Screeners and brief assessment methods

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Abstract

In the last two decades easy-to-use simple instruments have been developed and validated to assess specific aspects of the diet or a general profile that can be compared with a reference dietary pattern as the Mediterranean Diet or with the recommendations of the Dietary Guidelines. Brief instruments are rapid, simple and easy to use tools that can be implemented by unskilled personnel without specific training. These tools are useful both in clinical settings and in Primary Health Care or in the community as a tool for triage, as a screening tool to identify individuals or groups of people at risk who require further care or even they have been used in studies to investigate associations between specific aspects of the diet and health outcomes. They are also used in interventions focused on changing eating behaviors as a diagnostic tool, for self-evaluation purposes, or to provide tailored advice in web based interventions or mobile apps. There are some specific instruments for use in children, adults, elderly or specific population groups.

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Key words: Dietary assessment. Screening. Rapid assessment. Brief instruments.

MÉTODOS DE CRIBADO Y MÉTODOS DE EVALUACIÓN RÁPIDA

Resumen

En las dos últimas décadas se han desarrollado y validado instrumentos sencillos que permiten valorar aspectos concretos de la ingesta dietética o bien un perfil general que puede compararse con patrones dietéticos de referencia como la Dieta Mediterránea o bien con las recomendaciones de las Guías Alimentarias. Son instrumentos rápidos, sencillos y fáciles de utilizar por personal no especializado sin necesidad de un entrenamiento específico. Estas herramientas son de utilidad tanto en el ámbito clínico como en Atención Primaria o en la comunidad como instrumento de triage, como herramienta de cribado con el fin de identificar individuos o grupos de población con riesgo que requieran mayor atención o incluso se han utilizado en estudios para investigar entre aspectos concretos de la dieta y resultados de salud. También se utilizan en intervenciones sobre cambio de conductas alimentarias como herramienta diagnóstica o de autoevaluación, o para facilitar consejo personalizado en intervenciones a través de páginas web o de aplicaciones móviles. Existen algunos instrumentos específicos para su utilización en niños, en adultos, en ancianos o en grupos específicos de población.

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Abbreviations

CDC: Centres For Disease Control And Prevention’s.
CADET: Child And Diet Evaluation Tool.
CNQ: Child Nutrition Questionnaire.
DILQ: Day In The Life Questionnaire.
DINE: Dietary Intervention In Primary Care.

DSQ: Dietary Screener Questionnaire.
FEAHQ: Family Eating And Activity Habits Questionnaire.
HBSC: Health Behaviour In School-Aged Children.
FFQ: Food Frequency Questionnaires.
PRA: Participatory Rural Appraisal.
PREDIMED: Prevención con Dieta Mediterránea.
RRA: Rapid Rural Appraisal.
RFMMB: Risk Factor Monitoring And Methods Branch.
SNAPTM: Synchronised Nutrition And Activity Programme.

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Rapid Assessment Methods were designed by Chambers and colleagues in the 70s for use in rural communities in developing countries and were modified later in the 80s. These methods, Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA), based on qualitative evaluation methods, were developed to be used by fieldworkers in contexts with limited resources, lack of skilled trained personnel to conduct large surveys in order to identify problems and follow up, but where information is required for immediate action and decision adoption.

Data collected by these methods help to draw a situational analysis map, identify and prioritize problems as well as to identify at risk groups. However, short methods are not useful to detect individuals at risk who may need immediate intervention due to their physiological status, condition or any other circumstances. The rapid assessment questionnaires developed over the last decades have attempted to answer those needs.

Rapid assessment tools are described as questionnaires intended to identify key risk factors for malnutrition or inadequate consumption patterns for specific food groups. Based on these risk factors, appropriate algorithms are developed to compute scoring scales associated to each screening tool. Scores are usually categorized according to range levels in the scale and the subsequent corresponding appropriate actions or decisions to be adopted. Many of these instruments are designed in a user friendly format, so they can be used by nurses or social workers in their routine practice in Primary Health Care, in community settings for health promotion purposes and community interventions.

