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Evaluation of a Group Administered 24-Hour Recall Method for Dietary Assessment

Abstract
A group administered 24-hour food recall was developed by the Expanded Food and Nutrition Education Program of Texas to expedite dietary assessment of clients. The study reported here evaluated the group recall and an individual recall method. Data for one meal collected with the use of dietary recalls, either group of individual, were compared to observational data. Results suggest that the group recall may be at least as effective as the individual recall to estimate dietary intakes of subjects. The group recall method could be used by programs such as EFNEP to simplify and expedite dietary assessment of clients.

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Introduction

The Expanded Food and Nutrition Education Program (EFNEP) provides food and nutrition education to limited resource families. Typically, EFNEP uses individually administered 24-hour recalls (IARs), pre and post intervention, to evaluate the effectiveness of nutrition education lessons. However, this time-intensive procedure makes it difficult for program staff to meet the educational needs of clients and conduct accurate program evaluation. To maximize personnel time, EFNEP of Texas developed a group administered 24-hour recall (GAR) to expedite dietary assessment of adult clients (Suter, 1993).

While IARs are commonly used (Willett, 1998), the use of a GAR has only been reported in children (Farris, Frank, Webber, & Berenson, 1985). Thus, the study reported here evaluated both GARs and IARs compared to observed meals consumed by female food service workers, who served as surrogates for EFNEP clients.

Methods

The study involved meal observation and subsequent individual or group dietary assessment of subjects. Data were collected at nine university dining centers where subjects (female food service workers) were employed and ate meals. Subjects were targeted for this study because they were similar to Texas EFNEP clients in gender and income, and their meals could be observed. Approval to conduct this study was granted by the Institutional Review Board Human Subjects in Research, Texas A&M University. Enrollment was voluntary.

Research teams comprised of a Registered Dietitian and an undergraduate nutrition student spent two consecutive days at each dining facility. All members of the research team received training on interview, observation, and plate waste assessment protocols prior to data collection. Researchers conducting meal observation did not participate in individual or group assessment of subjects.

Day 1 of the study involved recruitment of subjects, collection of demographic and socioeconomic data, and meal observation. Researchers observed subjects consuming lunch at the dining center and then determined plate waste. Subjects knew they were being observed but did not know if they would complete an individual or group recall.

On Day 2, researchers returned to the dining facility to conduct individual or group recalls. Subjects were randomly assigned to a group or individual recalls based on their subject number. Following collection of all data, researchers provided free nutrition education information to subjects as an incentive for their participation.

Meal Observation and Plate Waste Assessment Methods

Meal observation is an objective standard against which other dietary assessment methods are compared (Mertz, 1992). Thus, meal observation served as the reference standard for evaluation of group and individual recalls. In the university dining centers, researchers observed a maximum of four subjects each and recorded food items and portion sizes selected by subjects. The size of the utensil used on the serving line helped researchers estimate initial food portion selected. Following the meal, researchers assessed plate waste to determine final food portions consumed (Baranowski et al., 1986). Subjects did not know that plate waste was evaluated.

Individual Recall Methods

A three-step multiple-pass recall was used for individual dietary assessment of subjects. Passes used in this study included a quick list, detailed description, and review (Guenther, DeMaio, Ingwersen, & Berlin, 1995; Guenther, DeMaio, Ingwersen, & Berlin, 1996). During the first pass, or quick list, subjects listed foods and beverages consumed in any order they chose for a specified 24-hour period. Next, during the detailed description, interviewers used probing questions to gather specific information about foods such as portion size, brand name, and preparation method. Food models and graduated measuring utensils were available to help subjects estimate food portion size. The final pass, or review, involved the interviewer reviewing the recorded information with the subject to check for accuracy. After each pass, the interviewer probed for additional foods or beverages consumed but not initially reported.

