Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Estimating the changing burden of disease attributable to high blood pressure in South Africa for 2000, 2006 and 2012

This appendix provides additional methods and results for the burden of disease estimation for high blood pressure for South Africa for 2000, 2006 and 2012.

Supplementary appendix to "Estimating the changing burden of disease attributable to high blood pressure in South Africa in 2000, 2006 and 2012"

This appendix provides additional details about the analysis of the national surveys and the results of the meta-regression.

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1. Additional methods

The number of measurements varied according to survey as shown in Table S1.

Table S1. Number of available measurements of SBP for calculation of the summary individual values

Survey	Data collection	No. and procedure of measurements as per protocol	Summary value for SBP calculation
SADHS 1998	1998	1	-
SADHS 2003	2003	1	-
SADHS 2016	2016	1	-
NIDS 2008	2008	Two measurements are taken. If the two readings vary by more than 0.5 cm/0.5 kg the measurement is repeated until both readings are within 0.5 cm/0.5 kg.	Average of the last two readings
NIDS 2010-11	2010-11		
NIDS 2012	2012		
NIDS 2014-15	2014-15		
NIDS 2017	2017		
SANHANES-1	2012	Two measurements are taken. If the two measurements differ by more than 100 g/0.1 cm, a third measurement is taken. The two measurements that are nearest to each other are selected.	Average of the two closest readings

SADHS = South Africa Demographic and Health Survey; NIDS = National Income Dynamics Study; SANHANES = South African National Health and Nutrition Examination Survey. Data collection: year(s) of data collection.

The number of non-missing observations and exclusions for each survey is reported in Table S2.

Table S2. Observations in each survey, before and after exclusion of implausible values, per survey

Survey	No. of observations with non-missing values of SBP	
	Before cleaning	After cleaning
SADHS 1998	13 546	13 474
SADHS 2003	7 798	7 764
SADHS 2016	5 481	5 474
NIDS 2008	13 893	13 732
NIDS 2010-11	15 044	14 868
NIDS 2012	18 317	18 275
NIDS 2014-15	22 320	22 276
NIDS 2017	23 357	23 300
SANHANES	5 282	5 187
Total	125 038	124 350

Table S3 shows the risk of bias associated with the estimation of systolic blood pressure (SBP) from data recorded in the various survey datasets, as quantified by the Burden of Disease Review Manager (BODRevMAN) risk assessment tool. The tool consolidates in a single number (ranging between 1 and 20, with lower scores indicating higher risk of bias) information on both internal (adequacy of measurement procedures) and external validity of the survey data (adequacy of sampling design and realisation).

Table S3. Risk of bias score associated with SBP estimates in each survey

Survey	Risk of bias score	Risk of bias category
SADHS 1998	18	Low
SADHS 2003	17	Low
SADHS 2016	18	Low
NIDS 2008	17	Low
NIDS 2010-11	12	Moderate
NIDS 2012	12	Moderate
NIDS 2014-15	12	Moderate
NIDS 2017	12	Moderate
SANHANES	17	Low

Before doing the meta-regression on the data from national surveys, we excluded the first of the multiple SBP readings included in the different datasets and those with implausible values (SBP <70 mmHg or >270 mmHg, as done by Zhou *et al.*, (2017)).[1] We then considered the average of the remaining readings as the subject's BP. We used standard methods (weighted estimators with robust standard error) to recover survey-, age-, race- and sex-specific estimates of mean and SD of SBP, taking into account the complex sampling design of each individual survey.

Table S4 provides the estimated mean and standard deviations of the population distribution of the SBP (mmHg) based on the meta-analysis of the national survey data by age, sex and population group for adults 25 years and older. The estimated prevalence of hypertension (>140/80 mmHg and/or on hypertensive medication) is shown in the last column with the 95% confidence intervals.

Table S4. Estimated mean and standard deviation of the population distribution of systolic blood pressure and prevalence of hypertension by sex and population group for adults 25+ years in South Africa for 2000, 2006 and 2012

Year	Population group	Sex	Age	Systolic blood pressure distribution [mmHg]						Hypertension prevalence (%)		
				Mean			Standard deviation					
				Est	LB	UB	Est	LB	UB	Est	LB	UB
2000	Black	Female	All	123.5	121.8	125.1	22.8	22.0	23.7	31.5	29.1	34.0
2006	Black	Female	All	123.8	122.5	125.2	22.7	22.0	23.4	35.1	33.1	37.2
2012	Black	Female	All	123.8	122.5	125.1	22.4	21.7	23.2	37.8	35.8	39.8
2000	Black	Male	All	124.7	123.6	125.9	19.3	18.8	20.0	25.1	23.0	27.3
2006	Black	Male	All	125.8	124.9	126.7	19.7	19.2	20.1	30.3	28.5	32.2
2012	Black	Male	All	126.6	125.6	127.5	19.8	19.4	20.3	34.9	33.0	36.9
2000	Coloured	Female	All	126.5	124.6	128.4	22.8	21.7	24.1	37.2	34.3	40.2
2006	Coloured	Female	All	128.6	127.3	130.0	22.6	21.7	23.5	44.3	42.1	46.6
2012	Coloured	Female	All	130.5	129.1	131.8	22.2	21.4	23.2	50.6	48.3	52.9
2000	Coloured	Male	All	130.8	128.8	132.8	18.1	17.2	19.4	31.8	28.5	35.1
2006	Coloured	Male	All	131.3	129.8	132.8	18.5	17.6	19.6	39.7	36.9	42.5
2012	Coloured	Male	All	131.6	130.1	133.1	18.8	17.9	19.8	46.9	44.1	50.0
2000	Asian	Female	All	120.2	118.9	121.6	19.1	18.1	20.2	33.0	30.1	36.0
2006	Asian	Female	All	121.7	120.3	123.1	19.7	18.6	20.8	35.1	32.3	38.0
2012	Asian	Female	All	122.9	121.5	124.2	20.2	19.3	21.4	37.0	34.1	39.8
2000	Asian	Male	All	128.5	126.3	130.8	16.2	14.3	18.6	31.1	27.6	34.5
2006	Asian	Male	All	127.1	125.3	128.9	15.5	14.0	17.5	32.5	29.3	35.9
2012	Asian	Male	All	125.5	123.6	127.3	14.7	13.1	16.7	32.7	29.2	36.1
2000	White	Female	All	122.1	120.3	123.8	18.6	17.3	20.2	32.0	29.1	34.9
2006	White	Female	All	123.5	122.2	124.8	18.4	17.4	19.6	37.3	35.0	39.6
2012	White	Female	All	124.8	123.5	126.1	18.3	17.2	19.4	42.2	39.8	44.6
2000	White	Male	All	127.6	126.6	128.6	18.0	17.0	19.1	39.6	37.3	41.7
2006	White	Male	All	128.8	127.8	129.8	17.5	16.8	18.4	42.0	39.9	44.0
2012	White	Male	All	129.4	128.4	130.4	16.8	16.1	17.6	42.9	40.9	45.0
2000	All	Female	25-34	113.0	110.1	116.0	15.1	13.9	16.4	9.2	4.9	13.2

Table S4. Estimated mean and standard deviation of the population distribution of systolic blood pressure and prevalence of hypertension by sex and population group for adults 25+ years in South Africa for 2000, 2006 and 2012

Year	Population group	Sex	Age	Systolic blood pressure distribution [mmHg]						Hypertension prevalence (%)		
				Mean			Standard deviation					
				Est	LB	UB	Est	LB	UB	Est	LB	UB
2006	All	Female	25-34	113.3	110.9	115.7	14.7	13.8	15.9	12.4	8.8	16.0
2012	All	Female	25-34	113.5	111.0	116.0	14.5	13.5	15.5	15.5	11.7	19.3
2000	All	Male	25-34	119.5	117.5	121.3	13.9	12.8	15.1	11.9	8.4	15.4
2006	All	Male	25-34	120.2	118.6	121.9	14.2	13.3	15.2	16.5	13.3	19.7
2012	All	Male	25-34	121.1	119.4	122.8	14.5	13.6	15.5	21.3	18.0	24.6
2000	All	Female	35-44	120.6	118.3	122.8	18.9	18.1	19.8	25.8	22.3	29.3
2006	All	Female	35-44	120.9	119.3	122.5	18.6	17.9	19.4	29.1	26.3	32.0
2012	All	Female	35-44	121.3	119.7	123.0	18.4	17.7	19.1	32.3	29.3	35.4
2000	All	Male	35-44	124.2	122.5	125.8	17.0	16.3	17.9	23.6	20.8	26.4
2006	All	Male	35-44	125.1	123.9	126.3	17.2	16.6	17.8	28.2	25.9	30.5
2012	All	Male	35-44	125.9	124.6	127.1	17.4	16.9	18.0	32.9	30.3	35.4
2000	All	Female	45-54	127.7	125.6	129.9	21.6	21.0	22.4	43.3	40.0	46.8
2006	All	Female	45-54	128.3	126.5	130.0	21.5	20.9	22.1	47.0	44.2	49.7
2012	All	Female	45-54	128.8	127.2	130.4	21.3	20.8	21.9	50.5	47.7	53.3
2000	All	Male	45-54	128.9	127.5	130.4	19.5	18.9	20.2	36.4	33.5	39.2
2006	All	Male	45-54	129.7	128.8	130.6	19.7	19.3	20.1	40.8	38.5	43.1
2012	All	Male	45-54	130.6	129.7	131.5	19.8	19.4	20.3	45.4	43.1	47.9
2000	All	Female	55-64	134.0	131.7	136.3	24.0	23.4	24.8	56.7	53.0	60.3
2006	All	Female	55-64	134.4	132.7	136.1	23.7	23.2	24.3	60.0	57.0	63.0
2012	All	Female	55-64	135.0	133.3	136.7	23.7	23.1	24.3	63.8	61.0	66.6
2000	All	Male	55-64	133.5	132.0	134.9	21.7	21.1	22.4	49.0	46.2	52.0
2006	All	Male	55-64	134.2	133.2	135.3	21.7	21.3	22.1	53.4	51.0	55.8
2012	All	Male	55-64	135.1	134.1	136.1	21.9	21.5	22.3	57.6	55.2	60.1
2000	All	Female	65+	141.3	138.5	144.1	25.8	25.0	26.6	68.0	63.7	72.4
2006	All	Female	65+	141.9	139.6	144.3	25.6	25.0	26.3	71.4	67.9	75.1
2012	All	Female	65+	142.3	140.1	144.6	25.3	24.7	26.0	75.0	71.6	78.3
2000	All	Male	65+	140.6	138.7	142.4	24.8	24.2	25.6	63.7	60.0	67.5
2006	All	Male	65+	141.5	139.9	143.0	24.7	24.2	25.3	68.3	65.1	71.4
2012	All	Male	65+	142.2	140.7	143.8	24.6	24.0	25.2	72.7	69.6	75.8

