

Burden of oral disease among priority population groups in Australia



Dr Mohammed Junaid

BDS, MDS (Public Health Dentistry), MFDS RCPS (Glasg), DDPH RCS (Eng), AFHEA, PhD
Senior Lecturer – Dental Public Health

Image Source: Uni of Sydney: <https://www.sydney.edu.au/news-opinion/news/2017/09/28/aboriginal-oral-health-care--double-the-services--half-the-cost.html>

Western Australian: <https://thewest.com.au/politics/state-politics/homeless-crisis-was-number-of-rough-sleepers-more-than-doubles-making-it-hardest-hit-in-australia--c-10116449>

ABC: <https://www.abc.net.au/news/2023-03-13/disability-dental-care-hampered-by-cost-and-accessibility/102079462>

<https://www.oralhealthgroup.com/news/hamilton-hospital-launches-study-on-prevora-dental-treatment-for-high-risk-patients-1003973907/>



Acknowledgement of country

I would like to acknowledge the traditional custodians of the land, the Whadjuk Noongar people, in whose land, I have recorded this lecture and pay my respects to elder's past, present and emerging. Including to all those with Indigenous heritage who are listening to this recording.

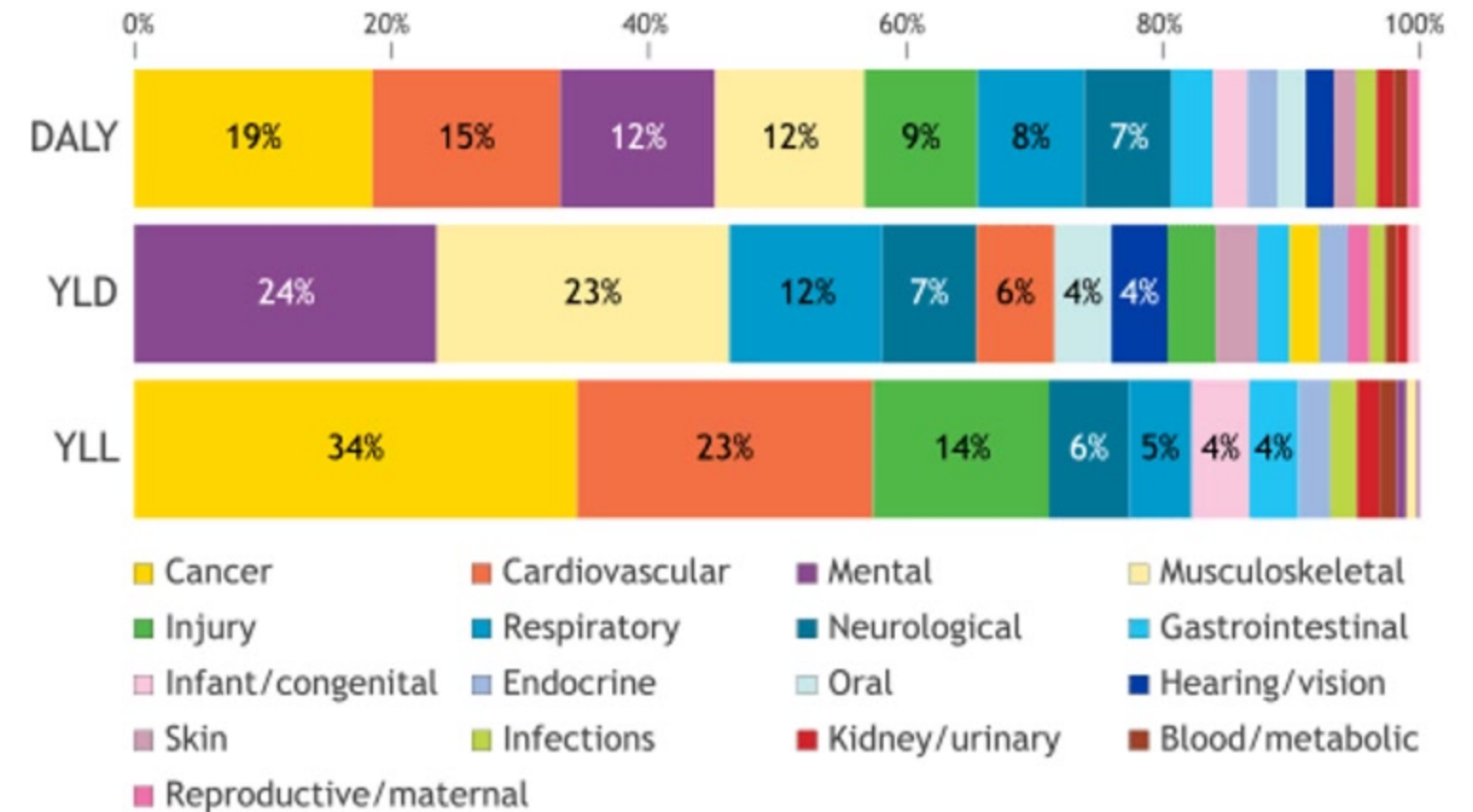
Learning outcomes

1. Understand the concept behind burden of disease.
2. Identify the priority population groups in Australia.
3. Understand the extent of burden of oral disease among these cohorts.
4. Enumerate and appreciate reasons behind the existing burden of disease among these groups of individuals.



Concept behind burden of disease

The term burden of disease generally describes the total, cumulative consequences of a defined disease or a range of harmful diseases with respect to disabilities in a community.



