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PHASA 2023
Transforming research translation
Reimagining public health evidence, policies, and practice

Burden of disease averted by antihypertensive treatment: South Africa 1998-2017

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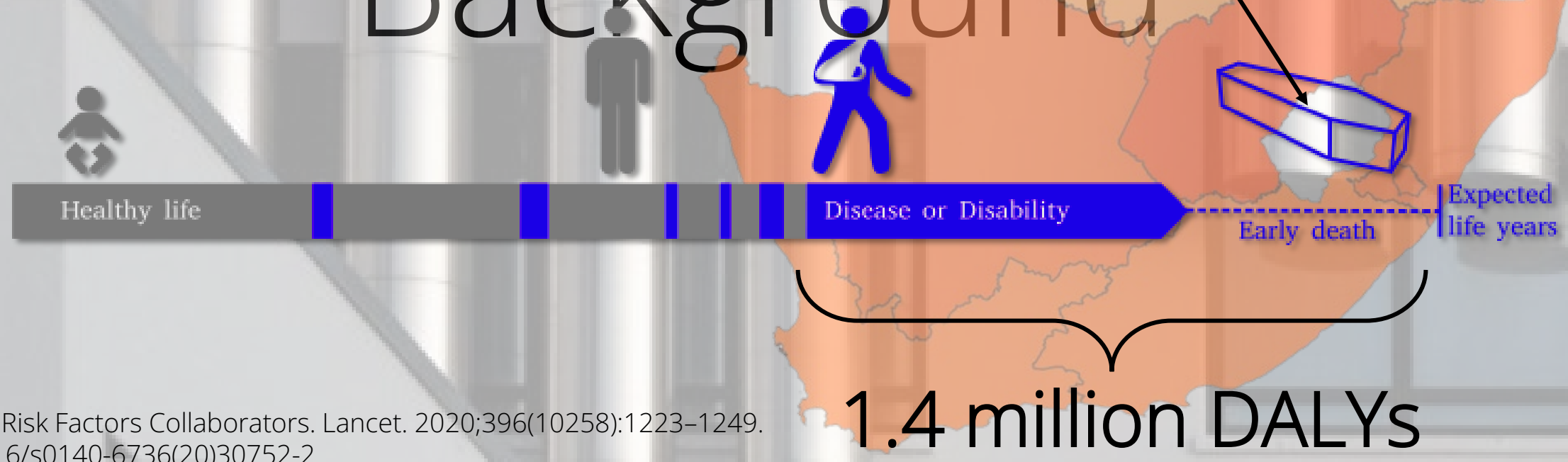
The Boardwalk Convention Centre ● Gqebertha ● 10-13 September 2023

