

Researchers Produce Innovation in Dietary Recall

Some folks go to great lengths to remember important anniversary dates and tasks. But many find it surprisingly difficult to remember what foods they ate just yesterday.

The ARS Food Surveys Research Group (FSRG) has developed a method for achieving nearly total recall—at least for what’s been eaten. The 30-member group is part of the Beltsville (Maryland) Human Nutrition Research Center.

The group’s mission is to plan, design, coordinate, and manage the U.S. Department of Agriculture’s nationwide food surveys. Before 2002, this included the well-known Continuing Survey of Food Intakes by Individuals, among others. The FSRG has now produced an innovative survey instrument, called the Automated Multiple Pass Method (AMPM), which helps people remember and report the foods they ate over 24 hours. It consists of a specialized software program, operated by highly trained interviewers. The method is now the primary instrument used to collect dietary food intake data from individuals sampled in the United States in national surveys.

“This finely tuned instrument helps ensure that we are using the best possible method to collect accurate information on what we eat in America,” says nutritionist Alanna Moshfegh, who heads FSRG. “Today, that information is more important than ever. About 60 percent of the U.S. population is overweight or at risk for obesity.”

AMPM is now the cornerstone of the FSRG’s Dietary Intake Data System—an overarching infrastructure of computer programs and databases that serves as the backbone for the federal government’s annual national survey known as “What We Eat in America.”

PEGGY GREB (K9308-3)



A new computerized interview process developed by the ARS Food Surveys Research Group prompts nutritionist Alanna Moshfegh to ask survey respondents about “forgotten” foods. The mounds help respondents estimate portion size.

From Paper and Pen to Automation

From 1994 to 1998, the survey of food intake was conducted in person, by an interviewer using paper and pencil to record a respondent’s replies using a three-step method. During one step, respondents were asked to recall, in chronological order, the foods they’d consumed the previous day.

Seven years ago, FSRG began planning the transition from paper and pencil to computer-assisted interviewing instruments. The group first identified key strengths and weaknesses of the old method. They also talked with former interviewers to solicit feedback. From there, several options were evaluated, based on in-depth interviews with volunteers. The researchers learned that the respondents’ ability to recall dietary information might improve if they were not required to report foods eaten in chronological order.

“With the new five-step system, we start by encouraging people to tell us about the foods they remembered eating the day before in any order they wish,” says Moshfegh. “We wanted to take the burden of reporting in a specific order away from the respondents, so their minds could be free to reflect on the foods they’d actually eaten. At this point, a rapport is developing between the respondent and the interviewer.”

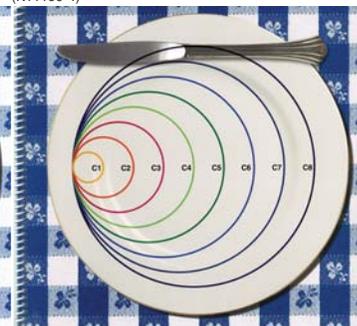
The second step involves probing the respondent’s mind for forgotten foods. Carefully crafted questions, embedded with word triggers and probes, ignite memories of potentially forgotten foods eaten. During the third step, answers already given are readdressed in the context of an “eating occasion,” such as breakfast, snack, or lunch, as well as a time of day. For example, the interviewer will ask, “What would you call that eating occasion?”

(K11190-2)



This two-dimensional drawing represents foods that mound on a plate, such as casseroles, vegetables, and rice. The plate and knife provide a size reference.

(K11190-4)



Respondents use this two-dimensional drawing to estimate the portion size.

Today, information on food intake is more important than ever. About **60 percent** of the U.S. population is overweight or at risk for obesity.

The five-step system was designed so that respondents are more in control during the first three steps. The fourth step is reserved for more difficult, detail-oriented questions, carefully executed by the interviewer after having developed a rapport, to increase the possibility of eliciting a thoughtful response. The fifth step provides one last opportunity to remember foods that were consumed.

In 1999, FSRG pilot-tested its new automated system by surveying 800 people, randomly chosen, nationwide. Those agreeing to participate were mailed visual aids for describing specific quantities of foods eaten. These included the *USDA Food Model Booklet*, measuring cups and spoons, and a ruler, to help respondents estimate the amounts of various foods eaten.

“The pilot study showed us that AMPM could be successfully used for collecting data over the telephone and that it could perform as well as, if not better than, the three-step method using paper and pencil,” says Moshfegh.

