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Letter to the Editor

Methodological issues estimating population attributable fraction related to 'Health care cost of overweight-related diseases in Bangladesh'

Madam

In their study, Hoque *et al.*[1] estimated the economic burden of overweight-related diseases in Bangladesh. They calculated the proportion of six diseases (CHD, non-insulin-dependent diabetes mellitus (NIDDM), Asthma, hypertension, gallstone and kidney disease) attributable to overweight using population attributable fraction (PAF). The PAF were estimated using the Levin formula (equation 1) where RR is the risk ratio and p_e means the proportion of population exposed to the risk factor[2].

$$\mathrm{PAF} = \frac{p_e(\mathrm{RR}-1)}{p_e(\mathrm{RR}-1)+1} \quad (1)$$

The prevalence of estimates of overweight-related diseases was obtained from national different observational studies. They used the RR that were based on the meta-analysis of adjusted and unadjusted RR of observational studies. Despite the mentioned limitations of this study (a limited number of overweight-related diseases, estimation of only direct costs, not including the risk of obesity in the analysis and using secondary data), there are several concerns in the analysis:

(i) Confounding is inevitable in observational studies; thus, it is necessary to estimate an adjusted RR. Levin formula is biased in the presence of confounding[2,3]. Also, it is not appropriate to plug in an adjusted RR in Levin formula[2,3]. So, the authors of the original paper were right in using adjusted RR but wrong in using the Levin formula. Unbiased estimation of PAF can be calculated using the Miettinen formula[2,3] where RRadj is the adjusted RR and pc is the prevalence of exposure among the cases[2].

$$\mathrm{PAF} = \frac{p_c\left(\mathrm{RR}_{\mathrm{adj}}-1\right)}{\mathrm{RR}_{\mathrm{adj}}} \quad (2)$$

(ii) The pooled adjusted RR derived from the meta-analysis are subject to biases including residual confounding and substantial heterogeneity[2,4]. These are other source of biases in the reported PAF estimates.

(iii) In this study, BMI was considered as a dichotomous exposure (overweight) which incorrectly assumes similar risks for obese and overweight person. They could estimate PAF for BMI as a multi-categorical variable (normal, overweight and obesity) using a simple extension of Miettinen formula.

In sum, unbiased estimation of PAF requires several assumptions[2] which are often ignored in practice. We recommend using the Miettinen formula to estimate PAF[2].

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