Est = point estimate; LB, UB = bounds of the 95% confidence interval.

Table S5. Relative risks per 10 mmHg above the systolic blood pressure TMREL for cardiovascular and chronic kidney disease by age group

Condition	25 - 29 years	30 - 34 years	35 - 39 years	40 - 44 years	45 - 49 years	50 - 54 years	55 - 59 years	60 - 64 years	65 - 69 years	70 - 74 years	75 - 79 years	80+ years
	Relative risk (lower limit – upper limit) per 100 mmHg increase											
Rheumatic heart disease	**1.631** (1.174-2.306)	**1.474** (1.474-1.898)	**1.317** (1.144-1.575)	**1.229** (1.089- 1.422)	**1.211** (1.101-1.367)	**1.193** (1.107- 1.328)	**1.175** (1.101-1.287)	**1.157** (1.086-1.265)	**1.139** (1.055-1.248)	**1.127** (1.048- 1.241)	**1.12** (1.060-1.238)	**1.104** (1.040- 1.280)
Hypertensive heart disease	**2.862** (1.829- 4.108)	**2.838** (1.857-4.187)	**2.814** (1.802 -4.337)	**2.703** (1.762 -4.186)	**2.504** (1.804 -3.758)	**2.304** (1.772 -3.464)	**2.105** (1.645 -3.336)	**1.905** (1.447 -3.171)	**1.706** (1.188 -3.215)	**1.619** (1.053-3.136)	**1.644** (1.078-3.091)	**1.708** (1.103-3.258)
Ischaemic heart disease	**1.972** (1.440-2.596)	**1.818** (1.818-2.207)	**1.665** (1.461- 1.911)	**1.568** (1.398- 1.799)	**1.527** (1.393- 1.705)	**1.487** (1.385-1.619)	**1.446** (1.368- 1.535)	**1.405** (1.332-1.488)	**1.364** (1.257-1.456)	**1.33** (1.224-1.424)	**1.303** (1.225 -1.404)	**1.266** (1.134-1.437)
Endocarditis	**1.755** (1.266- 2.423)	**1.605** (1.605-2.011)	**1.455** (1.278- 1.642)	**1.365** (1.232-1.510)	**1.335** (1.222-1.449)	**1.306** (1.219-1.394)	**1.276** (1.212-1.342)	**1.247** (1.183-1.303)	**1.217** (1.131-1.284)	**1.193** (1.116-1.263)	**1.175** (1.120-1.237)	**1.128** (1.071 -1.235)
Other cardiomyopathy	**1.755** (1.266- 2.423)	**1.605** (1.605-2.011)	**1.455** (1.278- 1.642)	**1.365** (1.232-1.510)	**1.335** (1.222-1.449)	**1.306** (1.219-1.394)	**1.276** (1.212-1.342)	**1.247** (1.183-1.303)	**1.217** (1.131-1.284)	**1.193** (1.116-1.263)	**1.175** (1.120-1.237)	**1.128** (1.071 -1.235)
Ischaemic stroke	**1.854** (1.395- 2.588)	**1.774** (1.774 -2.252)	**1.694** (1.404 -2.035)	**1.628** (1.354 -1.950)	**1.574** (1.360-1.823)	**1.521** (1.361-1.698)	**1.468** (1.344-1.596)	**1.414** (1.302-1.524)	**1.361** (1.214-1.490)	**1.318** (1.168-1.451)	**1.284** (1.179 -1.389)	**1.201** (1.109-1.370)
Haemorrhagic stroke	**2.134** (1.555- 2.919)	**2.050** (2.050-2.648)	**1.966** (1.589-2.465)	**1.874** (1.492-2.302)	**1.775** (1.484 -2.114)	**1.676** (1.446 -1.932)	**1.577** (1.402 -1.754)	**1.478** (1.331-1.619)	**1.379** (1.207-1.540)	**1.323** (1.162 -1.495)	**1.311** (1.193-1.450)	**1.279** (1.126-1.515)
Atrial fibrillation and flutter	**1.760** (1.336-2.430)	**1.631** (1.474-1.898)	**1.503** (1.396 -1.644)	**1.423** (1.340 -1.505)	**1.392** (1.328-1.457)	**1.361** (1.313 -1.411)	**1.330** (1.293 -1.369)	**1.299** (1.265 -1.333)	**1.268** (1.233 -1.308)	**1.237** (1.202 -1.277)	**1.208** (1.177- 1.238)	**1.134** (1.092-1.185)
Aortic aneurysm	**1.544** (1.259-2.164)	**1.469** (1.469-1.816)	**1.394** (1.300 -1.535)	**1.345** (1.227 -1.451)	**1.321** (1.233-1.405)	**1.296** (1.229 -1.362)	**1.272** (1.218-1.327)	**1.248** (1.191-1.299)	**1.223** (1.160-1.286)	**1.200** (1.137-1.261)	**1.177** (1.126 -1.229)	**1.119** (1.071-1.184)
Peripheral vascular disease	**1.728** (1.203-2.428)	**1.491** (1.491-1.870)	**1.254** (1.182-1.329)	**1.138** (1.019 -1.263)	**1.142** (1.047-1.243)	**1.146** (1.071 -1.224)	**1.15** (1.094 – 1.208)	**1.154** (1.110 -1.199)	**1.159** (1.113-1.207)	**1.152** (1.104 -1.201)	**1.136** (1.098-1.176)	**1.095** (1.054-1.154)
Other cardiovascular and circulatory diseases	**1.744** (1.339 -2.396)	**1.624** (1.624-2.006)	**1.504** (1.405-1.626)	**1.427** (1.354-1.498)	**1.395** (1.336-1.452)	**1.363** (1.318-1.406)	**1.330** (1.296-1.365)	**1.298** (1.266-1.332)	**1.265** (1.231-1.303)	**1.235** (1.201-1.270)	**1.207** (1.177-1.235)	**1.137** (1.095-1.187)
CKD due to hypertension	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)
CKD due to glomerulonephritis	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)	**1.281** (1.182-1.383)
CKD due to other and unspecified causes	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)	**1.282** (1.181- 1.395)
CKD due to diabetes mellitus	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)	**1.283** (1.186-1.397)

Source: GBD 2017 Risk Factors Collaborators, 2019.[2]

2. Additional results

The mean SBP for 2012, a key study year, is shown in Figure S1 by population group and age for males and females. The mean SBP increased slightly with age for both females and males.

