

How  
dangerous  
is it to live  
in a Mr  
Fluffy  
house?

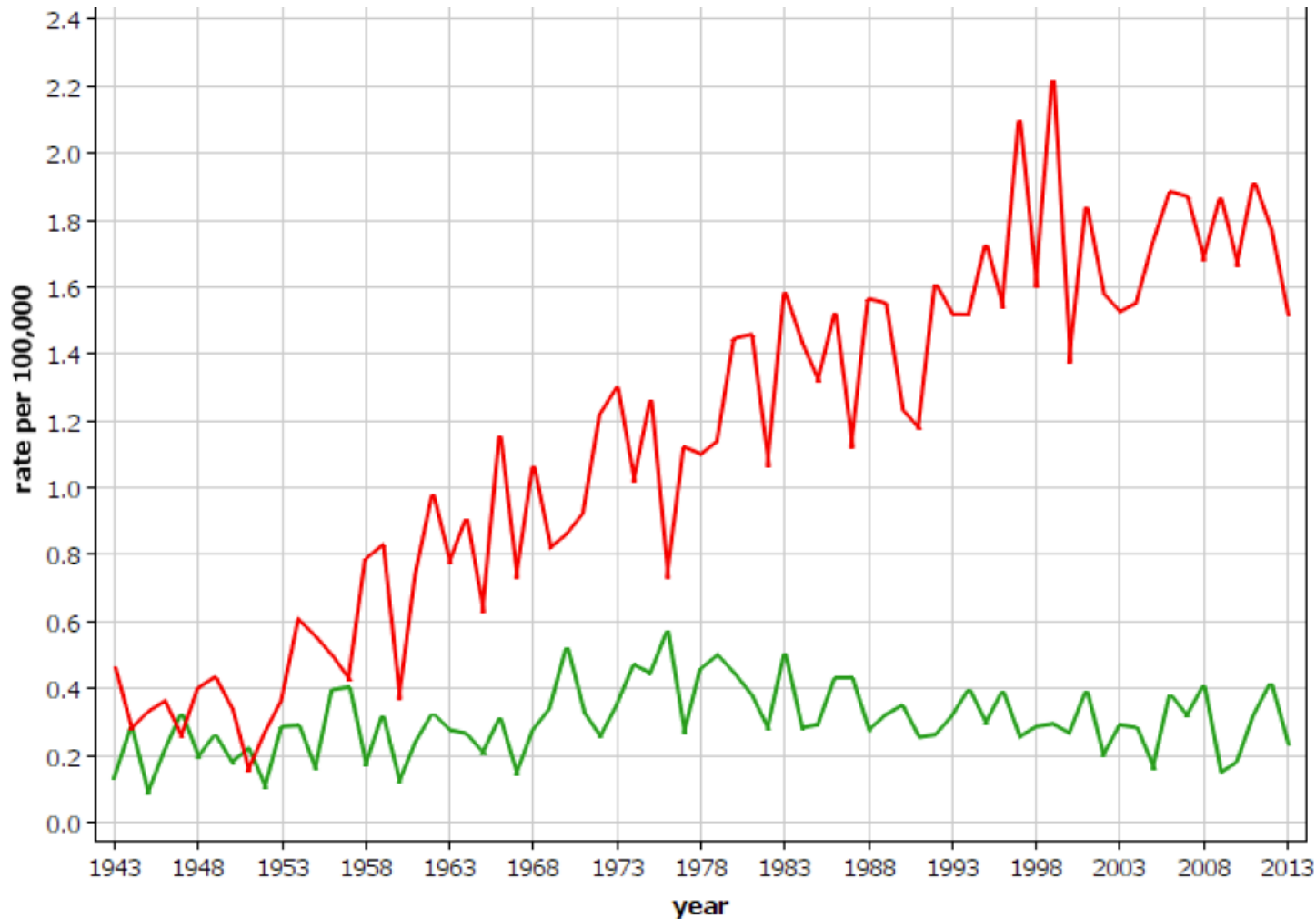


Bruce Armstrong  
Emeritus Professor, The University of Sydney  
Senior Adviser, The Sax Institute, Sydney

# Mesothelioma

- Mesothelioma remains an almost uniformly fatal cancer.
- In the absence of known exposure to asbestos and some other asbestiform minerals, it is rare.
  - Probably about 0.3 per 100,000 people per year.

# Trends in incidence of mesothelioma in Denmark, 1943 to 2013



Engholm G et al.  
NORDCAN: Cancer  
Incidence, Mortality,  
Prevalence and  
Survival in the Nordic  
Countries, Version 7.1  
(09.07.2015).  
Association of the  
Nordic Cancer  
Registries. Danish  
Cancer Society.  
Available from  
<http://www.ancre.nu>,  
accessed on 23 July  
2015.

