

Nutrition Assessment Module 5

Course instructor: Dr. Sherzad Ali Ismael

Professor of Community Medicine & Public Health, MBChB, FIBMS/ CM

Email: sherzad.ali@tiu.edu.iq

References: Lee RD, Nieman DC. Nutritional assessment. 6th ed. New York, NY: McGraw-Hill; 2013.

Lecture Title: Techniques for Measuring Dietary Intake

I. Introduction: Why Measure Dietary Intake?

Measuring what people eat is a fundamental part of nutritional assessment. Accurate data are essential because unhealthful dietary patterns are major risk factors for chronic, non-communicable diseases such as cardiovascular disease, cancer, and type 2 diabetes.

In the Nutrition Care Process (NCP), dietary measurement is the first step (Assessment). It provides the foundation for making a diagnosis, planning an intervention, and monitoring a patient's progress. Nutritionists use the mnemonic "ABCD" to remember the four assessment methods: Anthropometric, Biochemical, Clinical, and Dietary.

II. Traditional Dietary Assessment Methods

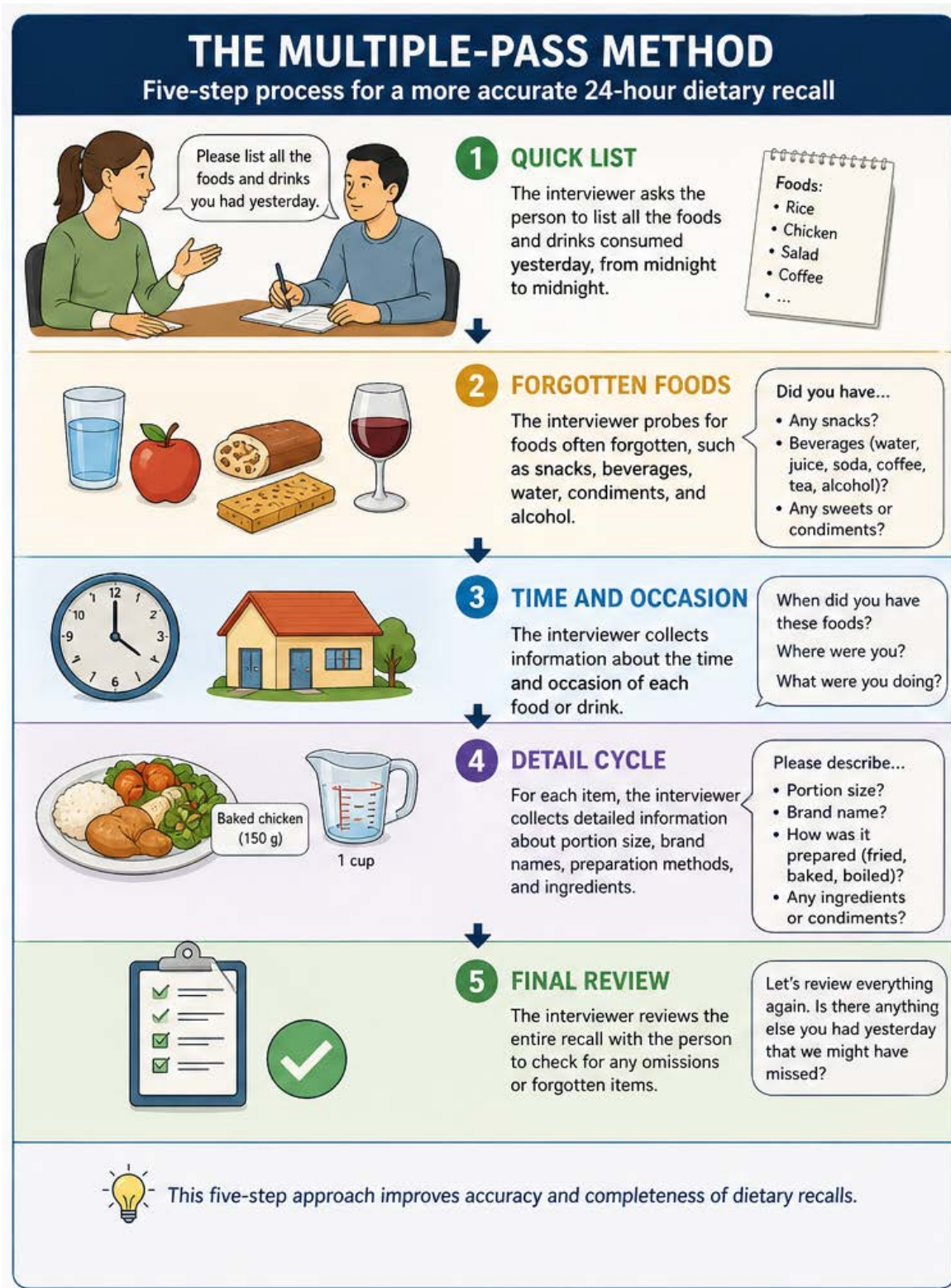
Dietary measurement techniques are generally categorized into two groups: those that measure daily food consumption and those that measure usual or average food consumption over a longer period.

