ARTICULOS GENERALES

THE ONE-DAY RECALL DIETARY SURVEY: A REVIEW OF ITS USEFULNESS TO ESTIMATE PROTEIN AND CALORIE INTAKE[1]

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SUMMARY

This paper reviews the usefulness of the 1-day recall method for assessing calorie and protein intake. To this end, it discusses the basic assumptions in determining nutrient intake of either populations or individuals. It is concluded that the 1-day recall survey is valid and reliable to estimate mean dietary calorie and protein intake in population groups. Its reliability to estimate individual intake is, however, low, and similar to that of other more complicated dietary survey techniques. In consequence, frequent surveys per person are required to reliably estimate usual individual intake.

Basic assumptions necessary to infer nutritional status as well as main limiting nutrients from dietary surveys are discussed. It is concluded that as long as basic objectives and assumptions are clear, the 1-day recall survey is a useful and practical tool estimate calorie and protein intake of population groups. In addition, a simplified one-day recall survey may be a suitable means for assessing calorie and protein individual intake provided that enough number of surveys per subjet are peromed.

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INTRODUCTION

A renewed interest has been sensed recently concerning the use of dietary survey techniques to assess food intake for nutritional, medical and economic purposes. Frequently, however, the data obtained have been inappropriately used because the underlying assumptions as to their interpretation and collection have not been considered.

The main purpose of the present article is to analyze the reported methodology for dietary surveys as a tool for estimating daily protein and calorie ingestion. Although we shall describe the techniques and their basic assumptions, a complete review of the area is beyond the scope of this paper. Excellent reviews on the general methodology have been published during the last 25 years[1-5] and the reader may refer to them for more detailed description of methodology and results. Our final concern is the usefulness of the 1-day recall method for assessing calorie and protein intake, and to this end we will summarize the objectives to which dietary surveys are aimed, describe the main types of surveys utilized, and review the principal assumptions, both explicit and implicit, on which they are based. The discussion of the most important of these assumptions: "The dietary survey measures dietary intake", will consider the inherent problems of validity and reliability. We will also discuss an additional assumption frequently made when dietary surveys are used to evaluate nutritional status: "Dietary intake measures nutritional status".

Finally, we will review some criteria, helpful to select the most appropriate survey method for each specific study.

OBJETIVES OF THE DIETARY SURVEYS

Dietary surveys have been mainly used to determine the food and nutrient intake of eitheir populations or individuals. Table 1 describes the components of populations, individual average, and individual 1-day dietary estimates. It is obvious that, depending on the relative variation of D, V, d_{ij} and e_{ij}, a technique which may be useful to estimate intake of a group, may be useless to estimate the usual intake of a specific individual. In fact, the very logic of sampling changes when assessing intakes of populations or individuals, since in the former case the components V and d are error terms to be eliminated by sampling a large number of different subjects, while in the latter these components are the object of regard, to be highlighted by repeatedly measuring the intake of the same subjects. The frequent lack of adequate definition of the specific objective of a particular dietary survey has been a main cause of erroneous interpretation of the data[6].

MAIN TYPES OF DIETARY SURVEYS USED

Table 2 presents an attempt to summarize the principal characteristics of the published methodology. Basically, there are two main types of dietary surveys which depend on the timing of the survey with respect to intake. The "record" survey is based upon direct observations of intake at the time foods are being consumed. The "recall" surveys, on the other hand, depend on the interviews of subjects as to the foods consumed previously. Thus, recall surveys require relatively fewer measures and collaboration from the subjects than record surveys do. Further, while the record technique circumvents inaccuracies due to inattention or memory loss, which are difficult to avoid in recall surveys, the fact that intake is recorded while the subject eats may influence eating patterns. In both types of surveys measurement of food has been made most commonly by weighing or by using household measurements (i.e., teaspoon, half a cup), or by simply measuring the frequency of ingestion of each food during the period studied. The conversion of amounts consumed to nutrient intake is most often done by utilizing food composition tables and less frequently by direct chemical or calorimetric analysis of representative samples of the ingested meals. Finally, the time periods covered by the surveys, show a wide range of variation: from one meal, through days, weeks, months, years and large periods of the subject's life.