Group Recall Methods

The GAR involved the same three passes as described for IARs but modified slightly for a group setting. Subjects completed the first pass of the GAR by writing down all foods consumed (Guenther et al., 1995; Guenther et al., 1996). During the second pass, or detailed description, they recorded detailed information such as portion size, brand name, etc., for each food item. Subjects were encouraged to use the food models and measuring utensils to help them estimate portion size. To simulate probing questions used in individually administered recalls, a poster with seven questions was displayed (Figure 1). These questions were read aloud to subjects. During the final pass, or review, subjects evaluated their recalls for completeness.

GARs were administered by two members of the research team. Subjects assigned to GARs were sub-divided into groups of five and given oral instructions. They completed each pass together with each subject completing their own form. Both research team members were available to assist subjects with reading or writing and moved from subject to subject to answer questions, spot check recalls, and ensure that subjects were completing recalls according to the instructions.

Figure 1.
Questions Read Aloud and Displayed to Subjects During Group Administered Recalls

Foods and Drinks You Ate

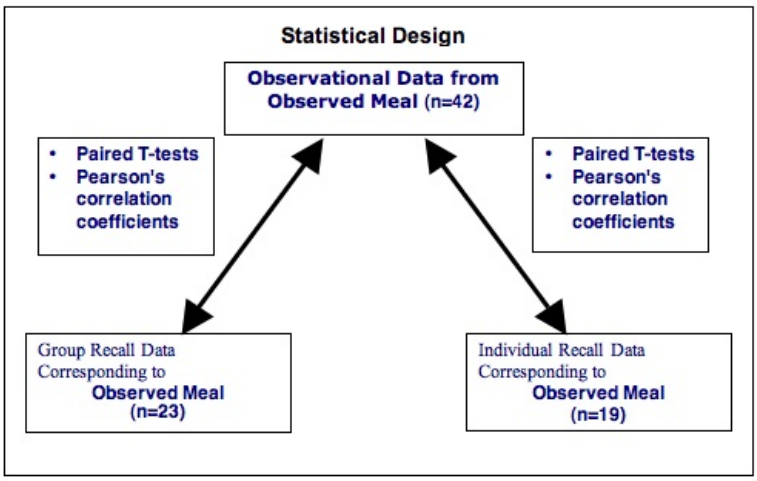
1. If you had any bread/biscuits/muffins, or other types of bread, did you put anything on them?
2. Did you add anything to your fruits or vegetables?
3. How thick were your slices of meat? How many slices did you eat? Did you add anything to your meat? If you had chicken, did you eat the skin?
4. If you drank or ate dairy products, what percent fat were they? (Whole, 2%, 1%, Skim)
5. If you ate a mixed dish, what were the main ingredients?
6. For tortillas, chips, or crackers, how many did you eat?
7. Were your foods regular, light, low-fat or fat free?

Nutrient and Statistical Analyses

Food Processor version 7.14 was used for nutrient analysis (The Food Processor, 2000) and SAS, version 6.12 (The SAS System for Windows, 1996) for statistical analyses. A p-value of ≤ 0.05 determined statistical significance.

Observational data served as the reference standard for evaluation of group and individual recalls (Figure 2). Statistical analyses compared observational and corresponding recall data (either individual or group administered) for the observed meal (Conway, Ingwersen, & Moshfegh, 2004; Lytle, Murray, Perry, & Eldridge, 1998). However, recall data for the entire 24-hour period were collected.

Figure 2.
Graphical Representation of the Study's Statistical Design



Paired t-tests were performed using both crude and log(e) transformed data sets. All data presented in this document were crude, as results were the same with either data set. Pearson's correlation coefficients were also computed (Lytle et al., 1993).

Differences in demographic and socioeconomic characteristics between groups of subjects were evaluated using t-tests or Chi-Square statistics where appropriate.

