REVIEW ARTICLE

Dietary Inquiries in Public Health Practice

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Summary

Public health administrations are responsible for monitoring the availability and use of foods. The information required can be obtained cheaply and easily by asking schoolchildren about the foods they have consumed. When the mean weights of adults is low and the number of kinds of food in use is small, nutritional problems probably exist and must be investigated. The same indicators may also be useful in the identification of families affected by poverty.

Key Words: Dietary inquiries, Public health, Identification of poverty

Introduction

Uncertainty about foods as causes of disease is due to a failure to measure diets accurately. An examination by Willett[1] suggests that sources of dietary information such as "national food balance sheets" and "24-hour recall" are not reliable. However, more sophisticated approaches and analyses are beyond the resources of most public health administrations.

Precise measurement of the diet is a responsibility of research establishments, whose efforts may eventually result in authentic knowledge about relationships between diet and disease and thereby provide health workers with sound guidance in devising nutritional activities. In the meantime public health authorities must obtain some nutritional information in the interests of communal health. To this end simple observation of the kinds of food in use may suffice.

Foods and Health

Particular foods are associated with the occurrence of some diseases. The use of rice can lead to beri-beri and of maize to pellagra. Scurvy can be prevented by the consumption of fruit. Examination of records made by Wills in India show that the use of green vegetables protected women from the development of megaloblastic anaemia of pregnancy[2].

Such observations led to enormous saving of life and eventually to the discovery of thiamine, niacin, vitamin C and folate. These events followed from simple observations of foods in use and not from measurements of diets.

All the constituents of foods which might affect health have not yet been identified, because the composition of foods is for ever changing due to variations in environmental conditions under which they are grown, agricultural practices, breeding of plants and animals and methods of manufacturing end-products[3,4]. Therefore, records should be kept of the kinds of food and particular parts of food which are eaten and of the origins and history of foods before they are ingested. Every now and then, unexpectedly, a food or some other product is found to have an effect on health. A recent example which has received much publicity is red wine, which apparently reduces the risk of intravascular coagulation of blood.

Sources of information about foods

The main kinds of foods in homes, markets, shops, supermarkets and roadside stalls indicate those in common use. Observations repeated at intervals may reveal important changes in dietary habits. Within households records can be made of how foods are stored, processed and cooked. Each event, such as washing, fermenting, heating, in the history of a food

can affect its chemical composition, physical nature and microbiology and thereby its nutritional value and safety. The effects on foods of each detail of local household practices is a somewhat neglected field of research which could be exploited by field workers in collaboration with scientific centres.

An assessment of what individuals eat can be made by asking them, although there is often considerable difficulty in arranging interviews with adults for this purpose. However, schools provide large numbers of children who can usually be questioned easily. Their answers provide valuable information about dietary patterns in the locality[5,6,7]. Each child should be seen alone and encouraged to make spontaneous replies, first about the foods which were eaten at the meal immediately before the interview, then those at the meal before that and then at the one before that, to cover the preceding 24 hours.

Prompting should be minimal and no attempt made to get information about quantities. Results are expressed as the number of times each food, or each class of food, has been mentioned. When the same, or a similar, group of children is questioned at intervals important seasonal or climatic influences on the use of certain foods and any changes in diets consequent to economical or political circumstances or to nutritional programmes can be monitored.

An indication of the onset of shortages of food is an increase in the times mention is made by children of "famine foods"[8]. One of these is sago, which has for long been known to replace rice in times of need. Mention of emergency foods is usually accompanied by mention of fewer kinds of food, which by itself is indicative of impending or existing shortages. Nutritional problems can be suspected when few foods are mentioned and when representatives of each class of food, such as green vegetables, meat, cereals, are not included.

Children must be asked about foods eaten outside traditional mealtimes because these can make essential contributions to the intake of some nutrients. In remote areas casual foods are often exotic[9] and the use of snack-foods is now universal in urban communities.