In summary, the dietary methods currently in use vary in important aspects, thus complicating the task of organizing and comparing the available data. Consequently, in order to simplify discussion of this issue, attention will be focussed on data obtained through the most common types of dietary surveys: the 1-day and 7-day record, and the 1-and 3-day recall methods.

BASIC ASSUMPTIONS

The main assumption underlying the use of dietary survey data is that the method employed really measures dictary intake. There are, of course, additional assumptions which depend on the specific utilization of the technique applied in the context of wider studies. The most common one is that dietary intake indicates nutritional status, an assumption implicitly made in many nutritional surveys of populations. Data obtained in these studies are often compared to reference standards, based on the assumption that these standards are adequate for the specific study population.

A. Does Dietary Survey Measure Dietary Intake?

Let us examine in more detail the first assumption: **"The dietary survey measures dietary intake".** As mentioned bejore, in discussing it we will focus our attention on two main aspects: validity, that is the degree to which the measure provides a true (unbiased) estimate of actual intake; and reliability, which concerns the proportional size of the errors of measurement.

1. Validity. Does the 1-day recall measure what it intends to measure?

Two approaches are available to answer this question. The first and most commonly used consists in comparing the results of the 1-day recall survey to other dietary techniques which are assumed to be valid measures of intake (i.e. the 1-day record). A less frequently reported approach consists of comparing the results of the 1-day recall survey to those of estimates of nutrient intake which do not depend on interviewing the subject nor on direct observation of the intake (i.e. caloric expenditure). Most of the data available allow only for comparisons between protein and calorie average intake of groups.

a) The main reports regarding the first approach are summarized in Tables 3 to 6. Table 3 presents four studies comparing the recall with the record technique for the same period of time, and using the same method to assess food quantity and nutrient intake. The first study shows that for a seven-day period there were no significant differences in the mean calorie and protein intake of the population as calculated by the recall and the record techniques, respectively[7]. The other three studies indicate no differences in average intake between the 1-day recall and the 1-day record methods. This means that the average caloric consumption of the population, as estimated by direct recording of food, is the same as that estimated by the food recall technique, other conditions remaining equal. Of course, there is the possibility that neither of the methods fully measures calories or an individual's intake. Only an independent estimate of calories would provide the first data (calories); only a comparison of recorded to recalled values person by person, would provide the second. Table 4 presents an analysis of the influence of differences in the time covered by the survey. It is evident that in the first study[8], there were no significant statistical or biological differences in the average protein intake of school-age children among the 1-day, 3-day and 7-day records. Our own data[9] also show no differences between the 1-day and the three-day recall in the average calorie and protein intake.

Finally, Table 5 compares the recall and the record techniques for different periods of time surveyed. The first study shows that the 1-day recall technique revealed population means of calorie and protein intake quite similar to those of the 7-day record for three samples of different ages and physiological status[10]. The second study provides similar evidence in relation to mean protein intake[11]. It is striking to note that in average terms there were no differences between the recall and the record techniques, a finding probably due to the mutual compensation of biases related to memory of foods eaten (under estimation) with the trend to overestimate food servings[12, 13].

In a second step, the influence of different techniques to assess food and nutrient quantities for populations, was analyzed. Table 6 presents four reports useful for this purpose. The first study show that the use of household measurements to estimate food intake resulted in estimations approximately 12 per cent lower than those arising from the use of direct weighing of foods[14]. The other three studies show that when nutrient content of foods is estimated by chemical analysis, the results are slightly higher (up to 12%) than when computed from the Food Composition Tables.