Results

Subject Characteristics

Forty-two of 47 eligible women completed the study. Some individuals did not participate, while others were present on Day 1 of the study, but not at the dining facility on Day 2. Only subjects for whom both recall and observational data were collected were used. Forty percent of subjects were Hispanic, 31% African-American, 26% White, and 3% other ethnicities. Using a weighted average, mean monthly household income was $1,173. Mean age of subjects was 41 ± 11.6 years. T-test and Chi-square statistics indicated no significant differences in demographic and socioeconomic characteristics (including income) between sets of subjects completing group or individual recalls.

Evaluation of the Group and Individual Recall Methods

Twenty-three women completed GARs and were observed consuming lunch. Paired t-tests showed no significant differences for energy or selected nutrients (Table 1). Pearson's correlation coefficients calculated between GARs and observational data ranged between 0.15-0.82 (Table 1), and nine were significant. Paired t-tests yielded no significant differences for energy or any nutrient (Table 2) among 19 subjects completing IARs. Correlation coefficients ranged from 0.01-0.92 (Table 2) for IARs, and 10 were statistically significant.

Table 1.
Means and Corresponding P-Values for T-tests with Pearson's Correlation Coefficients Calculated Between +Partial Group Recall Data and Corresponding Observational Data for Energy and Key Nutrients

Nutrient Variable	Group Recall n=23				
	Mean Reported Intake	Mean Observed Intake	++Paired T-Test P-Value	Correlation Coefficient	++Correlation Coefficient P-Value
Energy (kilocalories)	902.7	857.6	0.6951	0.4874	++0.0183
Total Carbohydrate (g)	99.9	104.5	0.7630	0.7025	++0.0002
Total Protein (g)	38.7	31.2	0.2931	0.3890	0.0666
Total Fat (g)	39.3	36.3	0.6332	0.4425	++0.0345
Total Fiber (g)	6.2	6.7	0.7132	0.6251	++0.0014
Cholesterol (mg)	127.7	116.2	0.6259	0.3942	0.0627
Total Vitamin A (µg RE)	2750.6	2860.5	0.9179	0.1460	0.5063
Thiamin (mg)	0.4	0.5	0.9093	0.8224	++0.0001
Riboflavin (mg)	0.6	0.5	0.1669	0.2036	0.3516
Niacin (mg)	7.5	7.2	0.8831	0.4936	++0.0167
Vitamin B6 (mg)	0.6	0.6	0.7446	0.3508	0.1008
Vitamin B12 (µg)	1.1	0.6	0.5993	0.2847	0.1880
Vitamin C (mg)	47.4	52.3	0.7685	0.2590	0.2328
Vitamin D (µg)	0.6	0.8	0.5894	0.6836	++0.0003
Vitamin E (mg)	3.9	4.8	0.4637	0.7426	++0.0001
Folic Acid (µg)	101.5	97.6	0.8127	0.4243	++0.0436
Calcium (mg)	598.2	356.3	0.3236	0.3094	0.1508
Iron (mg)	4.6	4.6	0.9473	0.3684	0.0837
Sodium (mg)	1706.9	1400.0	0.1627	0.2400	0.2701
+Recall data for observed meal only ++P-Value <0.05 indicates statistical significance					

Table 2.
Means and Corresponding P-values for T-Tests with Pearson's Correlation Coefficients Calculated between +Partial Individual Recall Data and Corresponding Observational Data for Energy and Key Nutrients

Nutrient Variable	Individual Recall n=19				
	Mean Reported	Mean Observed	++Paired T-Test P-	Correlation	++Correlation Coefficient P-