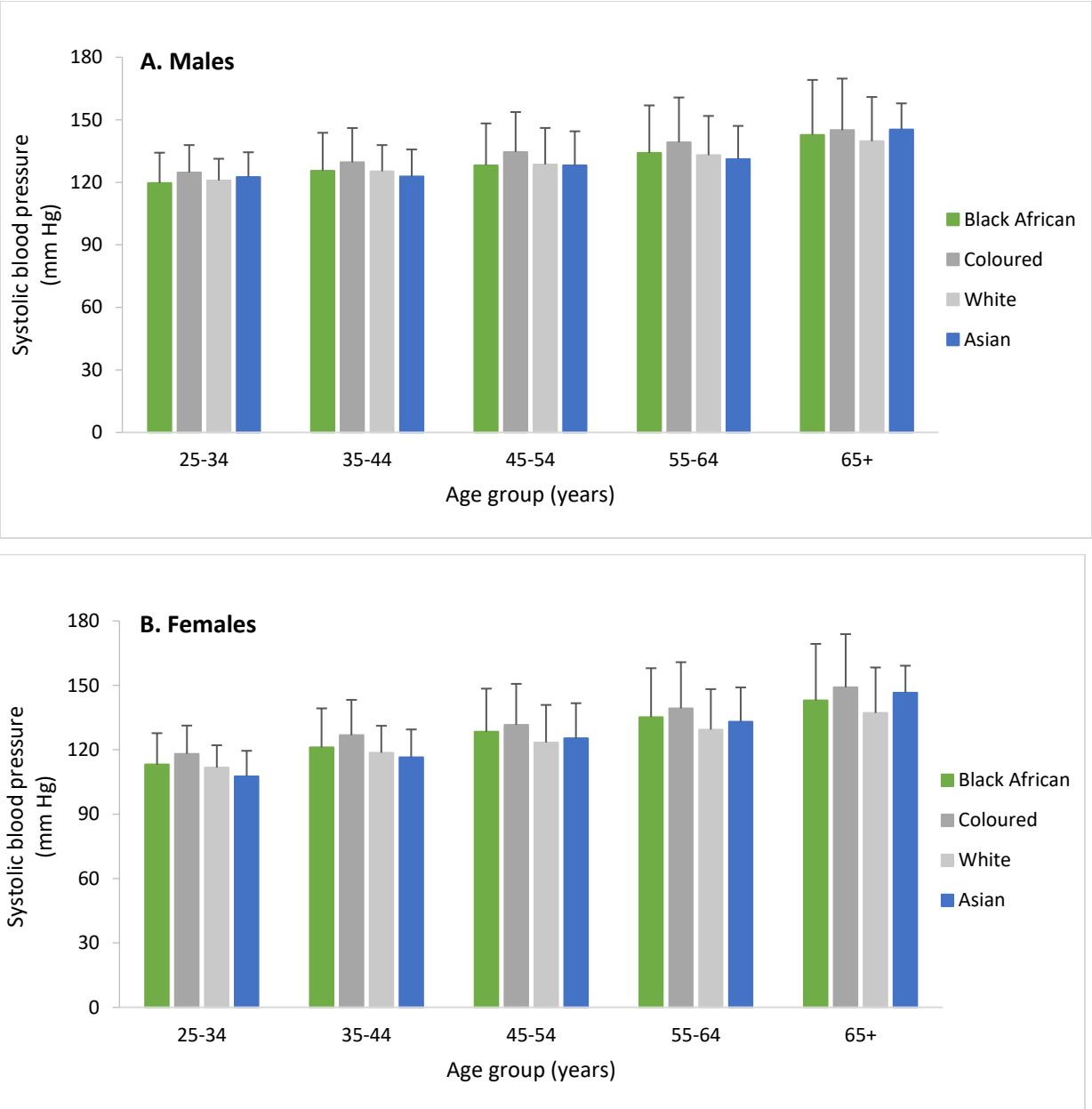


Fig. S1. Mean systolic blood pressure (mmHg) by population group (25+ years) for (A) Males and (B) Females in South Africa for 2012.

The trends in the estimated mean SBP for the period 1998 - 2017 based on the meta-regression of national surveys data are shown in Figs S2 - S5 for each population group by age and sex.

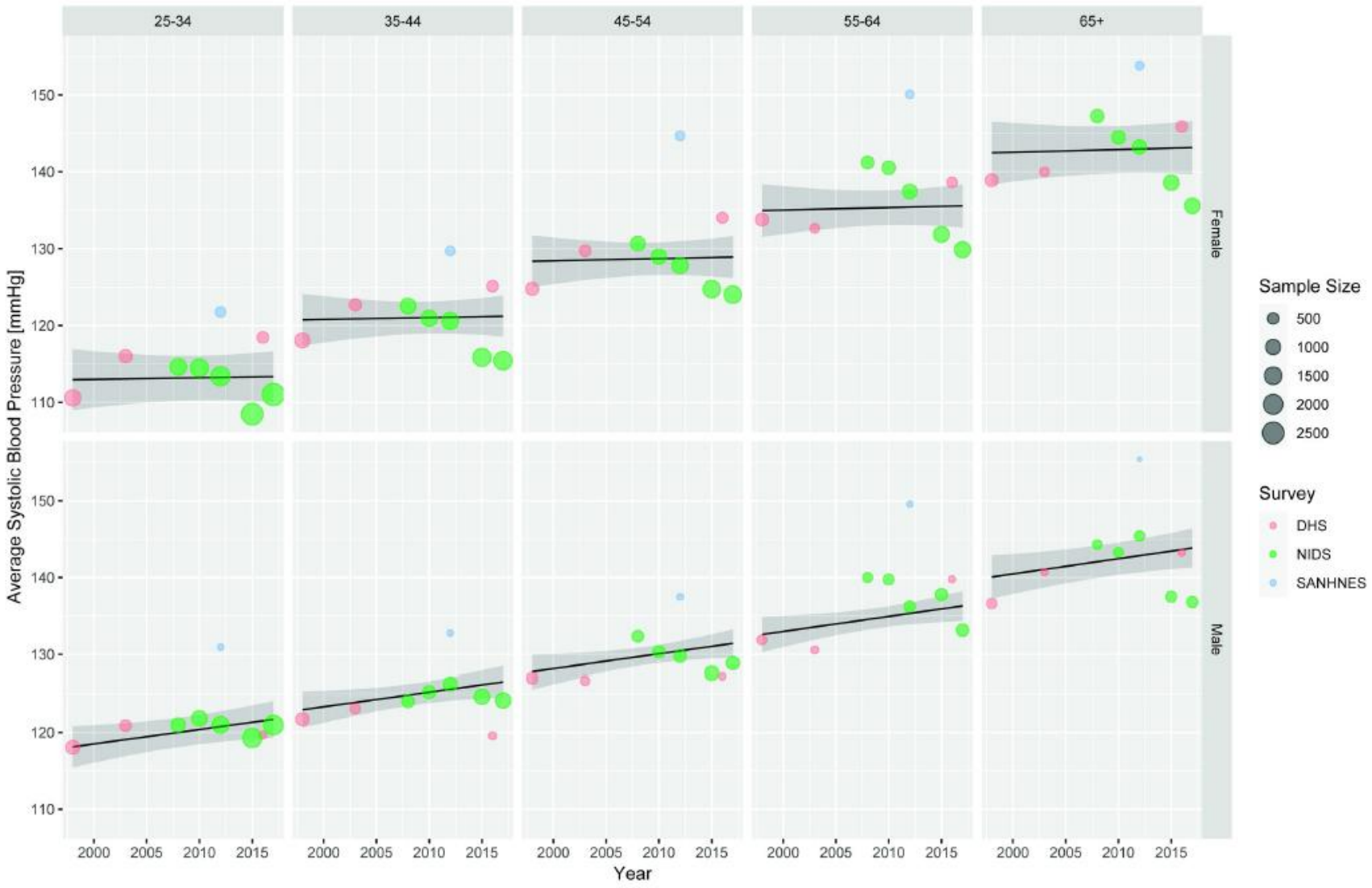


Fig. S2. Estimated trends 1998-2017 in systolic blood pressure in the black African adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

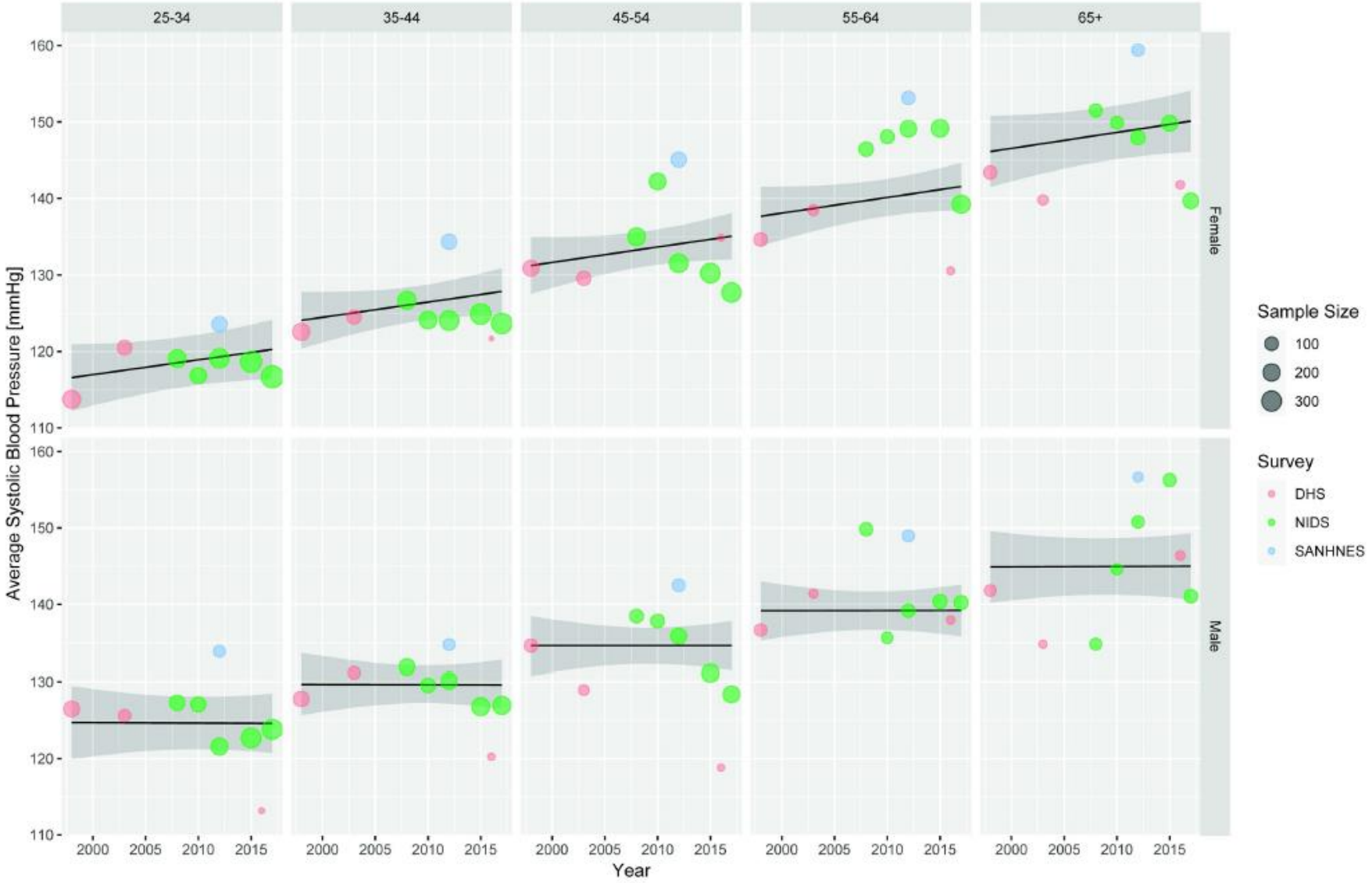


Fig. S3. Estimated trends 1998-2017 in systolic blood pressure in the coloured adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

