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SESSIONAL MEETING DISCUSSION

Update from the UK asbestos working party

[Institute and Faculty of Actuaries, Sessional Webinar, Monday 17 April 2023]

This discussion relates to the paper presented by Andy Whiting at the IFoA sessional event held on 17 April 2023.

Moderator (Ms L. Curtis, F.I.A.): Welcome to this afternoon's sessional meeting. I am Laura Curtis, Chair of the GI Lifelong Learning Committee and I will be chairing this session. I would like to welcome all of you who are joining us today for the winner of the 2022 Brian Hey Prize presentation by the Institute and Faculty of Actuaries (IFoA) UK Asbestos Working Party.

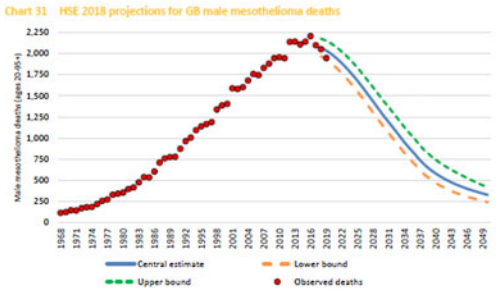
I would now like to introduce this session's speaker, Andy Whiting. Andy has been a member of the IFoA UK Asbestos Working Party since it was first set up in 2003, and he is the current Chair of the Working Party. He currently works at KPMG, specialising in legacy and one-off general insurance claims. I will now hand over to Andy to take you through his award-winning work.

Mr A. Whiting, A.I.A.: I will be presenting the findings of the UK Asbestos Working Party paper that recently won the Brian Hey Prize. I will give you a brief history of the Working Party. I will go through where you can find all the resources that the Working Party has produced, and then talk through the main findings from the 2021 GIRO Paper.

The UK Asbestos Working Party was originally founded by Julian Lowe at about the time of GIRO 2003. Over the subsequent period the Working Party has mainly been active and has produced three main papers. The 2004 GIRO Paper, which was the first one, also received a Brian Hey prize. The second major paper, which looked at the market estimate again, was the 2009 GIRO Paper. Finally, the third major paper that the Working Party produced was the 2021 GIRO Paper, which I will be going through in more detail today. All the resources the working party has published including papers, GIRO presentations, excel spreadsheets, surveys and aggregated market data can be found here.

The first part of the recent paper is just an introduction, an executive summary, and a look back at the previous workings of the Working Party and the steps of how the Working Party comes up with an estimate of the insurance claims for the UK market. Chapter 6 of the paper looks at estimating mesothelioma deaths. Chapter 7 moves on to how we convert those mesothelioma deaths into claimants. Chapter 8 looks at the average costs of those claimants, and Chapter 9 then brings those three steps together to estimate the mesothelioma market estimates. Then, combined with that, the other asbestos-related diseases such as asbestos-related lung cancers, asbestosis and diffuse pleural thickening and pleural plaques are covered in Chapter 10. Finally, Chapter 11 brings all those asbestos-related diseases together and comes up with an overall market cost.

The main body of the paper is about how we estimate the mesothelioma deaths into the future. What the Working Party uses is a mesothelioma death model published by the Health and Safety Executive (HSE) which forecasts deaths into the future. The graph you can see in Figure 1 is the actual male mesothelioma deaths that will have happened in the past, and then the projections of those mesothelioma deaths out into the future. Currently, the Working Party projects those deaths going out to about 2060.



The formula used by the HSE to estimate the number of mesothelioma deaths at age A, in year T ($F_{A,T}$) is:

$$F_{A,T} = \frac{\left[\sum_{l=1}^{A-1} W_{A-l} D_{T-l} l(l+1-L)^k 0.5^{l/H}\right] D_{xT} P_{A,T} \left(M - \sum_{A=20}^{94} \sum_{T=1968}^{2017} B_{A,T}\right)}{\sum_{A=20}^{94} \sum_{T=1968}^{2017} \left[\sum_{l=1}^{A-1} W_{A-l} D_{T-l} (l+1-L)^k 0.5^{l/H} D_{xT} P_{A,T}\right]} + B_{A,T}$$

Where:

- $P_{A,T}$ = The number of people alive (or person-years at risk) at age A in year T
- W_A = Age-specific exposure potential at age A
- D_T = Overall population exposure in year T
- D_{xT} = Proportion of mesothelioma deaths diagnosed in year T
- L = Lag period (in years) before effect starts
- H = Half-life (in years) for clearance of asbestos fibres from the lungs
- k = Exponent of time, modelling the increase in risk of developing mesothelioma with increasing time from exposure to asbestos
- $B_{A,T}$ = The total number of background deaths for age A in year T

  $B_{A,T}$ = background rate * $P_{A,T}$

  These deaths are then allocated to age using the proportion of $I * (A-L)^k$
- I = Indicator variable where $I = 0$ if $I < 1 - L$ and $I = 1$ otherwise
- l = Indexes years lagged from the risk year
- M = The total number of observed mesothelioma deaths to date

Figure 1. Estimating mesothelioma deaths based on Health & Safety Executive ('HSE') Model

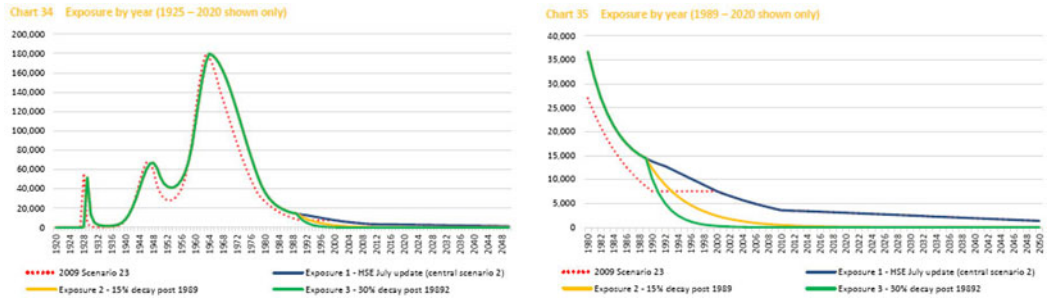


Figure 2. AWP adjustments to HSE Deaths model (exposure)

The HSE model that this is based on, as shown in Figure 1 is quite a complicated, highly-parametrised model. There are some key assumptions and parameters that go into it.