Elevated blood pressure

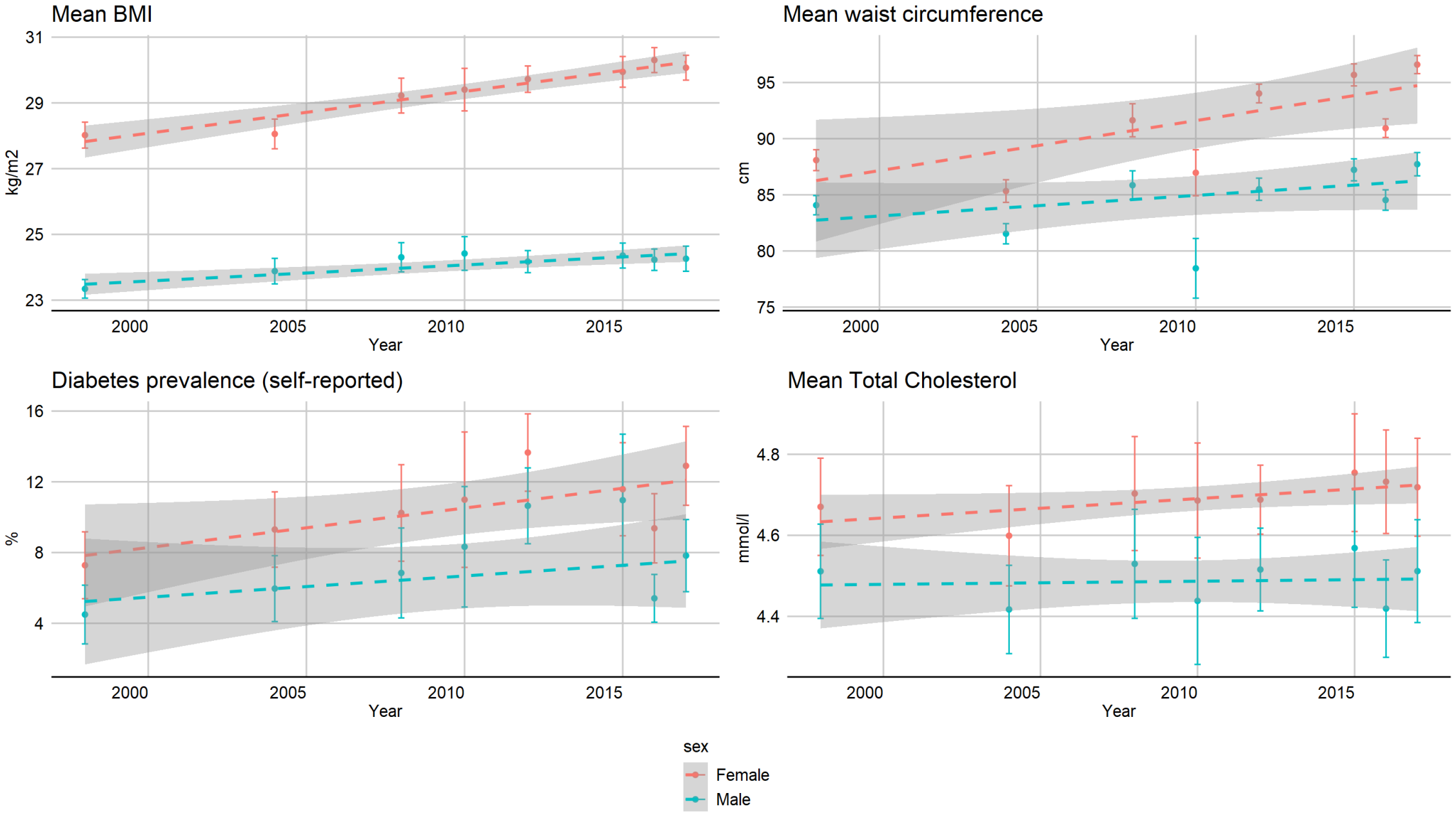
Background

> 60000 Deaths



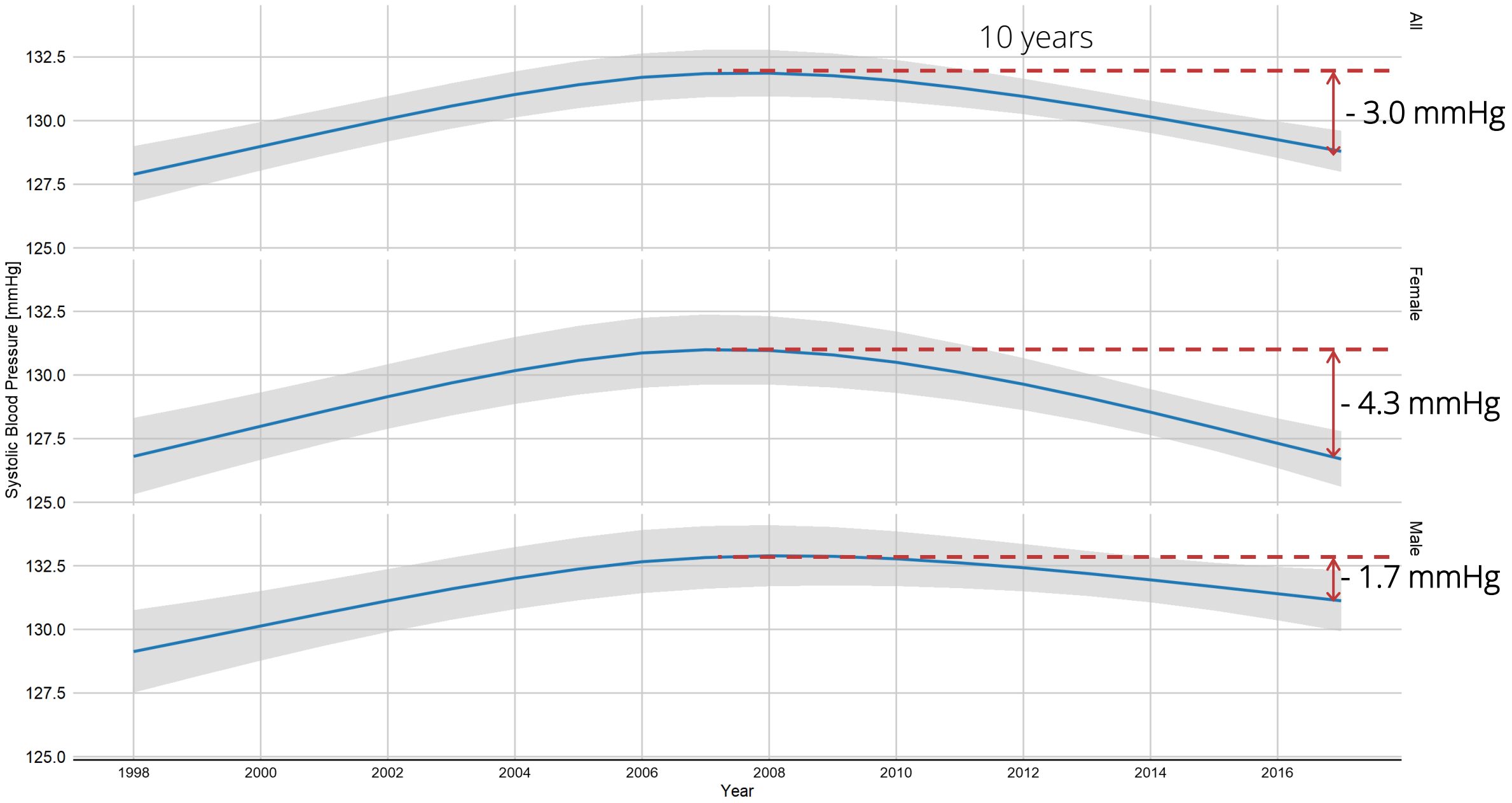
1.4 million DALYs

GBD 2019 Risk Factors Collaborators. Lancet. 2020;396(10258):1223–1249.
doi: 10.1016/s0140-6736(20)30752-2.



Trends in selected risk factors for hypertension. South African population 25+, by sex.

ExPoSE project estimates.

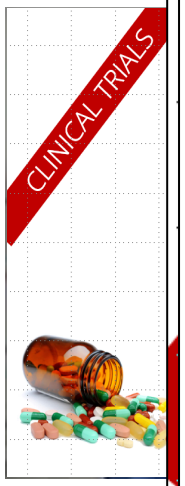


Trends in average blood pressure. South Africa population 25+, by sex.

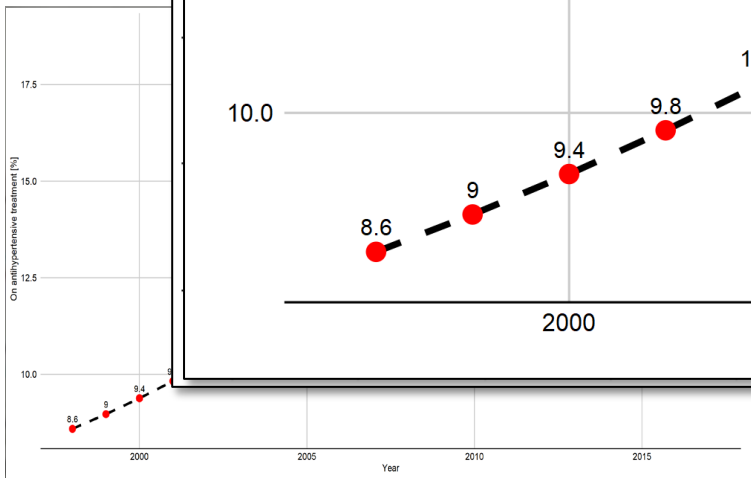
ExPoSE project estimates.

Treatment?