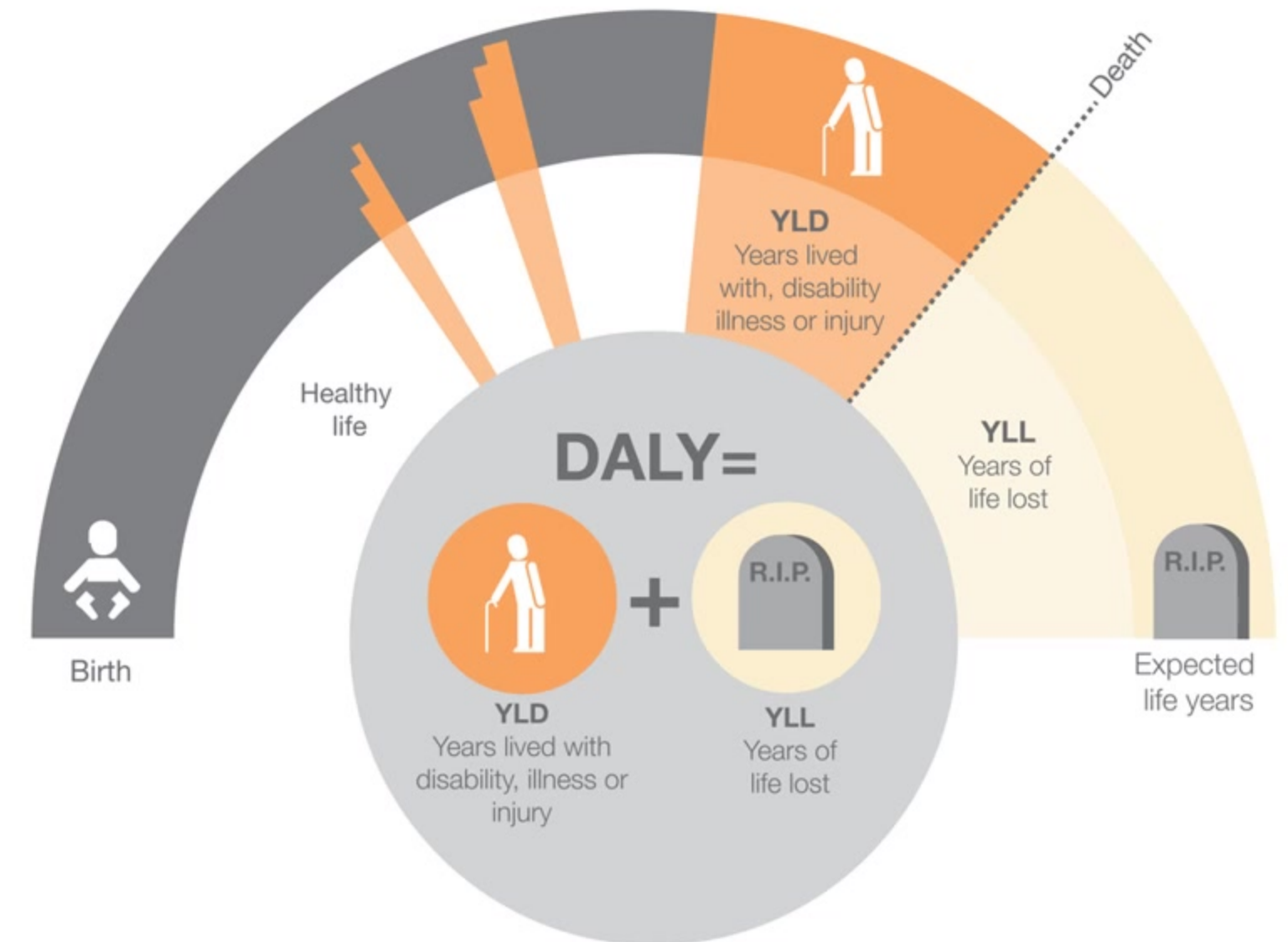
GBD 2021 Diseases and Injuries Collaborators. Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet*. 2024 May 18;403(10440):2133-2161. doi: 10.1016/S0140-6736(24)00757-8. Epub 2024.

Image source: Australian Institute of Health and Welfare (2016) *Australian Burden of Disease Study: impact and causes of illness and death in Australia 2011*, AIHW, Australian Government, accessed 27 July 2024.

Measuring burden of disease

– introducing Disability Adjusted Life Years (DALY)

One DALY represents the loss of the equivalent of one year of full health. DALYs for a disease or health condition are the sum of the years of life lost to due to premature mortality (YLLs) and the years lived with a disability (YLDs) due to prevalent cases of the disease or health condition in a population



Calculating DALY

Calculating YLL and YLD

- The basic formula for calculating the YLL

$$YLL = N \times L$$

where:

N = number of deaths.

L = standard life expectancy at age of death (in years)

- The basic formula for calculating the YLD

$$YLD = I \times DW \times L$$

where:

I = number of incident cases.

DW = disability weight.

L = average duration of disability (years)

DALY

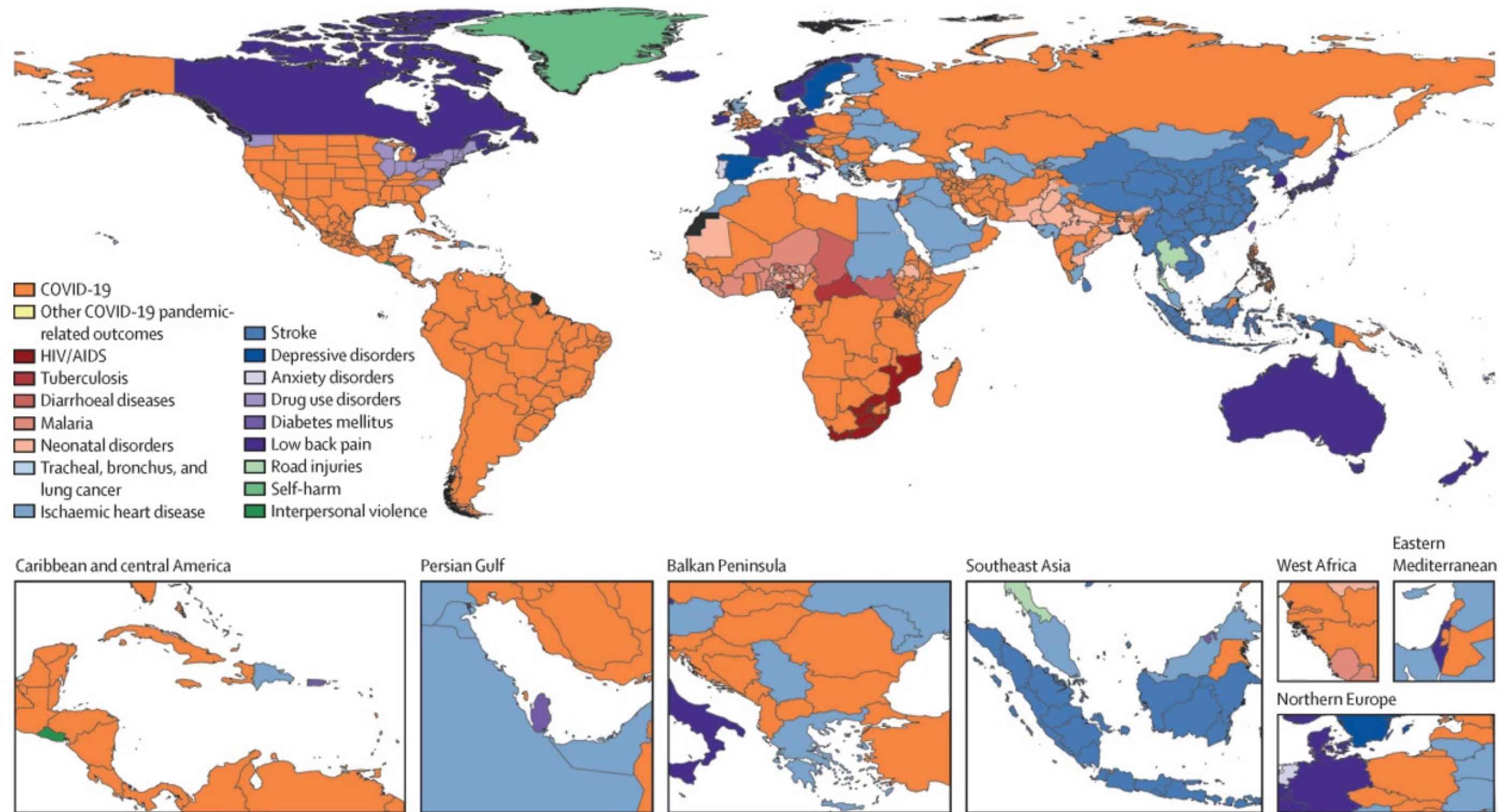
Disability Adjusted Life Years is a measure of overall disease burden, expressed as the cumulative number of years lost due to ill-health, disability or early death

