

**SPONTANEOUS
MESOTHELIOMA DATA:
AN INTERPRETATION**

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SPONTANEOUS MESOTHELIOMA

MESOTHELIOMA DEATHS

HSE (2003a) estimated there are about 26 spontaneous deaths per year in both males and females.

Tan & Warren (2009) estimated there are around 23 male spontaneous deaths per year.

MESOTHELIOMA DEATHS

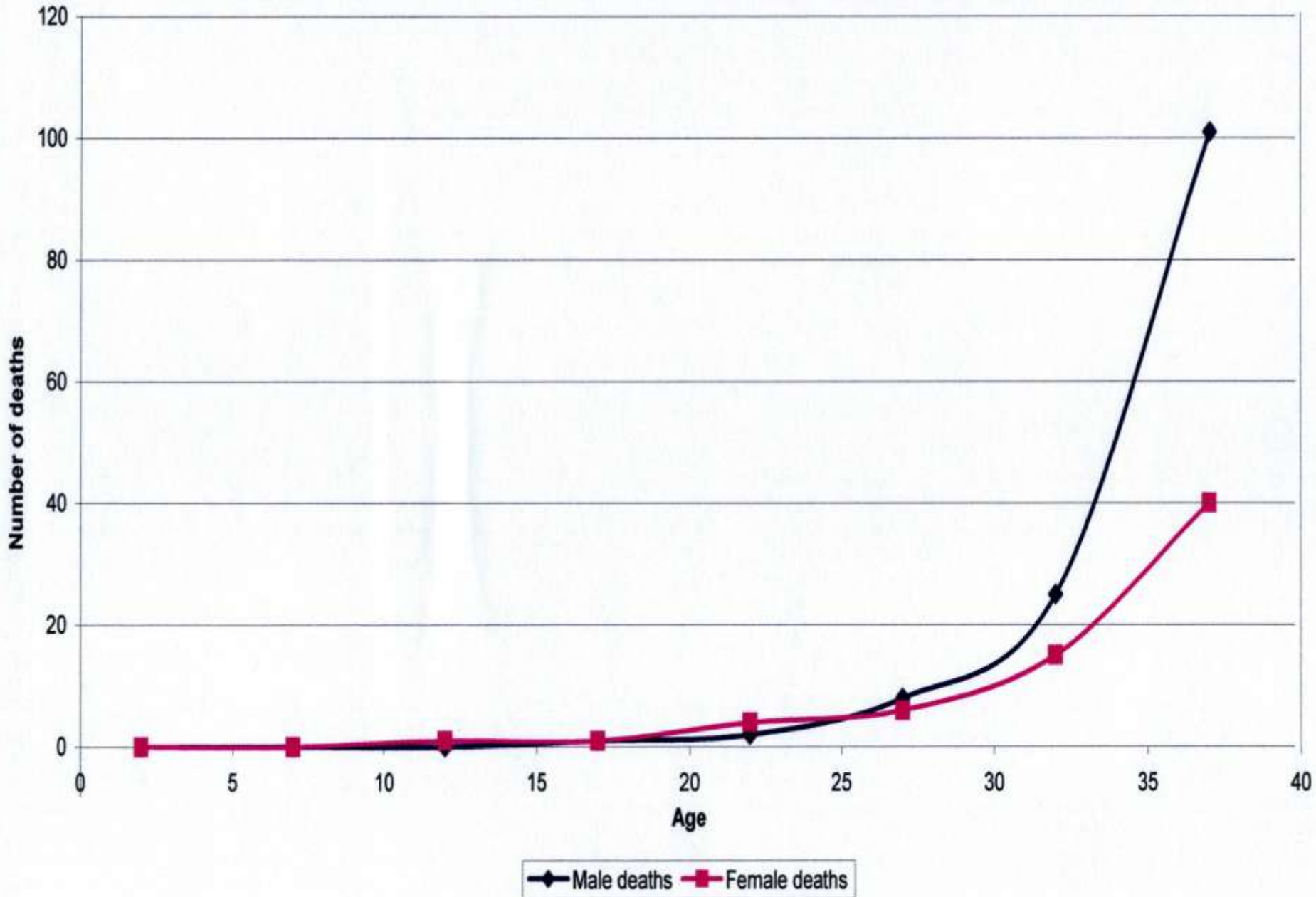
The above estimates are based only on identifying residuals in analysis of the temporal pattern of mesothelioma deaths, i.e. the intercept on the Y axis.

They are not based on medical evidence.

MESOTHELIOMA

Parkes (1994) suggested that spontaneous mesothelioma may have a “flat” pattern v age, a more equal sex ratio, a younger average age and a longer survival period from first symptom to death.

Cumulative male and female mesothelioma deaths by 5-year age bands, 1980-2000, ex. 1981



MESOTHELIOMA DEATHS

Male and female cumulative mesotheliomas up to the age band 25-29 are similar at about 8 deaths.

At higher ages both male and female deaths rise rapidly and the number of male and female deaths diverge.

MESOTHELIOMA DEATHS

As the mean latent period for mesothelioma is about 40 years, mesotheliomas below age 30 are probably too early to have been caused by exposure to asbestos.

MESOTHELIOMA DEATHS

*8 spontaneous mesothelioma deaths
to age about 29 suggests, assuming
a level occurrence with age, about
22 such deaths to age 80.*

MESOTHELIOMA DEATHS

From 1945 onwards the Registrar General for Scotland reported data for mortality and incidence of “cancer of the pleura”

Until the 1960s mortality was 1-2 deaths per gender per year and incidence was about twice mortality.