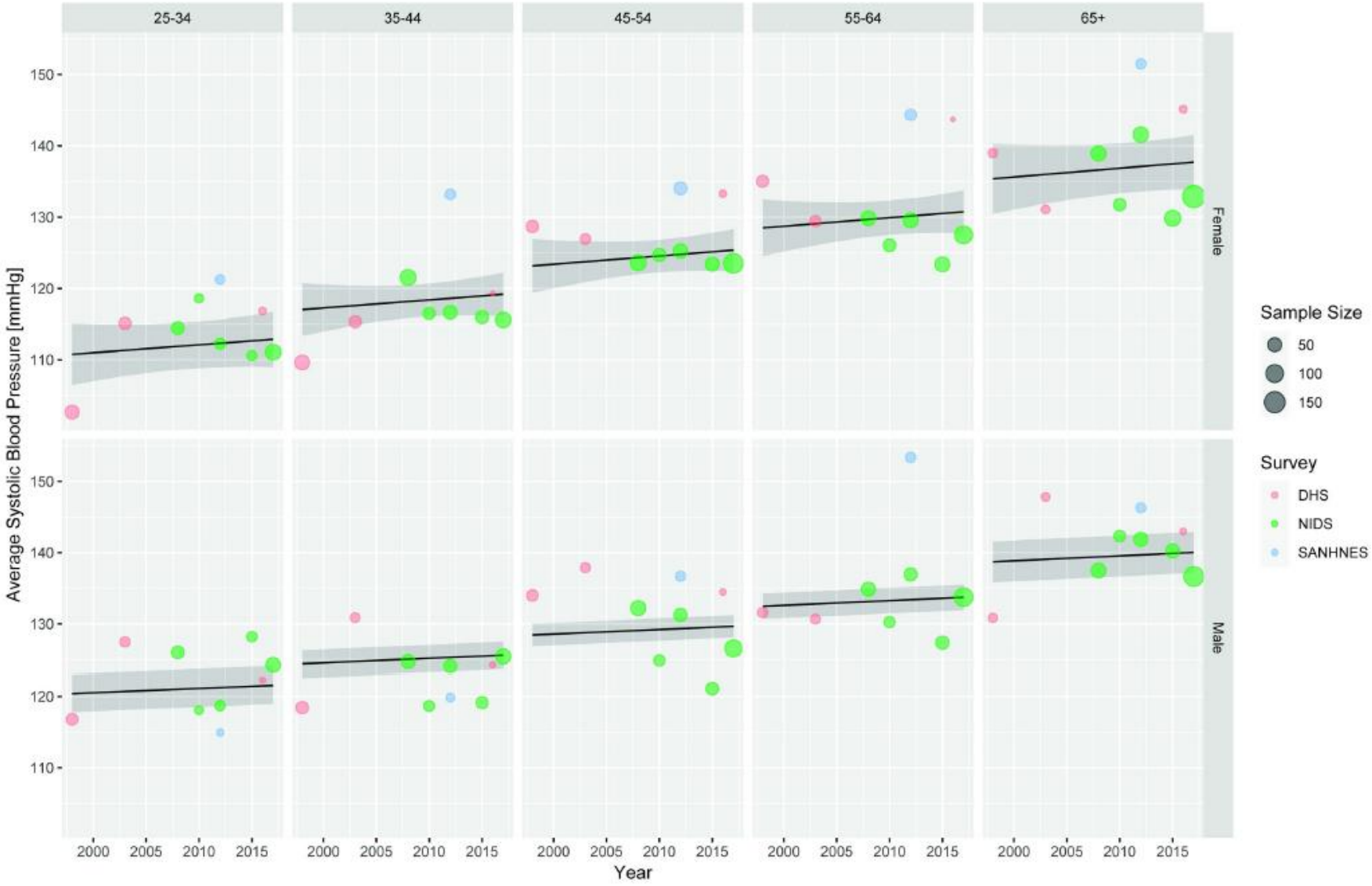


Fig. S4. Estimated trends 1998-2017 in systolic blood pressure in the white adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

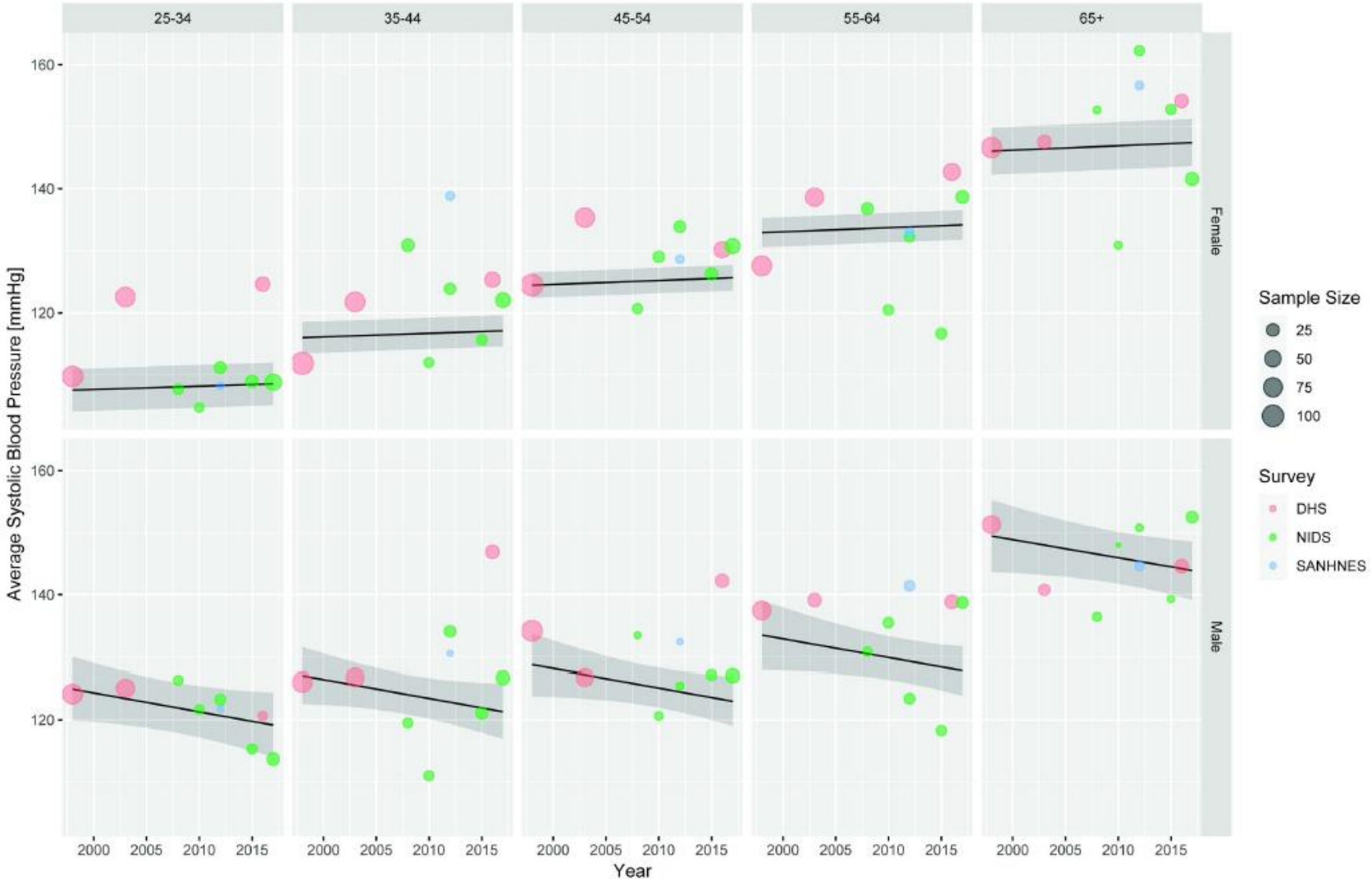


Fig. S5. Estimated trends 1998-2017 in systolic blood pressure in the Asian adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

Figs S6 – S9 show the estimated trends of the prevalence of hypertension. The relative risks per 10 mmHg for selected conditions are shown in Table S2 by age group.