■ Male ■ Female

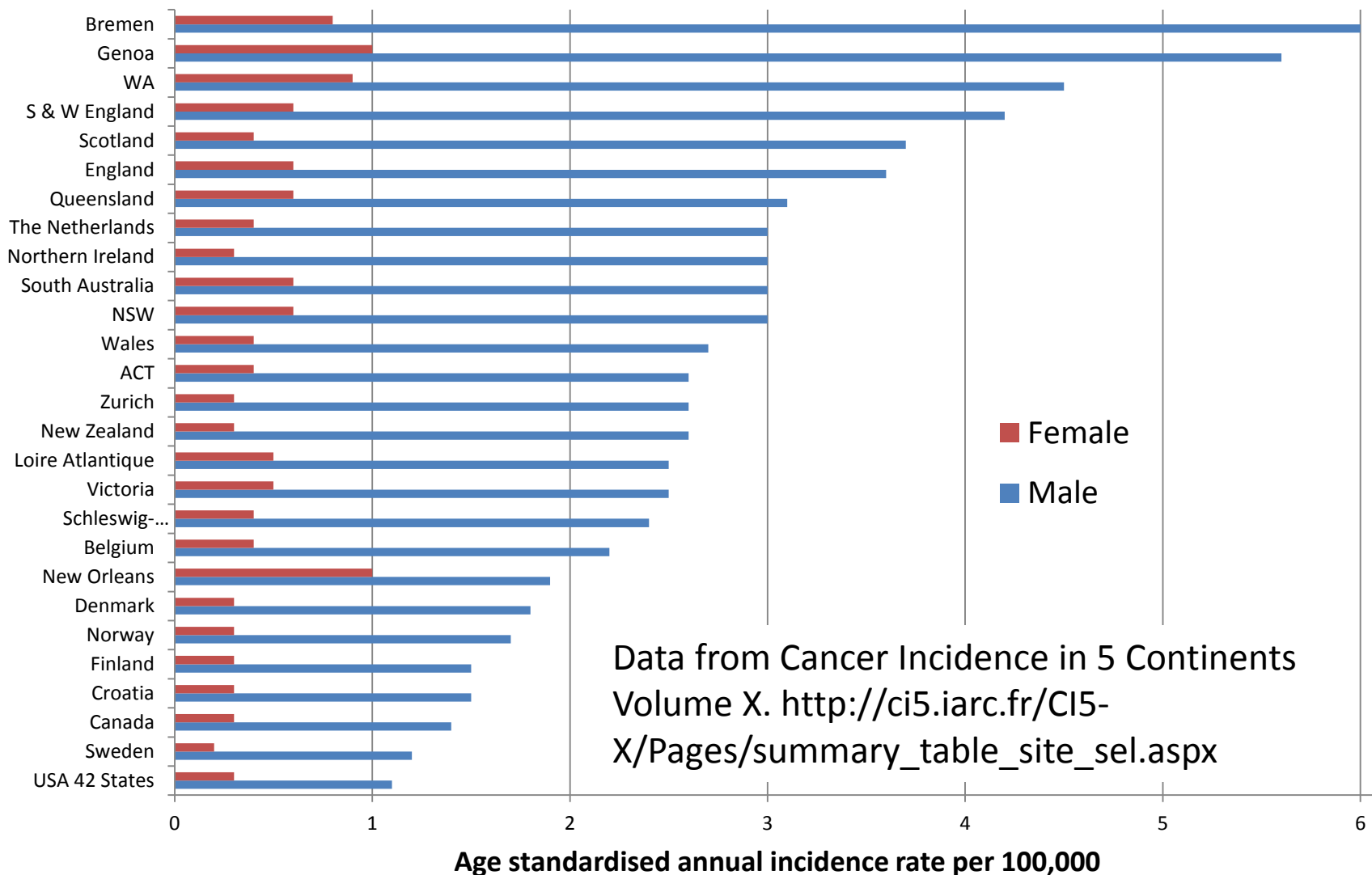
# Mesothelioma

- Mesothelioma remains an almost uniformly fatal cancer.
- In the absence of known exposure to asbestos and some other asbestiform minerals, it is rare.
  - Probably about 0.3 per 100,000 people per year;
  - 2011 Australian rates:
    - 2.8 per 100,000 per year in men
    - 0.5 per 100,000 per year in women.

# Mesothelioma

- Asbestos and some other “asbestiform” minerals are the only *known* causes of mesothelioma.
- Because it is naturally rare and exclusive to one class of exposure, mesothelioma is often used as a “marker” of asbestos exposure and an indicator of risk of other asbestos related diseases.

