behaviour throughout the life course, including fetal and early childhood nutrition and growth,52 adiposity,53,54 specific components of diet especially sodium and potassium intakes,53 alcohol use,54,55 smoking,56 physical activity,54 air pollution,57 lead,58 noise,59 psychosocial stress and the use of BP lowering medicines. Changes in risk factors, and increase in detection and treatment of raised BP, have been at least partly responsible for the decline in BP in high-income countries, although the decline seems to have begun before or in the absence of specific interventions for risk factors and scale-up of treatment, and is only partially explained by the measured risk factors and treatment.17,19-21,34,35,46,60-70 In particular, the decline in high-income and some middle-income countries has happened despite rising BMI.71

The partly secular nature of these favourable trends necessitates speculating about their drivers, which might include unmeasured improvements in early childhood nutrition and year-round availability of fruits and vegetables which may contribute to higher or more regular consumption. Our results show that similar, although slower, declining trends may have begun in some middle-income regions, but not in the poorest populations, including those in south Asia and sub-Saharan Africa, nor those affected by major social and economic changes in central and eastern Europe. These populations have low consumptions of fresh fruits72 and, in many cases, high consumption of salt.73 South Asia and sub-Saharan Africa also have the highest prevalence of maternal undernutrition,71,74 preterm and small-for-gestational age births, and child undernutrition;75,76 they have also had some of the smallest gains in adult height,74 which is associated with lower risk of CVDs. Many cases of raised BP go untreated in these regions.13,77 The absence of these favourable determinants of low BP, coupled with rising BMI,71 may be responsible for rising mean BP in these regions. Therefore, addressing the large and inequitable burden of CVDs and kidney disease associated with high BP requires a multi-faceted approach using both population-based strategies throughout the life course and individual lifestyle management and treatment through primary care systems.

**Research in Context**

*Evidence before this study*

We searched Medline (via PubMed) for articles published from 1st January 1950 to 19th February 2014 using the search terms ("blood pressure"[Mesh:NoExp] OR "hypertension"[Mesh:NoExp]) AND ("Humans"[Mesh]). Articles were screened according to the inclusion and exclusion criteria described in the Appendix.

Some studies, including the MONICA Project, have reported on blood pressure change or trends in one or more countries. Two previous global analyses, conducted over a decade ago, pooled data from different countries and reported mean SBP or prevalence of hypertension in the year 2000 for the world and its major regions. A more recent analysis pooled 135 studies to estimate global and regional hypertension prevalence in 2000 and 2010 but did not report changes in mean blood pressure which reflect shifts in the population distribution of blood pressure. None of these studies provided consistent estimates for all countries or accounted for the fact that the data used were collected in different years. The only analysis of trends at the country level reported mean SBP from 1980 to 2008 but did not report mean DBP or prevalence of raised blood pressure which is of clinical relevance and needed for monitoring progress towards the global target.

*Added value of this study*

This study provides the most complete picture of trends in adult blood pressure for all countries in the world with the longest observation period, and includes trends in mean DBP and prevalence of raised blood pressure, which were not included in prior studies and are of clinical, public health, and health systems significance. We also estimated trends in the number of adults with raised blood pressure, and how much they are driven by changes in prevalence versus population size and age structure.

*Implications of all the available evidence*

Over the past four decades, the highest levels of blood pressure worldwide have shifted from high-income countries to low- and middle-income countries in south Asia and sub-Saharan Africa, while blood pressure has been persistently high in central and eastern Europe. The global target of reducing raised blood pressure prevalence by 25% by 2025 is unlikely to be achieved in these regions. The number of people with raised blood pressure has risen worldwide, with the increase happening largely in low- and middle-income countries. Population-based interventions throughout the life-course and pharmacological treatment for those with high absolute risk or those with markedly raised blood pressure should be a part of any effort to address the global burden of NCDs, especially in the poorest countries.

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**Contributions**

ME designed the study and oversaw research. Members of the Country and Regional Data Group collected and reanalysed data, and checked pooled data for accuracy of information about their study and other studies in their country. BZ and MDC led data collection. BZ and JB led the statistical analysis. BZ prepared results. Members of the Pooled Analysis and Writing Group collated data, checked all data sources in consultation with the Country and Regional Data Group, analysed pooled data, and prepared results. BZ and ME wrote the first draft of the report with input from other members of Pooled Analysis and Writing Group. Members of Country and Regional Data Group commented on draft report.

**Figure 1:** Trends in age-standardised (A) mean systolic blood pressure and (B) mean diastolic blood pressure by sex and super-region in people aged 18 years and older. The lines show the posterior mean estimates and the shaded area shows the 95% credible interval. See Appendix Figure 5 for trends by country.

**Figure 2:** Trends in age-standardised (solid line) and crude (dashed line) prevalences of raised blood pressure by sex and super-region in people aged 18 years and older. The lines show the posterior mean estimates and the shaded area shows the 95% credible interval for age-standardised prevalence. See Appendix Figure 6 for trends by country.

**Figure 3:** Age-standardised (A) mean systolic blood pressure, (B) mean diastolic blood pressure, and (C) prevalence of raised blood pressure, by sex and country in 2015 in people aged 18 years and older. Interactive versions of these maps as well as downloadable numerical results are available from www.ncdrisc.org.

**Figure 4:** Relationship between age-standardised mean systolic blood pressure and mean diastolic blood pressure in men and women aged 18 years and older in 2015. The dotted line shows the linear relationship between the two outcomes.

**Figure 5:** Comparison of age-standardised (A) mean systolic blood pressure, (B) mean diastolic blood pressure, and (C) prevalence of raised blood pressure in men and women aged 18 years and older in 2015.

**Figure 6:** Trends in the number of adults aged 18 years and older with raised blood pressure (A) by region, (B) decomposed into the contributions of population growth and ageing, change in prevalence, and interaction of the two for the world and (C) decomposed into the contributions of population growth and ageing, change in prevalence, and interaction of the two by super-region. In panels B and C, the thick black lines show the trends in the number of people with raised blood pressure, and the light blue sections show the rise in numbers due to population growth and ageing that has been offset by the decline in prevalence.

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