The main driver of this latency model is the time from first exposure and how the probability of coming down with a mesothelioma is estimated. That probability is a factor of the length of time since first exposure which is raised to the power of k. The further you get away from being first exposed, the higher the probability that you will then come down with mesothelioma, and the HSE estimate k to be about 2.547. Previously, there was not a cap on the k factor. It kept on increasing as you moved away from your first exposure, but the Working Party did introduce a cap. The HSE, in their revised model, has followed the same route as the Working Party and has applied a cap on the k factor after 52 years.

So, that brings the HSE model structurally in line with what the Working Party was projecting in the 2009 paper. The HSE use various statistical methods to fit their parameters so that the model fits in well with the actual deaths in the past. They use that model to project the mesothelioma deaths out into the future. I would like to highlight that when the Working Party first started deaths had not peaked. We were looking at projecting the deaths into the future using the HSE model. The model was predicting that deaths would peak in about 2016 and then start to fall. Back in the 2009 paper, we had not reached that peak yet. The Working Party is now in a more fortunate situation that we have got to that peak and those numbers are coming down, which substantially reduces the uncertainty in our projections of deaths.

One of the parameters that is in the model is D_T, which is the exposure in the UK market of people to asbestos. The green line in the graph on the left of Figure 2 shows the fit of the exposure that the HSE have used. That was originally based on levels of imports of asbestos into the UK, and since then the HSE has been trying to find a fit of this exposure profile that best fits the actual deaths data. The graph shows that the exposure peaked in about 1964, and then it came down

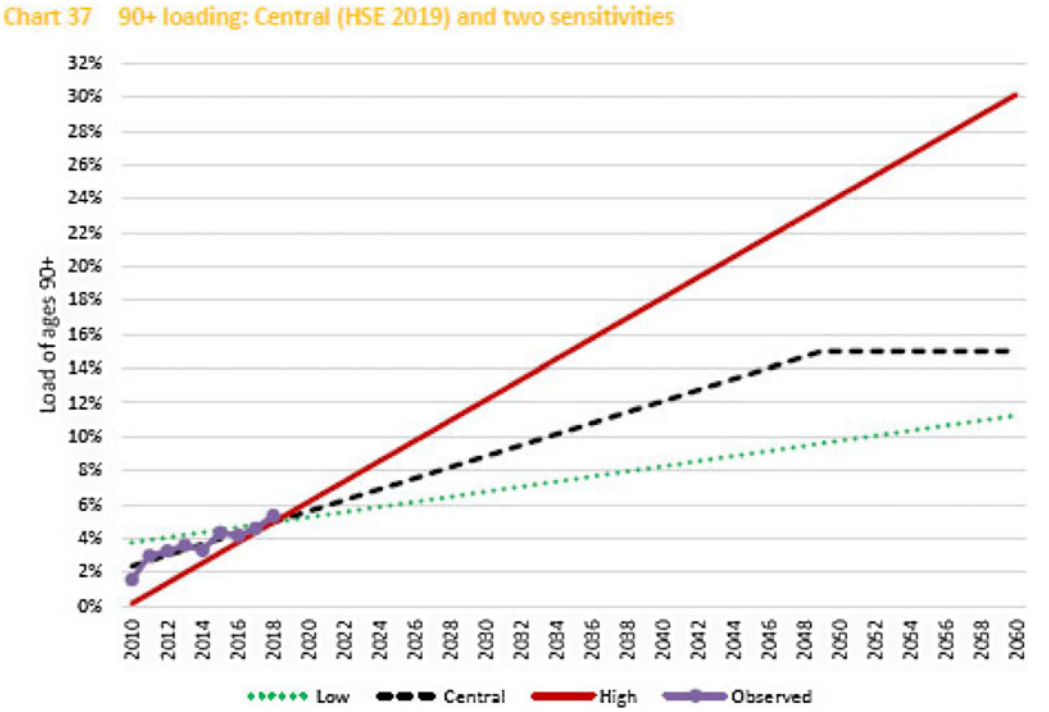


Figure 3. AWP adjustments to HSE Deaths model (loading ages 90+)

substantially as health and safety requirements were implemented into the workplace. One of the uncertainties is how this exposure is going to move in the future. That is one of the parameters that the Working Party has looked at. Looking at exposure post-1989, the Working Party came up with three different scenarios as shown in the graph on the right-hand-side of Figure 2.

The blue line is the assumption made by the HSE. The Working Party looked at two other scenarios, one with a 15% reduction year-on-year and another one with a 30% decay. The Working Party assumed a slightly reduced exposure profile compared to the HSE since the Working Party felt that the conditions had been implemented to reduce the exposures. Those conditions included a ban on the use or the import of crocidolite and amosite, that is, blue and the brown asbestos, which started in 1986.

In 1987, there was the Control of Asbestos at Work Regulations, which were introduced to protect workers from fibre exposure. In 1990, there was the Control of Asbestos in Air Regulations, reducing environmental pollution. Then there the last remaining asbestos-type chrysotile, white asbestos, was banned in 1999, and in 2002 the Control of Asbestos at Work Regulations, required businesses to identify asbestos in their properties.

In looking at the uncertainty of mesothelioma death projections, the Working Party looked at the adjustment of ages 90+.

The HSE projection is basically the middle line in the graph in Figure 3. They used the HSE model to project the number of future male mesothelioma deaths for ages up to 89. For the 90+ ages they applied a loading which increases in time as the population of the mesothelioma deaths is expected to get older, that was based on the fit of the number of male mesothelioma deaths in the over 90 population as shown by this graph. The black dotted line in the graph shows the HSE assumptions of the proportion of male deaths over the age of 90. The Working Party looked at varying that scenario. In this example, the low scenario was a 0.15% increase year-on-year in the number of deaths of people over age 90. The central scenario, which was the one that was recommended by the HSE, is based on a 0.3% increase year-on-year in the number of deaths for