# Australia has some of the highest mesothelioma incidence rates worldwide

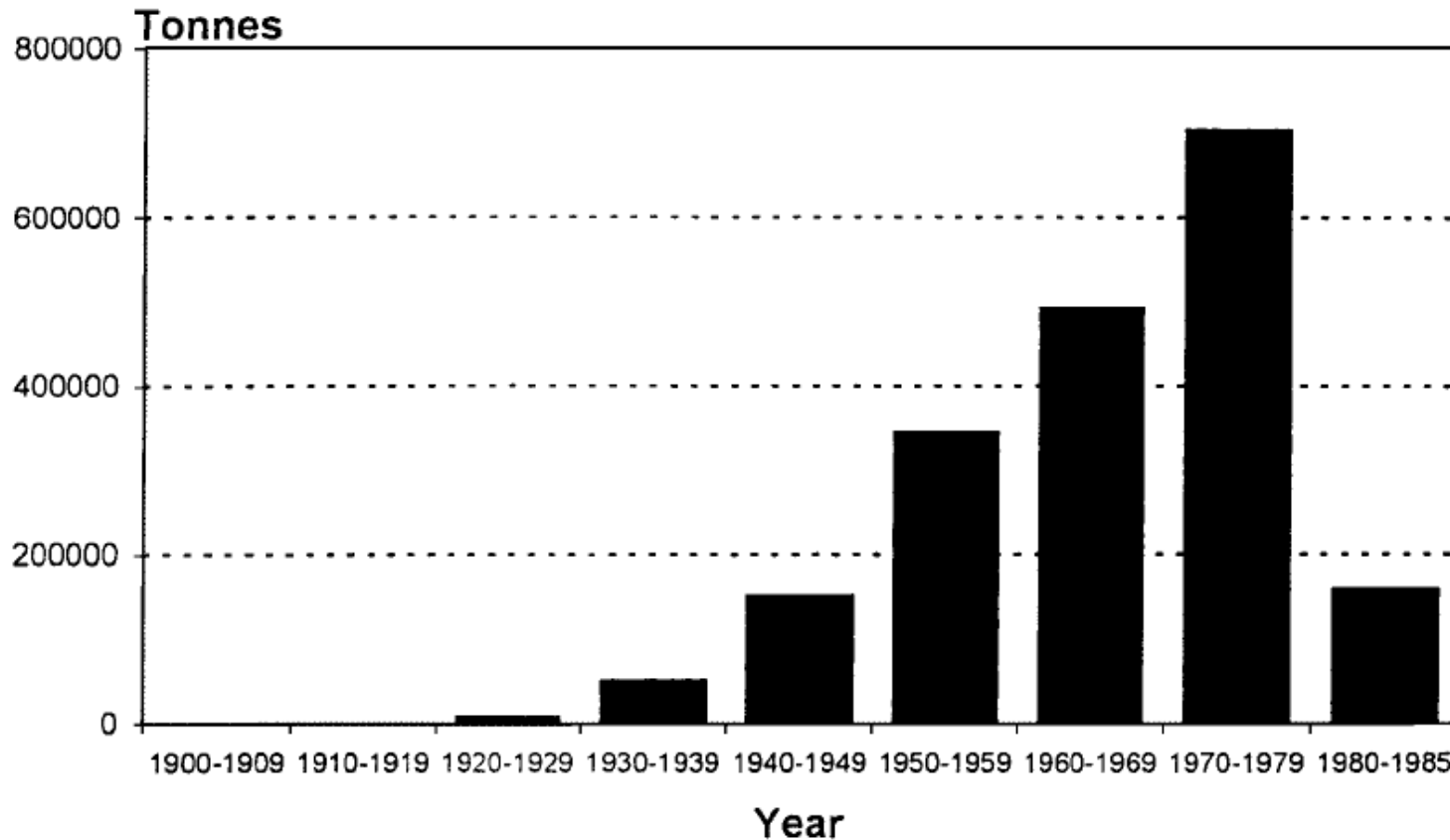


# Asbestos does cause some other cancers

- Lung cancer
- Laryngeal cancer
- Ovarian cancer

# Australia has been a very heavy user of asbestos

## Asbestos consumption in Australia 1900 to 1985





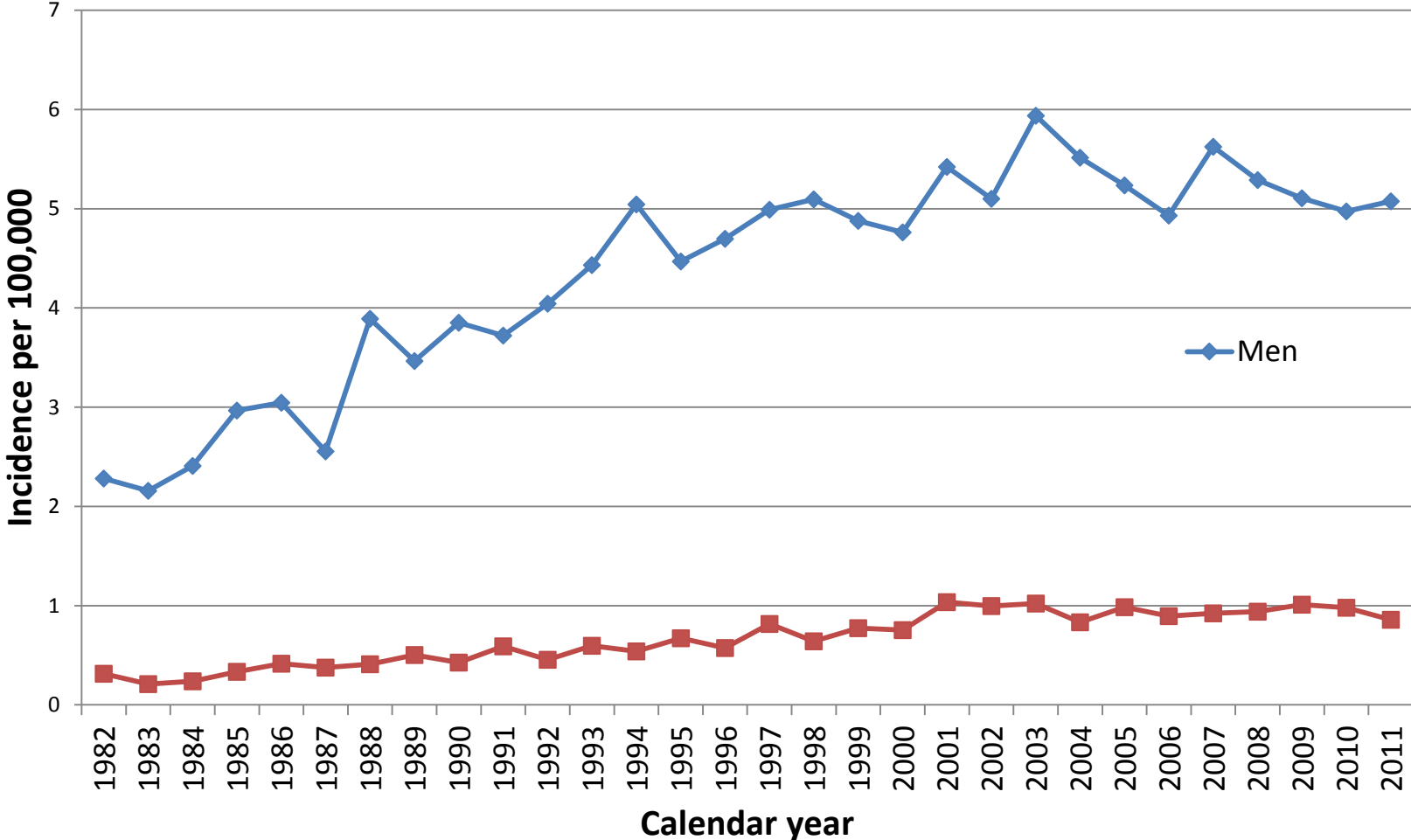
# How the asbestos was used

- By 1954 Australia was the 4<sup>th</sup> heaviest consumer of asbestos cement products – mainly building materials and water and sewage pipes.
- It was the heaviest *per capita* user worldwide.
- 90% of all asbestos consumed went into the manufacture of asbestos cement products.
- Much of Australia's output of these products remains in use today.
- This has raised concern about a possible “third wave” of asbestos-related disease.