In summary, the results presented in Tables 3 to 6 indicate that there were no significant mean population differences between the recall and record techniques nor between the 1- and 7-day surveys. Further, lower mean intakes of calories and proteins were obtained when household measurements, as opposed to direct chemical determinations, were used. However, it should be noted that in a review of 300 cases from 20 published reports, Grant Whiting and Leverton[15] found that the protein and calorie intake, as determined by chemical analyses of the diets, was around 10 per cent lower than that calculated from Food Composition Tables. This would indicate that both direction and magnitude of differences due to assessing methods of nutrient content vary notably.

b) The second approach, comparing intake estimations ob- ob-
tained through dietary surveys with those obtained through techniques which do not measure intake directly, has been rarely explored. Table 7 shows that in two groups of adult Guatemalan peasants, the mean calorie intake –as estimated by the 3-day record– was very similar to the total energy expenditure as measured by respirometry and after correcting for changes in weight occurring during the same period[16]. However, the computed correlation values between both variables were 0.64 and 0.71, respectively, in the two groups studied. This is an indication that although the dietary method was valid for mean estimations of group intake, it may not be good enough for assessing individual intake. Therefore, from the data presented in Tables 3 to 7 we can infer that the 1-day recall survey is, at least, valid to estimate mean dietary calorie and protein intakes in population groups.

2. Reliability

A measurement procedure is reliable if it gives the same results when used repeatedly in the same situation. Consequently, the reliability of a method should ideally be measured by comparing simultaneous assessments of the same individuals under the same circumstances. In practice, this is difficult to attain because each assessment affects the result of subsequent assessments;; furthermore, individuals eat differently at different times, and respond differently to different research methods and observers. Therefore, it is almost impossible to measure the true reproducibility or measurement variability of the one-day recall technique. However, it is possible to make approximate estimations which are of practical value for both study design and interpretation. In fact, these raw reliability estimations are the most convenient to assess the real usefulness of the method; since they include not only the instrument variability (i.e. assessment of food and nutrient quantities) but also the true variability in the individual.

a) There are several ways to estimate the reliability of the dietary survey techniques. One first approximation consists of examining differences in the coefficients of variation (CV)[3] of the mean population intake, as estimated by two different techniques. It is inferred that if the CV is similar, both have similar reliability. Table 8, for example, shows the results of five reports that provide these type of data.

In this Table, the first two studies (A and B) show data that allow comparison between the one-day recall and the record techniques. The first study[11] shows no differences in CV[3] for protein between the 1-day recall and the 7-day record methods. In the second report, from our own data (B) no differences in regard to the CV for calories are observed between the 1-day recall and the one-day record. The 1-day record resulted in an unexpectedly greater CV for protein intake, but given the small sample size, this difference is difficult to interpret. The third report in Table 8 (C) is also derived from our own data, and shows that there are no significant differences in regard to population CV values for calories, and protein intake when the 1-day and the 3-day recall surveys are compared. The two last studies include in the same Table (D and E) explore the influence of time covered by the record technique on the CV[3] of the sample. Both reports rendered a CV of similar order of magnitude, independently of the time covered by the survey, which ranged from 1 to seven days.

3. CV = (one standard deviation/population mean) x 100.

In summary, from the data presented in Table 8 we conclude that the 1-day recall method results in similar population CV values as those obtained when using the 3-day recall or the 1- to 7-day record. This is an unexpected finding since it suggests that the daily individual variation within a week is relatively small, and that most of the population variation during a week is interpersonal variability.