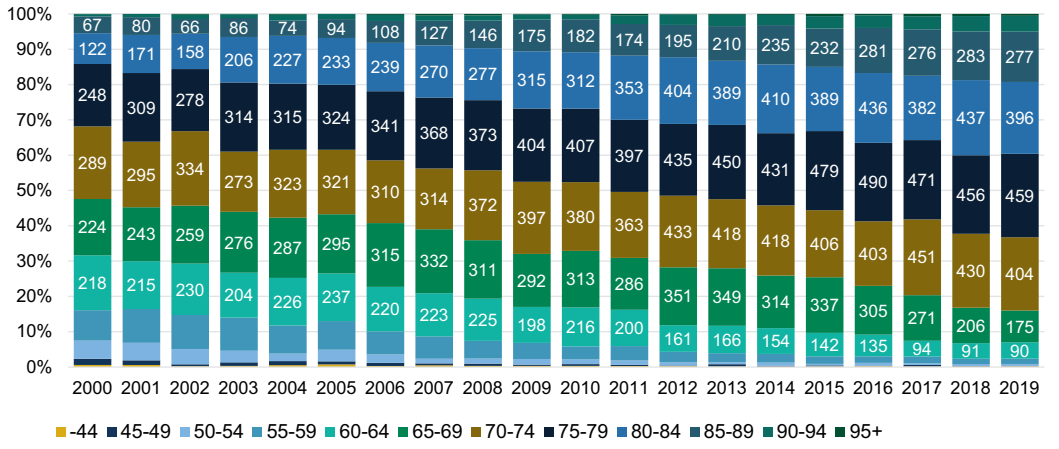


Figure 4. GB male mesothelioma deaths by age at death

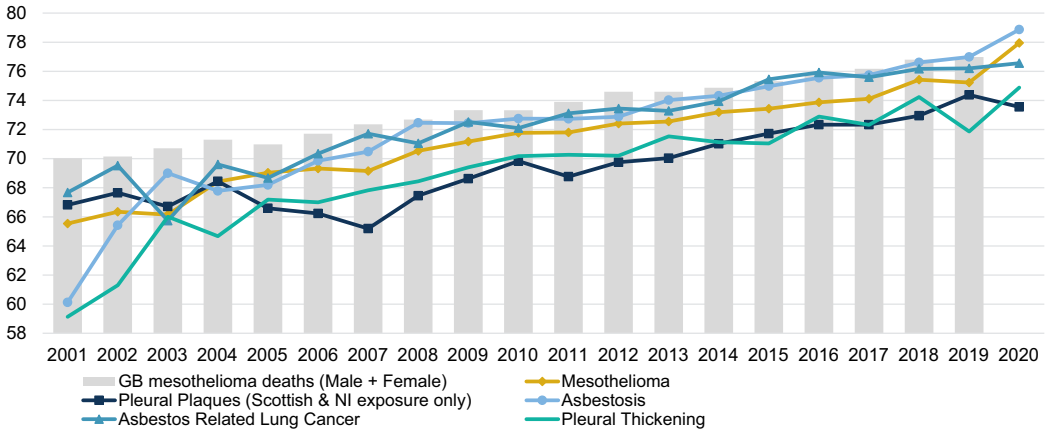


Figure 5. Average age by notification year and year of death

the 90+ ages capped at 15% which is the black dashed line in the chart. The high scenario was a 0.6% increase year-on-year in the number of deaths of people over age 90.

This graph in Figure 4 shows GB male mesothelioma deaths by age of death, which shows the shift as the population of deaths is slowly getting older. The impact of the 90+ ages will be bigger in the future as more and more of the older ages come through into play in these projections.

Figure 5 shows the graph of the average age by notification, and the gold line shows that the average age of the mesothelioma is steadily increasing as we move further away from the peak in the asbestos exposure.

To summarise so far, we are estimating the mesothelioma deaths. The Working Party came up with three Low, Central and High scenarios for the projection of the male mesothelioma deaths based on the HSE model and then tweaking some of the assumptions by adjusting for the portion of those mesothelioma deaths that are aged over 90 and looking also at the decay of the exposure profile post-1989.

The next step, once the mesothelioma deaths have been estimated, is to look at how those deaths convert into insurance claimants. To do that we were able to obtain a Freedom of Information request on Compensation Recovery Unit (CRU) data, in order to estimate the number of Employer's Liability male claimants that we could then compare with the HSE number of deaths.

In order to take the number of GB male mesothelioma deaths and calculate the number of UK EL Insurance Claimants the Working Party has applied assumptions for:

• The propensity of GB mesothelioma sufferers to make an insurance claim;

• The proportion of Female to Male claims estimated at 5.5%; and

• The proportion of claims from Northern Ireland (to uplift the estimates from GB to UK) estimated at 1.75%.

Freedom of information request with the CRU provided data on number of mesothelioma claims and claimants.

• The male claimant to death ratio appears to reflect a fairly stable pattern of decreasing propensity to claim for older ages.

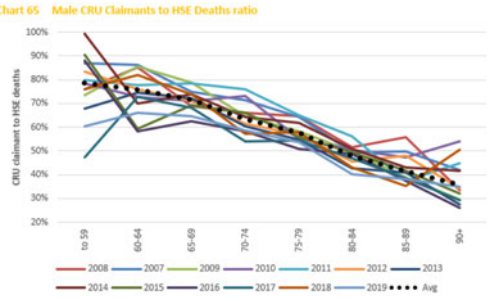


Figure 6. Estimating mesothelioma claimants using Compensation Recovery Unit ('CRU') data to estimate propensity to claim

• Central scenario: For the central estimate selection, the propensity to claim for 2019 is based on a linear fit through ages 60 to 93 of the average propensity to claims over CRU notification years 2012 to 2018.

• High scenario: The high estimate we have starts with the same 2019 position as the central estimate, but applies an age translation factor of 50%, meaning that the propensity at age A is equal to the propensity in the previous year at age A - 50% (so in 2 years an 80 year old will be as likely to claim as a 79 year old is now).

• Low scenario: The low estimate starts with the same 2019 position as the central estimate, but allows for the recent trend of reducing propensity to claim to continue at its current rate of around 1% per annum (additive) for the next 5 years and then to remain flat.

• Jump scenario: This starts with the same 2019 & 2020 position as the central estimate but applies an increase over the next five years so that the propensity to claim for the older ages 60+ increase to the age 59 and under level of 81%.