The time and resources available in clinical practice, especially in Primary Health Care, make it difficult to implement comprehensive nutritional assessments. In addition, healthcare professionals often are not particularly well trained and skilled in nutritional assessment methodology. Therefore, easy-to-use rapid assessment tools ready to be used by staff without a specific training or specialized qualification are highly valuable.

Nutrition screening tools had a major development in three main areas. On the one hand, in clinical practice to identify patients in situations that compromise their nutritional status and require an effective intervention either with a preventive or treatment aim, such as cardiovascular risk, cancer patients, candidates for certain surgery treatment patients or any other specific condition.

On the other hand, several tools have been developed for implementation in the elderly. Due to the specific physiological, clinical and socioeconomic characteristics associated with ageing processes, the elderly is an important at risk group and it is necessary to identify individuals who may be in situations vulnerable for malnutrition to provide them with adequate social and health care support.

Assessment of food habits is particularly interesting in childhood and adolescence to inform monitoring of adequate growth and development and for health promotion and nutrition education purposes. More recently new rapid assessment and self-evaluation tools have been developed in the context of health promotion interventions focused on modifying eating behaviours.

Table I summarizes the different types of screeners developed in recent years with some examples, scope, targeted population group and main characteristics.

**Short dietary assessment instruments**

For some research and/or public health purposes a full-length questionnaire is not practical. Therefore, brief assessments and screening tools have been developed, usually to assess just one or two nutrients or food groups. They generally ask about frequency of consumption but do not include portion size. This kind of tools are useful to identify individuals with a very low or high intake. Brief instruments can be simplified, targeted food frequency questionnaires (FFQ) or questionnaires that focus on specific eating behaviors other than the frequency of consuming specific foods.

Most of the focus in brief instrument development has been on fruits and vegetables and fats, but others have been developed for protein, calcium, sugar sweetened drinks and other food intake. Often, only 15 to 30 foods might be required to account for most of the intake of a particular nutrient. Food frequency type instruments to measure fruit and vegetable consumption range from a single overall question to 45 or more individual questions.

**Uses**

These instruments can be useful in situations that do not require either assessment of the total diet or quantitative accuracy in dietary estimates. For example, a brief diet assessment of some specific components might be used to screen large numbers of individuals and rapidly identify and focus attention on those subjects or groups at greatest need for intervention.

Brief instruments focusing on specific aspects of a dietary intervention have also been used to track changes in diet. However, it has been argued that responses to questions of intake that is directly related to intervention messages may be biased and that these instruments lack sensitivity to detect change. Use of a screener as the sole measure of change is not recommended when evaluating the intervention, because exposure to the intervention itself can create differential response bias in reporting in the intervention group relative to the control group.

Brief instruments of specific dietary components such as fruits and vegetables, food habits of particular interest such as breakfast consumption or specific food...
Screeners and brief assessment methods

Large studies such as National Health Surveys in many countries, the Health Behaviour in School-aged Children (HBSC) and other surveillance surveys include such instruments as well\(^2\). Brief instruments can also be used to examine relationships between some specific aspects of diet and other exposures\(^4\). Finally, some groups use short screeners to evaluate the effectiveness of policy initiatives\(^7\).

Brief instruments often combine food frequency questions and behavioural questions to assess multiple dietary patterns, even questions to reflect emotional eating and impulsive snacking behaviours. Some screeners have simplified answer options to reduce respondent burden by asking questions that require only Yes or No answers. The same approach has been used as a modification of the 24-hour recall. The instruments

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behaviours are often used for population surveillance. In the USA, the Risk Factor Monitoring and Methods Branch (RFMMB) has developed several short instruments that assess intake of fruits and vegetables, percentage energy from fat, fibre, added sugars, whole grains, calcium, dairy products, and red and processed meats which are used in the Centres for Disease Control and Prevention’s (CDC) Behavioural Risk Factor Surveillance System\(^2\). The Dietary Screener Questionnaire (DSQ) is one of the instruments developed by the RFMMB focused on the intakes of fruits and vegetables, dairy/calcium, added sugars, whole grains/fiber, red meat, and processed meat. The tool consists of 26-items which ask about the frequency of consumption in the past month of selected foods and drinks\(^8\).
present a pre-coded close-ended food list and ask whether the respondent ate that food item the previous day, sometimes including portion size questions61.