It should be stressed that the CV value is an estimation of the population variability, and is composed of two main sources of variation: interpersonal and intrapersonal. Each of these sources of variation also has two components: variation inherent to the measurement technique (measurement variability) and true or biological variation, which is what really occurs within and among the individuals. In turn, the measurement variability has several components which depend on the type of technique used. It frequently includes variation in the nutrient content of foods, since most of the values given in the Food Composition Tables are average values obtained several years before they are used in the study, and variations in the nutritive value of foods which are incidental to production, processing, storing, distribution and cooking[15, 17]. Aside from these facts, measurement variability includes changes in household measurements (i.e. weight of each "tortilla"), as well as changes in the observer and changes in the subject collaboration[18]. This last factor can be very important, since it may introduce bias related to poor collaboration on the part of subjects. If those who provide reliable dietary data are different in some characteristics related to the studied outcome variables, as compared with subjects who deliver less reliable data, this fact will introduce an artifact in the observed association between dietary intake and the outcome variables studied. Obviously, the importance of this bias will depend on the magnitude of the difference between the "reliable" and "unreliable" subjects.

b) A more direct way of exploring reliability of the 1-day recall method consists in determining the test-retest correlation, that is, the correlation between two surveys carried out on the same person. This value reflects the discriminatory power of the method, and it is a function of the ratio between inter and intrapersonal variance. The lower the intrapersonal variability in relation to the intrapersonal variation, the higher the test-retest correlation value; therefore, the higher the power of the technique to discriminate different categories of intake. In turn, the higher this discriminatory power, the higher the probability of detecting an association that truly exists. This means that if a measurement technique has low discrimination power, we will not be able to interpret negative results since they might be produced either by true absence of any association, or simply by relatively high intrapersonal variation of the measurement. Tables 9 and 10 refer to some articles in the literature in which the data allow computation of test-retest correlation values.

Table 9 reports data from our longitudinal study of nutrition and mental development in a Guatemalan rural population[19] using the 1-day recall method. It is apparent that as the interval between surveys increases, a slight trend to lower values occurs, but the correlation values are still significant at intervals of 3 years. It is also evident that no significant differences are observed between the 1-day and the 3-day recall methods. The fact that at a 3-month interval the test-retest value for the 1-day recall survey is around 0.5, indicates that half of the variation in the population is intrapersonal variability, mainly daily variation within the 3-month interval, and that the other half is due to interpersonal differences. As the interval between surveys increases, the test-retest correlation decreases, indicating that, as expected, intrapersonal variation becomes gradually greater than interpersonal variation.

For comparison purposes with data appearing in Table 9, seven studies using the 7-day record technique are presented in Table 10. Here again it can also be seen that the test-retest values decrease as the time interval between the two surveys increases. The correlations in Table 9 are roughly similar to those in Table 10 after taking into account the large differences in sample sizes.

Finally, Table 11 shows two studies where the correlation value between the 1-day recall and the 7-day record was computed in the same subjects at the same time. The two reports show significant correlation values between the techniques compared, values which are close to those expected given the test-retest correlation of these techniques.

The source of variation derived from computing nutrient intake using Food Composition Tables as compared to chemical analyses, has been explored by Bransby, Dubney and King[20] and Stock and Wheeler[21]. In the first study the correlation was 0.93 between calculated and analyzed values for calories in 33 adults. In the second study, carried out in 54 adults living in an institution, the correlation was 0.65. These results suggest that the most important factor affecting reliability of a survey derives from the subject under study and the instrument **per se** (dietary survey) and not from the type of survey (recall or record), or the period covered by the survey (from 1 to 7 days).

B. Does Dietary Intake Indicate Nutritional Status?

Let us discuss now the other common assumption made when using dietary surveys to assess nutritional status of an individual or of a group: "**Dietary intake indicates nutritional status**". In this regard it should be noted that nutritional status is a balance between nutrient input –which is a function of intake and absorption– and nutrient output, which depends on the cost of maintenance, growth and physical activity. It is obvious that a myriad of factors may influence this balance between input and output. Thus, the presence of disease (infectious and non-infectious) may increase significantly the output component of the equation; aspects such as pattern of physical activity, type of occupation, and ingestion of drugs, may also affect nutritional status. Finally, a miscellaneous group of factors such as temperature, altitude and type of intestinal flora may also produce changes in the nutritional status of individuals and groups. Therefore, it is important to keep in mind the fact that dietary intake is only one of several factors determining nutritional status and that, at its best, can only give presumptive evidence which may help in assessing the nutritional status of groups and individuals. This assertion implies that it is possible to have two populations with similar dietary intakes but with different nutritional status, and that it is also conceivable to find two populations with similar nutritional status and different nutrient intake.

