Illustration of Differing Approaches to Estimating an Intervention's Absolute Risk Reduction of Different Base Rates Based on Observed Reduction of One Base Rate

Table A below provides support for points made on the Subgroup Effects subpage of Scanlan's Rule page of jpscanlan.com. The table below shows the results of three methodologies for estimating the absolute risk reduction achieved by an intervention for various base rates where all one observes is that an intervention reduces an adverse outcome rate from 12.71% to 5.0%. The example is based on Table 1 of BSPS 2006. That table shows various measures of differences between the rates of two groups a points reflecting defined by a certain adverse outcome rates for the advantaged group, when the means of the distributions differ by half a standard deviation. But the patterns in the table also reflect the situation where the rates for the disadvantaged and advantaged groups are the untreated and treated groups where an intervention shifts the underlying means by half a standard deviation.

Method 1 first derives the difference between the underlying means on the basis of the two figures in accordance with the approach on the Solutions sub-page of Measuring Health Disparities page of jpscanlan.com and then determines the corresponding percentage point reduction for each base rate. The absolute risk reduction is the same figure as that shown in the AbsDf column of the referenced BSPS Table 1.

Method 2 estimates the absolute risk reduction based on the assumption that the observed relative risk of .39 would apply to all baseline risks. This approach, in keeping with the common assumption that, absent evidence to the contrary, the same relative risk will apply at all baseline risk levels, is the recommendation in Kent et al.[1] This approach would be deemed illogical because it is not possible for a factor that causes an equal proportionate change in different base rates to cause equal proportionate changes in the opposite outcome rates, as discussed on the Illogical Premises subpage of the Scanlan's Rule page.

Method 2 Alt estimates the absolute risk based on the assumption that the observed relative risk for experiencing the opposite outcome of 1.09 (87.29% increased to 95%) would apply to all baseline risks of experiencing the opposite outcome. The approach would be deemed illogical for the same reason that Method 2 would be deemed illogical.[2]

Method 3 estimates the absolute risk reduction based on the assumption that the observed odds ratio of .39 would apply to all baseline risks.[3] The approach is recommended in Wang et al.[4] H, Boissel JP, Nony P. Revisiting the relationship between baseline risk and risk under treatment. Emerging Themes

[1] Kent DM, Rothwell PM, Ionnadis JPA, et al. Assessing and reporting heterogeneity in treatment effects in clinical trials: a proposal. Trials 2010,11:85: http://www.trialsjournal.com/content/11/1/85

[2] There is no logical basis for distinguishing between Method 2 and Method 2 Alt. But has often been recognized that estimating proportionate increases in things like survival on the basis of one observed proportionate increase can lead to estimates above 100%, as would be the case for Row O1.

[3] The Method figure are derived by applying the odds ratio observed in M5 to all rows and then calculating the relative risk according to the method in Zhang J and Yu KF. What's the relative risk? A method for correcting the odds ratio in cohort studies of common outcomes. *JAMA* 1998;280:1690-1691. The relative risk thus calculated is then used to derive an absolute risk reduction.

[4] Wang H, Boissel JP, Nony P. Revisiting the relationship between baseline risk and risk under treatment. *Emerging Themes in Epidemiology* 2009, 6:1: http://www.ete-online.com/content/6/1/1

in Epidemiology 2009, 6:1: http://www.ete-online.com/content/6/1/1 The approach is not illogical. But it is problematic for other reasons discussed generally on the Scanlan's Rule page.

Table A: Three Approaches to Estimating Absolute Risk Reductions (Percentage Point Reductions) [b1714 b3]

Cut Point	BaseRate	Method 1	Method 2	Method 2 Alt	Method 3
O 1	3.44%	2.44	2.09	8.53	2.15
N 3	8.38%	5.38	5.08	8.10	5.15
M 5	12.71%	7.71	7.71	7.71	7.66
L 10	21.77%	11.77	13.21	6.91	12.55
K 20	36.69%	16.69	22.26	5.59	19.23
J 30	49.20%	19.20	29.85	4.49	23.08
I 40	59.48%	19.48	36.09	3.58	24.58
H 50	69.15%	19.15	41.95	2.73	24.14
G 60	77.34%	17.34	46.92	2.00	21.86
F 70	84.61%	14.61	51.34	1.36	17.86
E 80	90.99%	10.99	55.21	0.80	12.33
D 90	96.25%	6.25	58.40	0.33	5.90
C 95	98.38%	3.38	59.69	0.14	2.69
B 97	99.13%	2.13	60.15	0.08	1.47
A 99	99.76%	0.76	60.53	0.02	0.41