Adequate brief instruments can be used in estimating dietary intakes of components of food patterns, such as the Mediterranean dietary pattern or USDA food patterns. They can also be used in assessing adherence to Dietary Guidelines recommendations, estimating cost of healthy foods and diets34.

Diet related risks were identified as the top risk factor accounting for most attributable burden of disease in terms of percent disability-adjusted life years (DALYs) in Spain and in many other countries in 2012. A high body mass index was next and physical inactivity was the sixth risk factor. Evidence supports that a low consumption of fruit and vegetables, a trend to a positive energy balance due to a high energy intake and low physical activity levels alongside a sedentary lifestyle, low fiber intake and a high fat intake are among the main diet related risk factors associated to chronic disease and DALYs3.

A number of brief instruments have been developed and tested for screening purposes and behaviour change interventions. These have been particularly useful in interventions including self-evaluation, goal setting and tailored advice actions, either in a traditional format, website based or even in more recent interventions using new technologies, such as those implementing apps and serious games for mobile or tablet devices9, 10.

A recent review of studies investigating the relationship between the food environment and several dietary outcomes reported that in two thirds of the studies included in the review the dietary outcomes were assessed using a brief instrument, such as a screener or one or two items. The most commonly studied dietary components in such studies were fruit and/or vegetables; sugar sweetened beverages and fast food. The authors reported their concern about the potential bias in the estimates5.

Resulting estimates based on those questionnaires may be quantitative or qualitative, depending on the instrument.

Validity

Screeners are shorter and less detailed than a total dietary assessment, therefore less accurate. However, calibrating a screener against the more precise 24-hour recall can help ensure that a screener is providing the best and most accurate estimates possible. Many short questionnaires using a food frequency approach have been developed and compared with multiple days of food records, dietary recalls, complete FFQs, or biomarkers. Single-exposure abbreviated FFQs have been developed and tested for protein, calcium, iron, isoflavones, phytoestrogens, soy foods, folate, sugar snacks, heterocyclic aromatic amines, and alcohol11.

Some tools have been evaluated in cross-sectional general population studies. That is the case for the KIDMED questionnaire developed in Spain to assess adherence to the Mediterranean Diet, which was evaluated in the enKid population study. Other instruments have been validated in self-selected samples in intervention research12.

Estimates of intake from short dietary assessment instruments are not as accurate as those from more detailed methods. This kind of assessment instruments may be most useful for characterizing median intakes in a population; discriminating among individuals or populations with regard to higher vs. lower intakes; examining interrelationships between diet and other variables; and comparing findings from a smaller study to a larger population study24. However, short dietary assessment instruments generally are not useful for characterizing a population’s usual intake distribution. Such information is needed to estimate prevalence of intakes above or below a given level. They cannot be used either to accurately assess an individual’s intake and may not be appropriate to measure change in intervention studies34.

Validation studies of the CDC and 5-A-Day brief instruments to assess fruit and vegetable intake have suggested that they often underestimate actual intake, unless portion size adjustments are considered6,13,11. Following cognitive research findings, the revised version which included portion size questions was used in some studies suggesting better performance. However, results in community interventions were mixed. Fruit and vegetable consumption was significantly overestimated relative to multiple 24-hour recalls in some comparisons. Furthermore, the screener indicated change in consumption in both men and women while the 24-hour recalls did not show any2,6.

A 17 item fat screener was used as an initial screen for high fat intake in the Women’s Health Trial and in the CDC’s Behavioral Risk Factor and Surveillance System for nutritional surveillance. However, results in a sample of medical students showed that the screener substantially underestimated percentage energy from fat and was only modestly correlated (r = 0.36) with multiple 24-hour recalls. In samples of men participating in intervention trials, the screener was not as precise or as sensitive as complete FFQs3,11,14.