$$= \text{YLD} + \text{YLL}$$

Years Lived with Disability Years of Life Lost



Most common cause of age-standardised DALY rates by location, all ages, both sexes, in 2021



Top 25 causes of global Years lived with disability in 2021

	Cause	YLDs 2021			Percentage change, 2010-21	
		Percentage of all-cause YLDs	Count (millions)	Age-standardised rate (per 100 000)	YLD count	Age-standardised rate
1	Low back pain	7.7% (6.5 to 9.1)	70.2 (50.2 to 94.1)	832.2 (595.9 to 1115.3)	19.4% (17.9 to 20.8)	-2.4% (-2.9 to -1.8)
2	Depressive disorders	6.2% (5.0 to 7.8)	56.3 (39.3 to 76.5)	681.2 (475.3 to 924.0)	36.5% (31.7 to 41.7)	16.4% (11.9 to 21.3)
3	Headache disorders	5.2% (1.2 to 10.4)	48.0 (9.80 to 101)	588.4 (117.6 to 1245.7)	14.4% (12.7 to 17.8)	0.3% (-1.1 to 1.4)
4	Age-related and other hearing loss	4.9% (3.9 to 5.9)	44.4 (30.7 to 62.0)	525.9 (364.2 to 731.9)	31.6% (30.0 to 33.1)	2.5% (1.7 to 3.3)
5	Other musculoskeletal disorders	4.8% (3.6 to 6.2)	43.0 (29.6 to 59.2)	507.2 (349.5 to 698.0)	28.7% (26.7 to 30.8)	6.3% (5.6 to 7.0)
6	Anxiety disorders	4.7% (3.6 to 6.0)	42.5 (29.4 to 57.7)	524.3 (363.3 to 716.2)	33.7% (30.7 to 37.0)	16.7% (14.0 to 19.8)
7	Diabetes mellitus	4.5% (3.9 to 5.2)	41.2 (29.0 to 56.5)	477.0 (336.1 to 653.3)	62.9% (60.3 to 65.8)	25.9% (24.0 to 28.1)
8	Dietary iron deficiency	3.6% (2.8 to 4.2)	32.3 (21.8 to 46.5)	423.7 (285.3 to 611.0)	3.2% (0.9 to 5.2)	-7.3% (-9.4 to -5.5)
9	Blindness and vision loss	3.2% (2.4 to 4.4)	29.2 (19.0 to 42.9)	342.8 (224.2 to 503.6)	32.9% (27.4 to 38.6)	2.6% (-2.5 to 7.7)
10	Gynaecological diseases	3.0% (2.5 to 3.7)	27.4 (19.1 to 38.2)	334.0 (232.7 to 467.5)	15.3% (14.0 to 16.8)	1.4% (0.6 to 2.3)
11	Falls	2.7% (2.3 to 3.0)	24.2 (16.8 to 32.8)	288.6 (200.9 to 391.7)	21.4% (19.2 to 23.3)	-3.5% (-4.7 to -2.6)
12	Oral disorders	2.6% (1.7 to 3.6)	23.2 (13.8 to 35.0)	275.9 (164.2 to 416.8)	25.1% (21.4 to 28.6)	0.4% (-2.6 to 3.3)
13	Neonatal disorders	2.4% (2.0 to 2.8)	21.7 (15.7 to 27.3)	282.7 (204.9 to 356.1)	24.9% (13.8 to 35.3)	13.5% (3.6 to 22.9)
14	Osteoarthritis	2.3% (1.4 to 4.5)	21.3 (10.2 to 42.9)	244.5 (117.1 to 493.1)	36.9% (35.2 to 38.5)	2.4% (1.3 to 3.5)
15	Neck pain	2.2% (1.7 to 2.9)	20.4 (13.6 to 28.9)	242.3 (162.6 to 342.8)	22.0% (19.4 to 24.6)	1.4% (1.0 to 1.9)
16	Stroke	1.7% (1.3 to 2.0)	15.2 (11.0 to 19.4)	178.7 (128.9 to 227.6)	29.1% (25.4 to 32.8)	-1.2% (-4.0 to 1.5)
17	COPD	1.7% (1.3 to 2.1)	14.9 (12.4 to 17.1)	174.4 (145.5 to 201.0)	29.1% (24.8 to 33.3)	-2.5% (-5.7 to 0.5)
18	Schizophrenia	1.7% (1.2 to 2.2)	14.8 (10.9 to 19.1)	177.8 (131.6 to 228.9)	16.3% (14.9 to 17.8)	0.0% (-0.9 to 0.9)
19	COVID-19	1.6% (0.6 to 3.6)	14.3 (5.14 to 33.7)	176.4 (63.1 to 418.9)	..	-
20	Alzheimer's disease and other dementias	1.3% (1.0 to 1.6)	11.6 (7.96 to 15.3)	141.9 (97.7 to 187.2)	45.7% (44.1 to 47.2)	2.6% (1.7 to 3.5)
21	Autism spectrum disorders	1.3% (0.8 to 2.0)	11.5 (7.84 to 16.3)	147.6 (100.2 to 208.1)	12.9% (11.9 to 13.7)	0.7% (-0.2 to 1.4)
22	Alcohol use disorders	1.2% (1.0 to 1.5)	11.0 (7.68 to 15.3)	132.3 (92.3 to 184.5)	6.8% (3.4 to 10.5)	-8.1% (-10.8 to -5.4)
23	Asthma	1.1% (0.9 to 1.4)	10.2 (6.50 to 15.0)	131.1 (84.0 to 194.7)	2.1% (0.2 to 4.4)	-11.1% (-12.8 to -8.9)
24	Drug use disorders	1.0% (0.8 to 1.3)	9.23 (6.54 to 11.8)	114.1 (80.9 to 145.5)	26.2% (22.5 to 30.1)	13.9% (10.9 to 17.2)
25	Other mental disorders	1.0% (0.7 to 1.3)	8.96 (5.72 to 13.5)	106.6 (68.2 to 160.7)	19.5% (18.4 to 21.0)	-0.2% (-0.8 to 0.2)