1. The 24-Hour Recall

A trained interviewer asks the person to remember and describe all foods and beverages consumed in the last 24 hours.

- **The Multiple-Pass Method:** To improve accuracy, interviewers use a five-step process:
 1. **Quick List:** A simple list of foods eaten.
 2. **Forgotten Foods:** Probing for items like snacks, water, or alcohol.
 3. **Time and Occasion:** When and where the foods were eaten.
 4. **Detail Cycle:** Descriptions of portion sizes, brand names, and preparation methods (e.g., fried vs. baked).
 5. **Final Review:** A final check for any omissions.

- **Strengths:** Quick (20 minutes), inexpensive, and does not require the patient to be literate.
- **Limitations:** Relies on memory; one single day is not representative of a person's usual diet.



2. Food Records or Diaries

The person records all food and drink at the time of consumption for 1 to 7 days.

- **Estimated Food Record:** Portions are described using household measures like cups, tablespoons, or units (e.g., "1 medium apple").
- **Weighed Food Record:** All food is weighed on a scale before eating. This is more accurate but creates a higher burden on the user.
- **Strengths:** Does not rely on memory; provides detailed information about eating habits and moods.
- **Limitations:** Requires a highly cooperative and literate person; the act of recording may cause the person to change their diet.

FOOD RECORDS OR DIARIES

The person records all food and drink at the time of consumption for 1 to 7 days.

My Food Record – Day 1

Time	Food / Drink	Amount / Description	Mood
7:30 am	Oatmeal with milk	1 cup oatmeal, 1/2 cup milk	😊
10:00 am	Banana	1 medium	😊
1:00 pm	Grilled chicken, rice, salad	1 cup rice, 100 g chicken, 1 cup salad	😊
4:00 pm	Yogurt	1 cup	😊
6:30 pm	Fish, vegetables	120 g fish, 1 cup vegetables	😊
8:30 pm	Tea	1 cup	😊
—	Water	6 glasses (throughout day)	

TYPES OF FOOD RECORDS

Estimated Food Record

Portions are described using household measures like cups, tablespoons, or units.

Example: "1 medium apple", "1 cup rice".



Weighed Food Record

All food is weighed on a scale before eating. This is more accurate but creates a higher burden on the user.



STRENGTHS

- ✓ Does not rely on memory.
- ✓ Provides detailed information about eating habits, food choices, portion sizes, and preparation methods.
- ✓ Can capture variations in diet and patterns over several days.
- ✓ Can include information about moods, activities, or symptoms alongside meals.