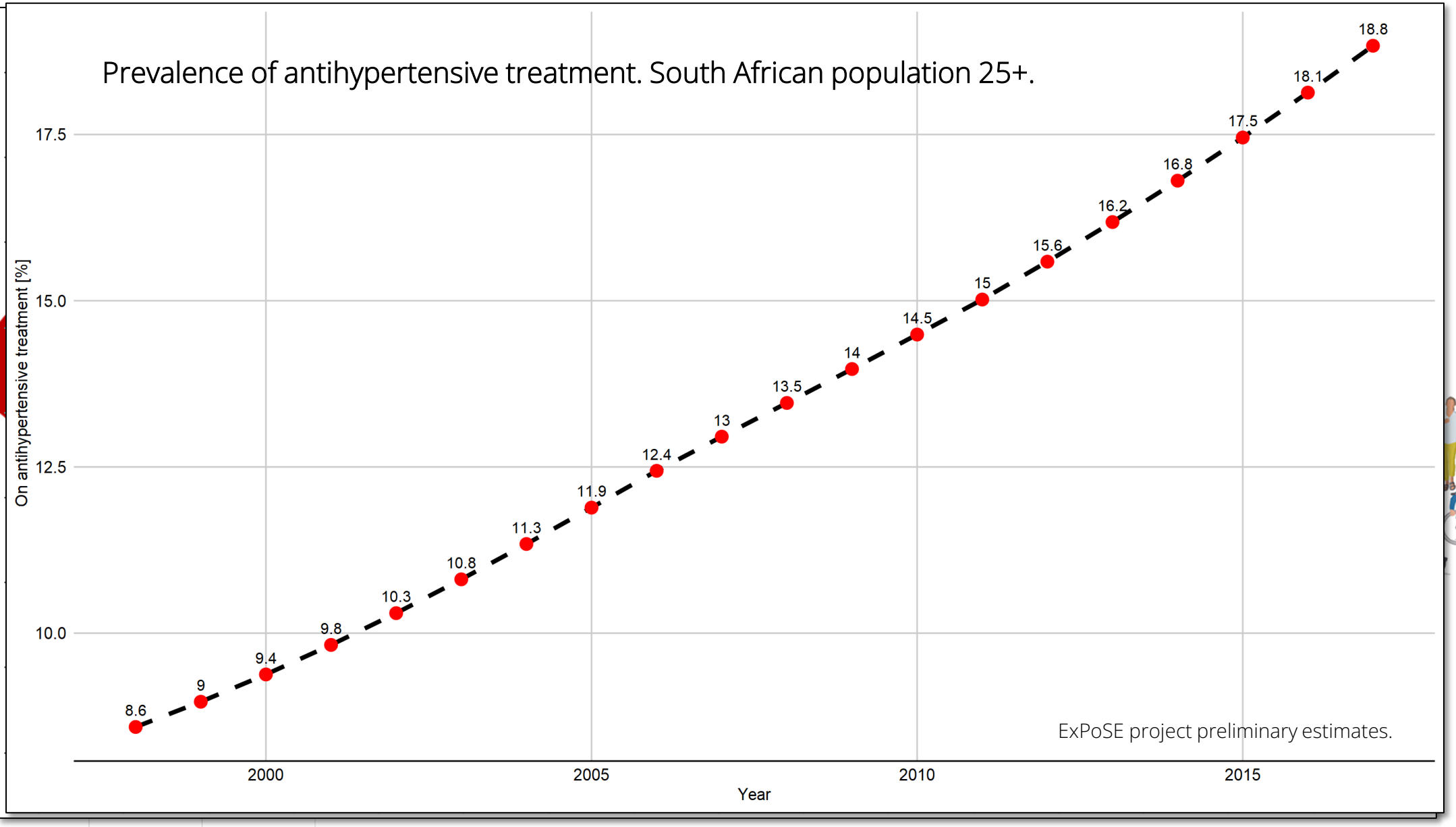
Cl



Incre



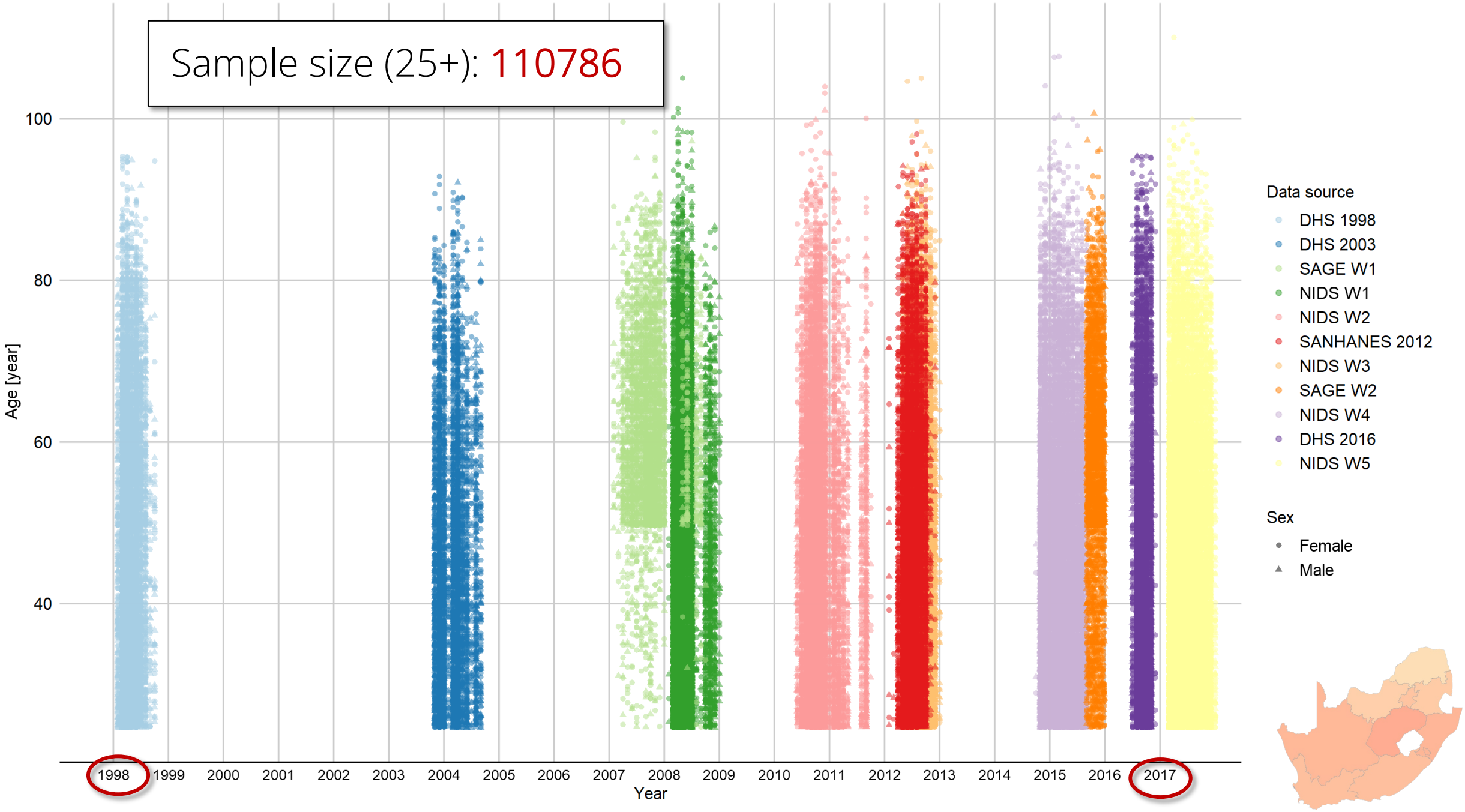
Prevalence of antihypertensive treatment. South African population 25+.