# The “three waves” of asbestos related disease

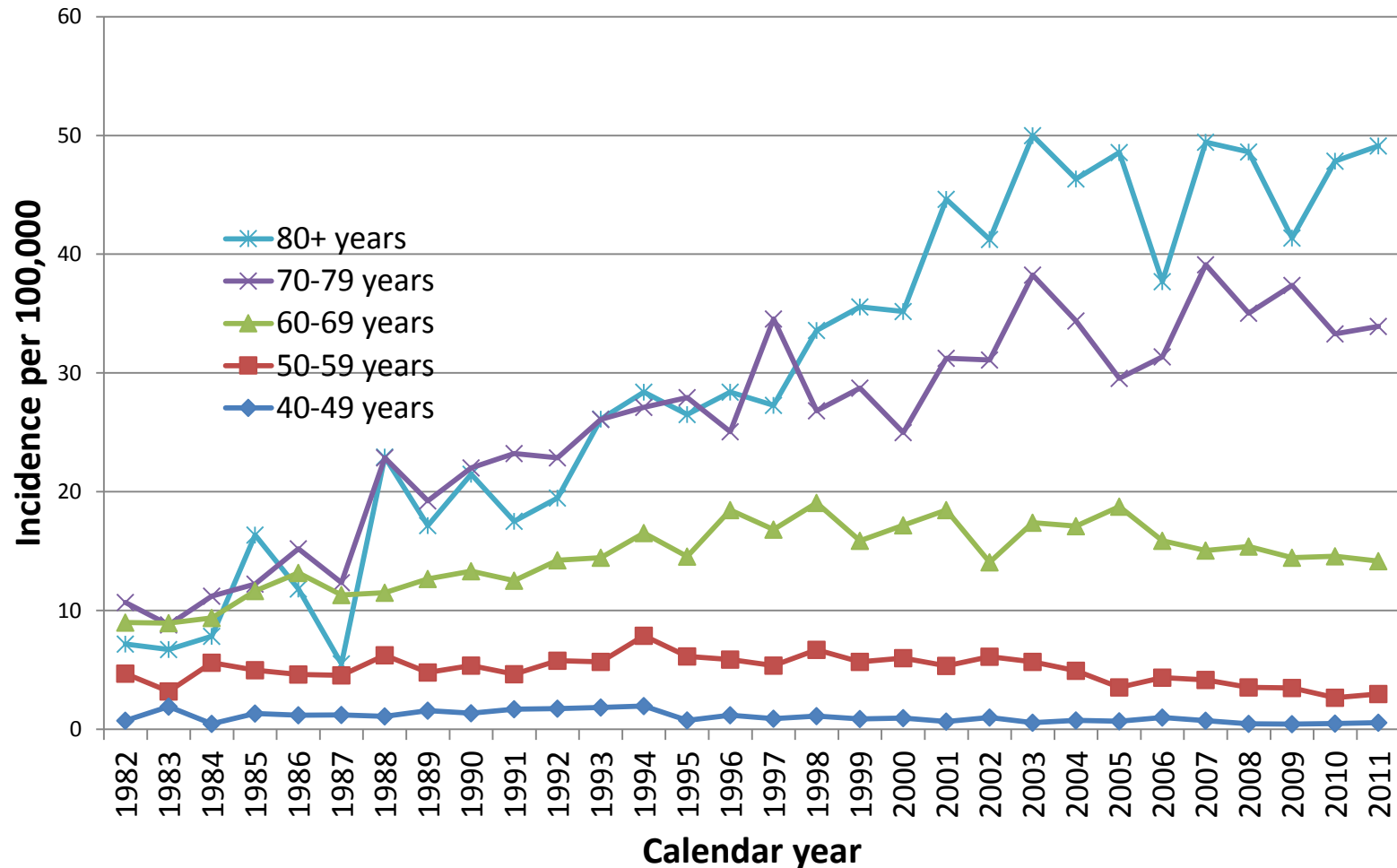
- First wave
  - In people who worked in mining and milling of ore and manufacture of asbestos products.
- Second wave
  - In people who used asbestos products.
- Third wave
  - In people who repair, renovate or demolish asbestos containing buildings.
  - In residents, tenants and users of these buildings.
  - Plausible in Australia given the extent of asbestos use in building materials.

# Mesothelioma incidence trends in Australian men and women



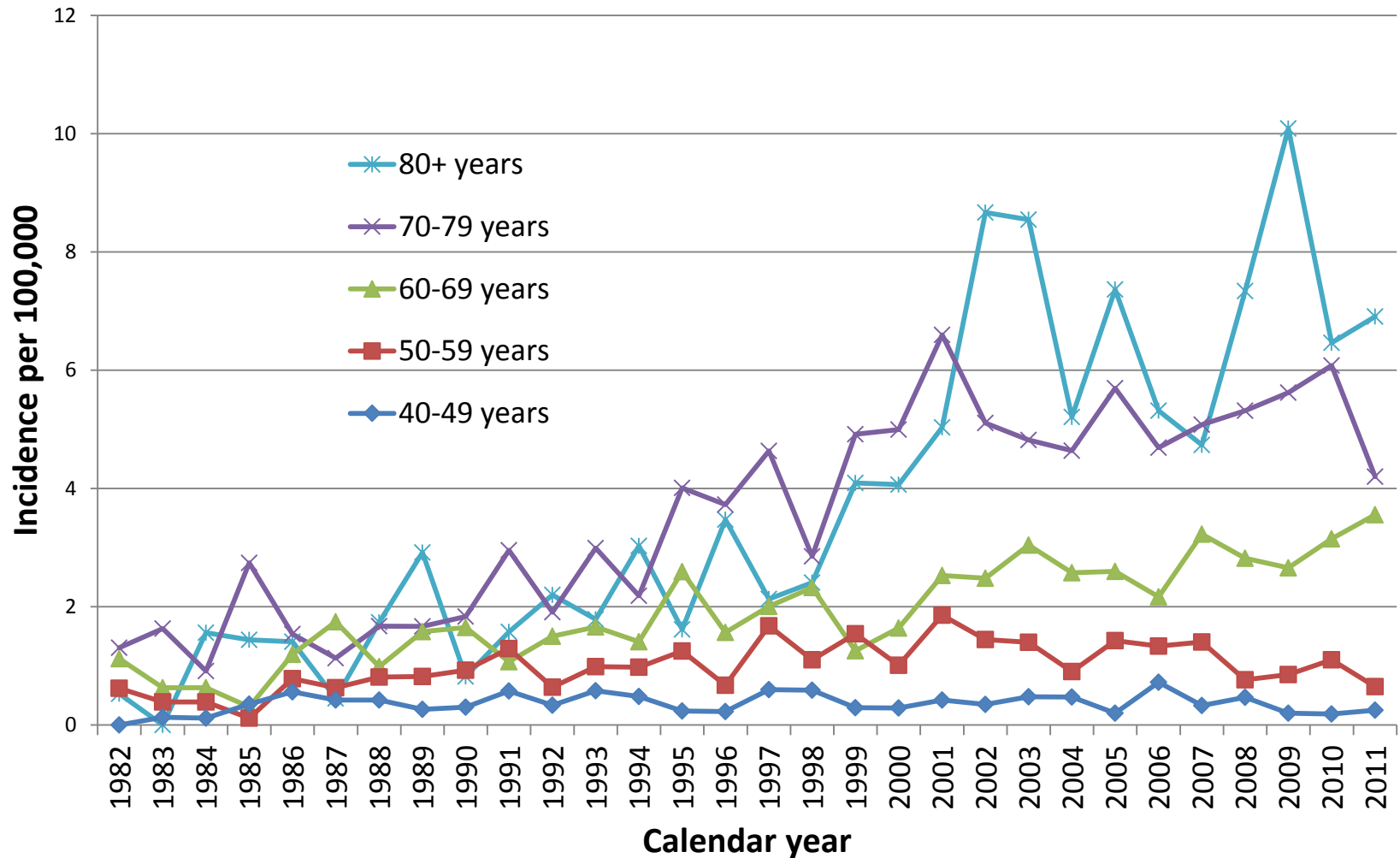
AIHW 2015. Australian Cancer Incidence and Mortality books: Mesothelioma. Canberra: AIHW. <http://www.aihw.gov.au/acim-books>.