LIMITATIONS

- ✗ Requires a highly cooperative and literate person.
- ✗ Time-consuming and may be burdensome.
- ✗ The act of recording may cause the person to change their diet (Hawthorne effect).
- ✗ Underreporting or inaccurate estimation of portions may still occur.

TIPS FOR SUCCESSFUL FOOD RECORDS



Record immediately after eating or drinking.



Use household measures or weigh food.



Photos can help improve accuracy of portions.



Record for 1 to 7 days, including weekends.



Include all foods, drinks, and beverages.

III. Measuring "Usual" Food Intake

These methods look at long-term patterns rather than what was eaten yesterday.

1. Food Frequency Questionnaires (FFQ)

A list of about 150 or fewer foods. The person indicates how often (daily, weekly, monthly) they consume each item.

- **Types:** Simple (frequency only), Semiquantitative (includes standard portion sizes), or Quantitative (user describes their typical serving size).
- **Screeners:** Short FFQs used to check for specific nutrients, such as the **MEDFICTS** questionnaire for dietary fat.
- **Strengths:** Modest demand on the user; useful for large research studies.






MEASURING “USUAL” FOOD INTAKE

These methods look at long-term patterns rather than what was eaten yesterday.

1 FOOD FREQUENCY QUESTIONNAIRES (FFQ)

A list of about 150 or fewer foods. The person indicates how often (daily, weekly, monthly) they consume each item.

How often do you usually eat the following foods?
(Circle one answer per food)

Food	Never or Less than 1/month	1-3 per month	1-2 per week	3-6 per week	1+ per day
 Apples	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
 Milk (low fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
 Chicken	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Rice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
 Salad	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

TYPES OF FFQ



Simple

Frequency of food items only.



Semiquantitative

Includes standard portion sizes.



Quantitative

User describes their typical serving size.

SCREENERS

Short FFQs used to check for specific nutrients, such as the MEDFICTS questionnaire for dietary fat.



STRENGTHS

- ✓ Modest demand on the user.
- ✓ Useful for large research studies.
- ✓ Captures usual intake over long periods.



