

EPIB-609: Assignment based on material listed under
"Etiologic and prevented fractions"

The learning aims for the two readings and the exercise are to (i) *really* understand the concepts behind these fractions (ii) be able to apply them with some confidence, rather than just rely on the formulae themselves.

JH does not give the personal details on his paper, but one of the motivations for writing that 2001 didactic paper in JECH was the fact that he had witnessed three McGill colleagues struggle with these concepts. And another colleague had told him that a former chair of the department, who was going to testify in a court case on the ill-effects of urea formaldehyde foam insulation, had called that colleague at home at 7 a.m. on that same court day and asked that this younger faculty member urgently photocopy and fax the textbook formulae to him.

Moreover, when preparing the 2001 article, JH asked Miettinen why he did not more fully explain his version of the formula. In the Discussion section, Miettinen notes *“That the (natural) preoccupation with the frequency of the factor in the source population of cases may be replaced by its frequency among the cases themselves may not be immediately obvious”* His followed this comment with a 1 sentence explanation: *“However, if among those in the source population who have the factor a fraction EF_1 of cases is attributable to the factor, then this fraction EF_1 of cases with the factor are attributable to the factor, while none of the cases without the factor are. This equivalence implies formulas 3 and 4.”* Miettinen told JH that it first took him “3 days of hard algebra” to get there, but then, he stared at the result and said “s**t! its obvious!”. Clearly, it wasn’t (and still isn’t) obvious to most people: see the half page of algebra in Armitage and Berry, for example. And see how it is introduced in textbooks.

In this exercise, you are asked to address the "calculations of attributable risk and attributable fraction" and the resulting numbers reported in the Abstract ("The risk explained about one-in-20 crashes") and in the Discussion ("Collectively, the attributable risk associated with these disorders explained about 1-in-20 crashes observed in this study") of the Redelmeier paper on Road Trauma in Teenage Male Youth.

You are also asked to address the "rate difference" calculation reported in the Azoulay paper on bladder cancer.

Further, you are also asked to think about the 10% estimate in the BBC story.

You are encouraged to understand fully not just the algebra, but also the *reasoning* behind these calculations.

Redelmeier

1. Review the cited pages in reference 66, and report the formula(e) you think the authors used. Compare them with those in the textbooks you own.
2. Carry out the calculation(s).
3. Review the 1974 article by Miettinen and identify the relevant formula(e).
4. Spend no more than 10 min. (as if you has a 10 min. recess in a court case) to derive these formula 'from scratch.' Some may not be "immediately obvious" don't be too upset if unable to.
5. Review the 2001 article by Hanley, focusing for now on the all vs. none case.
6. Use numbers from the report by Redelmeier at al. to create the equivalent of the Figure 1 and Figure 2 in Hanley 2001: remember you are explaining these numbers to the judge.
7. Consult 1 modern textbook & report how the formulae in it are motivated, derived, and explained (arrange it so that each one of you examines a different textbook). Comment.

Azoulay

1. On the face of it, is the highlighted statement "we calculated absolute adjusted rate differences and corresponding 95% confidence intervals using the formula: ..." correct?
2. Carry out the calculations that led to the 74 cases per 100,000 py (highlighted in next column).
3. Does the formula used seem correct, and does it make sense to you?
4. Use eqns. (6) & (7) in Miettinen 1976 ("estimability") to "roll your own" rate difference formula.

BBC Story

How might those who came up with it have arrived at the 10% estimate in the statement that the 'three-in-one' job may be causing "up to 10%" of autism in children in the UK.'