

ASH Briefing: how the Sunday Telegraph and BAT got it badly wrong on passive smoking and why SCOTH and WHO agree

"The world's leading health organisation has withheld from publication a study which shows that not only might there be no link between passive smoking and cancer but that it could even have a protective effect." (Sunday Telegraph, 8 March 1998)

The WHO (International Agency for Research on Cancer) report leaked to the Sunday Telegraph is undergoing peer review prior to being published in an academic journal. It therefore cannot be described as 'withheld'. The study gives the following figures for relative risk of a non-smoker contracting lung cancer as a result of living with a smoking spouse or working in a smoking workplace.

Spouse smokes 1.16
Smoky work place 1.17

These figures mean that non-smokers are 16% more likely to get lung cancer if their spouse smokes than if they live with a non-smoking spouse. In practice this is a small risk - an active smoker has a risk 20 times a non-smoker and a non-smoker's risk of getting lung cancer is small in absolute terms. However, applied to the millions of people in this situation, the 16-17% extra risk would amount to an extra several hundred deaths per year in the UK. The WHO has subsequently rounded on BAT and the newspaper, saying its reporting of the findings was "false and misleading" and "From these and other previous reviews of the scientific evidence emerges a clear global scientific consensus - passive smoking does cause lung cancer and other diseases". (press release - 9 March) Despite this, BAT and tobacco industry spokespeople continue to push the Sunday Telegraph's misleading version.

So how did BAT/Sunday Telegraph manage to make this into a *"Passive smoking doesn't cause cancer - it's official"* headline?

The error (or deception) was to misinterpret a statistical test applied to these results. Because the estimate of risk is based on a sample of 650 lung cancer cases, the risk in the whole population might be different because the sample may not be exactly representative. So the statisticians develop a 'confidence interval'. This allows them to give the central estimates above and then say "we are 95% confident that the real value for the whole population lies between the following limits x and y" - ie. the chance that the actual risk lies outside this range is 1 in 20 or 5%. For the WHO study the limits are as follows:

	Central Estimate	Lower limit (x)	Upper limit (y)	Number of cases
Spouse	1.16	0.93	1.44	650
Workplace	1.17	0.94	1.45	
BMJ (SCOTH)	1.24	1.13	1.36	4,626

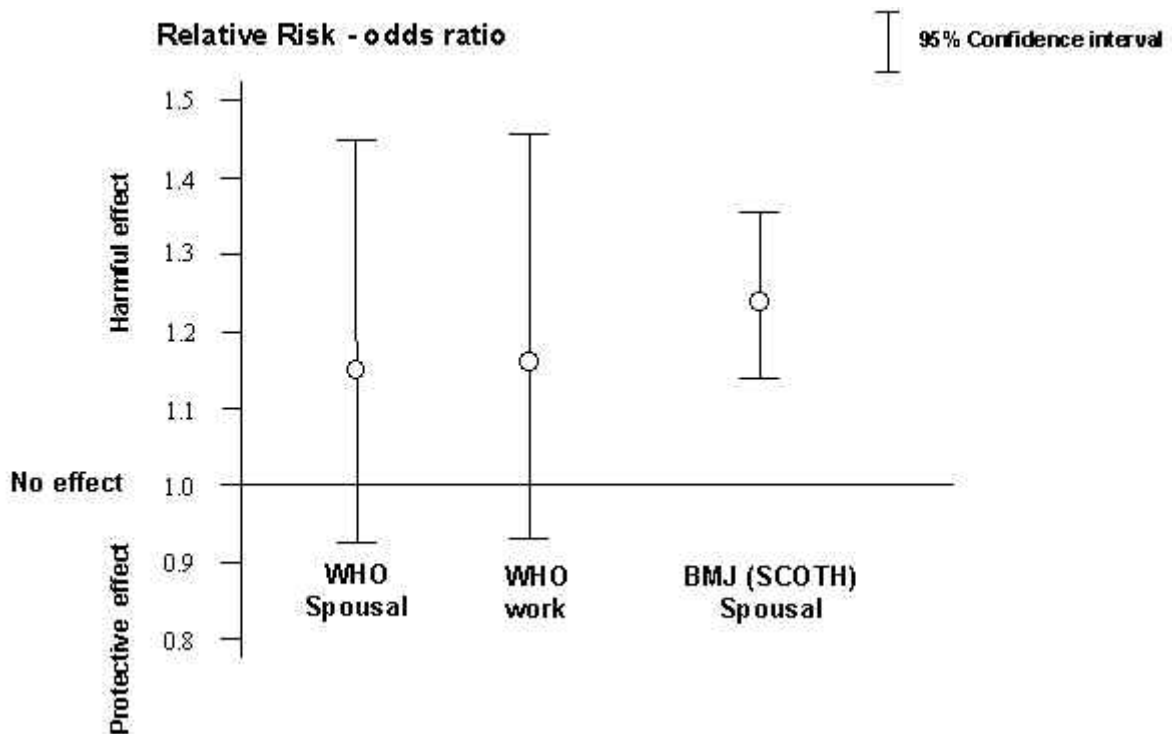
A graphical representation of this is shown on the [following page](#).