The Long Road to Validation

Late last year, FSRG completed the data-collection phase of a large-scale human research study designed to measure the effectiveness of AMPM. Preliminary research findings show the method enabled the first 100 volunteers to recall what they’d eaten to within 2 percent of the actual calories used.

The FSRG started planning the AMPM validation study at the same time it started producing the automated instrument. “Gearing up to process 525 volunteers onsite—in a way that would ensure scientific integrity with the least possible disruption to the volunteers’ lifestyles—took considerable time and resources,” says Moshfegh. “It’s the largest human research study we’ve conducted here.”

The researchers used a series of biochemical and physiological tests to support their ability to estimate the actual calories that volunteers consumed during the study and to assess other health indicators.

Biological samples, including blood, urine, saliva, and fat, were taken from volunteers. Tiny test tubes called cryovials were used to store each volunteer’s samples. “We used about 52,000 cryovials for the entire study,” says Moshfegh.

The researchers outfitted volunteers with a tiny motion detector worn around the waist to measure total daily activity, which could be related to calories burned. They measured the amount of oxygen volunteers consumed while breathing under a large, Plexiglas canopy to determine calories burned during rest. And they measured volunteers’ heart rates to assess their fitness levels during physical exercise. Each volunteer also consented to a full body scan to assess body composition and bone density.

One of the most important metabolic indicators was measured by giving the volunteers a drink of water with two natural isotopes added. This “doubly labeled” water has slightly



STEPHEN AUSMUS (K11188-1)

Using serving-size aides, nutritionist Grace Omolewa-Tomobi, left, helps a study participant recall food portions.

more mass than regular water, so it can be detected in body fluids by sensitive instruments as it’s eliminated. The turnover rate of the special water allowed researchers to calculate how many calories each volunteer actually burned over the 2-week study period.

Keeping It Real

One of the group’s goals was to replicate, as much as possible, the food-intake survey experience in the real world. “I keep pretty busy, so I don’t always pay attention to what I eat,” says Michael McMenamin, a study participant. “When the interviewer took charge of the process, sometimes she’d ask questions about a particular eating occasion. That would remind me of a particular item I’d eaten earlier, which I’d forgotten to tell her. I found that the questions led me along a path that allowed me to continue the flow of the conversation. And so at times when I’d realize there was something I’d skipped telling her, I could easily add it in.”

Another participant, Robert Ingwersen, says he’s generally conscientious about the foods he eats and rarely has difficulty remembering them later. “I usually don’t do well on the phone, but because of the way the interview was conducted, I was comfortable,” he says.

The AMPM validation study has created a large database on diet, energy expenditure, weight status, body composition,



Nutritionist Karen Spears, left, prepares to measure Ayanna Smith's heart rate after vigorous exercise.

physical activity, fitness, and biochemical indices of diet and health of the 525 adult participants. The study's large core of data may be used as the foundation for future diet and health studies. FSRG will continue analyzing the data over the next year.

A National Role

Nearly 50 years ago, Congress mandated that a continuing survey be conducted periodically to collect statistical data about the current dietary intake and health of people in the United States. That survey is called NHANES (National Health and Nutrition Examination Survey), and it's conducted by the U.S. Department of Health and Human Services.

In 2002, AMPM was first used to collect the dietary intake component of the national survey. "FSRG not only produced the AMPM, but we are also responsible for its implementation as the cornerstone for dietary intake collection within NHANES," says Moshfegh.

After collection during the national survey, AMPM data are sent back to FSRG for processing, analysis, and reporting. The resulting information is used by various public and private

groups as the basis for conducting in-depth studies. Those analytical studies in turn fulfill specific health-related goals and influence public policy to improve the health of the U.S. population, including food assistance and education programs.

"With chronic diseases and other health conditions directly related to nutrition and dietary intake, it's critical that we are able to accurately assess diets," says Moshfegh. "It's also important so that we can provide the right guidance and information to help Americans change their eating habits to be more healthy. That ultimately will improve their quality of life."—By **Rosalie Marion Bliss, ARS.**

This research is part of Human Nutrition, an ARS National Program (#107) described on the World Wide Web at www.nps.ars.usda.gov.

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To estimate calories burned during rest, exercise physiologist David Paul measures gases expelled by Ernie Goins in his breath.