Data in parentheses are 95% uncertainty intervals. Count data are presented to three significant figures, and rates and percentage change data are presented to one decimal place. COPD=chronic obstructive pulmonary disease. YLDs=years lived with disability.

Table: Top 25 leading Level 3 causes of global YLDs, ranked from 1 to 25, in 2021 across all ages, for both sexes combined, YLD counts, age-standardised rates, and percentage change between 2010 and 2021

YLD

Rank in 2023	Leading disease in 2023	% change since 2003
1	Back pain and problems	8.4
2	Anxiety disorders	33.2
3	Depressive disorders	11.4
4	Asthma	10.4
5	Osteoarthritis	27.3
6	Autism spectrum disorders	260.8
7	Rheumatoid arthritis	-35.4
8	COPD	-7.5
9	Hearing loss	14.1
10	Dementia	-0.5
11	Type 2 diabetes mellitus	24.5
12	Bipolar affective disorder	33.1
13	Eating disorders	20.6
14	Alcohol use disorders	-21.7
15	Dental caries	16.3

Burden of disease in Australia – recent findings

DALY

Rank in 2023	Leading disease in 2023	% change since 2003
1	Coronary heart disease	-58.2
2	Back pain and problems	8.3
3	Anxiety disorders	33.2
4	Depressive disorders	11.2
5	Dementia	39.8
6	Suicide and self-inflicted injuries	16.6
7	COPD	-12.9
8	Asthma	8.4
9	Lung cancer	-31.4
10	Osteoarthritis	26.7

How do we report burden of oral disease?

Global Burden of Disease reports the following specific oral diseases:

- a. Deciduous tooth caries (focus on untreated)
- b. Permanent tooth caries (focus on untreated)
- c. Periodontal disease
- d. Tooth loss
- e. Other oral disorders (not lip and oral cavity cancer)
- f. Lip and oral cavity cancer (covered under neoplasms)
- g. Cleft lip and palate (covered under congenital conditions)

Almost half of the world's population suffer from oral diseases

Untreated tooth decay affects
2.5 billion people

Complete tooth loss affects
350 million people

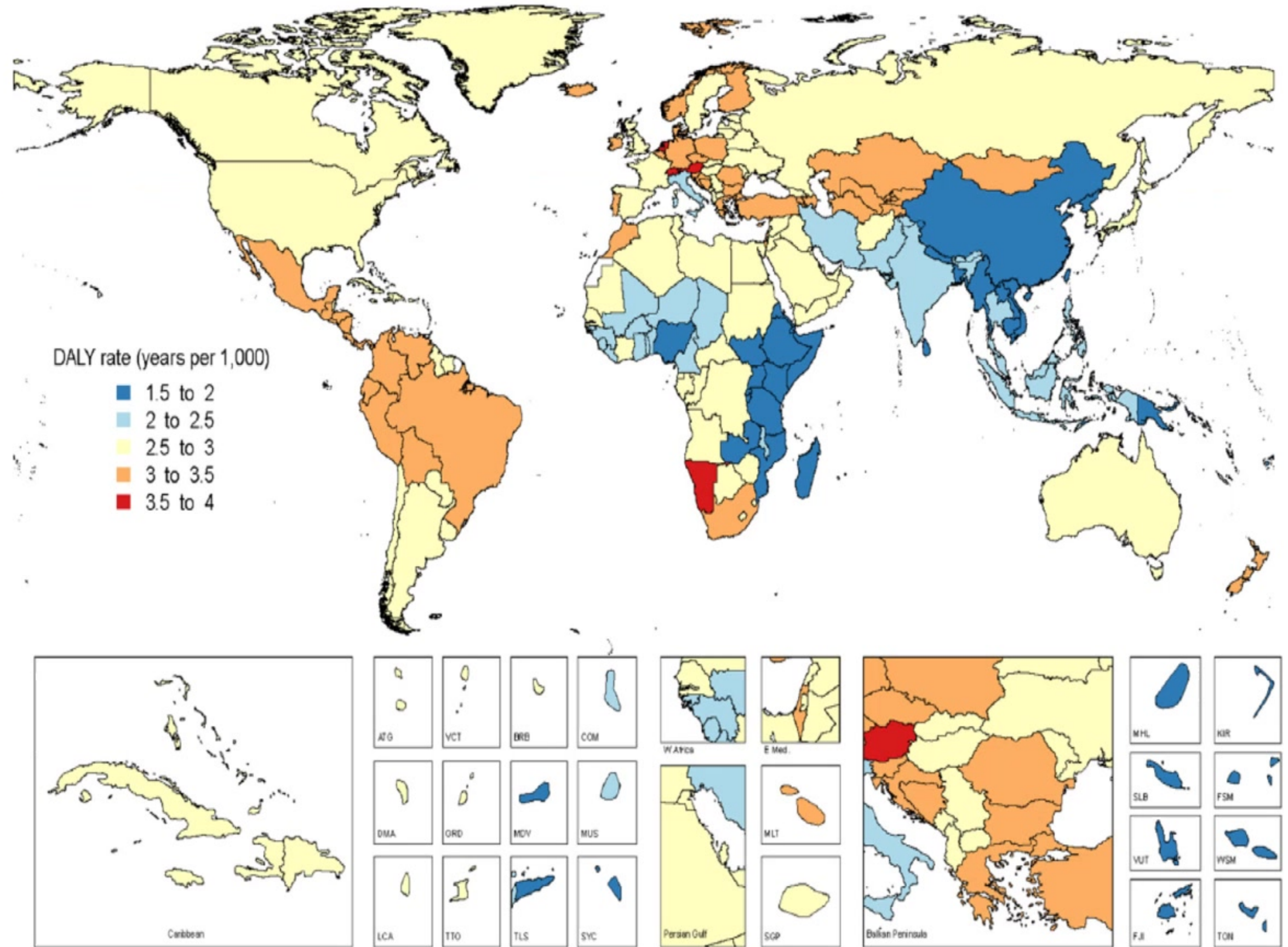
Severe gum disease affects
1 billion people

Oral cancer affects
380,000 people

Oral diseases can be prevented and treated in their early stages.