	Intake	Intake	Value	Coefficient	Value
Energy (kilocalories)	856.5	873.0	0.9456	0.2984	0.2146
Total Carbohydrate (g)	112.3	114.3	0.8894	0.4930	++0.0320
Total Protein (g)	33.4	35.3	0.6967	0.0989	0.6872
Total Fat (g)	33.5	32.6	0.8827	0.5318	++0.0191
Total Fiber (g)	5.1	5.4	0.7861	0.4046	0.0858
Cholesterol (mg)	116.7	119.5	0.9127	0.6038	++0.0062
Total Vitamin A (µg RE)	1936.8	1161.6	0.2107	0.1542	0.5284
Thiamin (mg)	0.6	0.6	0.9462	0.4366	0.0616
Riboflavin (mg)	0.5	0.5	0.7301	0.5785	++0.0095
Niacin (mg)	9.1	9.6	0.7986	0.1420	0.5820
Vitamin B6 (mg)	0.7	0.8	0.7012	0.4846	++0.0355
Vitamin B12 (µg)	0.9	1.1	0.4515	0.7715	++0.0001
Vitamin C (mg)	32.4	40.2	0.6574	0.9170	++0.0001
Vitamin D (µg)	1.1	0.8	0.5504	0.8011	++0.0001
Vitamin E (mg)	2.7	2.1	0.4988	0.0084	0.9728
Folic Acid (µg)	125.3	119.1	0.8786	0.4788	++0.0381
Calcium (mg)	99.8	200.8	0.4725	0.3936	0.0955
Iron (mg)	5.9	5.4	0.6740	0.4571	++0.0491
Sodium (mg)	1459.8	1256.2	0.4684	0.2710	0.2473
+Recall data for observed meal only ++P-Value <0.05 indicates statistical significance					

Discussion

Subject Characteristics

Subjects were racially diverse and similar to EFNEP clients in Texas. Typically, more than 90% of Texas EFNEP clients are female. Individuals of Hispanic origin comprised the greatest percentage of both subjects and typical EFNEP clients in Texas. In 2004, 78% of EFNEP clients were Hispanic, 11% were African American, and 8% were White (Expanded Nutrition Program, 2004).

The weighted, mean monthly income reported by subjects in this study was $1,173, a figure below the poverty line for a family of three (The 2006 HHS Poverty Guidelines, 2006). Typically, 70% of Texas EFNEP client families fall below the poverty line for the number of individuals in their home (Expanded Nutrition Program, 2004). Although not a direct comparison, these data suggest that both groups were low-income.

Evaluation of the Group Administered 24-Hour Recall

One objective of the study was to evaluate the accuracy of the GAR compared to an observed meal. Only one study previously reported the use of a group approach to 24-hour recalls. Farris, Frank, Webber, and Berenson compared nutrient estimates from individual recalls and group recall workbooks in children (1985). To our knowledge, evaluation of GAR in an adult population has not been previously reported.

Results of statistical analyses suggest that the GAR may be effective in assessing dietary intakes of the macronutrients, fiber, niacin, thiamin, vitamins D and E, and energy in these subjects.

Evaluation of the Individual 24-Hour Recall

Recent literature that addressed the relationship between observational and recall data on dietary intake of adults could not be found by our research team. In 1985, Karvetti and Knuts reported correlation coefficients between observational and recall data greater than 0.70 for cholesterol and vitamin C as noted in this study (1985). Among children, Lytle, Murray, Perry, and Eldridge reported a similar correlation coefficient (0.48) for fiber as found in this study (0.40) (1998). Emmons and Hayes reported correlation coefficients between 0.60 and 0.92 for energy and several key nutrients among 4th grade children (1973). These were greater than correlation coefficients observed in this study for most nutrients including energy.

Results of t-tests and correlation coefficients suggest the accuracy of the IAR in estimating intakes of certain nutrients, including carbohydrate, fat, vitamins B6, B12, C, D, riboflavin, and folate plus iron. However, these data suggest that the IAR may not be accurate to assess energy or protein as the correlation coefficients were not significant.

Comparison of Group and Individual Recalls

Conventional wisdom may suggest that an IAR would provide more accurate results than the GAR because the interviewer is able to fully utilize probing questions and provide one-to-one assistance to the interviewee.

Although both recall methods yielded results that were comparable to the data from observed meals, results of Pearson's correlation coefficients for the GAR suggest this method may be more accurate. For example, significant correlation coefficients for energy, carbohydrate, and fat greater than 0.60 were noted for the GAR. Data from IARs yielded only significant correlation coefficients for carbohydrate and fat.