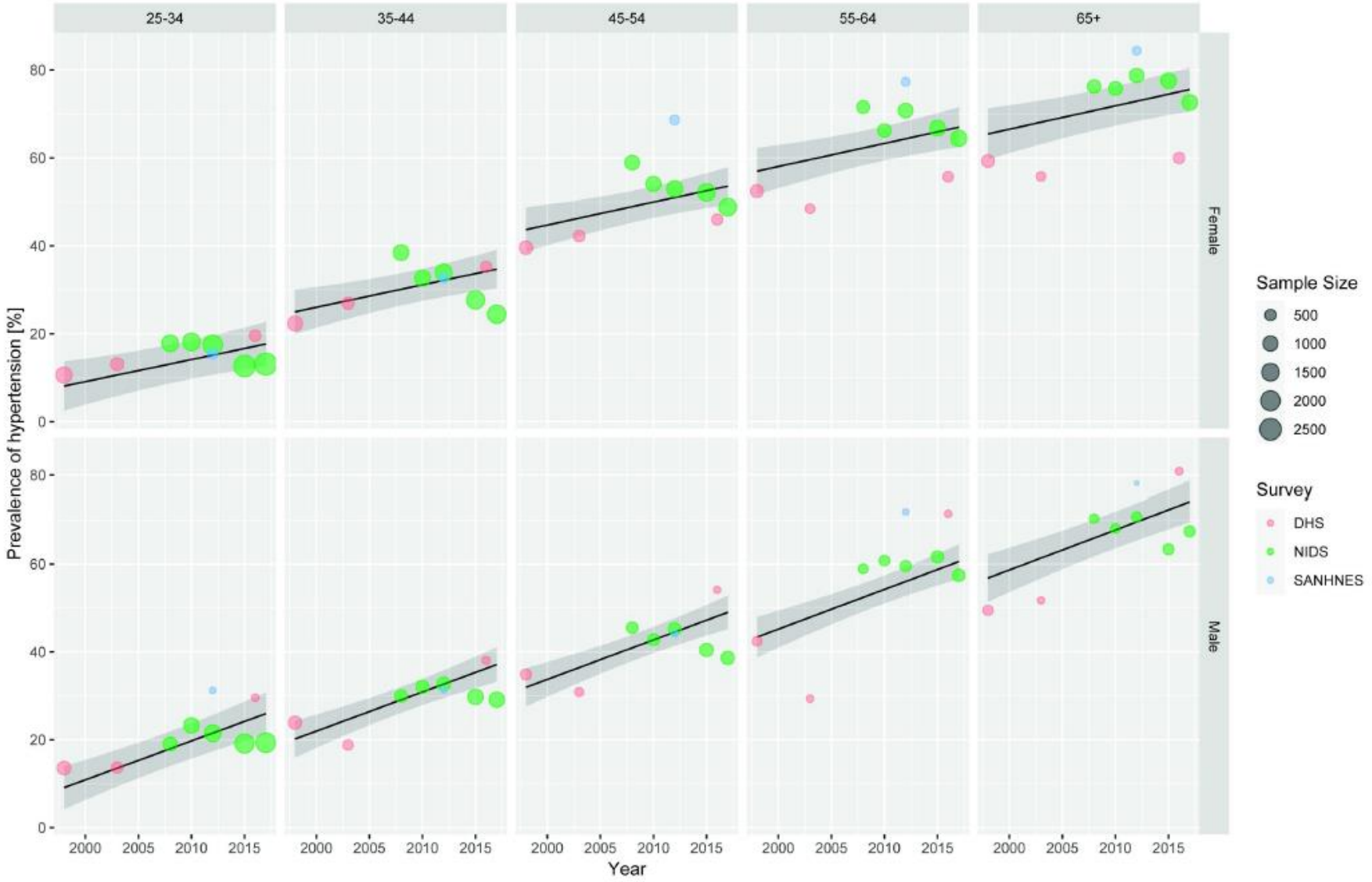


Fig. S6. Estimated trends 1998-2017 in prevalence of hypertension in the black African adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

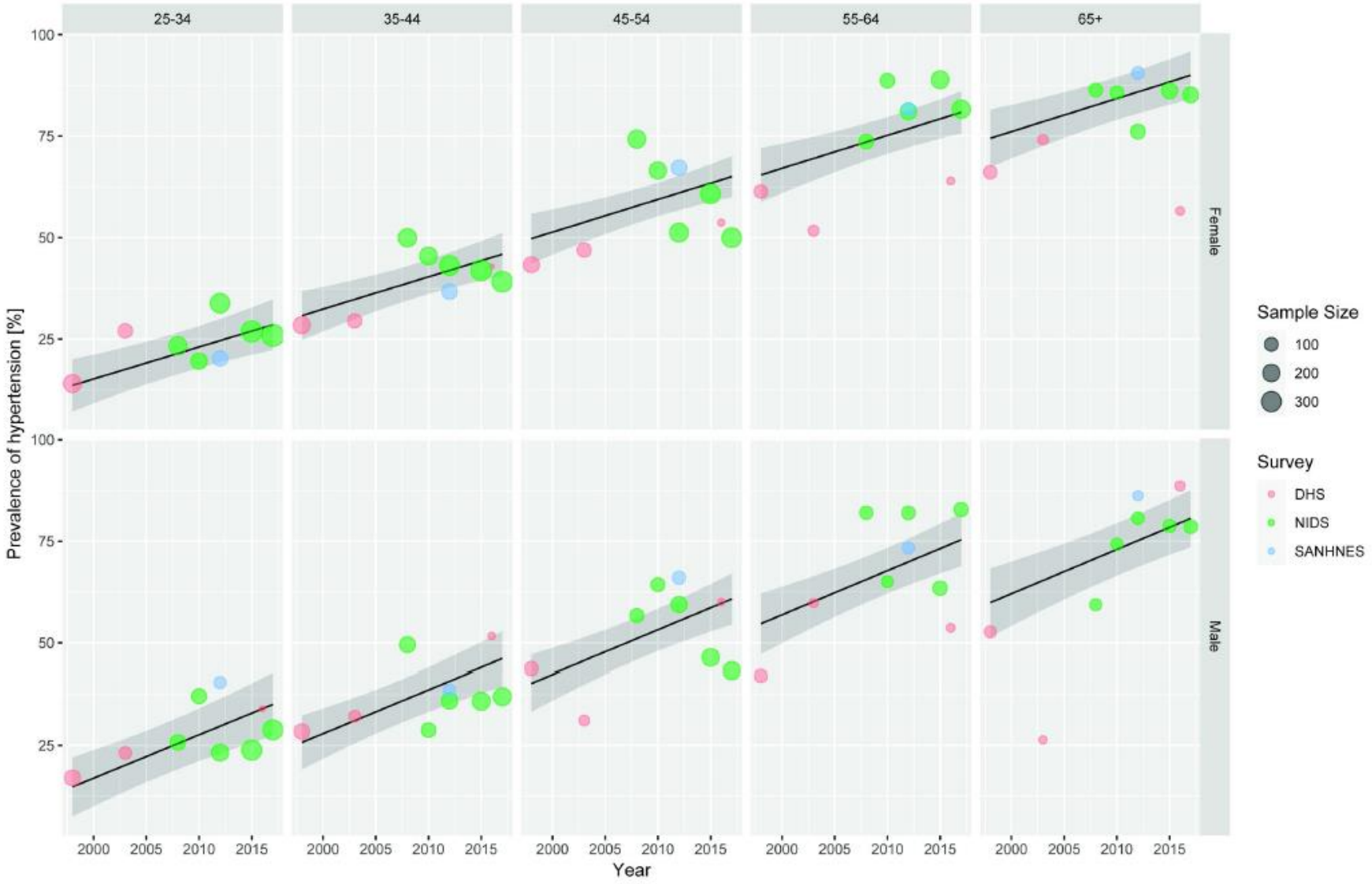


Fig. S7. Estimated trends 1998-2017 in prevalence of hypertension in the coloured adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