# Mesothelioma incidence trends by age in Australian men



AIHW 2015. Australian Cancer Incidence and Mortality books: Mesothelioma. Canberra: AIHW. <http://www.aihw.gov.au/acim-books>.

# Mesothelioma incidence trends by age in Australian women



AIHW 2015. Australian Cancer Incidence and Mortality books: Mesothelioma. Canberra: AIHW. <http://www.aihw.gov.au/acim-books>.

# Household exposure to asbestos

- There are two main classes of household exposure:
  - Workplace asbestos dust brought home on the clothing of people exposed to asbestos at work.
  - Exposure resulting from asbestos-containing materials in houses or other residences
    - Active exposure during installation, removal or repair of the asbestos containing materials;
    - Passive exposure due to presence, degradation or damage of the asbestos containing materials.

# Levels of exposure observed in buildings

Summary of results of 1,377 observations in 198 US, Canadian and UK buildings with asbestos-containing materials:

Types of buildings	Number	Asbestos concentration in air Fibres per mL		
		Mean	90 <sup>th</sup> centile	Maximum
Schools	48	0.00051	0.0016	0.0080
<b>Residences</b>	<b>96</b>	<b>0.00019</b>	<b>0.0005</b>	<b>0.0025</b>
Public & commercial buildings	54	0.00020	0.0004	0.0065

Asbestos in Public and Commercial Buildings: A Literature Review and Synthesis of Current Knowledge. Health Effects Institute – Asbestos Research 1991.

# Evidence regarding risk of mesothelioma from household exposure

“No solid epidemiologic data currently justify any judgment about the health effects associated with passive exposure in buildings containing asbestos.”

Goldberg M and Luce D. The health impact of non-occupational exposure to asbestos: what do we know? *Eur J Cancer Prev* 2009; 18: 489-503.



For Sure Comfort and Fuel Savings



**NEW**  
**'ASBESTOSFLUF'**

The perfect thermal insulating material  
C.B.I.R.O. TESTED AND APPROVED

Greatly reduces internal summer temperature. Retains winter warmth. Large savings on winter heating bills. ASBESTOSFLUF is the perfect insulating treatment for all types of homes, offices, restaurants, machine rooms and other industrial areas, in fact anywhere insulation is desirable. Completely incombustible — 2in thickness of ASBESTOSFLUF has much greater insulating and sound absorbing properties than equivalent thickness of any other type of material. It sprays on to ceiling areas quickly and cleanly.



Prices range from \$82-50 for average 11 square home. Finance readily available on 10% deposit with repayments over 12 months.

**ASBESTOSFLUF**

a product of

**ASBESTOS COATINGS**

division of  
**D. JANSEN & CO PTY LTD**

P.O. Box 6, Lyons, 2608  
Phone 811831

**FREE QUOTATION - NO OBLIGATION**

## Mr Fluffy

From 1968 to 1979, D Jansen & Co Pty Ltd (Mr Fluffy) insulated ~1,100 residences in Canberra by blowing loose-fill asbestos into their ceiling spaces; amosite in most cases, crocidolite in a few.