LIMITATIONS

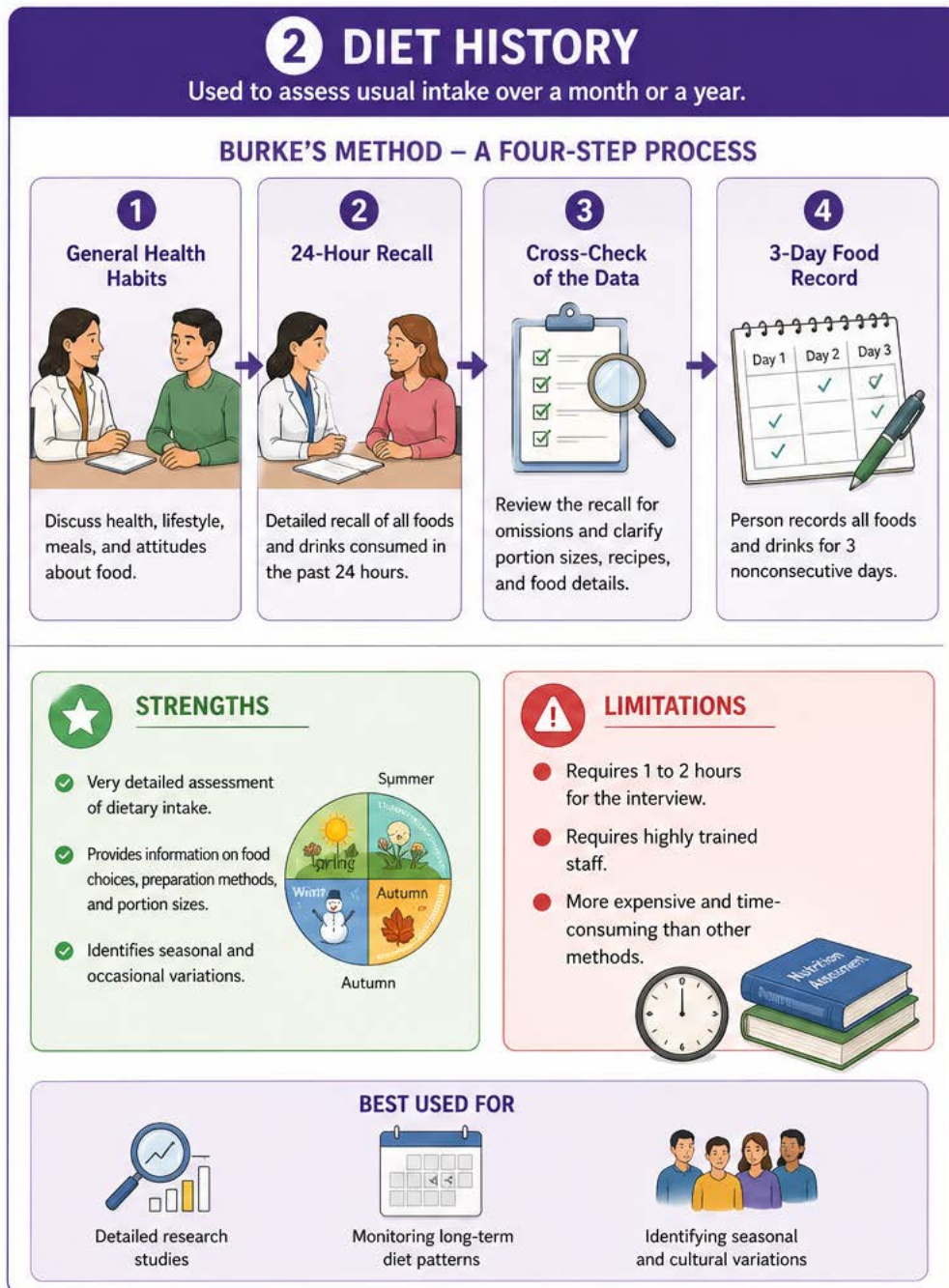
- Relies on memory and usual habits.
- May not reflect intake on specific days.
- Less accurate for foods eaten irregularly.



2. Diet History

Used to assess usual intake over a month or a year.

- **Burke's Method:** A four-step process involving general health habits, 24-hour recall, a cross-check of the data, and a 3-day food record.
- **Strengths:** Very detailed; identifies seasonal variations.
- **Limitations:** Requires 1 to 2 hours for the interview and highly trained staff.



IV. Group-Level and Specialized Methods

- **Duplicate Food Collections:** The person places an identical portion of everything they eat into a container for laboratory analysis. This is the most accurate for nutrient levels but very expensive.
- **Food Accounts:** Used in institutions (like schools or nursing homes) to track all food bought and consumed by the group.
- **Food Balance Sheets:** Used at a national level to estimate food availability per person. It subtracts exports and non-food use from the total national food supply.

V. Technological Innovations

Technology is making dietary assessment faster and more accurate:

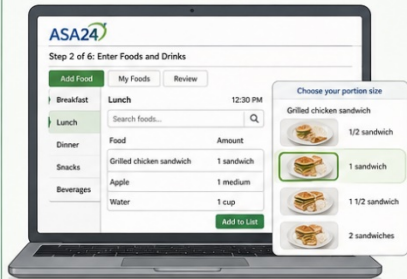
- **ASA24:** An Internet-based tool that allows people to complete their own 24-hour recalls with visual aids for portion sizes.
- **Digital Imaging:** Users take a photo of their plate before and after eating. Researchers use **fiducial markers** (like a checkered card) in the photo to estimate volume and portion size.
- **Nutrient Databases:** Software like **NutritionCalc Plus** or **Nutritionist Pro** uses huge databases (like the USDA Standard Reference) to automatically calculate nutrients from food lists.