World map of disability-adjusted life year (DALY) for all oral conditions combined in 2015, both sexes.



Burden of oral disease in Australia – Recent findings

Burden of oral disease in Australia – Recent findings

Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Oral disorders	All causes

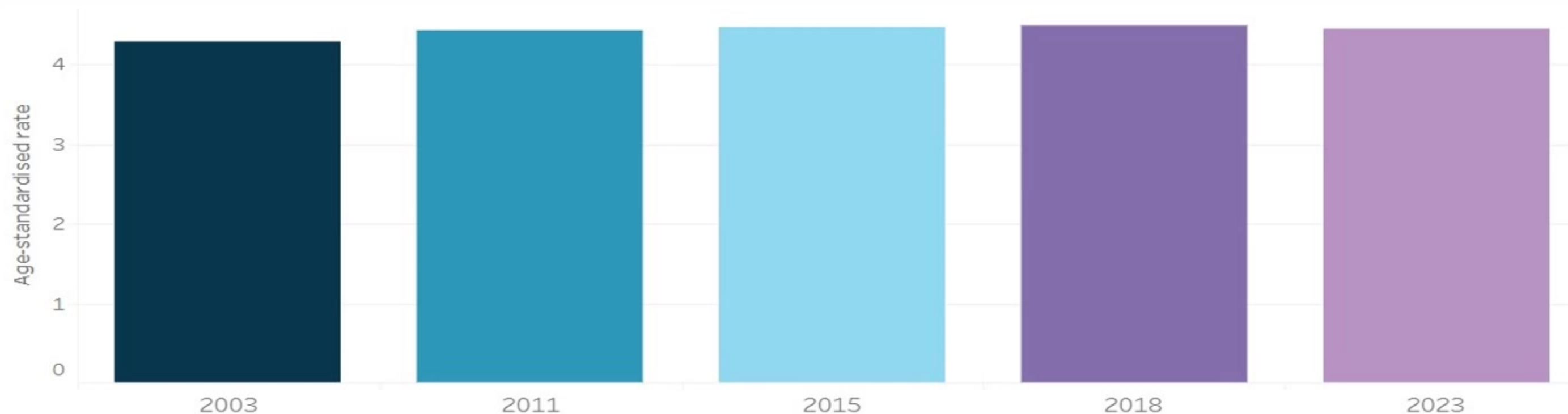
3.6% increase
in the age-standardised DALY rate
in **Persons** between 2003 and 2023
for the disease/s selected

1.7% increase
in the age-standardised DALY rate
in **Females** between 2003 and
2023 for the disease/s selected

5.5% increase
in the age-standardised DALY rate
in **Males** between 2003 and 2023
for the disease/s selected

DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

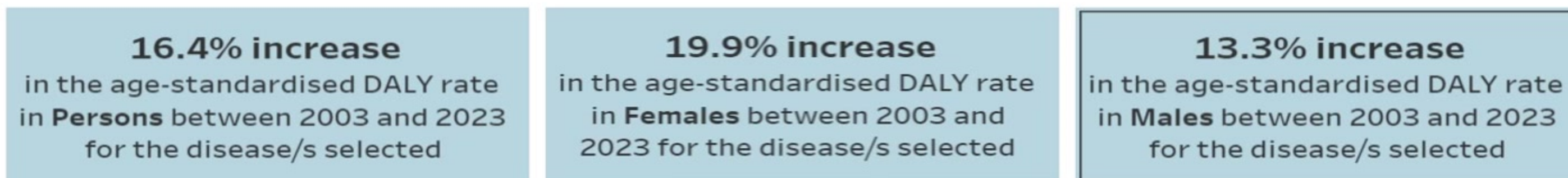
Comparison of age-standardised DALY rates, Persons



Burden of oral disease in Australia – Recent findings

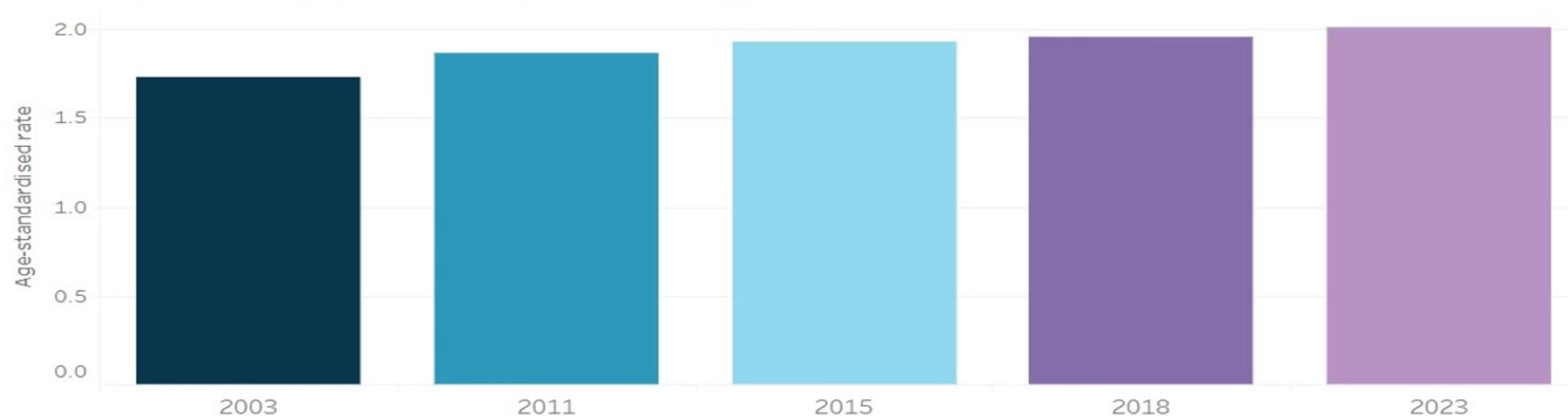
Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Oral disorders	Dental caries



DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

Comparison of age-standardised DALY rates, Persons



Burden of oral disease in Australia – Recent findings

Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Oral disorders	Periodontal dise...

