Age-standardised rate

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Age-standardised rate

Identifying and definitional attributes

Metadata item type:	Glossary Item
METEOR identifier:	327276
Registration status:	Health!, Standard 01/03/2005
Definition:	A method of adjusting the crude rate to eliminate the effect of differences in population age structures when comparing crude rates for different periods of time, different geographic areas and/or different population sub-groups (e.g. between one year and the next and/or States and Territories, Indigenous and non-Indigenous populations).
	Adjustments are usually undertaken for each of the comparison populations against a standard population (rather than adjusting one comparison population to resemble another). Sometimes a comparison population is referred to as a study population.
Context:	Population health and health services research: For valid comparisons of rates in different populations, such as incidence rates, prevalence rates, mortality rates and health service utilisation rates.

Collection and usage attributes

Guide for use:

Formula:

Direct method		*Indirect method*	
$\sum (r_i\, P_i)$		C	x R
$\sum P_i$		$\sum (R_i p_i)$	
SR=		SR=	

Direct method

SR= (SUM (r_i * P_i))/SUM P_i

Indirect method

SR=(C/SUM(R_i *p_i))*R

Where:
SR is the age-standardised rate for the population being studied
r_i is the age-group specific rate for age group i in the population being studied
P_i is the population of age group i in the standard population
C is the observed number of events* in the population being studied
SUM($R_i p_i$) is the expected number of events in the population being studied
R_i is the age-group specific rate for age group i in the standard population
p_i is the population for age group i in the population being studied
R is the crude rate in the standard population
* 'Events' can include deaths, incident or prevalent cases of disease or other conditions, or health care utilisation occurrences.

For the purposes of comparisons of population rates for Australia over time, and/or populations within Australia (e.g. states and territories, Indigenous and non-Indigenous) the standard population to be used is the final 30 June estimated Australian resident total population (males plus females) for the most recent year ending in 1 (e.g. 1991, 2001).

There are two methods (namely direct and indirect) of calculating age-standardised rates:

- The **direct method** is generally used for comparisons between study groups.
- The **indirect method** is recommended when the age-specific rates for the population being studied are not known but the total number of events is known or when calculating rates for small populations where fluctuations in age-specific rates can affect the reliability of rates calculated using the direct method.

The standard population used for purposes of international comparisons is generally the World Standard Population as recommended by the World Health Organization or the European Standard Population.

Five-year age groups should normally be used, with the age group 0-4 separated into 0 and 1 to 4, and ages over 85 years combined, thus 0, 1-4, 5-9, 10-14, ... , 80-84, 85+. If these age groups are not used, the actual age groups should be detailed in notes accompanying the age standardised population rate information.

Standardisation separately for males and females is not usually undertaken but may be appropriate for some applications, for example, hospitalisation rates for caesarean section is best undertaken using a female standard population rather than a standard population for both sexes. If standardisation is undertaken in this way this should be detailed in notes accompanying the age standardised population rate information.

When indirect age standardisation is undertaken for comparisons with or between Indigenous populations, the latest available rates could be used as the standard. In addition, age groups older than 70-74 years could be excluded. This is as recommended in the National Performance Indicators for Aboriginal and Torres

Comments:	Standardised rates are generally multiplied by 1,000 or 100,000 to avoid small decimal fractions. They are then called standardised rates per 1,000 or 100,000 population.

The **indirect** method is also used to calculate **standardised mortality ratios (SMRs)** and other standardised ratios, for example for health service utilisation. These ratios express the overall experience of a comparison population in terms of the standard population by calculating the ratio of observed to expected deaths in the comparison population:

Formula

$$SMR = \frac{C}{\sum(R_i p_i)}$$

The standard population used to calculate SMRs can be any population to which the comparison population is being compared. For example, if death rates for birthplace groups are compared to those of the Australian-born population using SMRs, the standard population would be the Australian-born population.

Sometimes the SMR is multiplied by 100 to express the ratio as a percentage, although this is not universally accepted. Not multiplying by 100 has the benefit of being able to say that the SMR was, for example, 2.3 times that expected rather than 130% higher.

Standardised ratios for hospitalisations and other events can be calculated using similar techniques.

Source and reference attributes

Submitting organisation:

Origin: Australian Institute of Health and Welfare

Reference documents: Textbooks of epidemiology, demography and biostatistics.
The notation used in this glossary term is based on Armitage P & Berry G 1994. *Statistical Methods in Medical Research*. Oxford: Blackwell Scientific Publications.