MEDFICTS (meats, eggs, dairy, fried foods, fat in baked goods, convenience foods, fats added at the table, and snacks) is a questionnaire developed to assess adherence to low-fat (<30% energy from fat) diets which asks about frequency of intake and portion size of 20 individual foods, major food sources of fat and saturated fat in the U.S. diet. The initial evaluation of MEDFICTS showed high correlations with food records. In additional cross-sectional studies, the MEDFICTS underestimated percentage energy from fat; it was effective in identifying individuals with very high fat intakes, but it was not effective in identifying individuals with moderately high fat diets or correctly
identifying those individuals consuming low-fat diets. In a longitudinal setting, positive changes in the MED-FICTS score have been correlated with improvements in serum lipids and waist circumference among cardiac rehabilitation patients.\(^{15}\)

A 20-item screener developed and tested in the German site of the EPIC study correlated with a complete FFQ. The validation of a 16-item percentage energy from fat screener in an older U.S. population showed correlations of 0.6 with 24-hour recalls, but variable performance in intervention studies.\(^{3}\)

Interventions are often designed to target specific food preparation or consumption behaviors, such as trimming the fat from red meats, removing the skin from chicken, or choosing low-fat dairy products. Many questionnaires have been developed in various populations to measure these types of dietary behaviors, and many have been found to correlate with fat intake estimated from other more detailed dietary instruments or with blood lipids.\(^{14}\)

The Eating Behaviors Questionnaire measures five dimensions of fat related behavior: avoid fat as a spread or flavoring, substitute low-fat foods, modify meats, replace high-fat foods with fruits and vegetables, and replace high-fat foods with lower-fat alternatives. An updated modified version was tested in African-American adolescent girls and correlated with multiple 24-hour dietary recalls. A subset of 30 items from the Sister Talk Food Habits Questionnaire developed for African-American women correlated with change in BMI as strongly as did the original 91 items.\(^{17}\)

Several multifactor short instruments have been developed and evaluated, many combining fruits and vegetables with fiber or fat components. Other short questionnaires assess additional components of the diet. Prime-Screen consists of 18 FFQ items asking about the consumption of fruits and vegetables, whole and low-fat dairy products, whole grains, fish and red meat, and sources of saturated and trans fatty acids. It also includes seven supplement questions. The average correlation with nutrient estimates from a full FFQ was 0.6. The 5-Factor Screener used in the 2005 National Health Interview Survey Cancer Control Supplement assessed fruits and vegetables, fiber, added sugar, calcium, and dairy servings.\(^{18}\)

**Brief assessment instruments for use in children**

Childhood and adolescence deserve special consideration. It is a key stage for the promotion and consolidation of food habits. Social changes, different ways of organizing family life as well as other factors are driving changes in eating habits and lifestyles in Spain as in many other countries.

Brief instruments are useful tools to identify individuals and groups who require further attention and intervention for involvement in behavior change strategies and interventions. The adapted version of the Healthy Eating Index for use among children and adolescents and the KIDMED questionnaire are examples of such tools targeted to this population group.

The USDA developed the Healthy Eating Index (HEI) with the aim of monitoring adherence to the Dietary guidelines for Americans. This index has been used in adults and children. Feskanich et al. validated and adapted version of the HEI to be used among children and adolescents (YHEI). The revised version consists of 13 components and a score ranging 0-100. Components 1 to 7 score 0-10; components 8 to 13 score a highest of 5.\(^{10}\)

YHEI components include: 1) Consumption of whole grains (2 or more servings a day score highest 10, and 0 servings / day score 0), 2) Vegetables and salads (3 or more servings score 10 points, 0 servings score 0), 3) Fruits (three or more servings score 10 points), 4) Dairy (3 or more servings score 10 points), 5) Ratio of protein foods (servings of chicken, fish, eggs, nuts, seeds and legumes, divided by the servings of beef, pork, lamb and offal, score the highest 10 for a ratio equal to or greater than 2), 6) Consumption of salty snacks, pastries and confectionery (0 per day score highest 10, and more or equal to 3 score the lowest 0), 7) Sugary drinks (same scoring that snacks), 8) Use of multivitamin supplements (Daily scores 5, never 0), 9) Margarine and butter (Never scores 5, 2 or more per day scores 0), 10) Fried foods away from home (Never scores 5, daily scores 0), 11) Visible animal fat (trim all fat scores 5, eat all fat scores 0), 12) Breakfast consumption (5 or more times a week scores 5, never scores 0) and 13) Family dinner (Daily scores 5 and never scores 0).