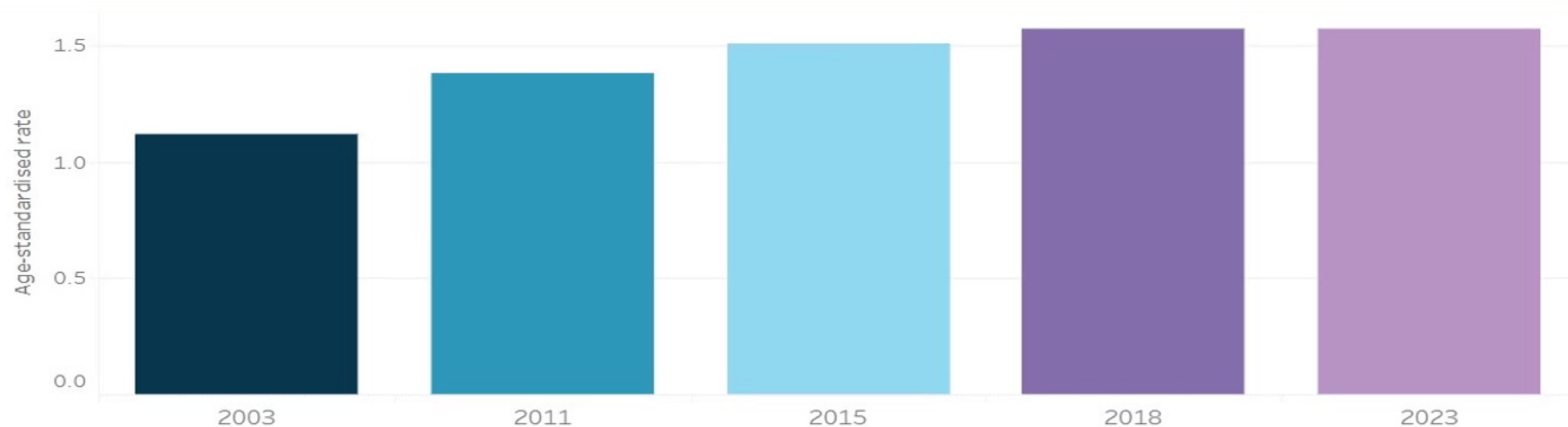
40.1% increase
in the age-standardised DALY rate
in **Persons** between 2003 and 2023
for the disease/s selected

47.6% increase
in the age-standardised DALY rate
in **Females** between 2003 and
2023 for the disease/s selected

34.8% increase
in the age-standardised DALY rate
in **Males** between 2003 and 2023
for the disease/s selected

DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

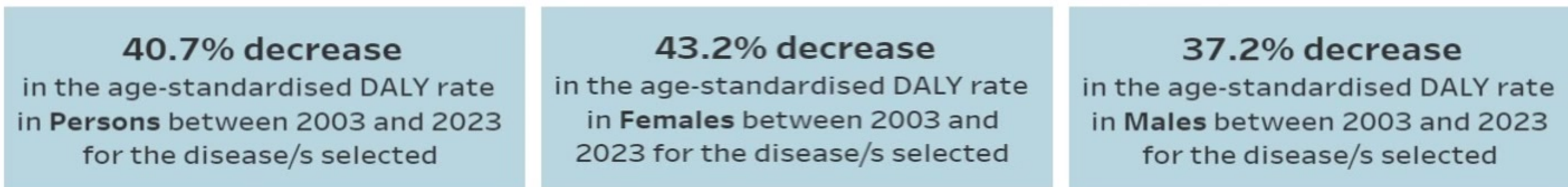
Comparison of age-standardised DALY rates, Persons



Burden of oral disease in Australia – Recent findings

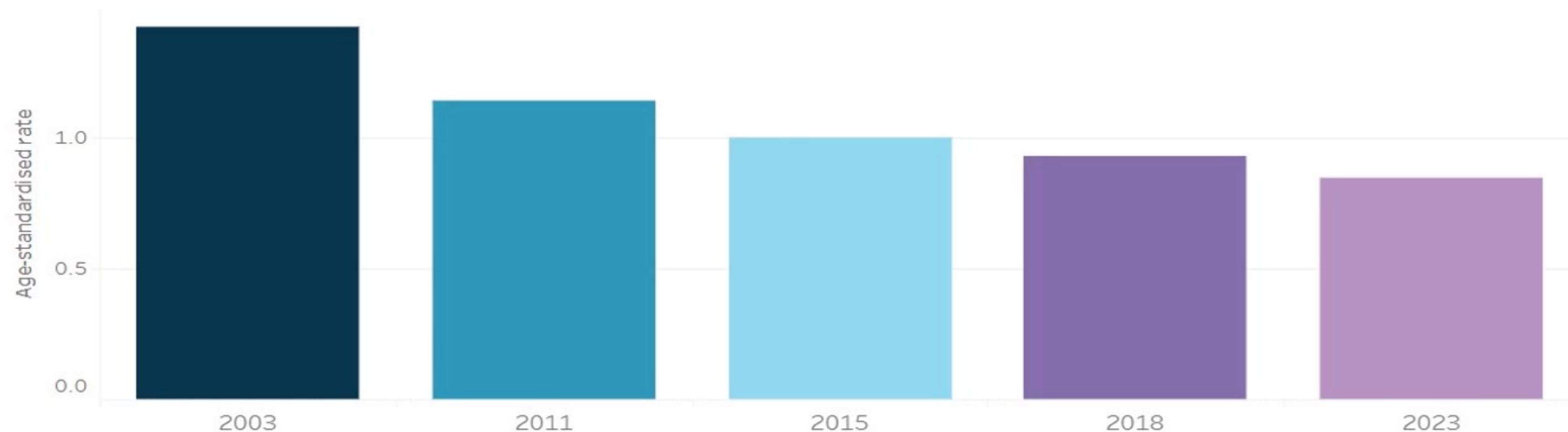
Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Oral disorders	Severe tooth loss



DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

Comparison of age-standardised DALY rates, Persons



Burden of oral disease in Australia – Recent findings

Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Cancer and other...	Lip and oral cavit...