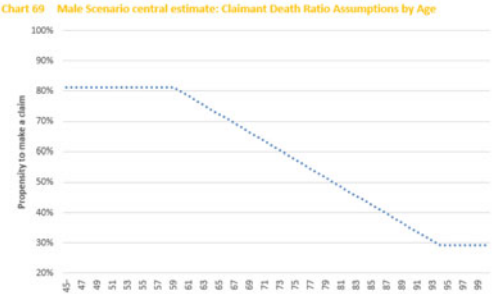


Figure 7. Estimating mesothelioma claimants using Compensation Recovery Unit ('CRU') data to estimate propensity to claim

The graph in Figure 6 shows that the propensity of a mesothelioma death to make an insurance claim reduces as the claimant gets older. That was a similar result to what we had found in the past, but we were able to investigate this at a more granular level than we had done in the previous 2009 paper. We were able to look at this on an annual age profile analysis to come up with a little more detail, but the general pattern is the same. As the mesothelioma claimant dies at an older age, the likelihood of that mesothelioma death converting into an insurance claim is reduced.

All this analysis has currently been based on looking at male GB mesothelioma deaths, and to convert that into a UK market statistic we have had to make two adjustments. One is to allow for females and the other is to allow for Northern Ireland in our statistics. The female to male ratio we have allowed for is about 5.5%, and the proportion for Northern Ireland is about 1.75%.

This summarises what the Working Party eventually came up with as their central scenario of the propensity to claim. It assumed that roughly just over 80% of the younger ages of deaths would convert into a claim, and then that reduces linearly until you get to just over the 90-year level where it reaches just below the 30% level as shown in Figure 7.

This was the Central scenario that the Working Party used for the propensity to claim going forward, and it assumed that it would stay stable in all future years. We also did some sensitivity analysis around that, and we came up with Low and High scenarios. In respect of the Low scenario, we assumed that propensity to claim reduced by about 1% per year for the next five years as we had seen a slight reducing trend in the propensity to claim from the CRU data. Then for the High scenario we assumed that this propensity to claim would increase by about one year of age every two years. A person that was, 80 would have the same propensity to claim in two years' time as a 79-year-old. The propensity to claim scenario is quite hard to model, and it was one of the important assumptions that changed the Working Party's models in the past. The first estimate back in 2004 assumed propensity to claim was going to be stable as we had seen in the previous

• The Working Party has used the 2009 average claimant cost model updating the underlying assumptions based on the experience to date.

• It is very important to remember that the average claimant cost model is not designed to provide an accurate claimant cost for each year and age, but is designed to understand how the inflation changes over time due to the different components of the award and the increasing average age of mesothelioma sufferers.

Table 50 2020 mesothelioma average claimant costs summary

Head of damage	Age-related	Living /Deceased differential	Inflation type
General Damages	Yes	No	Court
Special Damages	Yes	Yes	State Pension
CRU	Yes	Yes	CPI
Bereavement Award	No	Yes	Bereavement
Funeral Expenses	No	Yes	CPI
Costs of Care	No	No	Wage
Miscellaneous Expenses	No	No	CPI
Other costs	No	No	Wage
Legal Expenses	Yes	No	Wage

Figure 8. Estimating mesothelioma average costs

• Wage inflation: Due to the increasingly advanced age of mesothelioma claimants, the Working Party believes that pension income is more relevant for loss of future earnings than wages. Furthermore, due to socio-economic class, it was assumed that the state pension would comprise the majority of mesothelioma claimants' pensions.

• Court inflation: Based on the inflation of the JC guidelines compared to the RPI, from July 2000 to November 2019, the central selection for future Court inflation is RPI plus 0.4%.

Since the AWP 2020 Paper was published short term inflation has increased. The AWP recommends that practitioners calibrate inflation on their own assumptions and do not rely on the AWP 2020 Paper assumptions.

Table 51 Future inflation assumptions p.a.

Inflation type	Low Cost Scenario A	Central Cost Scenario B	High Cost Scenario C	Jump Cost Scenario D
CPI	1.5%	2.0%	2.5%	as per Central
RPI	2.0% *CPI+0.5%*	2.5% *CPI+0.5%*	3.0% *CPI+0.5%*	as per Central
Wage	2.5% *CPI+1.0%*	3.0% *CPI +1.0%*	3.5% *CPI +1.0%*	18.0% in 2021 & every 7 years; all other years as per Central
Pension	2.5% *CPI+1.0%*	3.0% *CPI +1.0%*	3.5% *CPI +1.0%*	as per Central
Court	2.0% *RPI*	2.9% *RPI +0.4%*	3.9% *RPI +0.9%*	10.9% in 2021 & every 7 years; all other years as per Central
Ogden multiplier update interval	5 years	4 years	3 years	as per Central

Figure 9. Estimating mesothelioma average costs

data. But after publishing the AWP 2004 paper the propensity to claim, which was around about a third of mesothelioma deaths who were converting into an insurance claim, increased quite substantially and it almost doubled after we had published the AWP 2004 paper. As a result of that, when we re-did our forecasts in the AWP 2009 paper, we had to allow for the increase in the propensity to claim that we had seen after issuing the 2004 paper.

The next chapter in our paper looks at the mesothelioma average costs and how inflation applies in the future using the same model that we had used in our 2009 paper. We had a database of about 300 mesothelioma claims that we were able to use to split the average claim out into various heads of damage such as General Damages, Special Damages, Compensation to the CRU, Bereavement Awards, Funeral Expenses, Costs of Care, Miscellaneous Expenses, Other Costs and Legal Expenses. Using the model that we had previously developed, we were then able to allocate an appropriate expected rate of future inflation to each of those heads of damage and determine whether the rates were age-related and whether there was an impact depending on whether the claimant was living or deceased. The AWP 2020 average cost model is based on the AWP 2009 mesothelioma cost model, which can be found on the IFoA website.

We assumed how different heads of damage will be inflated in the future and the details of this are shown in Figure 8.

General Damages, we assumed would increase by court awards. We had previously, in 2009, assumed that Special Damages, which are related to the loss of earnings were wage related. We converted that to a state pension assumption purely based on the age of the mesothelioma claimants now and the fact that the big driver of their loss of earnings will be their state pension.

For the various inflation types the assumptions that went into the average cost model are shown in Figure 9.

For the central assumption we assumed that the CPI was going to be 2.0%, RPI to be 2.5%, wage inflation 3.0%, pension increase 3.0% and the court awards 2.9%. These assumptions were arrived at by looking at how the type varied compared to RPI or CPI over the historic period. For example, the court inflation was assumed to be RPI plus 0.4%, which was the average increase in the Judicial College (JC) guidelines compared to the RPI over a prior period from, 2000 to 2019.