Difficulties and inadequacies of quantitative dietary inquiries

There are serious doubts about the cost-effectiveness, reliability and the proper interpretation of the results of quantitative dietary inquiries.

Collection of dietary records from an individual can take from 2 to 8 hours[10]. One field worker can usually obtain quantitative information from only 2 to 3 households in a week[10]. Questioning a child takes about 10 minutes[11] so that in a 5-day week, allowing time to travel to and from a village, one field worker should achieve 90 interviews.

Because of the time needed to collect quantitative information about diets, surveys can be made only infrequently, and, in some communities, have been made only once. The results of isolated inquiries may be quoted for years and used as a basis for nutritional programmes although in the meantime important temporary and permanent changes in dietary patterns may have occurred.

The monetary costs and the time required by personnel in quantitative dietary investigations extend beyond those connected with observations in the field. Training of ancillary workers, the supply of recording materials, equipment, transport and accommodation, tests of changes under local conditions of the weight of foods on preparation and cooking and statistical analyses must all be taken into account.

When dietary investigators weigh foods the time during which they can do so is limited not only by resources, but also by the tolerance of those being observed. Many housewives resent intrusion into their kitchens by strangers.

Detailed and prolonged inquiries may produce changes in the usual dietary habits of the subjects. Appreciable and progressive loss of weight by those under observation can occur because of a reduction in the amount eaten[12].

Objections to inquiries which involve weighing foods are avoided by the recall by subjects of the amounts which they have eaten in the preceding 24 hours[13] or

longer. However, accuracy of the information depends on the memory, honesty and intelligence of those interviewed.

Large variations in individual diets from day to day and over longer periods usually occur among adults and children[14,15]. Because of variability 23 separate daily records may be necessary to obtain the mean intake of fat with a standard error of -10% or less[16]. Information, whether qualitative or quantitative, about the intake of food by individuals for a single period of 24 hours does not provide a reliable assessment of their effective diets. The results of surveys using 24-hour recall are meaningful only as averages for groups of large size selected according to statistical criteria[17]. However, averages may not reveal important deficiencies which are affecting appreciable numbers of individuals.

There are difficulties in the interpretation of results of dietary surveys, for example, when attempting to assess them in association with states of health of the consumers. Not only is there variability in dietary intake, but also variability between and within individuals in the occurrence and nature of ill-health from which they may suffer at a particular time. Furthermore, the detection of pathological changes usually requires special investigations which are not available in the field and even with their use early, although important, stages of oncological and cardiovascular diseases may not be discerned. Health statistics may be used in relation to dietary statistics. However, authentic comparisons must be based on adequate, statistically acceptable samples for each set of information and each set must have been obtained at comparable seasons or eras; these criteria are rarely achieved in practice. Mortality and morbidity statistics derived from hospitals and health centres refer to the end results of a number of adverse factors which probably operated throughout many years and are, therefore, not sensitive indicators of acute reactions between diet and health.

By convention, adequacies of average amounts of energy and nutrients is judged against agreed "dietary requirements". However, there can be variability between dietary levels of a nutrient and the amounts which arrive in cells of the body where they exert their effects. This may be because of particular functional characteristics of the consumer, variation in energy expenditure, or the effects of one constituent of the diet on the digestion, absorption, or metabolism of another constituent. Thus, measurement of particular nutrients ingested, however accurate, may not always reveal the nutritional adequacy or the possible harmful effects of a diet. For example, very little correlation was found ("r" = 0.20) between the amount of free-folate in the diet and the concentration in the consumer's erythrocytes[18]; levels of selenium in serum are lower in vegetarians although their dietary intakes are higher than those of omnivores[19].

Relationships between diet and physiological functions and health are affected by involvement in metabolic processes of products of digestion of foods. Recent knowledge about "free radicals"[20] and their ability to produce pathological changes gives special significance to the protective effect of certain foods, notably those which provide vitamin C and vitamin E. These anti-oxidants counteract the effects of free radicals at the cellular level. Thus, the mixture of foods eaten together may be of greater importance in protecting health than is the total amount of any one constituent in isolation. Proper interpretation of the results of dietary surveys is not possible unless all the kinds of food and other materials ingested are considered together.