One explanation for better reporting with the GAR is the effect of social desirability on subjects. Social desirability is defined as the propensity for an individual to portray an image that follows perceived social norms to avoid criticism when being tested (Hebert, Clemow, Pbert, Ockene, & Ockene, 1995). It is possible that in a group setting, social desirability is reduced as subjects may feel less scrutinized than during an individual interview and are therefore more truthful. However, the potential also exists for group assessment to impair truthful reporting. Further investigation is needed to evaluate the effects of group assessment on levels of social desirability among subjects.

Limitations of Results

One limitation of the research study is the small number of subjects. T-tests used to determine statistical differences between groups did not detect any significant differences. However, with a larger sample size, or repeat administrations of the recall, differences in means may have been detected. Furthermore, a larger sample size would have provided results that are more reliable for all statistical methods used.

Logistics of the study made obtaining a large number of subjects problematic. Food service supervisors found it difficult to allow time during the workday for employees to participate in the study. Some subjects were present on Day 1 for observation but not scheduled to work on the following day. However, the research team considered limitations associated with using these employees instead of actual EFNEP clients to be outweighed by the ability to obtain observational data.

Data analyses in the study used a single meal or a partial recall, which has been reported in other studies (Lytle et al., 1998). One concern with this type of analysis is that the full extent of under- or over-reporting present cannot be evaluated. For example, consumption of between meal snacks is commonly under-reported (Krebs-Smith et al., 2000) and would not be captured with observational data for one meal only. Additionally, all subjects ate the observed meal in a single setting with a finite number of food choices, as opposed to EFNEP clients who would be eating in multiple settings in which a larger number of food choices would be likely.

Valid quantitative and qualitative data can be obtained if meal observation is completed in an unobtrusive manner and subjects do not know they are being observed (Mertz, 1992). In the study reported here, subjects knew they were being observed. The possibility exists that subjects paid more attention to the foods they consumed or altered their dietary habits for the observed meal. However, the purpose of the study was not to capture usual dietary habits of these individuals, but to evaluate the accuracy of the group and individual recall methods. Therefore, modified dietary habits of subjects were not a great concern in this study. Additionally, because subjects completing both group and individual recalls were observed, whatever bias existed was present for both groups of subjects.

Although subjects were demographically similar to Texas EFNEP clients, they were food service workers and may have been able to estimate portion sizes more accurately than other individuals through their use of structured serving sizes on serving lines and in food preparation. The study did not explore the possibility of this bias, and no studies were found that specifically assessed how accurately food service workers estimate food portions. One study reported that Women, Infants, and Children (WIC) clients (similar to subjects) could not accurately estimate portion sizes

(Webb & Yuhas, 1988).

A five-step multiple-pass dietary assessment method has been validated and used in national surveys (Conway, Ingwersen, Vinyard, & Moshfegh, 2003). Conway, Ingwersen, Vinyard, and Moshfegh describe the use of the five-step multiple pass method with which Food Model Booklets were used to improve portion size estimates of consumed foods (2003). Testing of the five-step multiple-pass method as part of a GAR with EFNEP clients may show improvements in the correlations between observed and reported recalls compared to the three-step multiple pass method used in this study.

Conclusions

In conclusion, results comparing IARs and GARs to observed intake for one meal suggest that the GAR may be at least as effective in assessing intakes of energy, the macronutrients, and certain micronutrients as the IAR. Although these results were encouraging, further studies of the GAR are needed.

The GAR could be used to expedite dietary assessment of clients participating in nutrition education programs.

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References

Baranowski, T., Dworkin, R., Henske, J. C., Clearman, D. R., Dunn, J. K., Nader, P. R., et al. (1986). The accuracy of children's self-reports of diet: Family Health Project. *Journal of the American Dietetic Association,* 86, 1381-1385.