Mesothelioma Projection - Detailed outputs									
Calendar Year	Male GB Deaths	GB Male: % Insurance Claimants to Deaths Ratio	Male GB Insurance Claimants	Female : Male ratio	NI : GB ratio (Male & Female)	Male and Female GB & NI Claimants	Average cost per claimant	Inflation	Undiscounted Total GB & NI Insurance Cost
2020	1,952	53.2%	1,039	5.5%	1.8%	1,115	236,637	1.4%	263,855,008
2021	1,898	52.7%	1,000	5.5%	1.8%	1,074	240,761	1.7%	258,476,358
2022	1,837	52.2%	958	5.5%	1.8%	1,029	245,164	1.8%	252,196,142
2023	1,771	51.6%	914	5.5%	1.8%	981	249,725	1.9%	245,050,489
2024	1,698	51.1%	868	5.5%	1.8%	932	254,437	1.9%	237,029,091
2025	1,619	50.6%	820	5.5%	1.8%	880	259,399	2.0%	228,195,275
2026	1,536	50.1%	770	5.5%	1.8%	827	264,741	2.1%	218,867,577
2027	1,450	49.7%	720	5.5%	1.8%	773	270,378	2.1%	209,033,213
2028	1,361	49.2%	670	5.5%	1.8%	719	276,134	2.1%	198,640,104
2029	1,272	48.8%	621	5.5%	1.8%	667	282,023	2.1%	187,978,159
2030	1,184	48.4%	573	5.5%	1.8%	615	288,321	2.2%	177,416,832
2031	1,101	48.0%	528	5.5%	1.8%	567	294,808	2.2%	167,142,059
2032	1,016	47.6%	484	5.5%	1.8%	519	301,621	2.3%	156,556,597
2033	930	47.3%	440	5.5%	1.8%	472	308,884	2.4%	145,786,430
2034	845	47.1%	398	5.5%	1.8%	427	316,868	2.6%	135,244,416
2035	767	46.8%	359	5.5%	1.8%	385	325,191	2.6%	125,276,991
2036	693	46.6%	323	5.5%	1.8%	347	333,724	2.6%	115,655,240
2037	613	46.6%	286	5.5%	1.8%	307	343,644	3.0%	105,402,713
2038	545	46.6%	254	5.5%	1.8%	273	353,684	2.9%	96,436,795
2039	487	46.5%	226	5.5%	1.8%	243	363,797	2.9%	88,408,324
2040	435	46.4%	202	5.5%	1.8%	217	373,738	2.7%	81,037,246
2041	390	46.3%	180	5.5%	1.8%	194	383,575	2.6%	74,243,142
2042	349	46.1%	161	5.5%	1.8%	173	393,759	2.7%	68,042,154
2043	312	46.0%	143	5.5%	1.8%	154	404,322	2.7%	62,220,577
2044	278	45.8%	128	5.5%	1.8%	137	414,774	2.6%	56,783,996
2045	249	45.6%	113	5.5%	1.8%	122	425,108	2.5%	51,759,163
2046	222	45.4%	101	5.5%	1.8%	108	436,057	2.6%	47,091,296
2047	197	45.2%	89	5.5%	1.8%	96	447,429	2.6%	42,749,417
2048	175	45.0%	79	5.5%	1.8%	84	458,869	2.6%	38,683,909
2049	154	44.8%	69	5.5%	1.8%	74	470,397	2.5%	34,919,914
2050	136	44.6%	61	5.5%	1.8%	65	482,853	2.6%	31,425,339
2051	119	44.4%	53	5.5%	1.8%	57	496,023	2.7%	28,186,709
2052	104	44.3%	46	5.5%	1.8%	49	509,538	2.7%	25,176,173
2053	90	44.2%	40	5.5%	1.8%	43	523,468	2.7%	22,405,792
2054	78	44.1%	34	5.5%	1.8%	37	538,545	2.9%	19,893,083
2055	67	44.0%	30	5.5%	1.8%	32	554,559	3.0%	17,610,639
2056	58	43.9%	25	5.5%	1.8%	27	570,961	3.0%	15,550,614
2057	49	43.9%	22	5.5%	1.8%	23	588,059	3.0%	13,687,473
2058	42	43.9%	19	5.5%	1.8%	20	606,298	3.1%	12,047,882
2059	36	44.0%	16	5.5%	1.8%	17	625,623	3.2%	10,591,735
2060	31	44.0%	13	5.5%	1.8%	14	645,112	3.1%	9,316,303
2020 to 2050	27,470	50.5%	13,576			14,573	288,318	2.4%	4,201,603,965
Mean term	9.6 yrs		9.2 yrs			9.2 yrs			10.5 yrs
2020 to 2060	28,145	49.3%	13,873			14,892	293,848	2.5%	4,376,074,367
Mean term	10.2 yrs		9.8 yrs			9.8 yrs			11.5 yrs

Source: AWP 2020 – Mesothelioma scenario Model

Steps:

1) Adjusted HSE male deaths => Male GB Deaths
2) Propensity to claim => Male GB claimants
3) Female to male ratio => M&F GB claimants
4) Northern Ireland to GB ratio => UK claimants
5) Average cost per claim
6) 4) * 5) => Undiscounted UK EL mesothelioma insurance cost

Figure 10. Mesothelioma EL Insurance Market estimate

Steps:

1) Adjusted HSE male deaths => Male GB Deaths
2) Propensity to claim => Male GB claimants
3) Female to male ratio => M&F GB claimants
4) Northern Ireland to GB ratio => UK claimants
5) Average cost per claim
6) 4) * 5) => Undiscounted UK EL mesothelioma insurance cost

Table 54 Mesothelioma results 2020-2060 – Adjusted HSE model (Scenarios 1 to 9)

Mesothelioma UK EL Insurance Market estimate (£m)		Low Cost Scenario	Central Cost Scenario	High Cost Scenario
Central Death Scenario	Low Propensity Scenario	£3,678m	£4,004m	£4,400m
	Central Propensity Scenario	£4,016m	£4,376m	£4,816m
	High Propensity Scenario	£4,689m	£5,144m	£5,705m

Table 55 Mesothelioma results 2020-2060 – Adjusted HSE model (Scenarios 10 to 15)