MODERN TOOLS FOR DIETARY ASSESSMENT

Technology makes it easier to collect accurate food intake data and analyze nutrients.

1 ASA24

An Internet-based tool that allows people to complete their own 24-hour recalls with visual aids for portion sizes.



STRENGTHS

- Guided, step-by-step recall.
- Includes photos of portion sizes.
- Built-in prompts to improve accuracy.
- Immediate data capture and storage.

LIMITATIONS

- Requires internet access and basic computer skills.
- Relies on the user's memory.
- May be less accurate for complex mixed dishes.

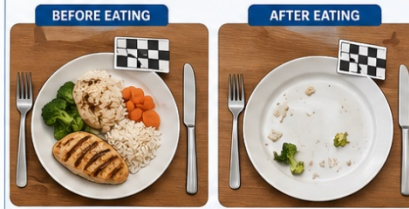


Best for: Large-scale studies, diverse populations, and remote data collection.



2 DIGITAL IMAGING

Users take a photo of their plate before and after eating. Researchers use fiducial markers (like a checkered card) in the photo to estimate volume and portion size.



HOW IT WORKS



Take a clear photo with fiducial marker.



Software analyzes image using the marker for scale.



Volume and portion size are estimated automatically.

STRENGTHS

- Objective and less relying on memory.
- Captures actual foods and amounts.
- Useful for free-living environments.

LIMITATIONS

- Requires smartphone/camera.
- Lighting, angle, and mixed dishes can affect accuracy.
- More complex data processing.



Best for: Real-world eating, children, weight management, and clinical or research settings.



3 NUTRIENT DATABASES

Software like NutritionCalc Plus or Nutritionist Pro uses huge databases (like the USDA Standard Reference) to automatically calculate nutrients from food lists.

The screenshot shows the NutritionCalc Plus software interface. It has a 'FOOD LIST' table and a 'NUTRIENT SUMMARY' table. The food list includes items like Oatmeal, Banana, Milk, Almonds, and Olive oil. The nutrient summary table lists various nutrients and their amounts and percentages of daily values.

FOOD LIST		NUTRIENT SUMMARY		
Food	Amount	Nutrient	Amount	% DV*
Oatmeal, cooked	1 cup	Energy (kcal)	520	26%
Banana	1 medium	Protein (g)	19	38%
Milk, 1%	1 cup	Total Fat (g)	18	23%
Almonds	1 oz	Carbohydrate (g)	71	24%
Olive oil	1 tbsp	Dietary Fiber (g)	7	28%
		Calcium (mg)	362	28%
		Iron (mg)	2.8	16%
		Potassium (mg)	820	17%

*Percent Daily Value



STRENGTHS

- Uses validated, comprehensive food composition data.
- Calculates many nutrients quickly and accurately.
- Consistent and reproducible results.

LIMITATIONS

- Accuracy depends on the food list quality.
- New or ethnic foods may be missing.
- Nutrient values are estimates, not direct measures.



Best for: Nutrient analysis, diet planning, research, and clinical nutrition.



HOW THESE TOOLS WORK TOGETHER



Collect accurate dietary data (ASA24 or Digital Imaging)