1. How much the diffusion of antihypertensive treatment has affected the distribution of blood pressure in the South African adult population between 1998 and 2017?

2. What contribution antihypertensive treatment has provided in terms of averted mortality and morbidity?

Methods


Sample size (25+): 110786
Age [year]
100
80
60
40
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year
Data source
DHS 1998
DHS 2003
SAGE W1
NIDS W1
NIDS W2
SANHANES 2012
NIDS W3
SAGE W2
NIDS W4
DHS 2016
NIDS W5
Sex
Female
Male

GAMLSS

$$g_1(\mu) = \eta_1 = X_1\beta_1 + \sum_{j=1}^{J_1} h_{j1}(x_{j1})$$

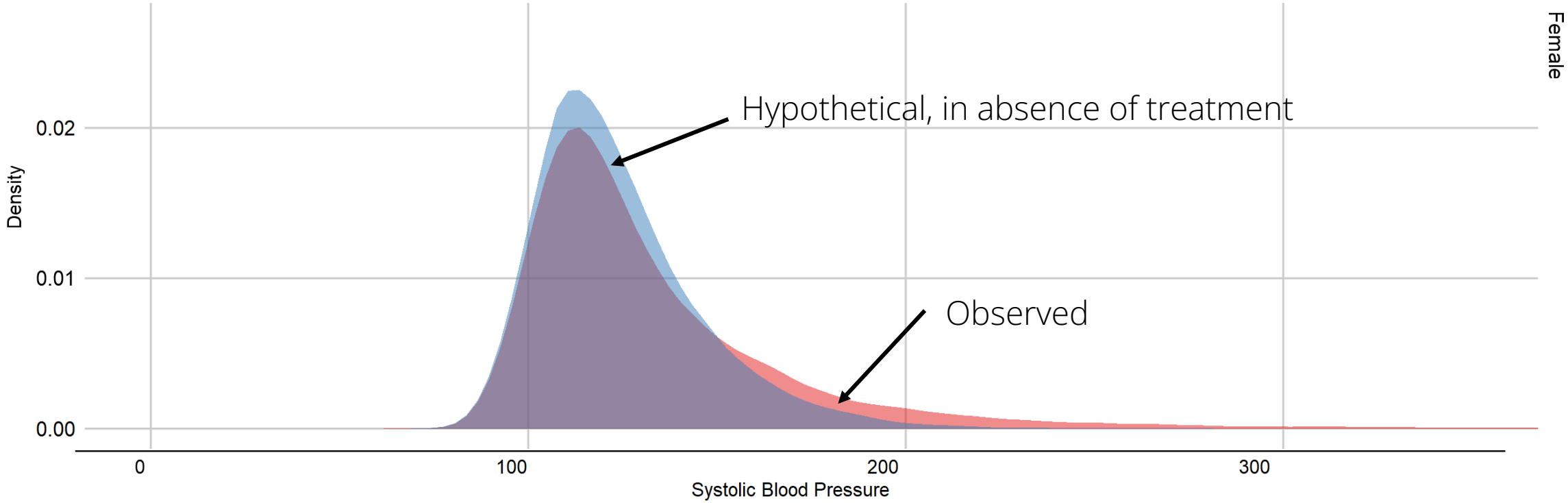
$$g_2(\sigma) = \eta_2 = X_2\beta_2 + \sum_{j=1}^{J_2} h_{j2}(x_{j2})$$

$$g_3(\nu) = \eta_3 = X_3\beta_3 + \sum_{j=1}^{J_3} h_{j3}(x_{j3})$$

$$g_4(\tau) = \eta_4 = X_4\beta_4 + \sum_{j=1}^{J_4} h_{j4}(x_{j4})$$

Censored regression

- Among treated, BP in absence of treatment is ≥ measured BP;
- After adjustment for a series of risk factors, the untreated BP distribution among hypertensives is similar to the distribution among healthy subjects