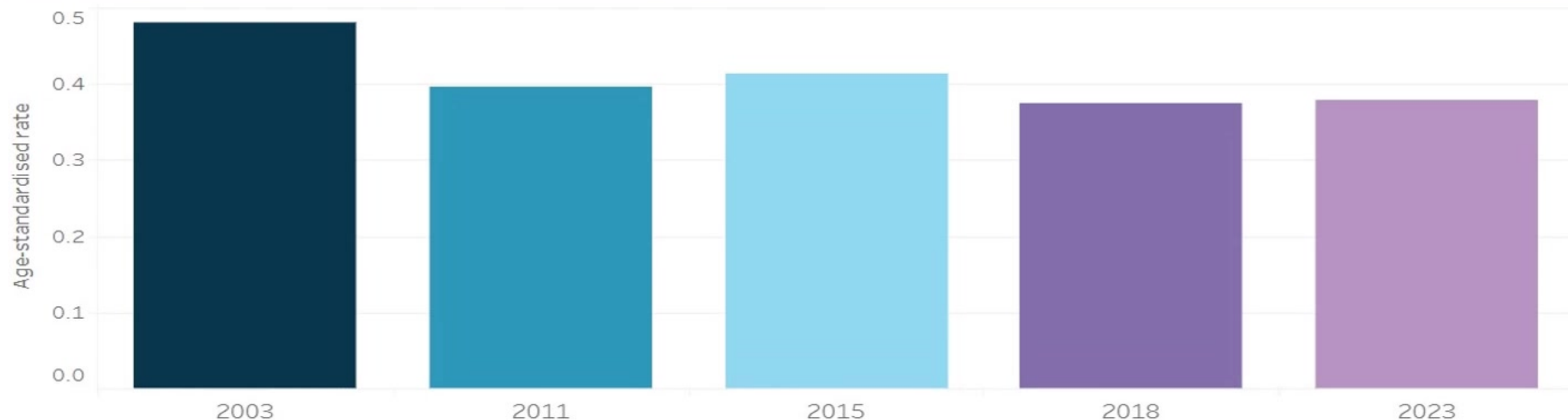
21.1% decrease
in the age-standardised DALY rate
in **Persons** between 2003 and 2023
for the disease/s selected

20.9% decrease
in the age-standardised DALY rate
in **Females** between 2003 and
2023 for the disease/s selected

20.6% decrease
in the age-standardised DALY rate
in **Males** between 2003 and 2023
for the disease/s selected

DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

Comparison of age-standardised DALY rates, Persons



Burden of oral disease in Australia – Recent findings

Select from the following:

Measure:	Choose sex view:	Start year:	End year:	Disease group:	Disease/injury:
DALY	Persons	2003	2023	Infant and conge...	Cleft lip and/or p...

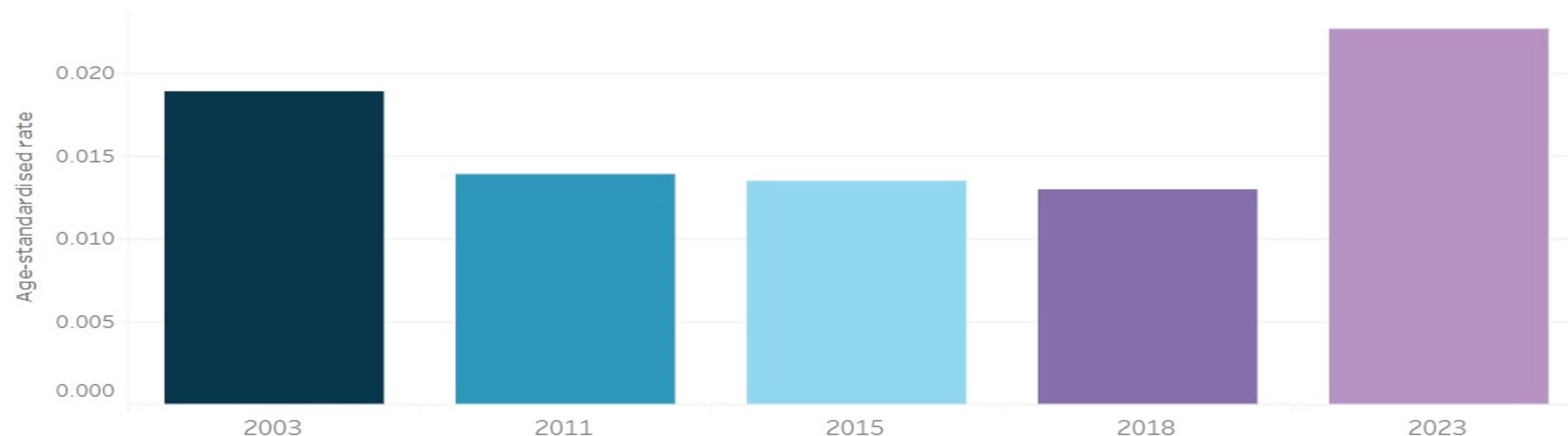
19.8% increase
in the age-standardised DALY rate
in **Persons** between 2003 and 2023
for the disease/s selected

19.1% decrease
in the age-standardised DALY rate
in **Females** between 2003 and
2023 for the disease/s selected

80.4% increase
in the age-standardised DALY rate
in **Males** between 2003 and 2023
for the disease/s selected

DALY= Disability-adjusted life years; YLD= Years lived with disability; YLL= Years of life lost

