

7. FOOD-BORNE EXPOSURE ASSESSMENT

Only one validation study of instruments/methods to assess food-borne exposure assessment was found in this literature review. In 1997, Thomas et al. (293) reviewed 29 duplicate diet studies designed to measure food-borne chemical exposures and then conducted a validation study of duplicate diet collection methodology. Under the duplicate diet method, an individual prepares and collects duplicate portions of foods, meals, or daily food composites at the point of consumption. For 28 days, nine adults and three children (age 2, 3, and 14 years) provided dietary intake information using three alternating dietary assessment methods: A 24-hour food diary, a 24-hour food checklist based on the NCI-Health Habits and History Questionnaire, or a 24-hour food group checklist. In addition each subject completed two other questionnaires daily that assessed location where meals were consumed and prepared and any changes in diet due to the study or other reasons. During this collection period, all subjects collected one 7-day duplicate diet sample. Methods for compositing and homogenizing mixed diet samples were tested. Participants were able to collect 96% of the meals they consumed, even with a third of the meals consumed away from home. Food consumed in social settings was the most difficult to collect and collection of meals and food items decreased after the third day of collection. The laboratory-measured caloric content of the collected foods was an average of 12 percent lower than estimates of energy intake using a food diary and 15% lower than estimated energy expenditure values, indicating under-reporting may be an issue.

Several studies have used the duplicate diet method to assess environmental exposures in children. The Minnesota Children's Pesticide Exposure Study (MNCPEs) (294;295) collected 4-day duplicate-diet samples as well as samples of drinking water, urine, indoor and outdoor air, surface wiped dust, and soil samples from 102 children age 3 to 12 years. Duplicate diet samples also were collected in the US National Human Exposure Assessment Survey (NHEXAS) which included the children in the households sampled (296;297). Duplicate diet samples were collected in the Agricultural Health Study of 48 children age 2 to 3 years (298). Observation of intake and collection of 3-day duplicate diet samples were also used to assess fluoride intake from foods in toddlers (299).

Because the duplicate diet method is expensive and requires highly motivated and literate subjects, most studies use existing dietary assessment instruments to assess intake of foods or food groups of interest. For example, the Harvard FFQ has been used to assess fish intake in pregnant women to evaluate exposure to mercury (40). Most exposure estimates for dioxins and related compounds are based on market place analysis of food and data from national food consumption surveys (300).

Guidelines and recommendations for collection of human milk samples for surveillance and research on environmental chemical exposures in the US were published in 2002 (71;301). Peterson reviewed

methodological issues related to assessment of exposures to environmental contaminants from food (302;303).