Metadata: Asthma hospitalisations

Information topic	Details
Indicator name	**Asthma hospitalisations**
Domain and topic	Indoor environment domain: Asthma
Rationale	Asthma affects a person's airways, and makes it difficult to breathe. Second-hand smoke exposure can increase the risk of asthma in children (US Department of Health and Human Services, 2007). Nitrogen dioxide from gas ovens and unflued gas heaters may also exacerbate asthma (Belanger et al., 2013; Pilotto et al., 2004). Indoor dampness/mould is also associated with asthma onset and exacerbation in children (Jaakkola et al., 2011; Prezant & Douwes, 2011). Evidence also suggests that asthma can be exacerbated by exposure to outdoor air pollution, particularly particulate matter ($PM_{2.5}$), nitrogen dioxide and sulphur dioxide (Orellano et al., 2017).
Indicator definition and units	The number and rate of hospitalisations for asthma (ICD-10AM J45–J46) and wheeze (R06.2), among children aged 0–14 years. Rates are presented per 100,000 population.
Data source	National Minimum Dataset (NMDS), Ministry of Health.
Numerator	Hospital admissions with a primary diagnosis of asthma (ICD-10 AM J45, J46) or wheeze (R06.2), for children aged 0–14 years. Wheeze is included as there is evidence that paediatricians are more likely to diagnose suspected asthma to wheeze for younger children (HQSC 2016; Simpson et al., 2017). The indicator includes overnight hospital admissions for acute or semi-acute/arranged visits (admission type in 'AA', 'AC', 'ZA', 'ZC'). The following hospitalisations were excluded from analysis: • transfers within or between hospitals • overseas visitors • deaths (defined as 'event end types' DD, DO or ED). Daycases and emergency department cases meeting the three-hour threshold have been included, to align with the approach taken by the Child and Youth Epidemiology Service (Simpson et al., 2017) and Health Quality and Safety Commission (2016). It is thought that this is the best way to measure childhood medical hospitalisations across the country, as some hospitals admit children as an in-patient, while other hospitals treat children in a short-stay unit.

Denominator	Population estimates (2013 and prior) and projections (after 2013) from Statistics New Zealand. For the NZDep2013 analysis, the 2013 denominator population by NZDep2013 deciles, age group and sex has been used.
Methodology	Age-standardised rates have been calculated using the direct method, using the World Health Organization world population age distribution (Ahmad et al 2000). Prioritised ethnicity has been used, in the following prioritisation order: Māori, Pacific peoples, Asian, European/Other. We have used the variables provided on the National Minimum Dataset for the analysis, including prioritised ethnicity, sex, NZDep2013 decile and District Health Board.
Time period and time scale	Annual data, from 2001 to the most recent data available.
Population coverage	New Zealand usually resident population aged 0–14 years.
Reporting variables	Results are presented by year, sex, age group, ethnic group, NZDep, and DHB.
Confidence intervals	95% confidence intervals were calculated based on the methodology outlined in APHO (2008). Confidence intervals are presented as error bars on graphs.
Limitations of indicator and data source	Limitations include the following. • The indicator only covers asthma events that resulted in hospital admissions. • The indicator presents the rate of hospitalisations and does not give information about the number of children affected; some children may be admitted more than once in a year, and each hospitalisation is counted in our analysis. From 2000 to about 2009, there were regional variations in whether providers uploaded their day cases to the NMDS. This has led to issues when comparing regions and time series. One possible way of minimising this variation is to exclude day cases and emergency department short stay visits from the analysis. However, this approach is not necessarily appropriate for children, since some hospitals treat children in specialist paediatric short-stay units, rather than admitting the child to hospital. For this reason, and for consistency with other agencies, we have used the same approach as the Child and Youth Epidemiology Service (Craig et al., 2013; Simpson et al., 2017) and the Health Quality and Safety Commission (2016), and included all day cases and emergency department visits that meet the 3-hour treatment rule. However, this may mean that earlier years of data (especially 2000–2009) have undercounted the number of admissions, since some hospitals may not have counted all day cases during this time period.
Related indicators	Asthma prevalence Second-hand smoke exposure Maternal smoking at two weeks postnatal

	Household crowding Lower respiratory tract infection hospitalisations Sudden unexpected death in infancy (SUDI) Meningococcal disease
References	Ahmad, O.B., et al. (2000). *Age Standardization of Rates: A New WHO Standard (Technical Report).* GPE Discussion Paper Series: No. 31. Geneva: World Health Organization. APHO. (2008). *Technical Briefing 3: Commonly used public health statistics and their confidence intervals.* York, UK: Association of Public Health Observatories. Belanger, K., Holford, T.R., Gent, J.F., Hill, M.E., Kezik, J.M, & Leaderer, B.P. (2013). Household levels of nitrogen dioxide and pediatric asthma severity. *Epidemiology* 24(2): 320–330. Craig, E., Adams, J., Oben, G., Reddington, A., Wicken, A., & Simpson, J. (2013). *The Health Status of Children and Young People in New Zealand.* Dunedin: New Zealand Children and Youth Epidemiology Service, University of Otago. HQSC. (2016). *Atlas of Healthcare Variation Methodology: Asthma.* Wellington: Health Quality and Safety Commission. Available online: https://www.hqsc.govt.nz/assets/Health-Quality-Evaluation/Atlas/asthmaSF18Aug/Methodology_asthma.pdf (accessed 26 Oct 2017). Jaakkola, M.S., Haverinen-Shaughnessy, U., Douwes, J., Nevalainen, A. (2011). Indoor dampness and mould problems in homes and asthma onset in children. In M. Braubach, D.E. Jacobs & D. Ormandy (Eds.), *Environmental burden of disease associated with inadequate housing: A method guide to the quantification of health effects of selected housing risks in the WHO European Region* (pp. 5–31). Copenhagen: World Health Organization Regional Office for Europe. Orellano, P., Quaranta, N., Reynoso, J., Balbi, B., & Vasquez, J. (2017). Effect of outdoor air pollution on asthma exacerbations in children and adults: Systematic review and multilevel meta-analysis. *PLoS ONE* 12(3): e0174050. Pilotto, L.S., Nitschke, M., Smith, B.J., Ruffin, R.E., McElroy, H.J, Martin, J., & Hiller, J.E. (2004). Randomized controlled trial of unflued gas heater replacement on respiratory health of asthmatic schoolchildren. *Int J Epidemiol.* 33(1): 208–214. Prezent, B., & Douwes, J. (2011). *Calculating the burden of disease attributable to indoor dampness in New Zealand: Technical Report.* Wellington: Centre for Public Health Research. Simpson J., Duncanson M., Oben G., Adams J., Wicken A., Pierson, M., & Gallagher, S. (2017). *The Health Status of Pacific Children and Young People in New Zealand 2015.* Dunedin: New Zealand Children and Youth Epidemiology Service, University of Otago. US Department of Health and Human Services. (2007). *Children and Secondhand Smoke Exposure. Excerpts from The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General.* Atlanta, GA: U.S.

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