WORLD BANK GROUP

HARVARD UNIVERSITY

World Health Organization

1993

World Health Organization

1998-2007

IHME
Measuring what matters

2008-present day

The Second South African COMPARATIVE RISK ASSESSMENT STUDY 2012

SAMJ SAMRC

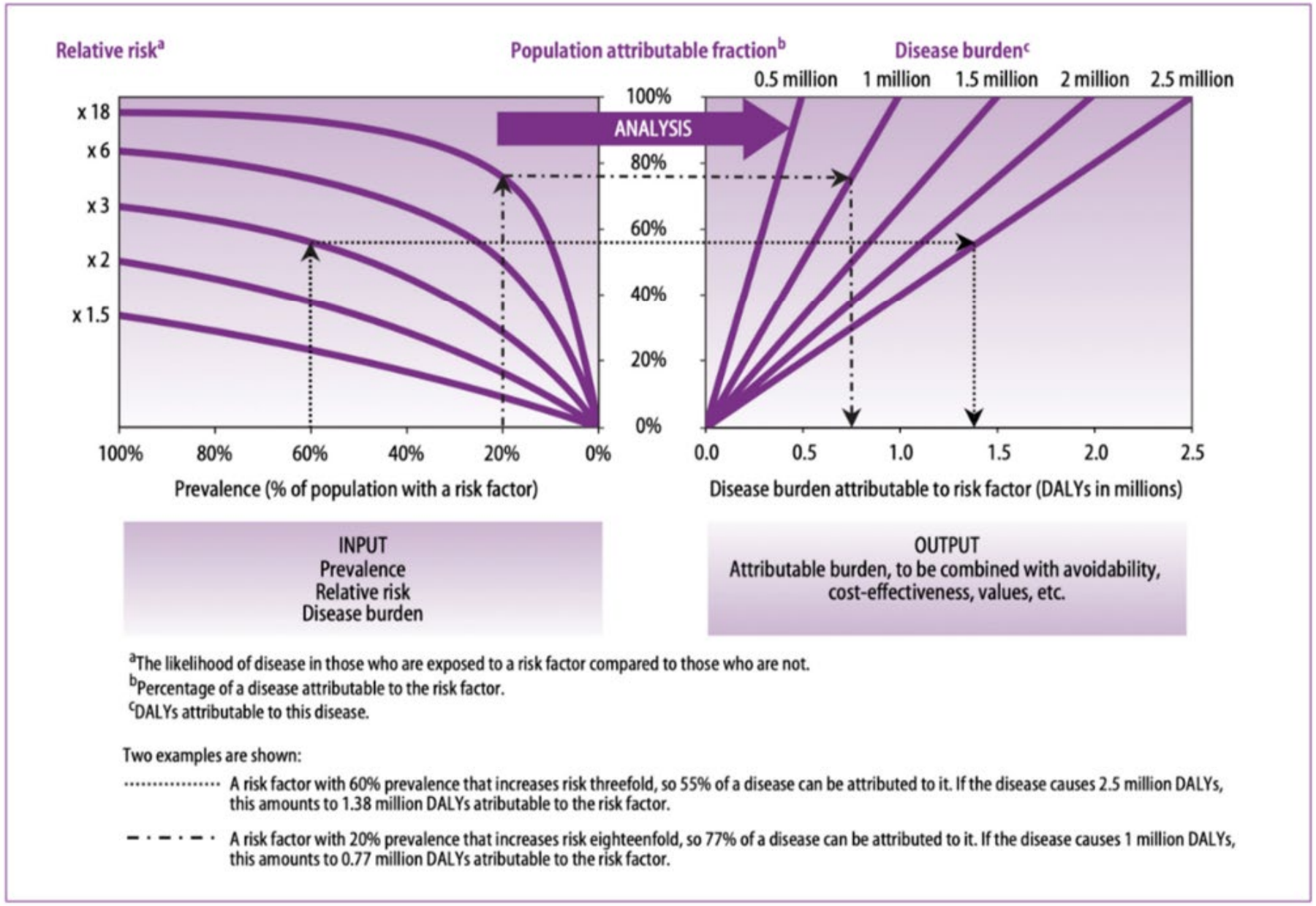
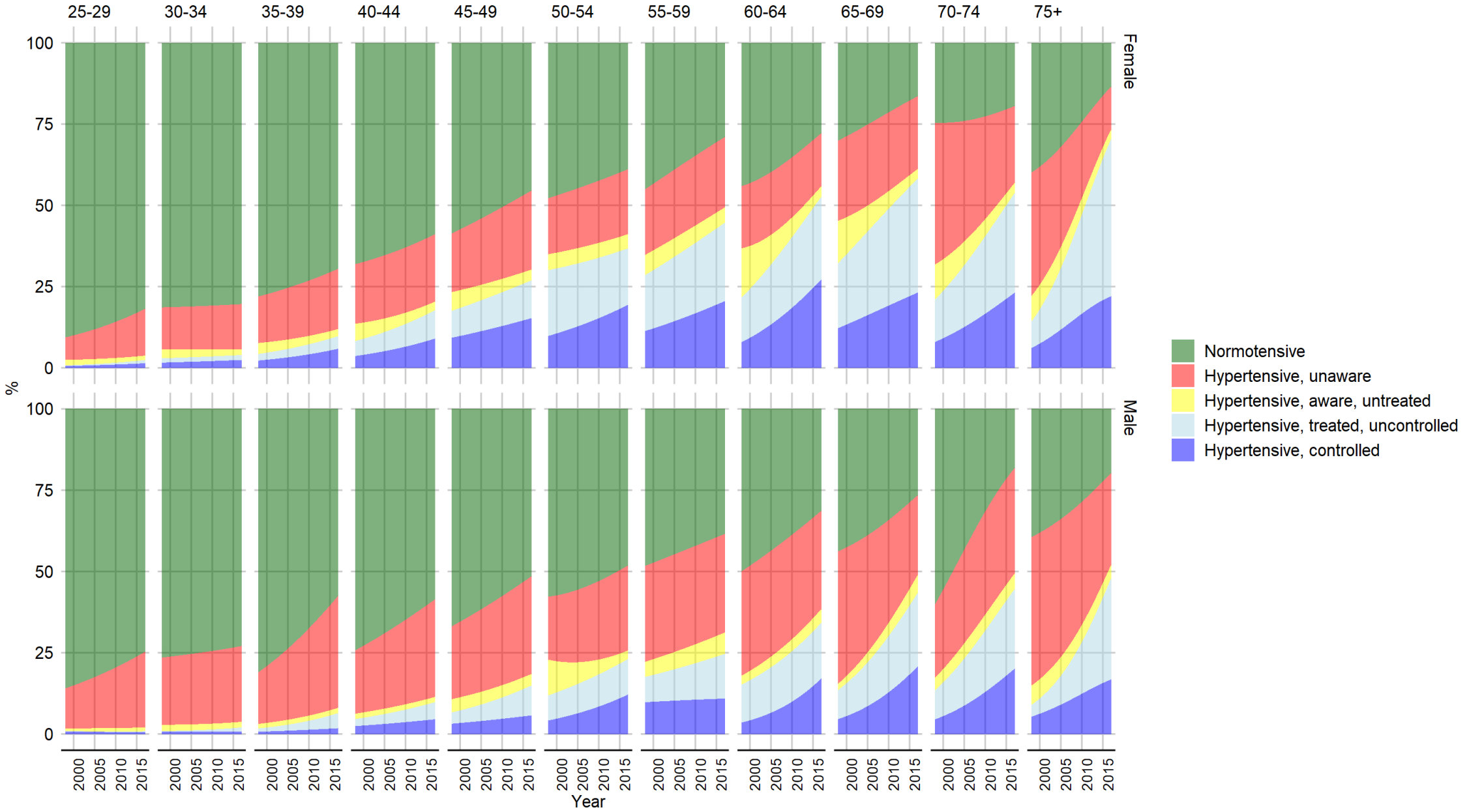


