



# What and how much do we eat? 24-hour dietary recall method

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## Abstract

Diet, along with lifestyle factors, is an important determinant of the health status of an individual and of a community. Dietary assessment at the population level provides us with key information on the frequency and distribution of possible inadequate diets and/or nutritional status. It is also useful as input into the elaboration of food and nutrition policies aiming to improve dietary habits and the health status of a community. This article reviews the characteristics, advantages and limitations of the 24-hour dietary recall method (24hDR), which is one of the most widely used tools in nutrition epidemiology to identify food, energy and nutrient intake in national nutrition surveys, cross-sectional studies, clinical trials and cohort studies as well as in the evaluation of individual dietary intake and Total Diet assessment. To reduce the key factors associated with bias, the importance of previously trained interviewers is highlighted, as well as the role of support materials and the contribution of novel technologies.

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Key words: Nutrition assessment. 24-Hour dietary recall. Nutrition surveys. Dietary surveys.

Diet is an important risk factor for a wide range of chronic diseases. The assessment of dietary intake at the population level provides us with important information on the frequency and distribution of inadequate diets and/or nutritional status, as well as guiding the design of population based interventions targeting the improvement of dietary habits at the community level. Obtaining reliable data on food consumption (identifying the intake of energy and nutrients) is a key factor and necessary tool in health promotion and the prediction of disease risk, particularly for cardiovascular diseases<sup>1,2,3</sup>.

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## ¿QUÉ Y CUÁNTO COMEMOS? MÉTODO DE RECUERDO 24 HORAS

### Resumen

La dieta, junto con los estilos de vida, es un importante factor determinante del estado de salud del individuo y de la comunidad. La valoración de la ingesta dietética a nivel poblacional nos aporta información básica para conocer la frecuencia y la distribución de posibles desequilibrios dietéticos y/o nutricionales, así como para orientar el diseño de políticas nutricionales dirigidas a mejorar los hábitos alimentarios y los niveles de salud de una comunidad. En este artículo se revisan las características, ventajas y limitaciones del método de recordatorio dietético de 24h (RD24h), uno de los métodos más ampliamente utilizados en epidemiología nutricional para determinar ingesta de alimentos, energía y nutrientes, en encuestas nutricionales a nivel nacional, en estudios transversales, ensayos clínicos, estudios de cohortes y también en valoraciones individuales y en evaluación de Dieta Total. Se destaca la importancia, para reducir los principales puntos de sesgo, de la formación de los encuestadores, las herramientas de apoyo y las aportaciones de las nuevas tecnologías.

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Palabras clave: Valoración nutricional. Recordatorio dietético de 24h. Encuestas nutricionales. Encuestas dietéticas.

A wide variety of dietary survey methods exists, with each one presenting a series of advantages and disadvantages that must be taken into consideration based on the study aims, the degree of precision needed and the available resources. Of the numerous methods available, the 24-hour dietary recall (24hDR) is one of the most utilised. In Spain, as well as in many other countries, the majority of nutrition surveys, particularly in the adult population, have employed this method, in combination with others (food frequency questionnaires, diet records, diet history, etc.). The 24hDR has also been systematically utilised in the different editions of the NHANES (National Health and Nutrition Examination Study) in the USA.<sup>4,5,6</sup>

The 24hDR is a subjective, retrospective method that requires a direct face to face or telephone interview, and can also be self-administered using computer programmes (on line retrospective self-reported data). The

method consists of precisely recalling, describing and quantifying the intake of foods and beverages consumed in the 24 hour period prior to, or during the day before the interview, from the first intake in the morning until the last foods or beverages consumed at night (before going to bed or later, in the case of those who get up at midnight and eat and/or drink something). The information should describe the type of food and its characteristics (fresh, precooked, frozen, canned, preserved), the net quantity consumed, method of preparation, commercial brands, sauces, dressings (type of fats and oils used), condiments, liquids, multivitamin supplements and food supplements, as well as the time and place of consumption (at home, away from home), etc.

The information is collected via an open or predetermined questionnaire (paper format or digital format employing specially designed reliable software). The method requires diverse support instruments (examples of dishes, volumes and household measures, drawings, photographic models, three dimensional models, detailed recipe ingredients, etc). The estimated average interview time can vary between 20 to 30 minutes.

