

Portion Sizes from 24-Hour Dietary Recalls Differed by Sex among Those Who Selected the Same Portion Size Category on a Food Frequency Questionnaire

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ABSTRACT

Background Accounting for sex differences in food portions may improve dietary measurement; however, this factor has not been well examined.

Objective The aim of this study was to examine sex differences in reported food portions from 24-hour dietary recalls (24HDRs) among those who selected the same portion size category on a quantitative food frequency questionnaire (QFFQ).

Design This study was conducted with a cross-sectional design.

Participants/setting Participants (n=319) were members of the Hawaii–Los Angeles Multiethnic Cohort who completed three 24HDRs and a QFFQ in a calibration study conducted in 2010 and 2011.

Main outcome measures Portions of individual foods reported from 24HDRs served as the outcome measures.

Statistical analyses performed Mean food portions from 24HDRs were compared between men and women who reported the same portion size on the QFFQ, after adjustment for race/ethnicity using a linear regression model. Actual amount and the assigned amount of the selected portion size in the QFFQ were compared using one-sample *t* test for men and women separately.

Results Of 163 food items with portion size options listed in the QFFQ, 32 were reported in 24HDRs by ≥ 20 men and ≥ 20 women who selected the same portion size in the QFFQ. Although they chose the same portion size on the QFFQ, mean intake amounts from 24HDRs were significantly higher for men than for women for “beef/lamb/veal,” “white rice,” “brown/wild rice,” “lettuce/tossed salad,” “eggs cooked/raw,” “whole wheat/rye bread,” “buns/rolls,” and “mayonnaise in sandwiches.” For men, mean portions of 14 items from the 24HDRs were significantly different from the assigned amounts for QFFQ items (seven higher and seven lower), whereas for women, mean portions of 14 items were significantly lower from the assigned amounts (with five significantly higher).

Conclusions These sex differences in reported 24HDR food portions—even among participants who selected the same portion size on the QFFQ—suggest that the use of methods that account for differences in the portions consumed by men and women when QFFQs are quantified may provide more accurate absolute dietary intakes.

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IN NUTRITIONAL EPIDEMIOLOGY, FOOD FREQUENCY questionnaires (FFQs) and 24-hour dietary recalls (24HDRs) are the most frequently used tools to assess an individual's dietary intake.^{1,2} A quantitative FFQ can provide estimates of long-term intake (typically 6 months to 1 year) but is less detailed concerning characteristics of individual foods than a 24HDR.²⁻⁶ Intake estimates from FFQs invariably differ from the true intake values, largely because of inaccurate long-term recall and difficulty in estimating average frequency of consumption and portion size.⁷ A single 24HDR obtained by a well-trained interviewer can provide

accurate, quantitative dietary intake information covering a 24-hour period.^{3,8} Although 24HDRs are generally more accurate than FFQs, some measurement error remains, usually underreporting of foods eaten, which can result in lower energy intake estimates.⁹

Portion size information is required to obtain quantitative data from FFQs.^{4,10} Methods of quantifying portion sizes for an FFQ have varied and include a single standard portion size, such as a commonly used household unit, with the respondent choosing the frequency for that portion; multiple categories such as small, medium, and large; and a description by

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the individual of his or her own portion sizes.^{4,10} In reviews of 227 validation studies from 30 different countries, with most (102) originating in the United States, reported correlation coefficients between FFQs and other dietary measures, such as 24HDRs or dietary records, were higher when individuals were able to describe their own portion sizes.^{10,11} Methods of estimating portion sizes more accurately for target populations have included color photographs of food items^{12,13}; age- and sex-specific portion size categories⁵; and adaptation of locally available portion sizes.¹⁴

Men's and women's portion sizes have been compared in several studies.^{15,16} In a previous study conducted with 151 university students in the United Kingdom, men reported significantly larger portions of six of the 12 test foods (eg, "peas," "rice," "new potatoes," "tikka masala and rice," "pasta and sauce," and "beef lasagna") compared with women.¹⁵ In a study from the National Diet and Nutrition Survey of British adults aged 19 to 64 years (n=1,519), researchers reported that median intakes of 24 of 30 food groups (eg, "rice and pasta," "breakfast cereals," "egg and egg dishes," "meat dishes," "meat products," "alcoholic beverages") were higher for men than for women; six food groups did not show significant differences, including "low-fat milks," "yoghurts," "vegetables," "fruits, juices, and nuts," "fish," and "beverages."¹⁶ These results support efforts to better reflect the usual portion size in FFQs and to discuss how men and women may perceive usual portion sizes differently.