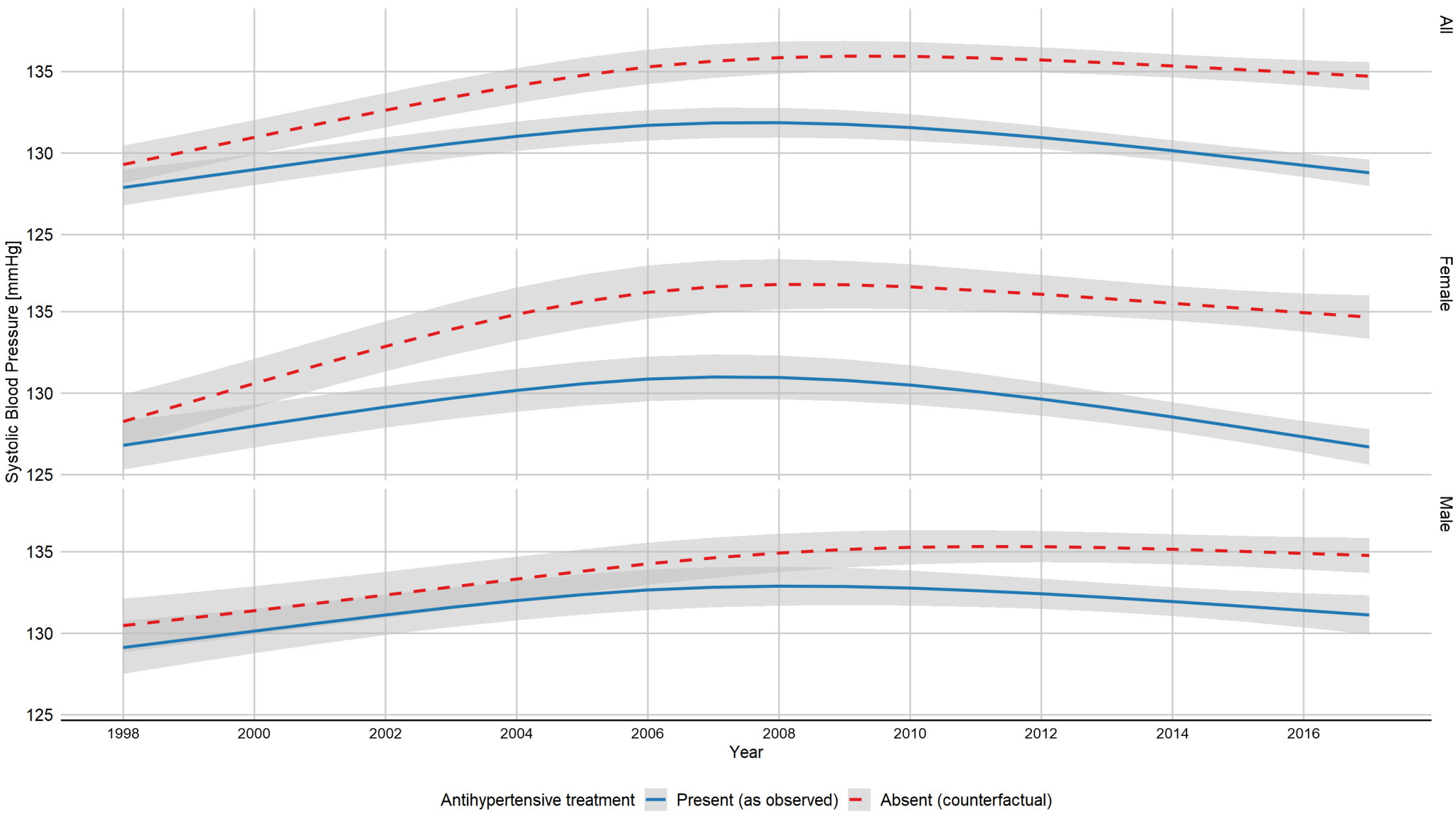
Figure 1. Determination of attributable burden in DALYs with prevalence of risk factor and relative risk.
Source: Reproduced from WHO 2002 World Health Report: Reducing Risks, Promoting Health Life.

Results



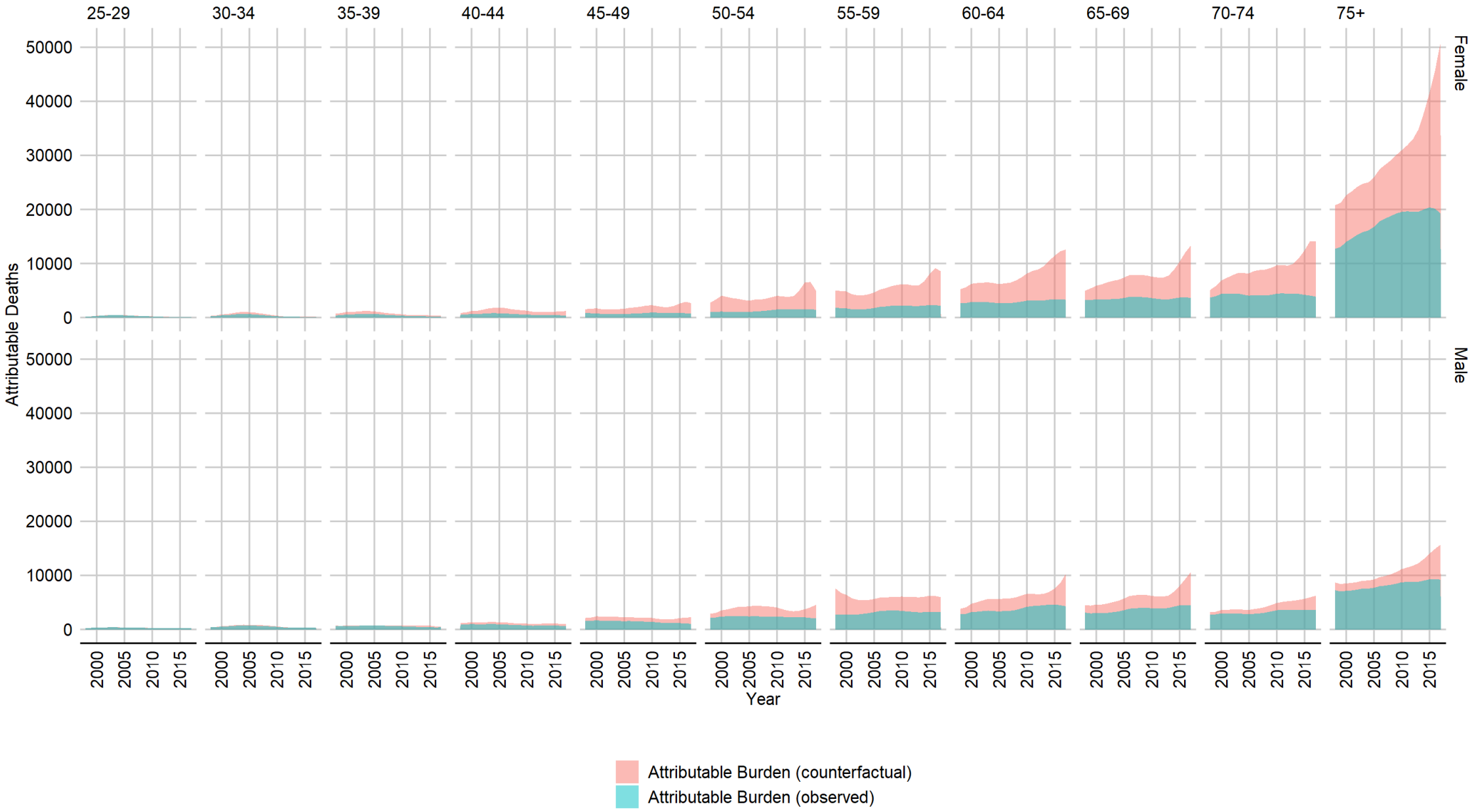
Hypertension cascade. By age and sex.