Convert food intake into nutrient data using nutrient databases



Analyze, interpret, and use results for research or personalized nutrition

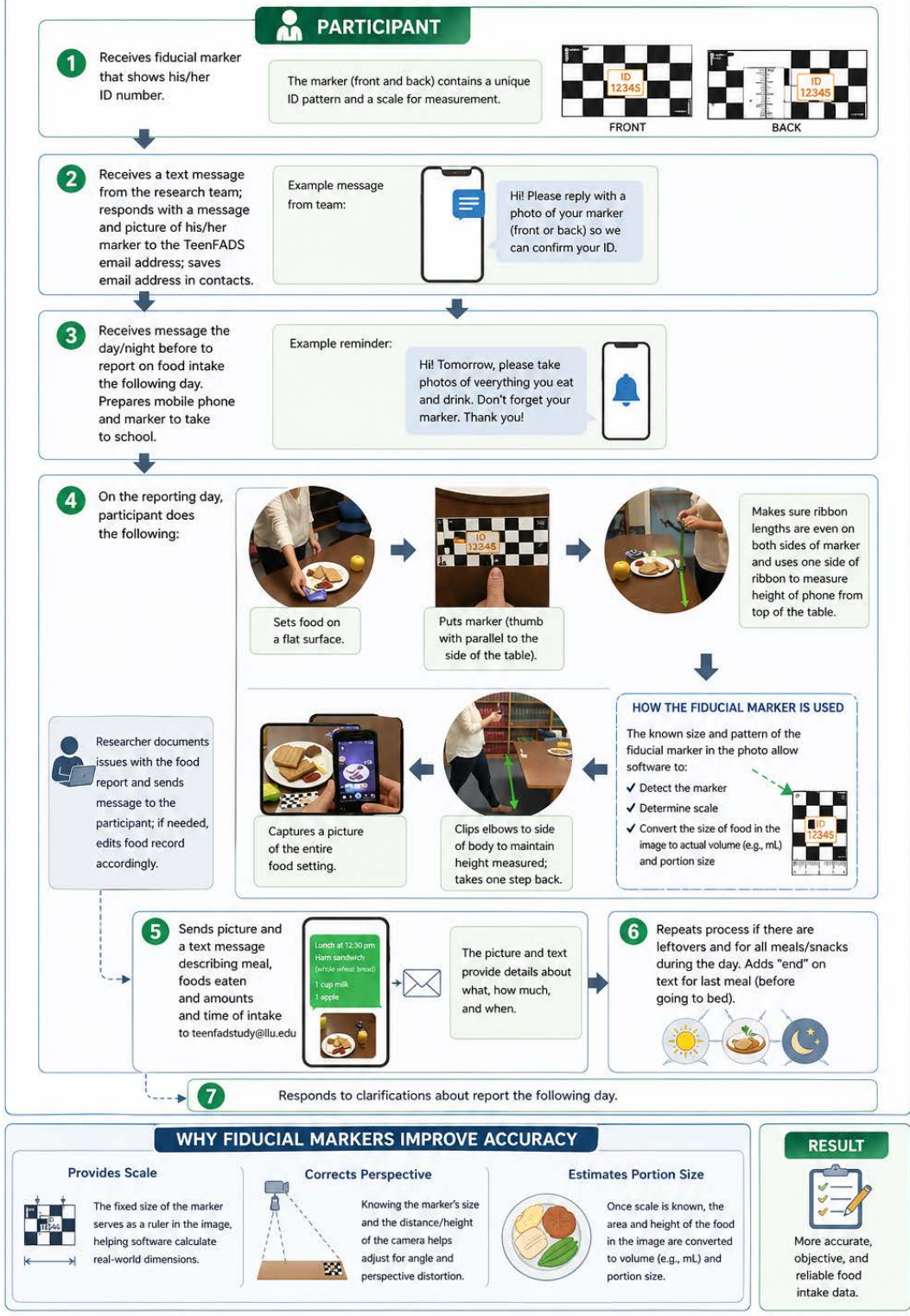


VI. Issues in Dietary Measurement

- Validity:** The ability of a tool to measure what it is intended to measure.
- Portion Size Estimation:** This is a major source of error. To help, nutritionists use food models (plastic food) or geometric shapes (circles and squares cut from cardboard) to help patients describe sizes.
- Underreporting:** People often report eating less than they actually do, especially regarding fats and sugars. This is sometimes called the "flat-slope syndrome": overestimating low intakes and underestimating high intakes.

FOOD INTAKE REPORTING USING FIDUCIAL MARKERS

A step-by-step process for accurate food portion estimation



End of Module 5