The objective of this study was to examine sex differences in food portions reported on 24HDRs among those who selected the same portion from several portion size categories in a quantitative food frequency questionnaire (QFFQ).

METHODS

Study Design and Participants

The Multiethnic Cohort (MEC) in Hawaii and Los Angeles was established between 1993 and 1996 to study the associations of lifestyle and genetic factors with cancer and other chronic diseases. Details of the study have been described previously.¹⁷ The cohort consisted of 215,251 men and women, aged 45 to 75 years at the time of recruitment, who were mostly from five race/ethnic groups: African American, Native Hawaiian, Japanese American, Latino, and non-Hispanic white. At baseline, the cohort participants completed a 26-page self-administered questionnaire including demographic factors, QFFQ, lifestyle behaviors, and a medical history, family history of cancer, and reproductive history for women. The primary sampling frame for the MEC was driver's license files for Hawaii and California, and participants were broadly representative of the target populations based on comparison of education and marital status with 1990 census information for these populations.¹⁷ Between 2003 and 2007, which was approximately 10 years from the baseline, the 26-page questionnaire was repeated. For the purposes of this study, the first QFFQ administered is abbreviated as QFFQ1, and the second QFFQ administered is abbreviated as QFFQ2.

Participants in the present study were recruited from a calibration study of the MEC QFFQ2. Details of the calibration study of the MEC QFFQ2 have been described previously.¹⁸ The goal was to recruit at least 300 participants in total, with at least 30 participants from each of the 10 sex-ethnic

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Research Question: Are there sex differences in food portions on 24-hour dietary recalls (24HDRs) among those who select the same portion size on a quantitative food frequency questionnaire (QFFQ)?

Key Findings: This cross-sectional calibration study included 319 men and women from the Hawaii–Los Angeles Multiethnic Cohort. Of the 163 food items with portion size options listed in the QFFQ, 32 items that were also reported in up to three 24HDRs by ≥ 20 men and ≥ 20 women were further examined. For those who chose the same portion size on the QFFQ, mean intake amounts from 24HDRs were significantly higher for men than for women for eight items ($P < 0.05$).

group categories in the MEC. From 2010 to 2011, MEC participants aged 56 to 80 years who indicated interest during a recruitment call were mailed either the randomly assigned QFFQ1 or QFFQ2 with a consent form. After return of the assigned QFFQ and the signed consent form, three unannounced 24HDRs were administered by telephone over a 1-month period. Two weeks after the recalls were completed, the other QFFQ (ie, QFFQ1 or QFFQ2) was mailed to participants. Only data obtained from administration of the QFFQ2 were used in these analyses. A total of 357 participants completed at least one 24HDR, and a total of 326 participants also completed QFFQ2, which was randomly assigned to be administered either before or after the 24HDRs. The final sample for this analysis included 319 participants who completed at least one 24HDR (3 days, n=314; 2 days, n=4; 1 day, n=1) in addition to the QFFQ2. The calibration study protocol was approved by the institutional review boards at the University of Hawaii and the University of Southern California.

Dietary Assessment: QFFQ and 24HDRs

The baseline QFFQ1 was developed based on 3-day food records collected from approximately 60 men and women, aged 45 to 75 years, from each of the five main race/ethnic groups.¹⁷ The food items in the QFFQ1 represent the minimum set that accounts for at least 85% of macronutrients and important micronutrients in each race/ethnic group.¹⁷ In addition, specific food items uniquely associated with the traditional diets of a particular group were included, regardless of their contribution to nutrients (eg, ham hocks for African Americans; tofu and salted fish for Japanese Americans; tamales for Latinos).¹⁷ More than 180 items were listed in the QFFQ1 with eight frequency categories for foods (ranging from "never or hardly ever" to " ≥ 2 times a day") and nine frequency categories for beverages (ranging from "never or hardly ever" to " ≥ 4 times a day"). Most items had three choices of portion size (in some instances, two or four).¹⁷ In a substudy, the energy-adjusted correlations between the QFFQ1 and three nonconsecutive unscheduled 24HDRs were 0.55 to 0.74.¹⁹ The QFFQ2 was updated with modest changes, generally in the design, the addition of newer foods (eg, fortified beverages), and additional examples given for each food item. In the present study, portion-

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