Advantages of qualitative observation on the diet

The main nutritional responsibilities of a health administration are, to detect shortages of food and the absence from diets of foods which are important sources of essential nutrients, and to identify individual families or groups who are short of food because of poverty. These responsibilities can be met by relatively simple observations of the number and kinds of food being eaten.

There is a positive association between the number of foods consumed, and also the frequency of use of single foods, and the total amount of dietary intake[1]. For example, observations on a group of people who consumed 4 foods each day, another 13 foods and a third, 20 foods, showed that the levels in plasma of beta-carotene were about 23, 35 and 70 ug/100 ml. respectively[21]. Coefficients of correlation between estimated amounts of foods eaten and the frequency

of their use can range from 0.50 to 0.96[22]. One inquiry found coefficients from 0.70 to 0.95 between frequency of use and the amounts eaten as determined by weighing diets during 7 days[23].

Many foods are eaten in particular amounts; people usually eat a whole egg and not part of an egg, for example. The amount of food eaten by an individual at a particular time is less variable than the frequency of its use[24]. Therefore, when certain foods are mentioned as being consumed certain quantities may be assumed to have been involved and the greater the frequency of use of these foods the greater would be the amounts of energy and nutrients obtained by the consumer. Thus, comparisons between individuals or groups, upon which opinions about the effects of diet on health are usually based, can be made on the number of foods consumed and their frequency without the need to measure absolute quantities[1].

Should there be a need to determine the amount of food being consumed, consideration should be given to weighing the consumer rather than the diet. The weight of a person immediately before and after a meal reveals the amount eaten. This is useful in refugee camps, prisons and military establishments, in which diets are standardised, to monitor adequacy of supplies of food and compliance with official schedules. Over the long-term in civilian populations, changes in the mean weight of adults can reflect very sensitively changes in the availability of food[25]. The thousands of records of weights of women who attend family planning centres could provide health authorities with a useful monitor of adequacy of supplies of food in different communities[26].

Dietary patterns of children as an aid to the identification of poverty

A person who is ill may be unable to earn money, or to procur food, or to construct and maintain adequate housing. Even minor afflictions, such as a septic wound, may have such effects. Communities who are poor may be unable to provide adequate supplies of water to households, sewerage systems, roads and bridges. These inadequacies increase the prevalence of infective disease and hinder visits to markets and health centres. Poverty can thus be a result of ill-health and ill-health can be a result of poverty. Therefore, the occurrence of poverty is of concern to health authorities.

Poverty is identified by comparing actual or notional cash incomes of different groups and poverty-areas and poverty-groups are designated accordingly. Programmes to redress poverty are planned for particular locations, communities or occupations. However, no group of humans is homogeneous in all respects and within a poverty-group some may be rich. Programmes directed to whole groups often benefit not only the poor, but also those with adequate incomes. Those who are poorest and those who are ill may be unable to benefit from the redressal schemes. For example, a poor fisherman cannot use a grant to buy an outboard motor or nets because he does not own a suitable boat. A farmer may be poor because his land is adversely affected by floods, drought, exposure to wild animals or soil erosion, so that the availability of fertiliser under a benefit scheme may not be useful. Because of such factors, programmes to alleviate poverty can lead to average economic improvement whilst leaving a substantial number of poor individuals unaffected. Identification of such victims is very difficult for administrators, especially in rural areas where many are not completely involved in a cash economy or when they are affected by poverty only from time to time.

In many areas where there is poverty there are schools the children of which can be questioned about their intake of food. Their answers can indicate poverty in families to which they belong. For example, some children from poor families may state that during the past 24 hours they have eaten only rice. This contrasts with answers from other children from richer families in the same location who may state, for example, that they have eaten rice, fish, beans, cucumber, green leaves and eggs. Exploration by health workers of this approach to the identification of poor families would be a valuable contribution in the attempt to eradicate poverty.

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