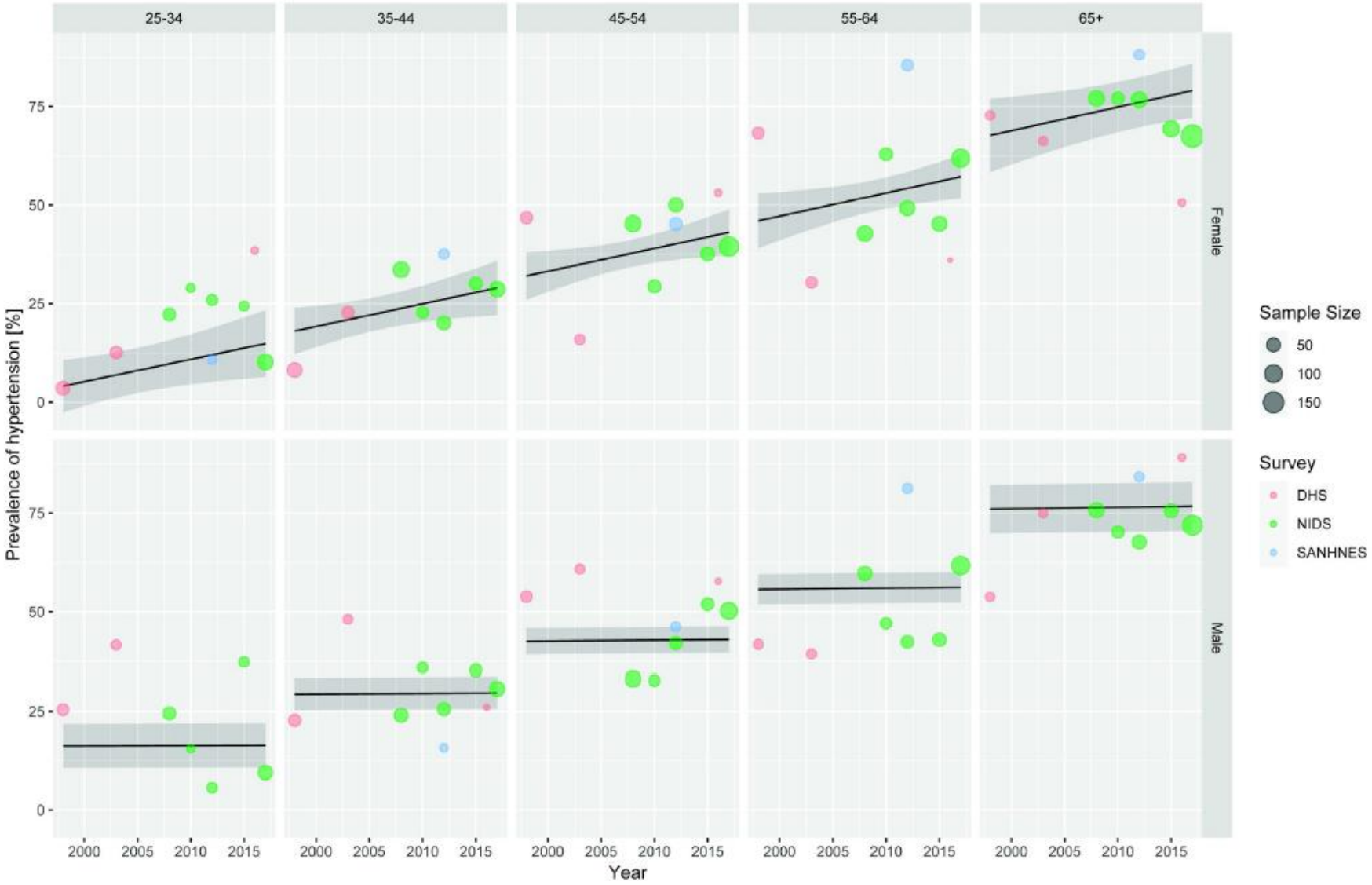


Fig. S8. Estimated trends 1998-2017 in prevalence of hypertension in the white adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

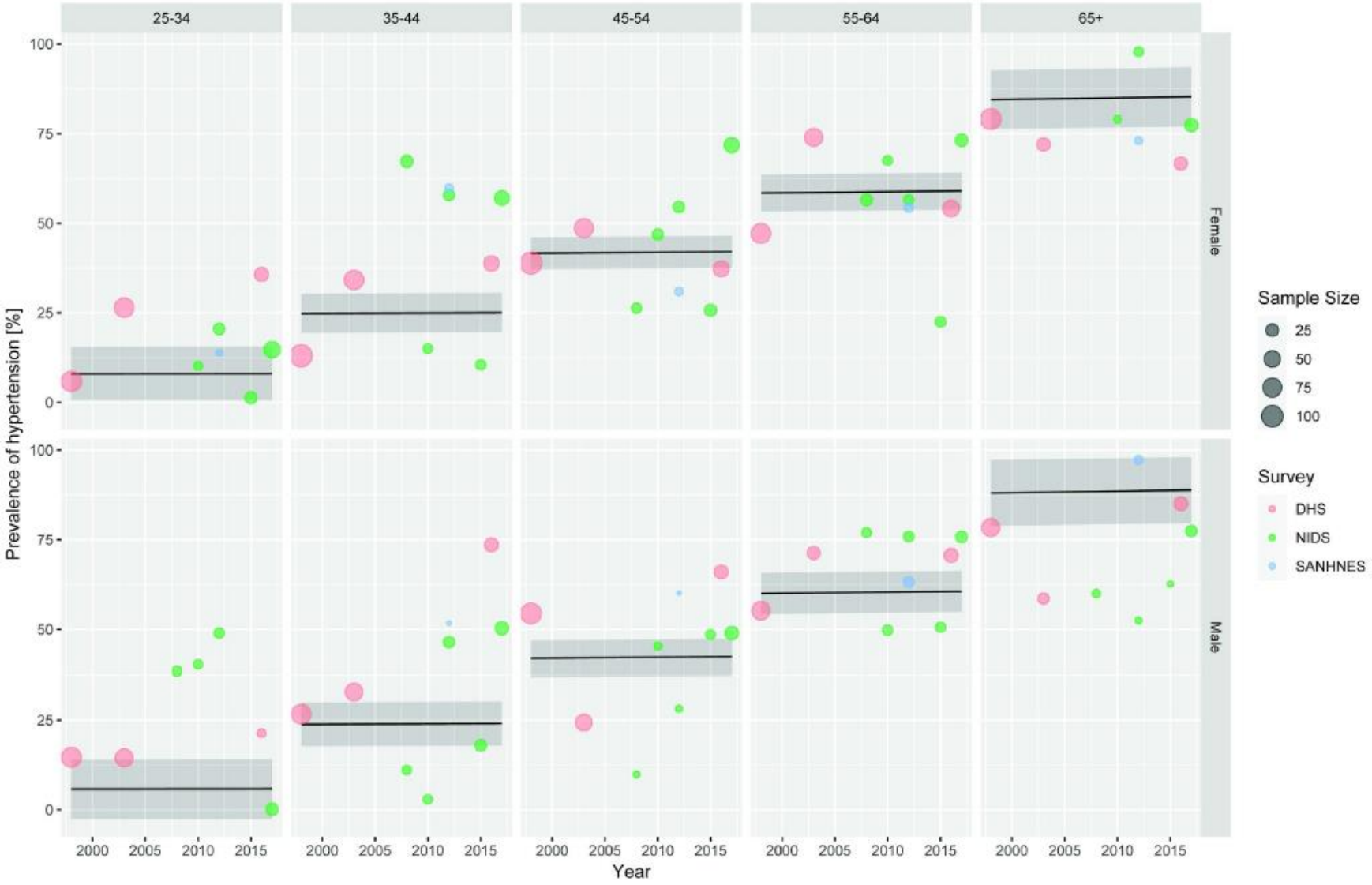
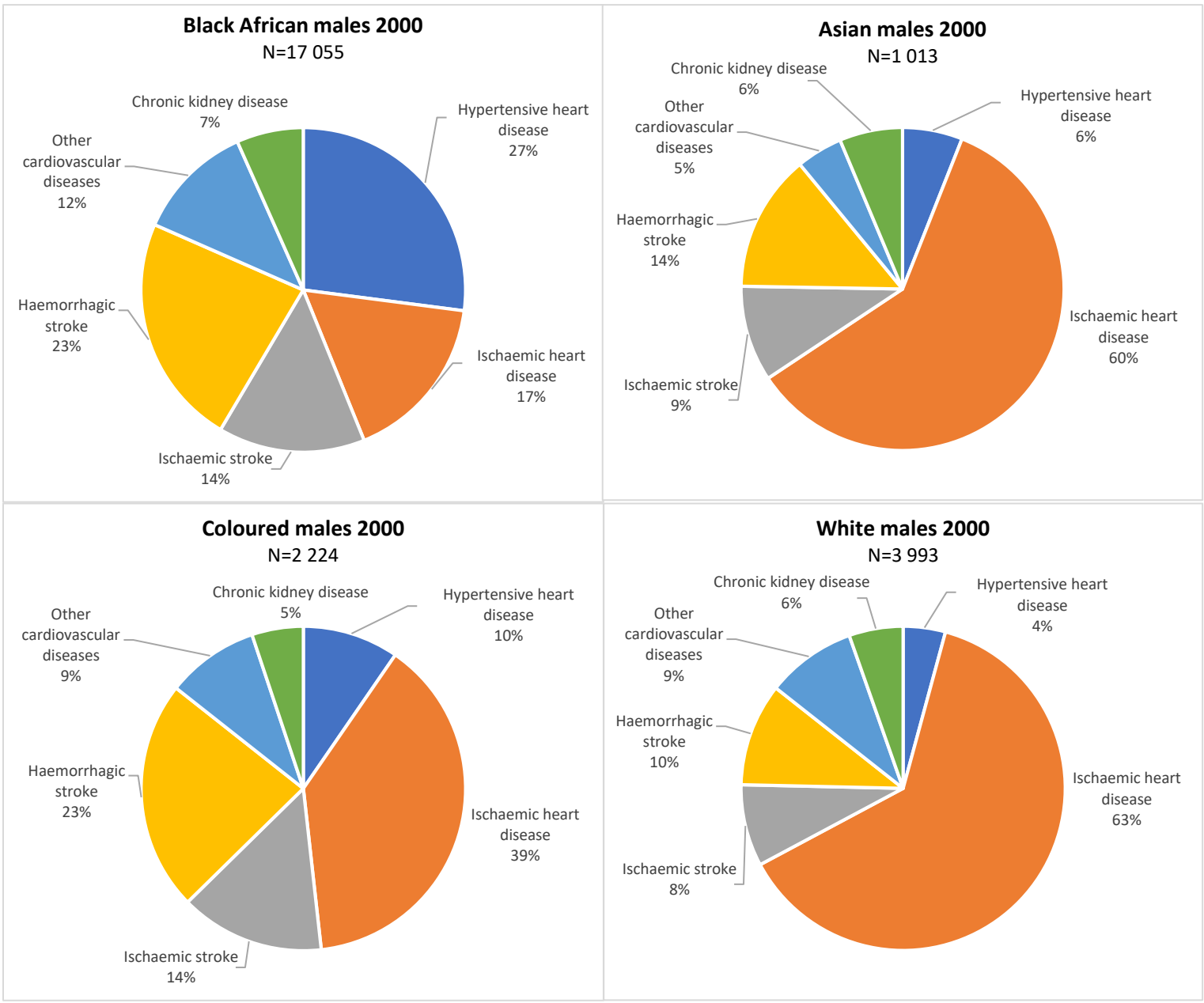
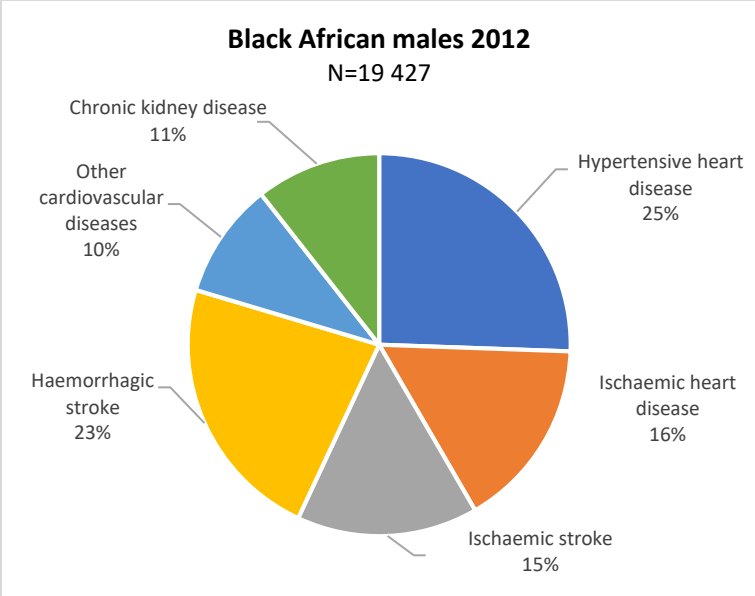
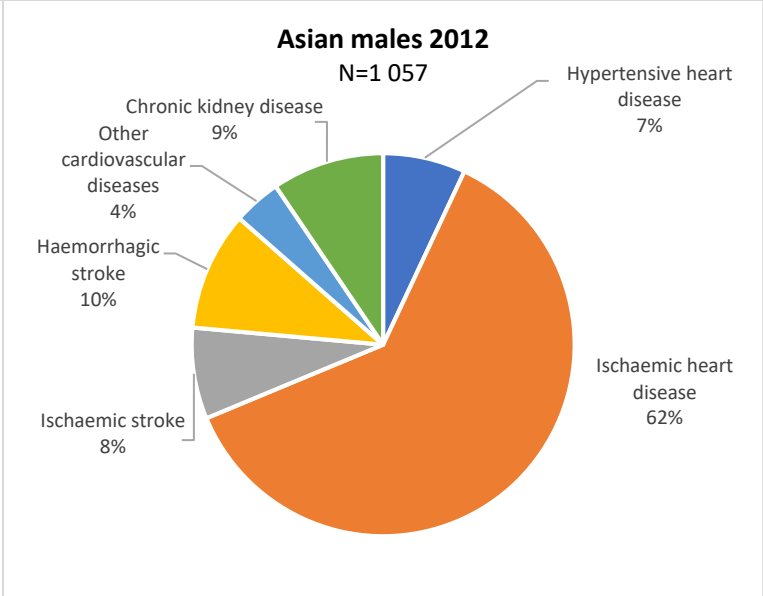