MESOTHELIOMA DEATHS

Assuming Scotland accounted for about 10% of the GB population, GB mortality would have been 10-20 per year.

Higher incidence than mortality suggests that survival exceeded at least 1 year, as against a median of about 8 months for occupational mesotheliomas.

MESOTHELIOMA DEATHS

The above suggests that spontaneous mesotheliomas do occur, and at a rate of about 25 deaths per year for each gender.

MESOTHELIOMA

It is assumed herein that there are two main causes of malignant mesothelioma: those which are spontaneous and those caused by exposure to asbestos or other fibrous materials.

MESOTHELIOMA DEATHS

*What is the relevance of
estimating spontaneous
mesothelioma deaths?*

MESOTHELIOMA DEATHS

*Spontaneous mesothelioma data
are critical in interpreting
occupational Proportional
Mortality Ratios (PMR) for
mesothelioma.*

MESOTHELIOMA DEATHS

Such data are also relevant in assessing the potential consequences of environmental exposures to asbestos.

PROPORTIONAL MORTALITY RATIOS

PMR

$$PMR = 100 \times \frac{\text{observed deaths}}{\text{expected deaths}}$$

PMR

The number of expected deaths in each occupation is currently determined by “smearing” the total number of occupational deaths up to age 74 from the disease of interest proportionally across all occupations.

PMR

This means that the number of expected deaths in every occupation includes a proportion of the deaths in occupations with heavy exposures.

PMR

In the HSE mesothelioma mortality reports 20 occupations generally account for about half both male and female occupational mesothelioma deaths.

PMR

It also means that the number of expected deaths in occupations with heavy exposures is mainly defined by the deaths in the same occupations.

PMR

*i.e. in the calculation of PMR
for such occupations the
denominator contains a major
input from the numerator!!*

PMR

*Current PMR for all occupations
are therefore underestimated.*

PMR

Rationally, the interest should be in comparing the number of deaths in each occupation with the number of deaths that would have been expected if there had been no exposure to the agent of concern.

PMR

If we were studying whether giving birth affected life expectancy, we would compare the data for women who had given birth with data for those women who had not.

PMR

For mesothelioma, the number of such deaths in each occupation should be compared with the number of spontaneous deaths expected in each occupation.

PMR

All occupations should therefore have a PMR of 100 based on spontaneous deaths.

Any occupation with a PMR significantly above 100 will therefore have had some level of exposure to asbestos.

ESOTHELIOMA DEATHS, 1980-2000, ex 1981

Gender	Total, all ages	in SC	to age 74	at ages >74
Male	17,493	12,821	13,136	4,356
Female	2,791	1,004	1,949	842

MESOTHELIOMA DEATHS, 1980-2000, ex 1981

Gender	% of total in SC	% to age 74 in SC	% of total at ages >74
Male	73	98	25
Female	36	52	47

EXPECTED SPONTANEOUS DEATHS 1980-2000, ex 1981

Gender	Total expected	% in SC	Expected in all SC
Male	500	73	365
Female	500	36	180

EXPECTED DEATHS

1980-2000, ex 1981

Gender	Expected, as presently calculated	Expected based on spontaneous deaths only
Male	12,821	365
Female	1,004	180

MESOTHELIOMA DEATHS, MALES, 1980-2000, ex 1981

SC	Observed	Expected (PMR)	corr. expected	corr. PMR
146: Metal plate workers	265	52.7 (503)	1.5	17,000
144: Plumbers, gas fitters	619	149.9 (413)	4.4	14,000
47: Farmers	114	441.4 (25.8)	12.9	883
88: Other coal miners	64	265.7 (24.1)	7.76	824

MESOTHELIOMA DEATHS, MALES, 2002-2005

SOC	Observed	Expected (PMR)	corr. expected	corr. PMR
3565: Insp factories etc.	2	2 (105)	0.04	5000
3567: Occ hyg, Safety Offs	11	4 (260)	0.08	13800
3568: EHO	2	2 (112)	0.04	5000

Comment 1

PMR as currently determined underestimate mesothelioma risk: very substantially so for occupations with heavy exposures to asbestos.

Comment 2

PMR as currently determined has no value as an absolute indicator of occupational disease and is relevant only for assessing the relative risk in different occupations: and then only for comparing occupations with similar training regimen and life expectancy patterns.

Comment 3

PMR as determined against spontaneous mesothelioma deaths provides an “absolute” indication of risk in each occupation.

**IS THERE EVIDENCE OF
ENVIRONMENTAL
EXPOSURES CAUSING
MESOTHELIOMA?**

ENVIRONMENTAL MESOTHELIOMAS?

If there is evidence of PMR based on spontaneous mesothelioma numbers being consistently higher than about, say 200, in occupations unlikely to have had significant exposure to asbestos, such excess could be due to environmental exposures to asbestos.

ENVIRONMENTAL MESOTHELIOMAS?

*If the expected in the 1980-2000, ex
1981 data set for females are
corrected as above, the average
corrected PMR for the 40, 30 and
lowest ranked non-zero SC are 381,
331 and 256 respectively.*

ENVIRONMENTAL MESOTHELIOMAS?

*These figures suggest that the
mesothelioma rate due to
environmental exposures to
asbestos may be 3-4 times higher
the spontaneous rate,*

ENVIRONMENTAL MESOTHELIOMAS?

*i.e. 75-100 deaths per year in
each gender.*