Mesothelioma UK EL Insurance Market estimate (£m)	Low Propensity & Cost Scenarios	Central Propensity & Cost Scenarios	High Propensity & Cost Scenarios
Adjusted HSE Low Death Scenario	£3,287m	£3,876m	£4,934m
Adjusted HSE High Death Scenario	£4,835m	£5,885m	£8,068m

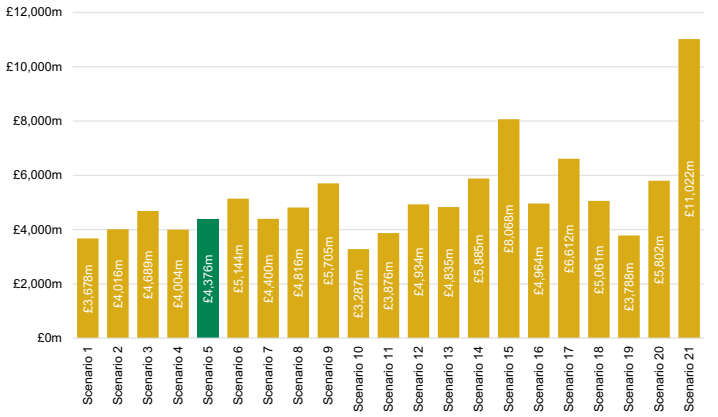
Figure 11. Mesothelioma EL Insurance Market estimates

It is important to highlight that all this work was done prior to the big increase in short-term inflation that we have seen recently. The latest update published from the working party in respect of inflation is based on long-term inflation rates without any adjustment for the recent high short-term inflation. The update does recommend that practitioners should consider inflation in their own assumptions and not rely on the AWP 2020 paper assumptions.

We produced a model which is available on the IFoA website, the AWP 2020 Mesothelioma Scenario Model, which goes through the scenarios that we have estimated. It produces this table of outcomes which projects from 2020 through to 2060 as shown in Figure 10.

Starting with the male GB death projections in the left-hand column of these projections, we allow for the propensity to claim, which is in the second column, which converts the deaths into male GB insurance claimants. We then put in our loadings for females and Northern Ireland to come up with the number of UK claimants. Then with that average cost model, we multiply those numbers and averages to come up with the costs which are shown in Figure 11.

The outcomes were wide-ranging. The low scenario based on low HSE death projection, low propensity to claim and low average cost inflation assumptions comes up with costs of about £3.3 billion. Our central scenario comes up with about £4.4 billion for the costs for the UK insured mesotheliomas. The high scenario gives costs of just over eight billion pounds.



	Deaths model / scenario	Propensity for a mesothelioma suffer to make a claim scenario	Average cost / inflation scenario
1	Adjusted HSE: 2 (Central)	Low	Low
2	Adjusted HSE: 2 (Central)	Central	Low
3	Adjusted HSE: 2 (Central)	High	Low
4	Adjusted HSE: 2 (Central)	Low	Central
5	Adjusted HSE: 2 (Central)	Central	Central
6	Adjusted HSE: 2 (Central)	High	Central
7	Adjusted HSE: 2 (Central)	Low	High
8	Adjusted HSE: 2 (Central)	Central	High
9	Adjusted HSE: 2 (Central)	High	High
10	Adjusted HSE: 3 (Low)	Low	Low
11	Adjusted HSE: 3 (Low)	Central	Central
12	Adjusted HSE: 3 (Low)	High	High
13	Adjusted HSE: 1 (High)	Low	Low
14	Adjusted HSE: 1 (High)	Central	Central
15	Adjusted HSE: 1 (High)	High	High
16	Adjusted HSE: 2 (Central) + background	Central	Central
17	Adjusted HSE: 2 (Central)	Jump	Central
18	Adjusted HSE: 2 (Central)	Central	Jump
19	GLM Age-Birth: Low	Low	Low
20	GLM Age-Birth: Central	Central	Central
21	GLM Age-Birth: High	High	High

Figure 12. Range of estimates – mesothelioma

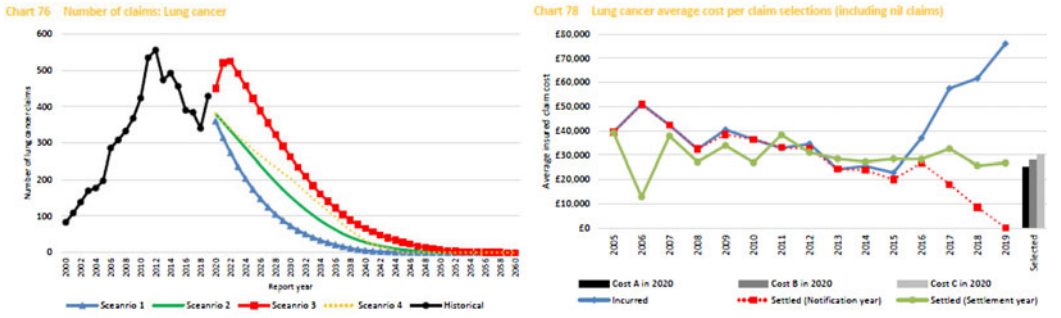


Figure 13. Estimating UK EL non-mesothelioma claims – lung cancer

This table in Figure 12 shows the range of those different scenarios for different assumptions or different death projection models, low, high or central, or different propensity to claim, or different average cost. The scenario highlighted in green is the central scenario that the working party produced. The table shows a range of 21 different scenarios that the working party has published.

Due to the severity of mesothelioma and the high average costs of those claims, they make up just under 90% of the estimated cost to the UK EL insurance market. The other asbestos diseases make up the 11% of the cost. Those diseases are mainly lung cancer, asbestosis and pleural thickening, and plural plaques for which projections are done in less detail using frequency-severity methods. There is no publicly available epidemiological model for the other asbestos types like the one that we use based on the mesotheliomas. The other asbestos-type projections have a shorter average latency and there is no real information about the propensity of those non-mesothelioma incidents to convert into an insurance claim.

The frequency-severity type projections that we have done for the other non-mesothelioma claims are covered in chapter ten of our paper.