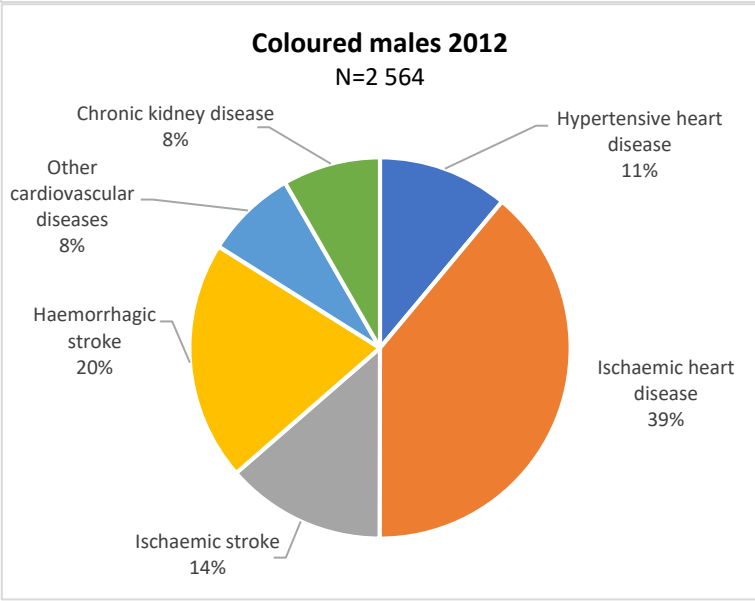
Fig. S9. Estimated trends 1998-2017 in prevalence of hypertension in the Asian adult population (25+ years).
Dots represent estimates from individual surveys. Solid lines represent the best fit linear trend estimated by the meta-regression model, with the corresponding 95% pointwise confidence band.

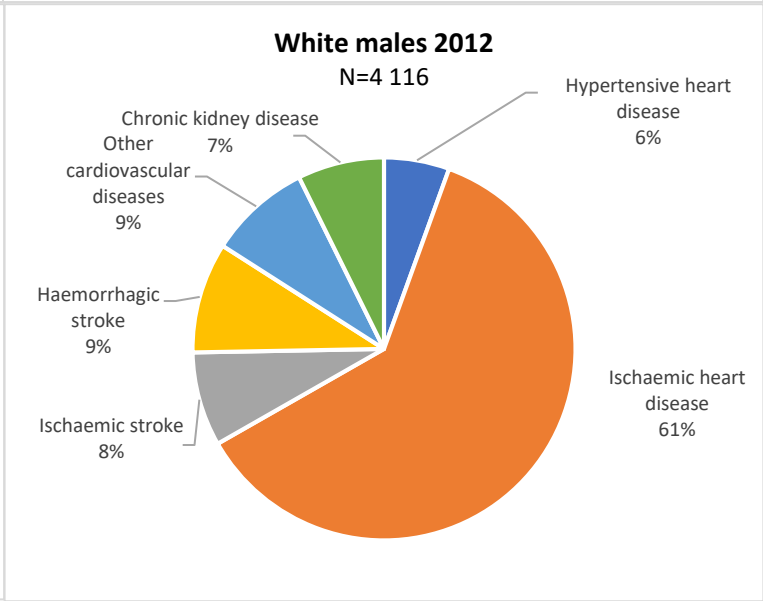
Fig. S10 shows the percentage distribution of the conditions comprising the deaths attributable to high blood pressure by population group. Hypertensive heart disease was the biggest contributor of death for African males and females in 2000 and 2012, whereas death due to ischaemic heart disease was the greatest for the other population groups, followed by haemorrhagic stroke.

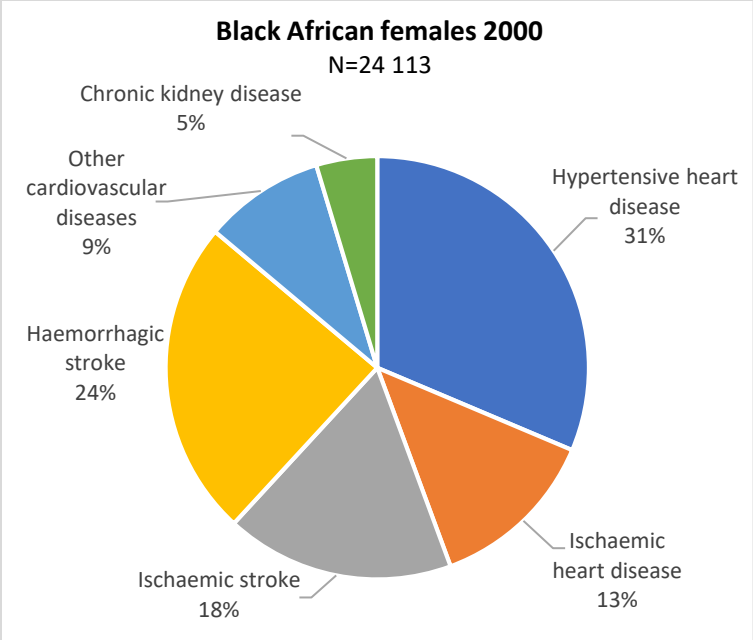


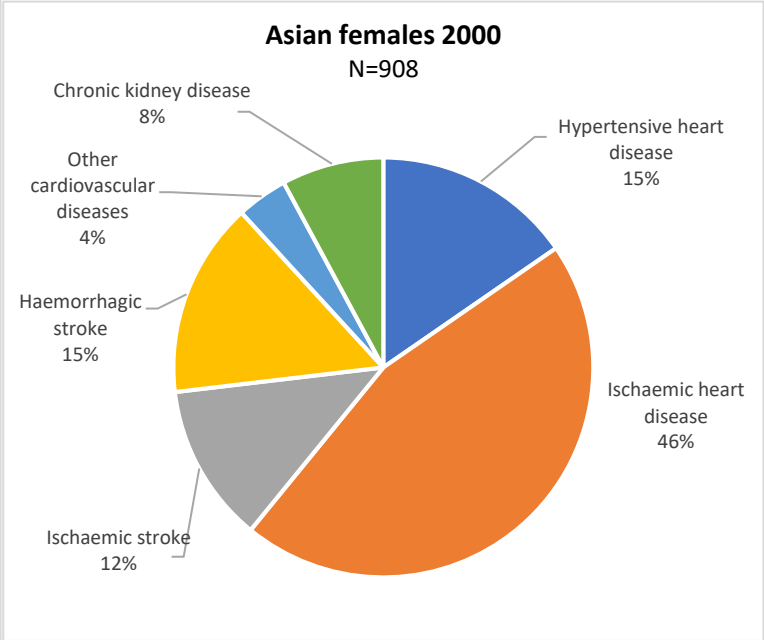

Black African males 2012
N=19 427
Chronic kidney disease 11%
Hypertensive heart disease 25%
Other cardiovascular diseases 10%
Haemorrhagic stroke 23%
Ischaemic heart disease 16%
Ischaemic stroke 15%