# A brief history of Mr Fluffy

## 1968

- Gersh Major, physicist in the Occupational Health Section of the Sydney School of Public Health and Tropical Medicine, wrote:

*“Some thought should be given to whether D Jansen & Co Pty Ltd should be dissuaded or prevented from using asbestos as insulation material in houses. Not only are men unnecessarily exposed to a harmful substance in the course of their work ... but there is some evidence that community exposure to asbestos dust is undesirable.”*

# 1988 to 1993

- The Commonwealth began and the ACT Government continued:
  - Survey of all residential properties in the ACT built since 1980 for asbestos insulation;
  - Removal of all visible and accessible loose asbestos fluff from affected residences;
  - Sealing of all accessible roof and ceiling spaces with PVA.

# 2005 to 2014

- In 2005 ACT Government sent a letter to owners of affected residences advising on care to be taken when doing extensions or renovations.
- In February 2014 ACT Government again wrote to owners warning of the likelihood of residual asbestos and recommending they obtain an Asbestos Assessment Report.
- In July 2014 results of early Asbestos Assessments prompted establishment of the Asbestos Response Taskforce.

# 2014 to 2015

- in August 2014 Asbestos Response Taskforce's report released; recommended all affected Canberra homes are demolished.
- July 6<sup>th</sup> 2015, first house demolished in response to this recommendation.

# Exposure to asbestos in ACT Mr Fluffy houses

- A survey of levels of asbestos in air was undertaken in 22 asbestos “office and plant” buildings, probably in ACT and probably in the early 1980s\*.
- 59 samples were taken from one building in which the asbestos source, type and location were “Amosite; loose floc in roof space above ceiling”.
- Fibres were counted using NPF/SEM method.

# Distribution of asbestos concentrations in 59 air samples

Concentrations fibres/mL	Number of samples
0.022*	1
0.003	2
0.002	4
0.001	9
<0.001	43

\*The 0.022 fibres/mL result “was obtained in a room containing a man-hole access to a roof space in which loose floc amosite insulation was spread on top of the ceilings”.

Altre-Williams S and Preston JS. Ann Occup Hyg 1985; 29: 357-63.

# Additional ACT measurements

Asbestos concentrations (by the membrane filter method, NOHSC 1988) were reported to be less than 0.01 f/mL in the living spaces of 16 ACT houses where measurements were made (W. Riley, ACT Board of Health, pers. comm.).

Brown SK. Indoor air quality. Australia: State of the Environment Technical Paper Series (Atmosphere). Department of the Environment, Sport and Territories 1997.



# ACT Asbestos Assessments

- Asbestos Response Taskforce organised ~1,000 Assessments in 1,022 Mr Fluffy properties in 2014 and 2015.
  - Roof space, wall cavities and under floor uniformly contain asbestos fibres.
  - Asbestos fibres found in living areas in ~60% of properties. Mostly amosite, rarely crocidolite.
- ~10% of families unable to continue living in their homes:
  - asbestos found in main living areas, multiple rooms, corridors or heating or cooling systems.

# NSW Mr Fluffy houses

- There are known to be 63 Mr Fluffy residences in NSW.
- Loose fill asbestos has not generally been removed from these houses.
- As from July 2015, the NSW Government has implemented a voluntary purchase and demolition program.
- 42 residences underwent detailed investigation in 2014 and early 2015 including:
  - 24/7 measurement of asbestos fibres in air;
  - Sampling of interior dust; and
  - Visual search for structural defects that might permit fibres to enter living areas.

NSW Taskforce Report: Loose-fill asbestos insulation in NSW homes. WorkCover NSW, 2015.

# Findings

Finding	Residences
Asbestos concentration 0.01 fibres/mL (intervention required)	1 house
Asbestos concentration <0.01 fibres/ml but asbestos found in dust (structural attention required)	9 houses 10 apartment units
Asbestos concentration <0.01 fibres/ml and no asbestos found in dust (may or may not require structural attention depending on inspection)	3 houses 19 apartment units

# Summary of exposure in buildings with asbestos containing materials

Buildings	Mean	Maximum
<i>International</i>		
Schools (48)	0.0005 f/mL	0.008 f/mL
Residences (96)	0.0002 f/mL	0.002 f/mL
Public and commercial (54)	0.0002 f/mL	0.006 f/mL
<i>ACT</i>		
Offices and plants 1980s – loose-fill amosite (1 property, 59 measurements)	<0.001 f/mL	0.02 f/mL (1)
Mr Fluffy houses 1988 (16)	<0.01 f/mL	<0.01 f/mL
<i>NSW</i>		
Mr Fluffy houses (42)	<0.01 f/mL	0.01 f/mL (1)

# Risk of death from mesothelioma or lung cancer from living in a Mr Fluffy house

- Estimates made by Dr Mark Clements, Dept of Medical Epidemiology and Biostatistics, Karolinska Institutet.
- Used:
  - asbestos potency factors for lung cancer and mesothelioma mortality from US EPA Airborne Asbestos Health Assessment Update 1986.
  - lung cancer and all cause mortality rates from US EPA Technical Support Document for a Protocol to Assess Asbestos-Related Risk 2003.
  - methods described in Berman and Crump *Critical Reviews in Toxicology*, 38(S1):1–47, 2008 and include an adjustment for competing risks.