See also **Crude rate**

Relational attributes

Related metadata references: Is re-engineered from 🗎 Age-standardised rate, version 1, Derived DE, NHDD, NHIMG, Superseded 01/03/2005.pdf (22.1 KB)
No registration status

Metadata items which use this glossary item:
Crude rate
Health!, Standard 01/03/2005

National Health Performance Authority, Healthy Communities: Frequent GP attenders, 2012–13
National Health Performance Authority (retired), Retired 01/07/2016

National Health Performance Authority, Healthy Communities: Very high GP attenders, 2012–13
National Health Performance Authority (retired), Retired 01/07/2016

National Indigenous Reform Agreement: PI 02-Mortality rate by leading causes, 2018
Indigenous, Superseded 31/07/2018

National Indigenous Reform Agreement: PI 02-Mortality rate by leading causes, 2019
Indigenous, Superseded 17/11/2019

National Indigenous Reform Agreement: PI 02-Mortality rate by leading causes, 2020

Indigenous, Standard 17/11/2019

[National Indigenous Reform Agreement: PI 03-Rates of current daily smokers, 2018](#)
Indigenous, Superseded 31/07/2018

[National Indigenous Reform Agreement: PI 03-Rates of current daily smokers, 2019](#)
Indigenous, Superseded 17/11/2019

[National Indigenous Reform Agreement: PI 03-Rates of current daily smokers, 2020](#)
Indigenous, Standard 17/11/2019

[National Indigenous Reform Agreement: PI 04-Levels of risky alcohol consumption, 2018](#)
Indigenous, Superseded 31/07/2018

[National Indigenous Reform Agreement: PI 04-Levels of risky alcohol consumption, 2019](#)
Indigenous, Superseded 23/08/2019

[National Indigenous Reform Agreement: PI 04-Levels of risky alcohol consumption, 2020](#)
Indigenous, Standard 23/08/2019

[National Indigenous Reform Agreement: PI 05-Prevalence of overweight and obesity, 2018](#)
Indigenous, Superseded 31/07/2018

[National Indigenous Reform Agreement: PI 05-Prevalence of overweight and obesity, 2019](#)
Indigenous, Superseded 23/08/2019

[National Indigenous Reform Agreement: PI 05-Prevalence of overweight and obesity, 2020](#)
Indigenous, Standard 23/08/2019

[National Indigenous Reform Agreement: PI 08-Tobacco smoking during pregnancy, 2018](#)
Indigenous, Superseded 31/07/2018

[National Indigenous Reform Agreement: PI 08-Tobacco smoking during pregnancy, 2019](#)
Indigenous, Superseded 23/08/2019

[National Indigenous Reform Agreement: PI 08-Tobacco smoking during pregnancy, 2020](#)
Indigenous, Standard 23/08/2019

[National Indigenous Reform Agreement: PI 09-Antenatal care, 2018](#)
Indigenous, Superseded 31/07/2018

[National Indigenous Reform Agreement: PI 09-Antenatal care, 2019](#)
Indigenous, Superseded 23/08/2019

[National Indigenous Reform Agreement: PI 09-Antenatal care, 2020](#)
Indigenous, Standard 23/08/2019

[Number of lumbar spinal decompression (excluding lumbar spinal fusion) hospitalisations per 100,000 people aged 18 years and over, 2012-13 to 2014-15 and 2015-16 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of lumbar spinal fusion (excluding lumbar spinal decompression) hospitalisations per 100,000 people, aged 18 years and over, 2012-13 to 2014-15 and 2015-16 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of lumbar spinal fusion (with or without lumbar spinal decompression) hospitalisations per 100,000 people, aged 18 years and over, 2012-13 to 2014-15 and 2015-16 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18-54 years, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of myringotomy hospitalisations per 100,000 people aged 17 years and under, 2012-13, 2015-16 and 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of PBS/RPBS prescriptions dispensed for amoxicillin per 100,000 people, 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 22/09/2020

[Number of PBS/RPBS prescriptions dispensed for amoxicillin-clavulanate per 100,000 people, 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 22/09/2020

[Number of PBS/RPBS prescriptions dispensed for antimicrobials per 100,000 people, 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 22/09/2020

[Number of PBS/RPBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of people dispensed five or more medicines per 100,000 people aged 75 years and over, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of people who had at least one medication management review, per 100,000 people aged 75 years and over, 2018-19](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of potentially preventable hospitalisations - cellulitis per 100,000 people of all ages, 2014-15 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of potentially preventable hospitalisations - chronic obstructive pulmonary disease (COPD) per 100,000 people of all ages, 2014-15 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of potentially preventable hospitalisations - diabetes complications per 100,000 people of all ages, 2014-15 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of potentially preventable hospitalisations - heart failure per 100,000 people, of all ages, 2014-15 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of potentially preventable hospitalisations - kidney and urinary tract infections per 100,000 people of all ages, 2014-15 to 2017-18](#)
Australian Commission on Safety and Quality in Health Care, Standard 27/04/2021

[Number of tonsillectomy hospitalisations per 100,000 people aged 17 years and](#)

[under, 2012-13, 2015-16 and 2017-18](#)
    [Australian Commission on Safety and Quality in Health Care](#), Standard
    27/04/2021