South African population 25+ years, 1998-2017



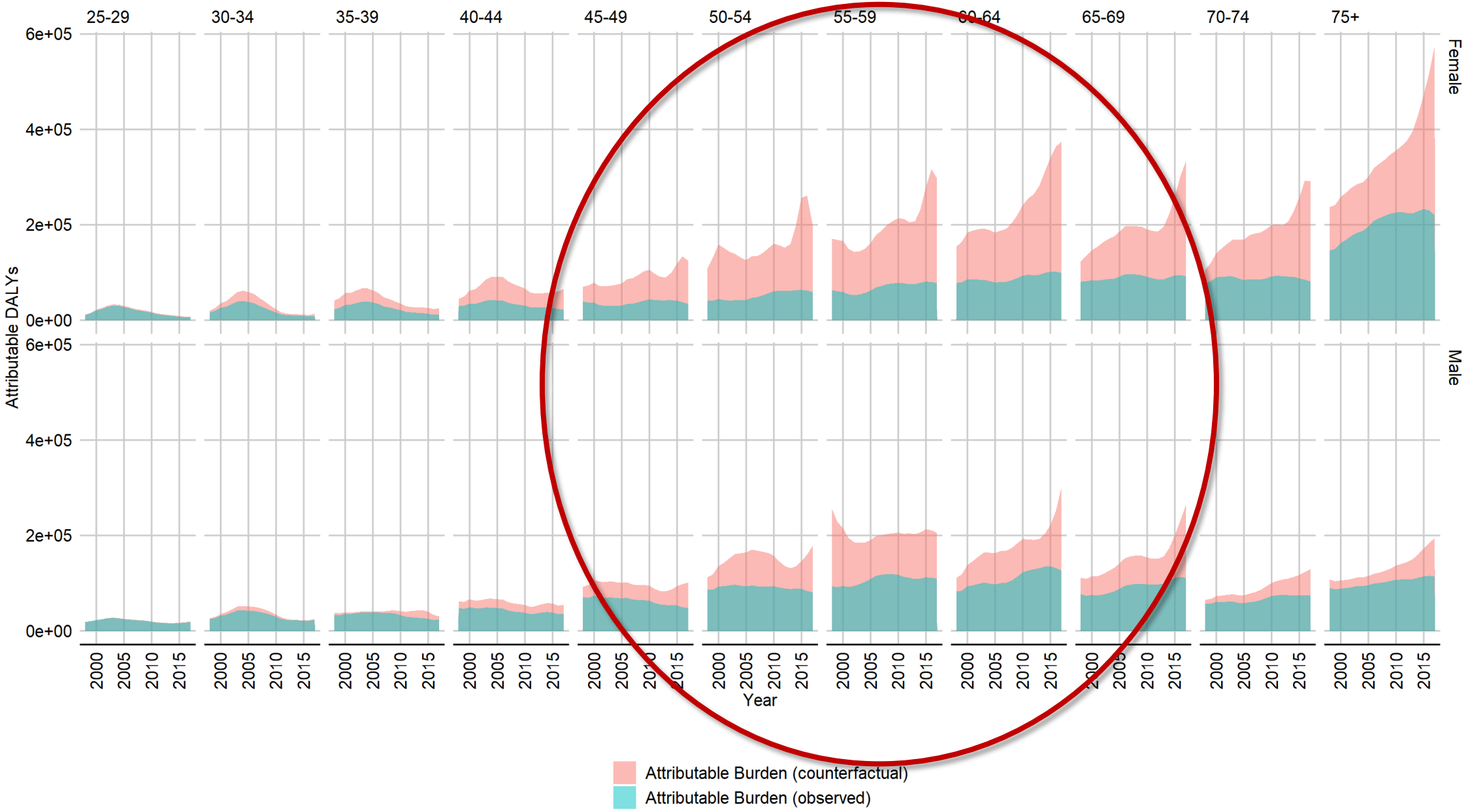
Observed and counterfactual (in absence of treatment) trends in systolic blood pressure, by sex

South African population 25+, 1998-2017



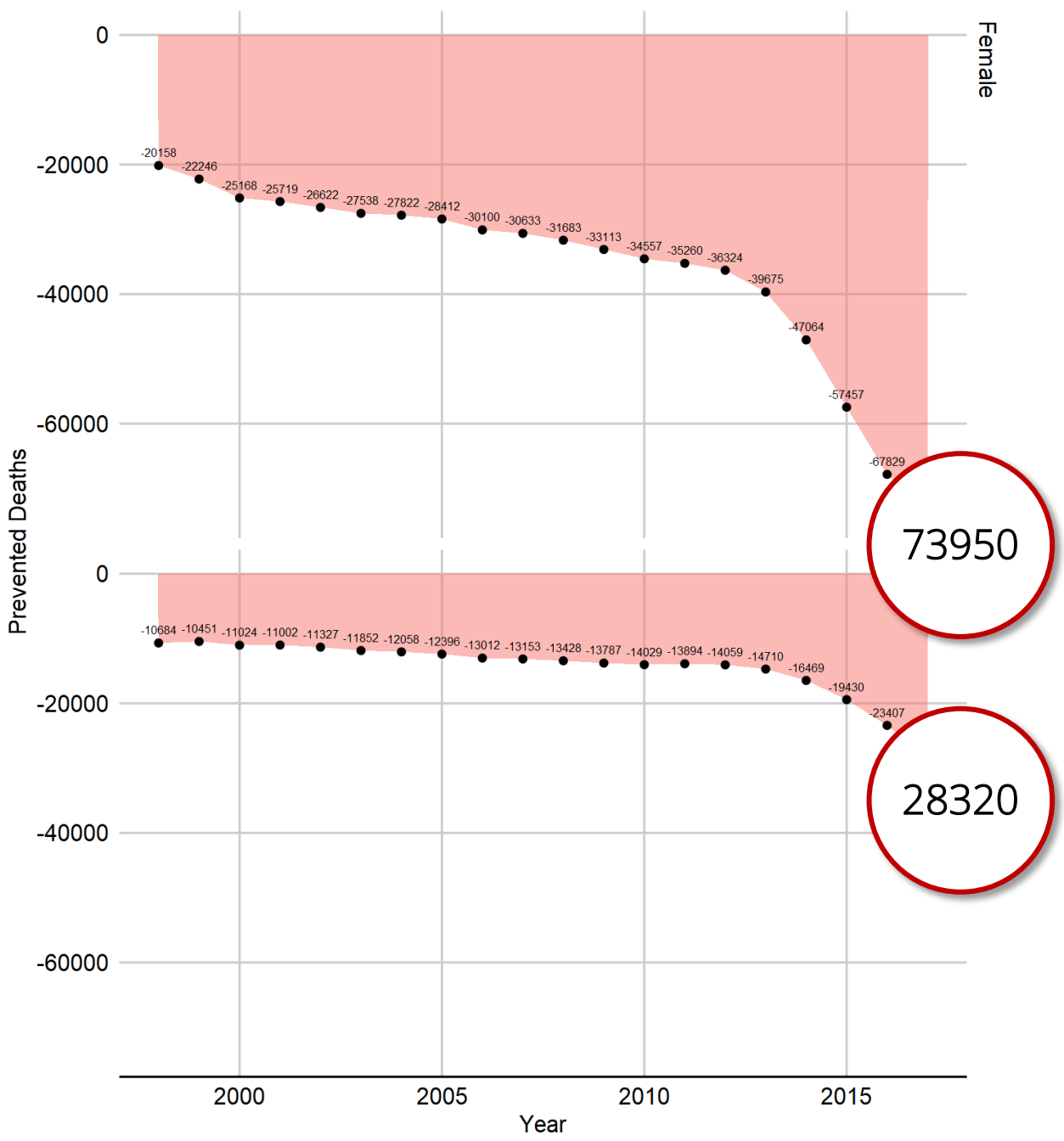
Observed and counterfactual (in absence of treatment) **deaths** attributable to raised blood pressure. By age and sex.