Conway, J. M., Ingwersen, L. A., Vinyard, B. T., Moshfegh, A. J. (2003). Effectiveness of the US Department of Agriculture 5-step multiple-pass method in assessing food intake in obese and nonobese women. *American Journal of Clinical Nutrition,* 77, 1171-1178.

Conway, J. M., Ingwersen, L. A., Moshfegh, A. J. (2004). Accuracy of dietary recall using the USDA five-step multiple-pass method in men: An observational validation study. *Journal of the American Dietetic Association,* 104, 595-603.

Emmons, L., & Hayes, M. (1973). Accuracy of 24-hr. recalls of young children. *Journal of the American Dietetic Association,* 62, 409-414.

Expanded Nutrition Program. (2004). *EFNEP report for Texas (FY2003-2004).* College Station, TX: Texas Cooperative Extension.

Farris, R. P., Frank, G. C., Webber, L. S., & Berenson, G. S. (1985). A group method for obtaining dietary recalls of children. *Journal of the American Dietetic Association,* 85, 1315-1320.

The Food Processor (Version 7.14) [Computer software and manual]. (2000). Salem, OR: ESHA Research.

Guenther, P. M., DeMaio, T. J., Ingwersen, L. A, & Berlin, M. (1995, January). *The Multiple-pass approach for the 24-hour recall in the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996.* Presented at the 2nd International Conference of Dietary Assessment Methods, Boston, MA.

Guenther, P. M., DeMaio, T. J., Ingwersen, L. A., Berlin, M. (1996). The multiple-pass approach for the 24-h recall in the Continuing Survey of Food Intakes by Individuals [Abstract]. *FASEB Journal,* 10, A198.

The 2006 HHS Poverty Guidelines, Fed. Reg. 71, 3843–3849 (Jan. 24, 2006).

Hebert, J. R., Clemow, L., Pbert, L., Ockene, I. S., & Ockene, J. K. (1995). Social desirability bias in dietary self-report may compromise the validity of dietary intake measures. *International Journal of Epidemiology,* 24, 389-398.

Karvetti, R. L., & Knuts, L. R. (1985). Validity of the 24-hour dietary recall. *Journal of the American. Dietetic Association,* 85, 1437-1442.

Krebs-Smith, S. M., Graubard, B. I., Kahle, L. L., Subar, A. F., Cleveland, L. E., & Ballard-Barbash, R. (2000). Low energy reporters vs. others: a comparison of reported food intakes. *European Journal of Clinical Nutrition,* 54, 281-287.

Lytle, L. A., Murray, D. M., Perry, C. L., & Eldridge, A. L. (1998). Validating fourth-grade students' self-report of dietary intake: results from the 5 A Day Power Plus program. *Journal of the American Dietetic Association,* 98, 570-572.

Lytle, L. A., Nichaman, M. Z., Obarzanek, E., Glovsky, E., Montgomery, D., Nicklas, T., et al. (1993). Validation of 24-hour recalls assisted by food records in third-grade children. The CATCH Collaborative Group. *Journal of the American Dietetic Association,* 93, 1431-1436.

Mertz, W. (1992). Food Intake Measurements: Is there a "gold standard"? *Journal of the American Dietetic Association,* 92, 1463-1465.

The SAS System for Windows (Version 6.12) [Computer software and manual]. (1996). Cary, NC: SAS Institute, Inc.

Suter, C. B. (1993). *The 24-hour food recall in the EFNEP Evaluation/Reporting System: A programmed learning guide for paraprofessionals in the Expanded Nutrition Program.* College Station, Texas A&M University, Texas Cooperative Extension.

Webb, C. A., & Yuhas, J. A. (1988). Ability of WIC clientele to estimate food quantities. *Journal of the American Dietetic Association,* 88, 601-602.

Willett, W. C. (1998). *Nutritional epidemiology* (2nd ed.). New York: Oxford University Press.