The fact that the lower limits drop below 1.0 shows that the statisticians cannot be 95% confident that the survey has detected an effect - it is possible to obtain the central estimate of 1.16 and 1.17 by chance but for there to be no real effect. This is what the statisticians mean when they say the result is not 'statistically significant' - ie. they cannot be 95% certain that they have detected a link between passive smoking and lung cancer. However, this uncertainty was inverted to give and reported as evidence of 'no effect'. The tobacco industry has translated this formal statistical meaning of the word 'significance' into lay language and has been arguing that "the study shows the risk is insignificant" (paraphrase).

Furthermore, because the lower limit is 0.93 it was translated to a possible 'protective effect'. Of course the study no more shows a protective effect than it shows a 44% increase in risk - the other extreme of the confidence interval. This is an outrageous misinterpretation of the results and it is difficult to know if this was naivety on the part of the Sunday Telegraph or manipulation by BAT, who should know better, or both.

The figures from the BMJ report of 18th October 1997 (Vol 315 p980-988) are added above for comparison. This shows that the ranges overlap and therefore that the results are consistent. The BMJ results have a much smaller confidence interval - ie. the use of several studies in a 'meta-analysis' increased the effective sample size, and therefore the overall sample is more likely to be representative. Note, it may seem paradoxical at first sight, but when several studies that each show no statistical significance are added together, the overall result may be statistically significant - each of the studies contributes to greater confidence in detection of the effect and a larger overall sample and hence smaller confidence interval. This is why meta analysis is important and used to detect what are quite small additional risks.

The statistics set out above are often represented graphically:



In no way can the illustration of the WHO results above be used to support the thesis that there is no effect or that there is a protective effect. The result does point towards a link between passive smoking and lung cancer because it is consistent with other major studies. There are also sources of evidence other than epidemiology that support the argument.

Finally, it should be noted that the choice of a 95% confidence interval is arbitrary, though conventionally used as a scientific test. However, when policy makers have to make decisions, they cannot reserve judgement because doing nothing is to act as if there is no risk - and there is no evidence to support that idea. For this reason, a policymaker without the luxury of reserving judgement would be right to use a lower test of statistical significance... we would be unsettled if the Government failed to act on passive smoking if it was 80% sure that it causes lung cancer - even if wasn't 95% sure. The 80% confidence interval would be smaller and probably show a statistically significant link between passive smoking and lung cancer in the WHO study.

To be precise, when a 'statistical significance' is quoted it should be accompanied by the confidence interval - ie. "the results were not statistically significant at the 95% level". But then we doubt that being precise was what BAT had in mind.

Formal abstract of the WHO paper (unpublished)

We conducted a case-control study of lung cancer and exposure to environmental tobacco smoke (ETS) among non-smokers in twelve centres from seven European countries. A total of 650 cases and 1542 controls aged up to 74 were interviewed. The odds ratio (OR) for exposure to spousal ETS was 1.16 (95% confidence interval [CI] 0.93-1.44); the OR for exposure to workplace ETS was 1.17 (CL 0.94-1.45). For most quantitative indicators of ETS exposure, risks were highest in the category with highest exposure. A non-significant decrease in lung cancer risk was present with

time since cessation of exposure to spousal or workplace ETS. Childhood exposure to ETS and exposure in vehicles and in public settings were not associated with lung cancer risk. No confounding effect was exerted by education, urban residence, exposure to occupational carcinogens, and dietary factors. Interview with the spouses of a subset of cases and controls validated the non-smoking status and the spousal ETS exposure status of study subjects. Our results are in line with those of recent investigations; they add substantially to the evidence available from Europe of the association between ETS exposure and lung cancer, provide statistically stable risk estimates, assess the contribution of different sources of ETS, and point towards a decrease in risk after cessation of exposure."

The story first appeared in the Sunday Telegraph in the UK and has been completely discredited. The Sunday Telegraph has since changed its story to say "In other words the results are - as the Sunday Telegraph stated - consistent with there being no real cancer risk for non-smokers, and even with there being a reduced risk." and "the simple fact reported in the Sunday Telegraph remains: the WHO study failed to make its case." This is not only weasel wording, it is rather different to the headline the previous week "Passive smoking doesn't cause cancer - it's official". Even this is highly misleading.... what the WHO study really shows should be described as follows: "the study shows an increased risk of lung cancer of 16-17% to those who live or work in a smoky environment. Because of the relatively small sample size, when viewed in isolation it is possible that this result could have been achieved by chance and there to be either no effect or a substantially greater risk. However, the result adds to and is consistent with a large number of studies showing a 10-30% increase in lung cancer risk." - *ASH paraphrase*.

Further Reading: [The UK Government's Scientific Committee on Tobacco and Health \(SCOTH\) report released on March 11th 1998.](#)

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