Comparison of age-standardised DALY rates, Persons

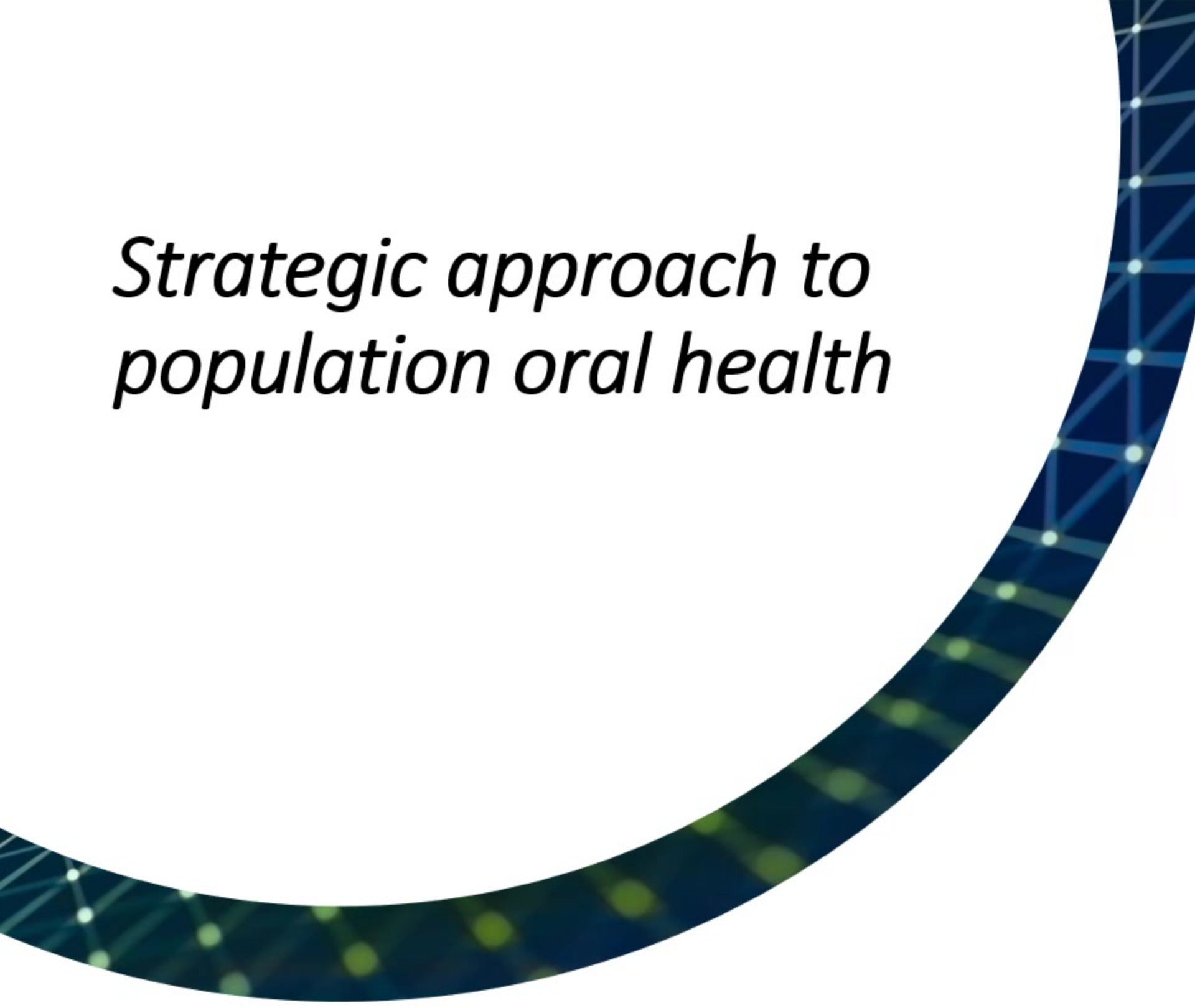


*Prevalence of oral
disease is
disproportionate !*

Figure 2: Proportion of children aged 6–14 who have experienced decay in permanent teeth by selected population groups, 2012–14



Source: National Child Oral Health Study 2012–14, published in Ha et al. 2016.



Strategic approach to population oral health

Whole population approach

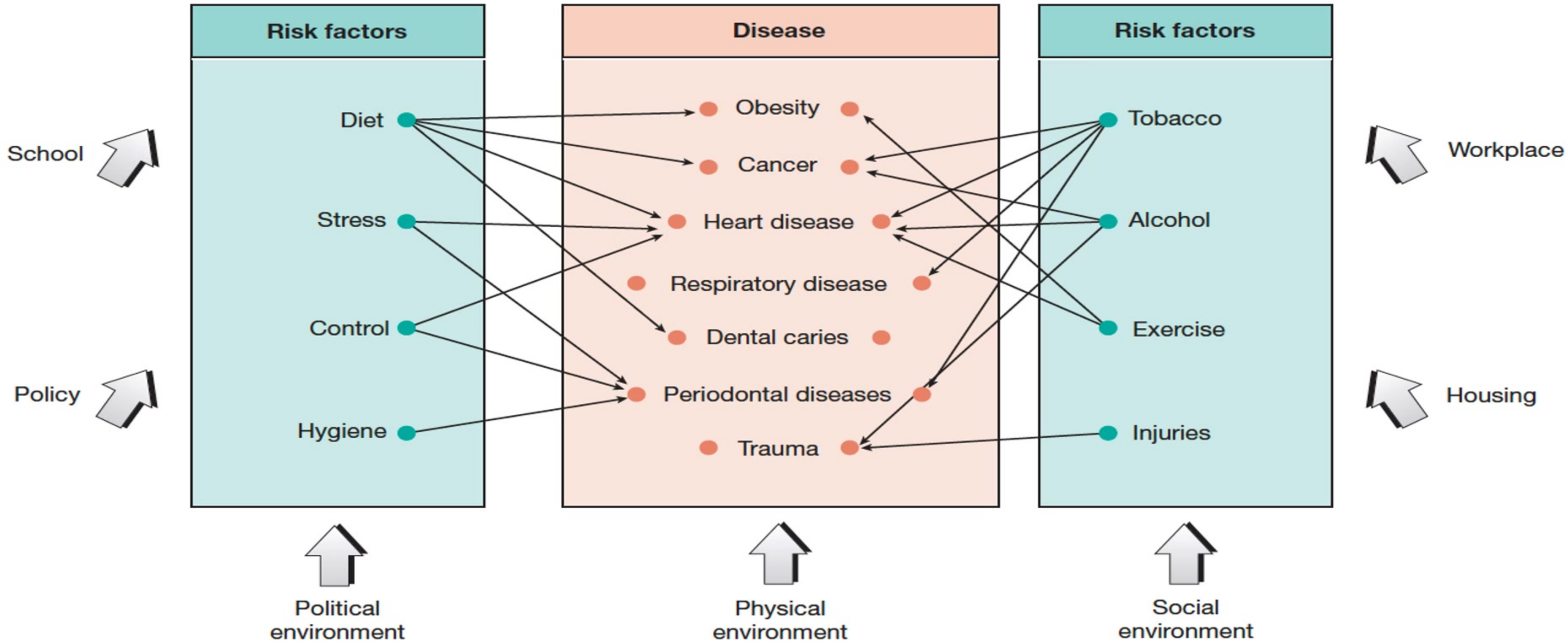
Targeted population approach

High risk individual approach

Proportionate universalism

Common risk factor approach in dental public health

Figure 21.1 Common-risk factor approach. Source: Watt 2005. Reproduced with permission from World Health Organisation. Originally adapted from Sheiham and Watt 2000 with permission from John Wiley & Sons.



Source: Ivor G Chestnutt, *Dental Public Health at a Glance*, John Wiley & Sons, Inc., 2016.

Priority populations as outlined by the National Oral Health Plan (2015-24)

Priority populations

1. People who are socially disadvantaged or on low incomes
2. Aboriginal and Torres Strait Islander people
3. People living in regional and remote Australia
4. People with additional and/or specialised health care needs