The KIDMED screener was designed to assess adherence to Mediterranean Diet in children and adolescents. The instrument was based on Kreeplus, a screener developed jointly by the Spanish Society of Community Nutrition and the Spanish Association of Pediatrics for use in Primary Health Care and Health Promotion settings as a tool to identify and monitor selected energy balance behaviours. The traditional pattern of DM includes a high consumption of fruits and vegetables, olive oil, fish, legumes, grains and nuts, and dairy, and promotes household food consumption. Conversely, snacks, and pastries, sweets or fast food are not characteristic elements of the DM. Therefore, KIDMED index was built from these premises. A KIDMED score below 4 is labelled low adherence to a Mediterranean Dietary Pattern. The scale highest score is 10.\(^{21}\)

Some of these instruments have been specially developed and tested to be implemented in behaviour change interventions targeted to children and adolescents, such as Pro Children aimed to increase consumption of fruit and vegetables in European 10-12 year-old children and other intervention projects.\(^{21}\)

In the UK and in other countries as well, a number of questionnaires have been developed for different purposes. Child and Diet Evaluation Tool (CADET)
is a tick-list record for all foods consumed over one 24-hour period, with a retrospective breakfast section. The instrument consist of two questionnaires, one to be completed at home by the parent or carer, and one for completion at school by a lunchtime supervisor or classroom assistant. The questionnaire was initially developed to evaluate the National School Fruit and Vegetable Scheme and was targeted to 3–7 year olds22.

The questionnaires assess dietary intake of 115 food items over a 24-hour period with a focus on fruit and vegetables. It includes additional questions about dietary behaviours, attitudes and socio-economic characteristics. Portion sizes are based on mean portion sizes in the National Diet and Nutrition Survey and are age and gender specific. According to the validation study, it is considered appropriate for assessing behavioural change in dietary patterns at a population level or to rank populations according to dietary intake. It is appropriate for use with children from diverse social and ethnic backgrounds across a range of settings. However, it is not considered suitable for monitoring diet-related targets in a population.

Day in the Life Questionnaire (DILQ) (7-9 years) was developed as a supervised classroom activity to measure fruit and vegetable consumption in the previous 24 hours. It is a self-completion questionnaire consisting of 17 items, including pictures and words to aid recall and improve completion. The DILQ (9–11 years) is a modified version that contains 23 items23.

Synchronised Nutrition and Activity Programme (SNAPTM) is a web-based programme that uses a typical 24-hour recall method to assess dietary intake and physical activity in 7–15 year old children through a typical school day. It measures intake of 40 different food and nine different drink items in the previous 24 hours. It is a tick-list record for all foods consumed over one 24-hour period, with a focus on fruit and vegetables. It includes additional questions about dietary behaviours, attitudes and socio-economic characteristics. Portion sizes are based on mean portion sizes in the National Diet and Nutrition Survey and are age and gender specific. According to the validation study, it is considered appropriate for assessing behavioural change in dietary patterns at a population level or to rank populations according to dietary intake. It is appropriate for use with children from diverse social and ethnic backgrounds across a range of settings. However, it is not considered suitable for monitoring diet-related targets in a population.

A more standardized protocol about application procedures and advice to provide users according to the scoring. Many have not assessed the validity and reliability of the method and often not investigated the sensitivity, specificity and acceptability of these tools In thePrevención con Dieta Mediterránea (PREDIMED) trial 14-point Mediterranean Diet Adherence Screener (MEDAS) was validated and used to identify subjects’ adherence to the intervention diet, a Mediterranean dietary pattern28.

Dietary Intervention in Primary Care (DINE) is a 19-item questionnaire developed for use in interview-administered. It measures an individual’s intake of total fat and dietary fibre, categorized as low, medium or high. Specific foods are included which account for 70% of the fat and fibre in a typical UK diet. The tool has been validated with good correlation with a validated four-day semi-weighed food diary. An experienced interviewer can complete it in 5–10 minutes29.

Web-based tailored interventions aimed to modify food behavior, physical activity and other lifestyles in adults have also used screeners of brief instruments22.

Several screening tools focused on malnutrition targeted to be used in old adults have been validated, such as DETERMINE your health or MNA. These instruments will be discussed in another paper in this issue.
References