The graph on the left of Figure 13 shows the numbers of claims, and the graph on the right the average cost per claim that we have obtained from our summary data for asbestos-related lung cancers. The black line on the graph showing claim numbers represents the actual number of lung cancer notifications. Our projections go forward to 2060. We have compared these to the mesothelioma projections but allowing for a shorter tail compared to the mesothelioma projection. This is to allow for the reduced latency that we see for the other non-mesothelioma

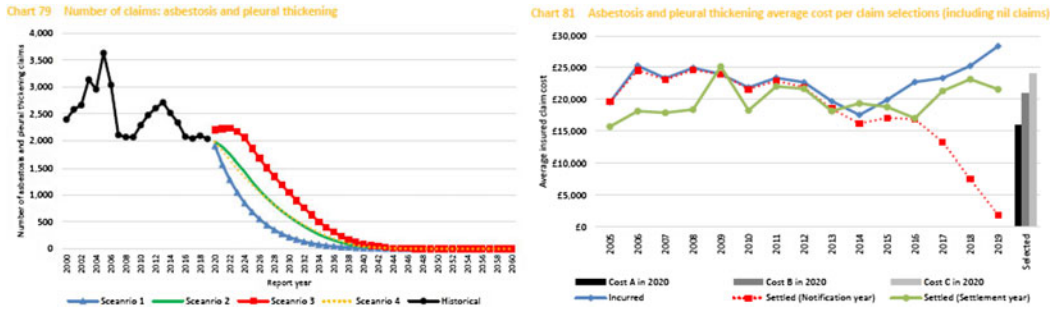


Figure 14. Non-mesothelioma – asbestosis and pleural thickening

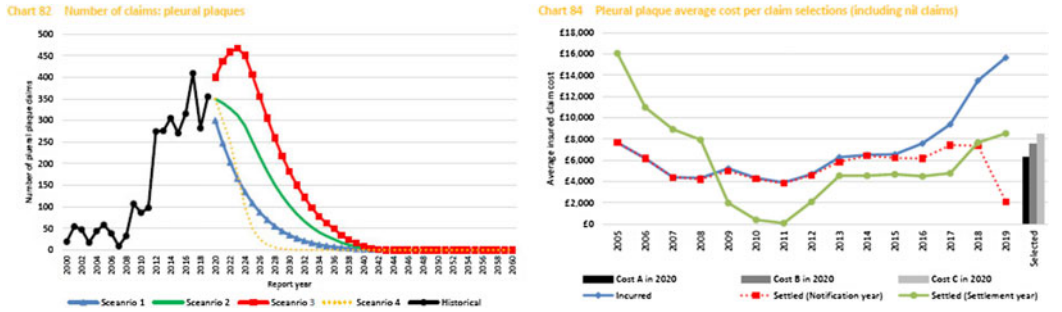


Figure 15. UK EL non-mesothelioma claims – pleural plaques

type projections. The blue line on the graph on the right shows the actual incurred average cost per claim for the lung cancers that increases in the most recent years as we expect those claims to settle and some nil claims to increase the average. Similarly, the settled averages by notification (dotted red line) is quite low for the most recent years and is expected to go up as some of the larger claims get settled. The better reflection of this is probably the green line, which shows the settled average on a settled year basis, which does not have those distortions.

Graphs for asbestosis and pleural thickening, are shown in Figure 14.

This year we have combined these two claim types due to their similarity and latency profiles. The graph on the left of Figure 14 shows claim numbers and the one on the right shows average costs.

Finally, Figure 15 shows similar graphs with our projections for the pleural plaques. This is just covering Scotland and Northern Ireland, as pleural plaques are not compensable in England and Wales.

We have produced a range of estimates for the non-mesothelioma claims by varying the projection curves and the inflation. We used a broad-brush inflation assumption in projecting the average. Our estimates are shown in Figure 16. The low scenario is based on a 1% future inflation, our central scenario is based on a 3% future inflation, and the high scenario on 5% future inflation. The Central estimate is highlighted in green which was £404 million, in respect of the asbestosis and pleural thickening, £129 million in respect of lung cancer and £26 million in respect of pleural plaques.

In the last chapter of the paper the UK EL insurance market estimates are calculated by combining the mesothelioma and the non-mesothelioma projections together. The estimates are shown in Figure 17.

Figure 18 shows the analysis of changes in our estimates. The last market estimate by the working party was in 2009. The Figure shows changes from previous projections to our latest,

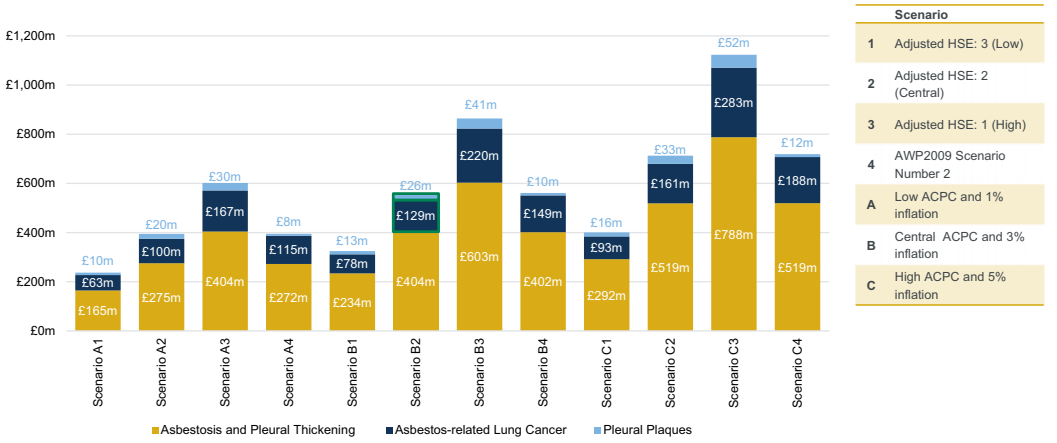


Figure 16. Range of estimates – non-mesothelioma

This brings together the selected results for the individual disease types described in Chapter 9 (mesothelioma) and 10 (non-mesothelioma).

The table to the right illustrates the range of results that can be generated for all disease types combined. We have combined the low, central and high deaths and propensity assumptions for the mesothelioma scenarios with the respective low, central and high claim number scenarios for the non-mesothelioma scenarios and, for each, we have shown the results using the respective low, central and high cost scenarios. In order the encompass the full range of results from our projections, we have shown this using both the HSE/HSL based mesothelioma deaths projections, and the GLM projections.

It should be noted that the numbers are intended to represent a range of potential estimates and not a range from low to high. These projections are highly uncertain, and it is possible that the ultimate cost could be outside of this range.