An additional problem encountered when dietary surveys are used to estimate nutritional status, is the need for assessing the adequacy level of the diet under study. To do this, the observed dietary intake is compared with standards of reference, under the assumption that these are appropriate. However, this assumption should be carefully analyzed in each particular case to ensure that the mentioned standards are really appropriate to population characteristics such as age, height, weight, physiological status, and cultural patterns of activity. In judging the appropriateness of the standards, attention should also be paid to qualitative dietary differences, a consideration of particular importance in the case of proteins with different biological values.

Another difficult problem arises when the researcher aims to make inferences about the main limiting nutrients in the diet of a particular population group. A clear example of this problem is the current controversy regarding the existence of a protein gap as opposed to the one entailing the total amount of food or calorie gap. Inferences on this problem, which are mainly based on comparisons of relative deficiency between protein and calories, should take into account the fact that approaches to establish recommendations for calories and proteins are not only conceptually different, but also that the statistical bases for both standards are quite different. Thus, the common recommendations for calorie intake are based on estimations of the average needs of a population, while the current recommendations for proteins (or "safe level of intake") are based on the average needs of a population plus two standard deviations, in order to cover 98 per cent of the group under study(22). It is evident, therefore, that the different bases used to establish reference standards for protein and calories should be taken into account when making inferences about the main limiting nutrient from results of dietary surveys.

Other considerations aside from the expressed concepts, are also of interest. One must bear in mind that the level of adequacy may vary significantly depending on which committee's standards are used. For example, the group studied by Chappell(23) had a caloric adequacy of 98% as judged by one standard, and 129% when compared with a standard established by a different committee. When estimating adequacy of intake at the individual level, an important consideration is the variability of the standard around the mean. For example, a 3-year-old child whose usual protein intake is 0.86 g of milk protein/kg of body weight, is 30% below the safe level of protein intake. However, this fact does not necessarily mean that the child is truly underfed in regard to protein, but that his risk of being underfed is around 50% (assuming that one standard deviation of protein requirements is 15% of the average needs). In other words, out of 10 children of this age and with the same intake, five may be underfed in protein and the other five may have a protein intake entirely adequate to cover their needs. Consequently, it is advisable to make clear the statistical assumptions of the specific recommended allowances, as well as the risk estimations of being underfed when evaluating the adequacy of intake.

FINAL COMMENTS

The methodological aspects of dietary surveys reviewed previously may be useful in selecting the appropriate dietary survey method for specific studies. To achieve this, the following main questions must be answered:

1. What is the objective of the study, to assess the intake of individuals or of groups?
2. What specific nutrient or types of foods are to be assessed?
3. Are qualitative or quantitative data required? In the latter case, what units of measurement are desired?
4. Are present or previous intake data required?
5. What period of time must the data cover?

When the purpose of the study is to evaluate the dietary intake of a population at a point in time, the one-day recall survey is a useful and cheap method, estimating food quantities with household measurements and nutrient content by the Food Composition Tables. In this case, the main problem is who and how many individuals should be studied in order to obtain a valid and reliable estimation of the nutrient intake of the particular population under study. Frequently, the dilemma here is one of choosing between a larger sample size or longer periods of time to be covered by each survey. The first alternative will probably have the greater impact on the precision of the group estimations[24]. In other words, the one-day survey applied to a large sample will be most efficient to improve precision than the one-week survey used with a sample seven times smaller.