The method requires a trained interviewer and the elaboration of a detailed and thorough procedure protocol. A minimum of 2 to 5 24hDRs are needed (in common practice 2-3 are usually collected) to establish usual intake, depending on the study objectives, the nutrients of interest and the sample size, and optimally administered in distinct times of the year so as to capture seasonal variation. In population based studies, interviews are usually conducted in the subject's home and as such, facilitates the quantification of household measures, collect brand names and corroborate the composition of multivitamin/mineral and food supplements<sup>7,8</sup>.

### **The quality of information obtained is largely determined by 5 factors**

1. *Interviewee*: age, sex, educational and cultural level, degree of involvement with food and nutrition, recall capacity, etc.
2. *Interviewer*: prior training, specific training for the project, level of commitment, past experience.
3. Quality and adequacy of *interview support tools*.
4. *Coding system and computer software* that allows for the conversion of collected information into data that can be utilised in statistical programmes.
5. *Food and beverage composition table*.

### **Recommendations and procedures to reduce error and bias**

- Conduct interviews over seven days of the week (including weekends).

- Prefer direct face to face interviews (ideally in the subject's home).
- In our setting, it's important to detect seasonal intake (seasonal production and food preparation).
- Essential to have a thorough interviewer training programme and interview protocol. (know how to motivate the subject interviewed to participate, ask questions, assist in recall with influencing responses, identify quantities, foods and ingredients with agility, resolve unexpected events, etc.).
- Have available/elaborate interview support materials: photographs of various serving sizes, volumes, plates, foods, ingredients of recipes prepared food. The use of different sized models improves the reported answers.
- Data collection via specialised software that directly carries out codification improves the quality of information obtained, allows for increasing the number of food codes, reduces possible errors linked to manual coding and also saves time.
- Utilization of novel technologies for data collection and processing.

### **Advantages of the 24hDR<sup>7,8,9</sup>**

- Being a retrospective method, the subject's usual consumption is not altered.
- Serial recalls can estimate the usual intake at the individual as well as the community level.
- It's administration does not require so much time.
- High precision (capacity of the method to produce similar measures or results when the tools is repeatedly administered in one context). Improves with increased numbers of 24hDR administered in the same study subject (2-3 times).
- Elevated response rate.
- Can be administered to low literacy populations (via direct interviews).
- Validity (the extent to which the method or instrument measures what is supposed to be measured and is exempt of systematic errors). It is considered as a valid instrument for the assessment of energy and nutrients. To validate 24hDRs, the use of food records or other methods such as direct observation of actual consumption (weighed food records, doubly labelled water, filming, cameras, etc.) as well as certain biochemical parameters.

### **Limitations of the 24hDR**

- Extensive dependence on the recent memory of the study subject (not recommended for the elderly or subjects less than 12 years of age).
- Depends on interviewer capacity for describing ingredients, food preparation, dishes.

- One single 24hDR does not estimate usual intake. The planning of 2 or more 24hDRs complicates field work.
- Requires well trained interviewers, both for face to face and telephone administered interviews.
- Difficulty in precisely estimating “What, How and How much”.
- In general the 24hDR tends to underestimate intake, especially in the elderly and children.
- “Flat slope syndrome” or the tendency to overestimate low intakes and underestimate high intakes
- The quality of data obtained via interviews is frequently limited by the lack of adequate food composition databases.

### Digital vs. Paper & Pencil instruments

The majority of the latest generation technologies offer interesting tools for the process of evaluating dietary intake in epidemiological studies<sup>10,11, 12, 13, 14, 15</sup>.

The following highlights the advantages of digital instruments:

- Reduces interviewer bias.
- Reduces the time and cost during field work.
- Data collection and codification in real time.
- Automatic calculation of daily intake.
- Highly economic options of capturing food intake: on line (computer, tablets and smart-phone) tools.

New technologies provide us with many possibilities for assessing dietary intake in individuals and groups, although they are not free of certain limitations.

- High cost of programme design in the initial phases.
- High costs related to the acquisition of laptops, tablets...(online programmes and smart-phone applications are the most economic options).
- Methods are difficult to apply to certain population groups that aren't familiar with new technologies and are of a given age.
- Requires access to internet.
- The method still depends on the subject's recall capacity.

### Conclusion

Dietary intake is difficult to measure and a single instrument that is optimal for all settings does not exist as each method has its pros and cons or practical diffi-

culties that should be taken into account when selecting the instrument to be administered. Despite the interesting progress and the incorporation of innovative technology into dietary assessment methods, we still remain with some of the same flaws. As such, research groups continue recommending the combination of diverse methods, with the 24hDR being the most thorough, comprehensive and complete instrument that exists to date<sup>7,8,10</sup>.

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