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GUEST EDITORIAL

The Food Frequency Questionnaire Abandonment Debate: Time to Resolve

Introduction

Much of the evidence available today on the relationship between diet and disease is based on studies using the food frequency questionnaire (FFQ). The original form of the FFQ can be traced back to 1947 when Burke developed the diet history which included the 24-hour recall, a 3-day food record and an account of frequency of food intake over a period of one to three months (Subar, 2004). The diet history, a long and tedious tool, led to the development of a simplified, self-administered and inexpensive dietary assessment tool, the FFQ (Stefanik & Trulson, 1962). In the 1980s, the semi-quantitative FFQ developed by Block at the NCI and later modified by Willett and colleagues at Harvard (Brown, 2006) supported by an analytical software became the instrument of choice for several case control and cohort studies in the United States. The FFQ is also the main dietary assessment method used in the EPIC studies. Ease of administration, relatively low respondent burden and its cost-effectiveness gives the FFQ a superior edge over other demanding methods. In recent years, scientists have raised concern that the evidence on the diet-disease relationship based on the FFQ is not sufficiently convincing.

The Debate

In 2005, an editorial by Kristal *et al.* in the *Cancer Epidemiology Biomarkers Prevention* journal stirred the hornets' nest with a contentious question "Is it time to abandon the food frequency questionnaire?" On a serious note, the authors claimed that while millions of dollars had been spent on studies based on the FFQ, it alone cannot answer many of the questions related to diet and disease particularly in relation to cancer. In short, nutritionists were warned that dietary assessment was facing a 'crisis'! In the following year, an article by Brown (2006) in the *American Journal of Dietetic Association* raised yet another question i.e. "Do food frequency questionnaires have too many limitations"? An European journalist claimed that FFQs can be up to 50% inaccurate and declared "It is time to ditch the FFQ" and that "The FFQ is a fragile basis for any conclusion" (Daniells, 2006). These articles snow-balled a debate on whether it was "time to abandon" the FFQ between renowned nutritional epidemiologists.

Kristal *et al.* (2005) firstly argued that the validity of the FFQ measured against multiple-day food records or 24-hour recalls is generally not strong. Correlations between FFQ obtained nutrients and that by the latter methods are less than 0.4 and never more than 0.6. In addition, correlations between FFQ derived nutrients with objective measurements such as anthropometric indicators and dietary biomarkers are also weak despite statistical adjustment for total daily energy intake. The validation exercise was considered futile as the observed variance between FFQ and the criterion measure ranged from 1% to 40%! Secondly, the growing lack of consistency in findings within and across studies was identified as a strong limitation of the FFQ. This aside, the inability of findings from case-control studies to be replicated in cohort studies and clinical trials have also weakened the case against the FFQ. They concluded that the food record which provides real-time consumption data has superior predictive power compared to the FFQ which is based on recall. Willett & Hu (2006) promptly

reacted to this provocative article with an in-depth explanation in support of the Harvard FFQ. Their main argument was that even 7-day diet records provide intra-class correlations of not more than 0.6 for nutrient intakes indicating substantial within-person error variation. Strong evidence was also provided for the validity of the FFQ against biomarkers such as protein and lipids. As for the lack of consistency in findings, they pointed out that the heterogeneity observed was for studies on diet and cancer and not for diet and coronary heart disease and type 2 diabetes. In a counterpoint article, Kristal & Potter (2006) elaborated on the three yardsticks of validation namely face, construct and predictive validity and highlighted further the weaknesses of the FFQ. Once more Willet & Hu (2007) replied in earnest that while they were in agreement on the validity issues raised by the former authors, food records too would not be able to answer the diet-disease relationship because of much day-to-day variability. This response prompted a lengthy comment from Freedman *et al.* (2007), who capped the debate with the heading "It is not the time to abandon the FFQ". Thus rested the debate but the question remains "What is or are the alternative methods?"

Time to Resolve

Dietary assessment is the cornerstone of nutritional epidemiological studies. It is imperative that the most appropriate method or a combination of methods be used to arrive at plausible findings. The FFQ is by far the cheapest and least demanding of the available methods. As part of the design of the Women's Health Initiative study, the estimated cost of using FFQ was \$1.2 million compared to \$25 million for the multiple 24-hour recall and \$23 million for the three day food records. However, can cheap combined with greater accuracy of data be possible?

Freedman *et al.* (2007) in their response to Willet & Hu recommended relatively inexpensive, individual-level alternatives. These alternatives include automated multiple 24-hour recalls self-administered via Internet and food records or recalls. The authors cautioned that these methods should be objectively validated against biomarkers. Furthermore, dietary information obtained through food records could be strengthened if combined with FFQs and biomarker data. Combinations of methods in addition to biomarkers will help reduce exposure to mis-classification and measurement errors which the FFQ in isolation is greatly prone to.

Concluding Remarks

Perpetuation of the FFQ abandonment debate should not dissuade nutritionists from applying an alternative or a combination of tools that complement one another to enhance the quality of data in epidemiologic studies. The choice of the most appropriate dietary tool is subject to other important elements such as study design, sample size and so on. The FFQ has not seen its last days and I concur with Carol Boushey (Brown, 2006) who puts the final touches to this debate with "It is naïve to think that there is one perfect method... they all have measurement errors but in varying degrees."

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