# Risk of death from mesothelioma or lung cancer from living in a Mr Fluffy house

- Assumed a person spent 2/3 of their time in their home.
- Made estimates assuming lifetime exposure to asbestos concentrations in air of:
  - 0.0002 fibres/mL, estimated upper limit for asbestos concentration in outdoor air;
  - 0.001, 0.005, 0.01, 0.05 and 0.1 fibres/mL as possible asbestos concentrations in indoor air in Mr Fluffy houses.

# WARNING

These estimates are very uncertain

- The potency factors used are based on:
  - Epidemiological studies of men exposed to asbestos at work mostly before the 1970s.
  - Very inaccurate measurements of asbestos in the air men breathed.
  - Often incomplete and inaccurate work histories.
  - Poor documentation of types of asbestos to which men were exposed.

# Estimated lifetime risk of mesothelioma death per 100,000 from lifetime home exposure

Asbestos concentration in air	Males	Females
0.0002 fibres/mL	2	3
0.001 fibres/mL	12	15
0.005 fibres/mL	61	75
0.01 fibres/mL	122	151
0.05 fibres/mL	611	750
0.1 fibres/mL	1,216	1,494



# Estimated lifetime risk of mesothelioma death per 100,000 from lifetime home exposure

Asbestos concentration in air	Males	Females
0.0002 fibres/mL	2	3
0.001 fibres/mL	12	15
0.005 fibres/mL	61	75
0.01 fibres/mL	122	151
0.05 fibres/mL	611	750
0.1 fibres/mL	1,216	1,494
<b>Risk to age 85 – Australia 2011*</b>	<b>769</b>	<b>119</b>

\*Australian Institute of Health and Welfare. Cancer in Australia: an overview 2014

# Estimated lifetime excess risk of lung cancer death per 100,000 from lifetime home exposure

Asbestos concentration in air	Males	Females
0.0002 fibres/mL	<1	<1
0.001 fibres/mL	3	2
0.005 fibres/mL	17	11
0.01 fibres/mL	34	22
0.05 fibres/mL	168	110
0.1 fibres/mL	335	219

# Mesothelioma deaths due to *ASBESTOSFLUF* to 2012 in residents of Mr Fluffy houses

- Assumes
  - 1,100 Mr Fluffy houses
  - An average of 2.6 residents per household (Australian Census 2006 and 2012)
  - A 40 year period of occupancy of each Mr Fluffy house from installation of *ASBESTOSFLUF* in 1973, on average.
  - Lifetime risks of mesothelioma at different levels of asbestos exposure as shown previously.

# Mesothelioma deaths due to *ASBESTOSFLUF* to 2012 in residents of Mr Fluffy houses

Asbestos concentration in air	Number of mesothelioma deaths
0.0002 fibres/mL	0.00
0.001 fibres/mL	0.01
0.005 fibres/mL	0.06
0.01 fibres/mL	0.1
0.05 fibres/mL	0.6
0.1 fibres/mL	1.1

# Mesothelioma deaths due to *ASBESTOSFLUF* after 40 more years and no more Mr Fluffy exposure

Asbestos concentration in air	Number of mesothelioma deaths
0.0002 fibres/mL	0.05
0.001 fibres/mL	0.25
0.005 fibres/mL	1.2
0.01 fibres/mL	2.5
0.05 fibres/mL	12
0.1 fibres/mL	25

# How dangerous is it to live in a Mr Fluffy house?

- Assuming an average asbestos concentration in air in a Mr Fluffy house of 0.001 fibres/mL, the estimated lifetime risk of death from mesothelioma or lung cancer due to a lifetime of living in a Mr Fluffy house is 16 per 100,000.
- It is widely accepted that the general population should not be exposed to hazards that confer a lifetime risk of cancer of >1 per 100,000.
- Thus, in these terms living in a Mr Fluffy house presents an unacceptable risk to life and health.

# How dangerous is it to live in a Mr Fluffy house?

- A lifetime risk of 16 per 100,000 is in the ballpark of Australian population risks of death before 85 years of age from:
  - Anal cancer: 29 per 100,000
  - Hodgkin lymphoma: 39 per 100,000
  - Lip cancer: 7 per 100,000
  - Testis cancer: 18 per 100,000
- Comparatively low risks, but all things we would like to avoid.

# How dangerous is it to live in a Mr Fluffy house?

- Some Mr Fluffy houses may have higher asbestos concentrations in air, up to 0.01 or 0.02 fibres per mL, and carry higher risks estimated at:
  - 0.01 fibres/mL: lifetime risk of death from mesothelioma or lung cancer 164/100,000
  - 0.02 fibres/mL: lifetime risk of death from mesothelioma or lung cancer 328/100,000



# Public health impacts

- Living in Mr Fluffy houses will probably have only a small impact on public health.
- One person, and perhaps up to three, will die from a mesothelioma due to living in a Mr Fluffy house.