Table 65 Total UK EL Insurance Market estimate (£m)

Mesothelioma Scenario (Deaths & Propensity)	Non-mesothelioma Scenario (Claim Numbers)	Cost Scenario A (Low)	Cost Scenario B (Central)	Cost Scenario C (High)
Adjusted HSE: 3 (Low)	Scenario 1 (Low)	£3,524m	£4,201m	£5,335m
Adjusted HSE: 2 (Central)	Scenario 2 (Central)	£4,411m	£4,935m	£5,529m
Adjusted HSE: 1 (High)	Scenario 3 (High)	£5,436m	£6,749m	£9,191m
GLM Age-Birth: Low	Scenario 1 (Low)	£4,025m		
GLM Age-Birth: Central	Scenario 2 (Central)		£6,361m	
GLM Age-Birth: High	Scenario 3 (High)			£12,145m

Figure 17. Total UK EL Insurance Market estimate

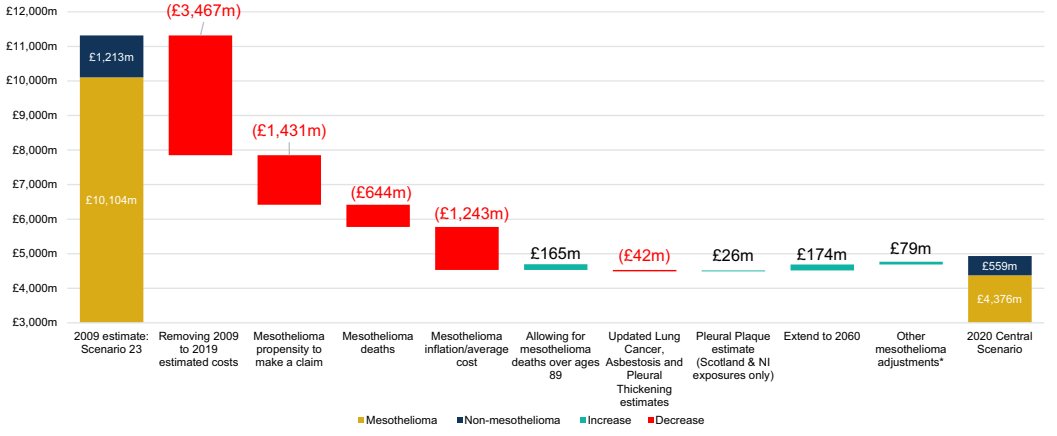


Figure 18. Key movements in central estimate

based on the central estimate. The Figure also shows the reasons why the projections have come down. The propensity to claim has been reduced, the deaths have reduced slightly, and the inflation assumptions that we had compared with the 2009 model have come down. The other adjustments are quite small. But, compared with our previous model, we have allowed for deaths

over the age of 89, which has an impact of about £165 million. We did extend our projection models from 2050 to 2060 which added another £174 million.

The Moderator: The first question we have is about Odgen rate and the impact on claims settlement. At the moment, there is a consultation about the introduction of dual or multiple rates. What sort of impact do you think that could have on asbestos claims?

Mr Whiting: In the paper, we mention the impact of Ogden and it can be allowed for in the average cost model. But it is one of the items that was not covered specifically by the paper because we leave the projection of the Ogden rates to the Ogden working party rather than trying to estimate it ourselves. In respect of the paper that we published, we assumed that the −0.25% Ogden rate continues in the future. What I would mention is the age of the mesothelioma claimants, they are a lot older than you would see in a motor account. Thus, the change in the impact of the discount rate will be less on the asbestos portfolio than you would see on, say, a typical motor book.

The Moderator: We have got a question on Figure 18 that showed the movement in the central estimate. You showed in 2009 to 2019 that there was about three billion estimated cost change. Do you know the actual amounts for those years?

Mr Whiting: We do. Every year we do a survey of the insurance market, and we publish that on an annual basis. The best source would be to go on to the link to the summary data to find out what the survey data has shown about actual claims that have come through.

The Moderator: The analysis you presented was done prior to the current inflation changes, and, so, uses lower inflation rates. How would you estimate changes in light of the recent higher-than-expected inflation?

Mr Whiting: We published a short update paper. It is up to the individual practitioners to make their own adjustments for short-term inflation. We recommend a reserving practitioner would make their own adjustments for the inflation averages in their frequency-severity type projections.

On the website you can go and download our average cost model, which has got the parameter assumptions within it, and you can adjust those assumptions to reflect your own assumptions. What we have seen is that practitioners will apply their own short-term assumptions to allow for the higher inflation that is seen in the market.

The Moderator: On the initial mesothelioma death data, you have assumed males and then applied an uplift for females. Were there studies done before to compare whether there is any difference in propensity to claim or sickness or death in females versus males for mesothelioma?

Mr Whiting: The HSE has started doing a separate projection for females, and the working party did consider using the male and then the separate female projection from the HSE. We decided not to have separate projections due to materiality considerations. The proportion of the costs for the female was about 5.5% so, we did not go down a separate modelling route for males and females for the latest paper. But it is something of which we are aware, and maybe can change in the future.

The Moderator: What is next for your working party? What are your next areas of planned research?

Mr Whiting: The working party are currently in a monitoring phase because these are long-term projections, and the latest paper is fairly recent. We will be doing another summary survey of the insurance market. We continue to be in contact with the HSE and looking at whether they are going to update their modelling for the mesothelioma deaths. We will look at the crude data as well for the propensity to claim. We do not intend to be producing any big papers imminently.

The Moderator: Do you expect any changes to the estimates due to Covid, particularly given Covid was related to respiratory difficulties? If data was up to 2020, it would not include any Covid impacts and there is potential for there to be links between people who have respiratory issues and Covid.

Mr Whiting: When we produced the paper it was one of those areas that we caveated and said Covid was not covered by the paper. It was fairly new at that point. We are tracking the situation to determine the way that Covid impact in the long-term. We mentioned the short-term impacts, the longer-term impacts and the potential impacts on the average cost, but we have not come to any conclusions yet about how Covid is going to impact our projections.

The Moderator: All that remains is for me to thank Andy (Whiting) for such a great session and for answering all our questions. I would also like to thank the IFoA team for arranging this sessional meeting and making sure everything ran smoothly and the audience for their questions. So, thank you very much, everyone, and have a great evening.

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