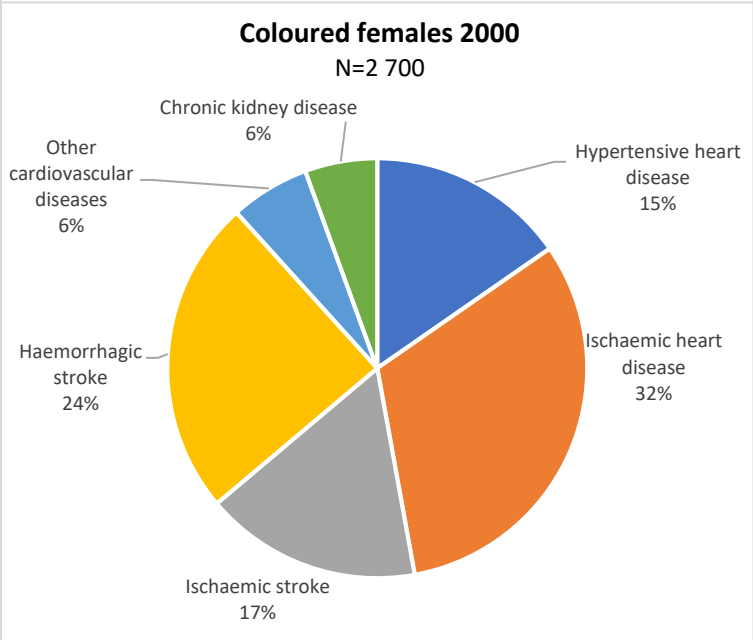

Asian males 2012
N=1 057
Hypertensive heart disease 7%
Chronic kidney disease 9%
Other cardiovascular diseases 4%
Haemorrhagic stroke 10%
Ischaemic heart disease 62%
Ischaemic stroke 8%


Coloured males 2012
N=2 564
Chronic kidney disease 8%
Hypertensive heart disease 11%
Other cardiovascular diseases 8%
Haemorrhagic stroke 20%
Ischaemic heart disease 39%
Ischaemic stroke 14%


White males 2012
N=4 116
Hypertensive heart disease 6%
Chronic kidney disease 7%
Other cardiovascular diseases 9%
Haemorrhagic stroke 9%
Ischaemic heart disease 61%
Ischaemic stroke 8%


Black African females 2000
N=24 113
Chronic kidney disease 5%
Other cardiovascular diseases 9%
Hypertensive heart disease 31%
Haemorrhagic stroke 24%
Ischaemic heart disease 13%
Ischaemic stroke 18%


Asian females 2000
N=908
Chronic kidney disease 8%
Other cardiovascular diseases 4%
Hypertensive heart disease 15%
Haemorrhagic stroke 15%
Ischaemic heart disease 46%
Ischaemic stroke 12%


Coloured females 2000
N=2 700
Chronic kidney disease 6%
Other cardiovascular diseases 6%
Hypertensive heart disease 15%
Haemorrhagic stroke 24%
Ischaemic heart disease 32%
Ischaemic stroke 17%

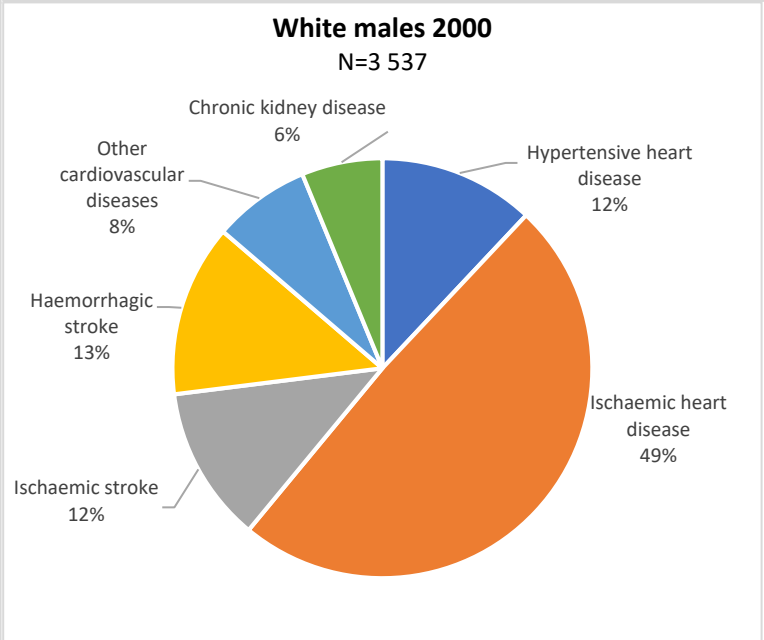

White males 2000
N=3 537
Chronic kidney disease 6%
Other cardiovascular diseases 8%
Hypertensive heart disease 12%
Haemorrhagic stroke 13%
Ischaemic heart disease 49%
Ischaemic stroke 12%

Fig. S10. Percentage of deaths attributable to high SBP by sex and population group in South Africa for 2000 and 2012.

Table S6. High blood pressure attributable age-standardised death rates (per 100 000) for specific disease groups								
Condition	**Male**				**Female**			
	2000	**2006**	**2012**	**% change 2000-2012**	**2000**	**2006**	**2012**	**% change 2000-2012**
Black African								
Other cardiovascular diseases*	39.0	41.6	33.1	-15%	31.1	31.3	20.9	-33%
Hypertensive heart disease	97.3	100.7	103.4	6%	112.8	116.6	105.0	-7%
Ischaemic heart disease	58.7	69.8	57.9	-1%	45.1	47.5	35.0	-22%
Ischaemic stroke	54.3	61.6	61.4	13%	61.1	63.7	56.8	-7%
Haemorrhagic stroke	77.1	84.6	79.2	3%	84.4	85.0	71.2	-16%
Chronic kidney diseases	23.2	29.8	38.4	66%	16.1	19.4	22.4	39%
Coloured								
Other cardiovascular diseases*	36.8	28.8	23.8	-35%	21.9	22.8	18.7	-15%
Hypertensive heart disease	51.3	37.4	39.4	-23%	73.2	73.1	53.2	-27%
Ischaemic heart disease	164.4	167.3	124.5	-24%	129.3	131.7	98.9	-24%
Ischaemic stroke	70.6	54.2	49.1	-30%	72.3	59.7	48.9	-32%
Haemorrhagic stroke	92.8	71.3	63.4	-32%	93.8	75.3	62.1	-34%
Chronic kidney diseases	23.3	21.9	28.8	24%	21.9	23.6	26.2	19%
White								
Other cardiovascular diseases*	22.6	21.1	19.4	-14%	12.3	11.6	10.9	-11%
Hypertensive heart disease	11.1	12.6	12.4	11%	18.5	19.2	14.2	-23%
Ischaemic heart disease	159.1	154.0	137.9	-13%	78.1	71.6	60.3	-23%
Ischaemic stroke	20.8	19.7	17.7	-15%	18.5	18.9	16.1	-13%
Haemorrhagic stroke	26.2	23.6	21.1	-19%	21.5	21.4	18.1	-16%
Chronic kidney diseases	14.1	19.4	16.4	17%	9.5	12.5	10.6	11%
Asian								
Other cardiovascular diseases*	27.3	24.8	14.8	-46%	17.9	18.2	12.4	-31%
Hypertensive heart disease	39.7	40.8	28.5	-28%	82.6	76.9	44.1	-47%
Ischaemic heart disease	316.8	309.8	224.2	-29%	192.1	208.2	151.3	-21%
Ischaemic stroke	62.5	50.0	30.5	-51%	59.8	45.8	31.7	-47%
Haemorrhagic stroke	76.0	58.4	36.0	-53%	66.5	48.6	34.3	-48%
Chronic kidney diseases	38.2	41.4	37.1	-3%	34.5	37.1	34.9	1%
National								
Other cardiovascular diseases*	35.0	35.8	28.8	-18%	26.6	26.8	18.9	-29%
Hypertensive heart disease	72.0	72.2	71.8	0%	89.1	92.2	80.9	-9%
Ischaemic heart disease	96.4	106.4	89.2	-7%	61.9	63.6	49.4	-20%
Ischaemic stroke	47.3	50.3	48.2	2%	52.6	53.7	47.3	-10%
Haemorrhagic stroke	66.5	69.0	63.1	-5%	71.8	71.0	59.4	-17%
Chronic kidney diseases	21.5	27.5	32.7	52%	15.7	19.0	21.0	34%
* Other cardiovascular diseases include rheumatic heart disease, endocarditis, other cardiomyopathy, atrial fibrillation & flutter, aortic aneurysm, peripheral vascular disease and other cardiovascular & circulatory diseases								

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1. Zhou B, Bentham J, Di Cesare M, et al. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19·1 million participants. Lancet 2017; 389(10064), 37-55. https://doi.org/10.1016/S0140-6736(16)31919-5
2. GBD 2017 Risk Factors Collaborators. Health effects of dietary risks in 195 countries, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet 2019;393:1958-1972.