On the other hand, if the purpose is to evaluate individual intake in a longitudinal prospective study, one of the most suitable methods would be a simplified one-day recall survey, estimating food quantity with household measurements, and nutrient intake by reference to the Food Composition Tables. Sometimes, according to the study purposes it may be enough to rank individuals in a consumption scale. In this case, asking for the few foods that explain above 70 or 80% of the variance may suffice. For example, in rural Guatemala, where the number of tortillas alone may explain 70% of the total variance in food intake, some of the pertinent questions would be: How many "tortillas" did you eat yesterday? Did you eat meat? The appropriate frequency of surveys per individual will depend mainly on the discrimination power of the selected method under similar field conditions and on the grade of collaboration of the population covered by the study.

In the latter case, the main sampling problem is one of points in time of the life of the study subjects. It should be kept in mind that a continuous changing situation is being measured, and thus, it is necessary to determine variations within individuals over a period of time. In this case, the choosing between increasing the frequency of surveys or increasing the time period to be covered by each survey seems to be a common dilemma. The literature available on this topic, although scarce, suggests that an increment of the number of points surveyed would produce a higher increment in precision of the individual's assessment than a similar increment of the time period covered by each survey[25] In other words, increasing the frequency of 1-day surveys from 1 to 10 will produce a greater effect on precision than performing only one survey and increasing the time covered from 1 to 10 days.

In any case, priority should be given to the pre-testing of the selected technique as well as to the implementation of quality control systems for data collection, the latter including training, rotation of observers among groups of subjects, and careful standardization.

RESUMEN

LA ENCUESTA DIETETICA DE RECORDATORIO DE UN DIA: REVISION DE SU UTILIDAD PARA ESTIMAR LA INGESTA PROTEINICA Y CALORICA

Se revisa la utilidad del método de recordatorio de 1 día para estimar la ingesta calórica y proteínica. Con este fin, se discuten las premisas básicas que se asumen al estimar la ingesta de nutrientes, ya sea por parte de poblaciones o de individuos. Se concluye que la encuesta de recordatorio de 1 día es válida y confiable para estimar el promedio de ingesta calórica y proteínica en grupos de población. Sin embargo, la confiabilidad del método para estimar la ingesta de cada individuo es baja, y de magnitud similar a la de encuestas dietéticas más complicadas. Por lo tanto, se requieren frecuentes encuestas por persona a fin de estimar en forma confiable la ingesta usual de cada individuo.

Se discuten las premisas básicas necesarias para evaluar, a partir de la encuesta dietética, el estado nutricional y los nutrientes limitantes de mayor importancia. Se concluye que, siempre que se definan con claridad sus objetivos y premisas básicas, la encuesta de recordatorio de 1 día es un método práctico y útil para estimar la ingesta calórica y proteínica de grupos de población. Además, una encuesta simplificada de recordatorio de 1 día puede ser el método más apropiado para estimar la ingesta individual de estos nutrientes con el entendido que se realice un número suficiente de encuestas por individuo.

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TABLE 1

COMPONENTS OF A DIETARY INTAKE ESTIMATE

A. The dietary intake estimate (DI) of an individual, during day j is made up of the following components:

1. Average daily intake for group of individuals i of the same age, sex and size (D age, sex, size, usually written as just D).
2. Individual variation in average daily intake for the subject (V_i).
3. Daily variation of individual i average intake on day j (d_{ij}).
4. Error of method (e_{ij}).

Thus, DI (individual i, day j) $= D + V_i + d_{ij} + e_{ij}$ where the average of all V_i's $= 0$ and the average of all d_{ij}'s $= 0$ for every i.

B. Usual assumptions: evidently, these are not exact, but they are implicit assumptions in most calculations involving dietary survey estimates:

1. Independent, identically distributed errors e_{ij}. This means that any estimate on any individual and any day is subject to the same error of measurement, independent of any other factor.
2. Independent, identical distribution of daily variation. This means that the probable variation of any individual on any day (d_{ij}) from his usual diet is the same, regardless of the individual or day.
3. Independent, identical distribution of V_i. This means that the probable variation V_i of any individual average diet from that of the overall group average D, is the same for all groups.