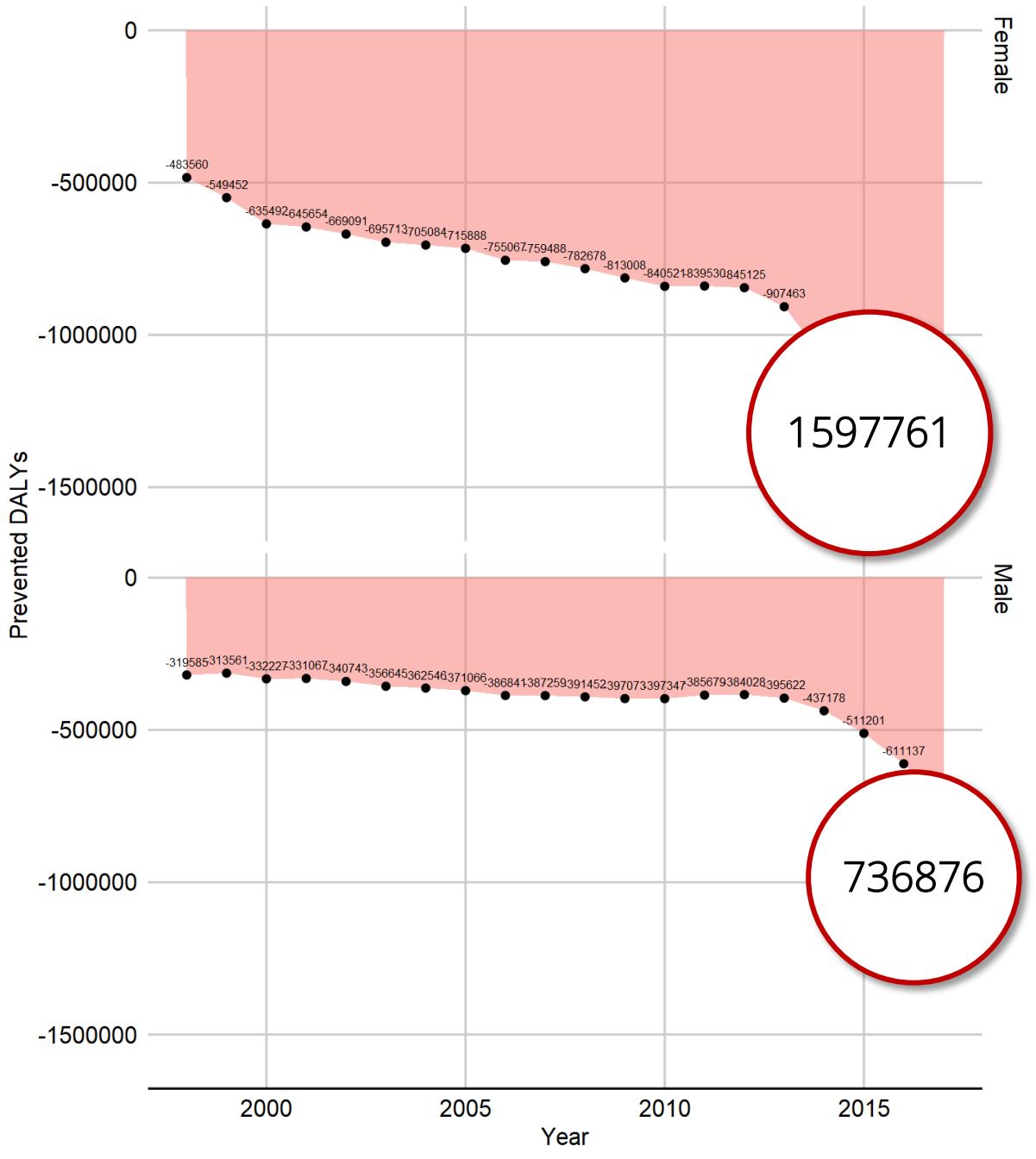
South African population 25+ years, 1998-2017



Observed and counterfactual (in absence of treatment) DALYs attributable to raised blood pressure. By age and sex.

South African population 25+ years, 1998-2017





South African population 25+ years, 1998-2017

Conclusions

- In the South African population, antihypertensive treatment is effective in reducing blood pressure by clinically significant amounts, resulting in a shift of the population distribution of public health relevance.
- The increasing diffusion (and, possibly, improved effectiveness) of antihypertensive treatment contributed substantially to the observed decline of average systolic blood pressure in the last decade, and to curb the associated burden in terms of deaths and DALYs.
- Unfavourable trends in major risk factors for hypertension – especially obesity, high blood cholesterol and diabetes -- persist and should be targeted by primary prevention interventions.
- Despite noticeable improvements, levels of awareness and control of hypertension are still largely inadequate, especially among the younger age groups.

Limitations

- Observational data
- Between-survey differences in sampling strategies, data collection methods, quality
- Self-reported use of medication
- No record of medication type/class
- Assumptions underlying the modelling of counterfactual distributions

Thank you

ExPoSE

Explaining Population trends in cardiovascular risk: A comparative analysis of health transitions in South Africa and England

Collaborating Institutions:

Stellenbosch University
IYUNIVESITHI
UNIVERSITEIT

University of Greenwich

UCL

UKRI Economic and Social Research Council

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