C. Components involved in various types of assessment:

Type of assessment	Components estimated	Example of use
1. Population	D (averaged across categories of age, sex, size)	Assess average consumption of a group.
2. Individual i	$D + V_i$	Assess individual average diet to correlate with growth rate.
3. Individual i on day j	$D + V_i + d_{ij}$	Assess individual diet on a given day to correlate with his activity level or urea excretion on the same day.

TABLE 2

MAIN TYPES OF DIETARY SURVEYS REPORTED

	Record	Recall
A. Occurrence of intake regarding survey	Simultaneous	Past
B. Measurement of foods	Weight Estimated weight (common volume units) Frequency of occurrence	Estimated weight (common volume units) Frequency of occurrence
C. Measurement of nutrients	Direct analysis: chemical; calorimetric Food composition tables	Food composition tables
D. Time covered	Meals One to three days One to two weeks Months Years Life (dietary history)	Meals One to three days One to two weeks Months Years Life (dietary history)

TABLE 3

VALIDITY STUDIES: COMPARISON OF DIFFERENT DIETARY SURVEY METHODS FOR THE SAME PERIOD OF TIME

Study population (n)	Methods compared	Mean calorie intake (Kcal/day)	Mean protein intake (g/day)	Reference
Adults (59)	7-day record 7-day recall	$\frac{1\text{ week}}{2\text{ weeks}} = 1.05$	$\frac{1^o}{2^o} = 1.05$	Adelson, 1961 (7)
Adults and children (184)	1-day record 1-day recall	1776 1639	58.3 59.1	Schaeffer (in Beaton), (26)
Pregnant women, 7th month (20)	1-day record 1-day recall	2435 2574	NI NI	Thomson, 1958 (14)
Preschool children, 2-5 yrs (36)	1-day record 1-day recall	861 854	21.7 21.0	Division of Human Development, INCAP, 1974 (9)

NI = No information available.
(n) = Number of cases in parenthesis.

TABLE 4

VALIDITY STUDIES: COMPARISON OF THE SAME DIETARY SURVEY METHODS FOR DIFFERENT PERIODS OF TIME

Study population (n)	Methods compared	Mean calorie intake (Kcal/day)	Mean protein intake (g/day)	Reference
Children, 10-12 yrs (132)	7-day record	NI	65.6	Trulson, 1955 (8)
	3-day record	NI	65.9	
	1-day record	NI	65.0	

NI = No information available.
(n) = Number of cases in parenthesis.

TABLE 5

VALIDITY STUDIES: COMPARISON OF DIFFERENT DIETARY SURVEY METHODS FOR DIFFERENT PERIODS OF TIME

Study population (n)	Methods compared	Mean calorie intake (Kcal/day)	Mean protein intake (g/day)	Reference
Pregnant (28)	1-day recall	1830	67	Young et al., 1952 (10)
	7-day record	1880	66	
7th-8th grade, 14 yrs (51)	1-day recall	2240	78	Young et al., 1952 (10)
	7-day record	2390	79	
College, 18 yrs (87)	1-day recall	2170	70	Young et al.,1952 (10)
	7-day record	2150	67	
Children 7–12 yrs (47)	1-day recall	NI	65.7	Trulson, 1954 (11)
	7-day record	NI	65.2	

NI = No information available.
(n) = Number of cases in parenthesis.

TABLE 6

VALIDITY STUDIES: COMPARISON OF DIFFERENT METHODS TO ESTIMATE FOOD AND NUTRIENT INTAKE

Study population (n)	Methods compared	Mean calorie intake (Kcal/day)	Mean protein intake (g/day)	Reference
Women, 7th month pregnancy (20)	1-day recall: weights, household measurements	2574 2140	NI NI	Thomson, 1958 (14)
Adults and children (184)	1-day record: computed vs chemical	1776 1937	58.3 66.6	Schaeffer (in Beaton) (26)
Adults (21)	1-day record: computed vs chemical	NI NI	59.8 62.3	Wertz, 1952 (27)
Adults (33)	3-day record: computed vs chemical	2088 2053	68 76	Bransby, Dubney and King, 1948 (20)

NI = No information available.
(n) = Number of cases in parenthesis.

TABLE 7

VALIDITY STUDIES: COMPARISON OF DIETARY SURVEYS WITH OTHER METHODS USED TO ESTIMATE CALORIE AND PROTEIN INTAKE

Study population (n)	Methods compared	Results	Reference
Supplemented		Average calories/day:	
1. Adults (18)	a) 3-day record	3555	Computed from Viteri and Torún, 1974 (16)
	Total energy expenditure corrected for weight changes	3651	
	Correlation between both methods	(r) = 0.64	
Non-supplemented			
2. Adults (18)	b) 3-day record	2695	Computed from Viteri and Torún, 1974 (16)
	Total energy expenditure corrected for weight changes	2704	
	Correlation between both methods	(r) = 0.71	

(n) = Number of cases in parenthesis.

TABLE 9

EFFECT OF INTERVAL BETWEEN SURVEYS ON THE TEST-RETEST CORRELATION VALUE 1-DAY RECALL SURVEYS*

Study population (n)	Interval between surveys	Test-retest correlation value (r)	
		Calories	Proteins
Children (419)	3 months	NI	0.56**
(417)			0.58**
(365)			0.33**
Children (576)	6 months	NI	0.40**
Children (335)	9 months	NI	0.33**
Lactating women (44)	3 months	0.55**	NI

* Human Development Division, INCAP, 1974 (9).
** $P < 0.01$.
(n) = Number of cases in parenthesis.
NI = No information available.

TABLE 10

EFFECT OF INTERVAL BETWEEN SURVEYS ON THE TEST-RETEST CORRELATION VALUE 7-DAY RECORD SURVEY

	Study population (n)	Interval between surveys	Test-retest correlation value (r) Calories	Protein	Reference
A.	Adults (59)	Consecutive	0.68**	0.60**	Adelson, 1960 (7)
B.	Children 6-14 yrs (18)	One week	0.67* 0.60*	0.79*--0.86* 0.72*	Huenemann and Turner, 1942 (29)
C.	Children (21)	4 weeks	0.68**	0.80**	Huenemann and Turner, 1942 (29)
D.	Pregnant women (20)	6 weeks	0.90*	0.87*	Thomson, 1958 (14)
E.	Adults (25)	6 months	0.84**	0.72**	Marr, 1971 (3)
F.	Adults (11)	2 years	0.43	0.43	Trulson, 1954 (11)
G.	Adults (42)	3 years	0.30	NI	Keys, 1965 (30)

* $P < 0.05$; ** $P < 0.01$.
NI = No information available.
(n) k
(n) = Number of cases in parenthesis.

TABLE 11

CORRELATION VALUES BETWEEN DIFFERENT METHODS APPLIED AT THE SAME TIME

Study population (n)	Methods compared	Correlation value (r) Calories	Protein	Reference
Children 7-12 yrs (47)	7-day record	NI	0.54*	Trulson, 1954 (11)
Pregnant women (28)		0.54**	0.47**	
School children (7-8 grade (51)	1-day recall	0.56**	0.60**	Young et al., 1952 (6)
College students (87)		0.51**	0.54**	

(n) = Number of cases in parenthesis.
NI = No information available.
* P ≤0.05; ** ≤0.01.

TABLE 12

SUGGESTED TECHNIQUES OF DIETARY SURVEY

For populations ←	Objetive	→ For Individuals
Recall Usual, complete	1) Technique	Recall Simplified
Estimates (households)	2) Measures	Estimates (households) Frequency of occurrence
24 hours	3) Time	24 hours
Cross-sectional (no subjects)	4) Sampling	Longitudinal (No. points/subject)
Continuous quality control*	5) Principal recommendation	Continuous quality control*

* It includes pre-testing (validity, precision), standardization and supervision.