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**FOOD BALANCE SHEETS
and
FOOD CONSUMPTION SURVEYS
A COMPARISON OF METHODOLOGIES AND RESULTS**

The paper presents a general description of the methodology used in both food balance sheets and food consumption surveys and the impact of such methodologies on the results. It also describes their complementary role in the assessment of the food situation.

I. INTRODUCTION

The most common and widely used data sets in the field of food consumption statistics are obtained through food balance sheets. They provide estimates of quantities available for human consumption in a country during a specified period. Information on food consumption or availability is also available from surveys of household consumption or expenditure.

Due to differences in the concepts and definitions used and to measurement errors, the data from these two sources are not expected to be directly comparable. It is the purpose of this paper to review the differing conceptual and practical approaches of these two sources of data on food and to consider when and how they may be used to complement each other.

II. FOOD BALANCE SHEETS

Food balance sheets present a comprehensive picture of the pattern of a country's food supply during a specified reference period. A food balance sheet shows for each food item - i.e., each primary commodity and a number of processed commodities potentially available for human consumption - the sources of supply and its utilization. The total quantity of foodstuffs produced in a country added to the total quantity imported and adjusted for any change in stocks that may have occurred since the beginning of the reference period, gives the supply available during that period. On the utilization side, a distinction is made between the quantities exported, fed to livestock, used for seed, put to manufacture for food use and non-food uses, lost during storage and transportation, and available as food for human consumption at the retail level. The per caput supply of each such food item available for human consumption is then obtained by dividing its respective quantity by the related data on the population actually partaking of it. Data on per caput food supplies are expressed in terms of quantity and also in terms of caloric value, protein and fat content.

It is important to note that the quantities of food available for human consumption, as estimated in the food balance sheets, relate simply to the quantities reaching the consumer in private households, as well as in the non-household sector, i.e., catering establishments, boarding schools, hospitals, prisons, armed forces' bases and other communities. The amount of food actually consumed may be lower than the quantity shown in the food balance sheet. The difference reflects waste occurring between the retail level and the kitchen and losses of edible food and nutrients in the household, e.g., during storage, in preparation and cooking (which affect vitamins and minerals to a greater extent than calories, protein and fat), as plate-waste, or as quantities fed to domestic animals and pets, or that thrown away.

The accuracy of food balance sheets, which are in essence derived statistics, is of course dependent on the reliability of the underlying statistics of supply and utilization of food and of population.

Among the practical issues that often must be addressed in constructing food balance sheets, a conceptual problem frequently arises with respect to the coverage/representativeness of the basic data. Production statistics are mostly confined to commercialized major food crops. Non-commercial or subsistence-level production usually are not included.

The incompleteness and inaccuracy of the basic data are the major problem encountered in developing countries. Production statistics may not be available for all commodities needed. And even where the statistics are available, they are not always complete or reliable. An appreciable part of total production is non-commercial or subsistence production, i.e., foodstuffs grown or gathered wild by households for their own consumption. The estimation of production of some crops is further complicated because they are continuously harvested at regular or irregular intervals over a long period of time, e.g., cassava, and certain fruits and vegetables. Moreover, for certain crops, the produce is not completely harvested; a portion is held back as a reserve from which to draw if the need arises or even left to rot, e.g., cassava and plantains. Moreover, certain kinds of food may not be covered by food balance sheets because they are not included in national production statistics. Meats, such as those of game, wild animals and insects, may be excluded for this reason. Under conditions such as those prevailing in many developing countries, these meats may form a substantial part of the low consumption level of animal protein. Also, major food crops may not be grown in pure stands but mix-planted in fields of bewildering complexity. In such instances, per caput food consumption data derived from household surveys, multiplied by population numbers, can sometimes help to provide the required production estimates.

Import and export data may be reasonably accurate in the majority of countries, but in some countries significant amounts of trade across national boundaries go unrecorded. Moreover, import and export transactions may not receive equal attention from the custom's administration because taxes and/or quantitative controls are generally concentrated more on imports than exports. As a consequence, the reliability of export data may also be questionable.

Seeding rates for crops are fairly well established in most countries, but when the quantities fed to animals have to be estimated, many aspects must be considered. Feeding practices vary from country to country according to the quantity and quality of pastures, the degree to which rearing is intensive, the prices of feedstuffs, etc. In addition, the quality of grain and other feeding stuffs fed to livestock may vary from one year to the next.

Often in constructing the food balance sheets, a number of adjustments on the basic data as well as imputations/estimations of the missing data have to be carried out. Once estimates of the other components have been made, the estimate of food available for human consumption is usually derived as a residual according to the following equation:

$$\text{Food available for human consumption} = \text{Total food supply} - \text{Feed} - \text{Seed} - \text{Industrial uses} - \text{Waste}.$$

Since the estimate of food available for human consumption is derived as a residual, its reliability would depend on the availability and accuracy of the other components on which it is based. In the case where the majority of the basic data are available and reliable, and the adjustments are based on sound judgement, the estimate of the food available for human consumption is likely to be reliable.

It stands to reason that where the basic data are incomplete and unreliable, an estimate of food available for human consumption is unlikely to be accurate. Furthermore, since it is derived as a residual, the error is unquantifiable and its direction is also unknown. In view of the frequent use of the estimate of food available for human consumption in various food and nutritional studies, it would be desirable if a more reliable and justifiable estimate of this component could be made available. At a minimum, this means the quantity of food available for human consumption would have to be estimated independently based on other existing statistical sources of information. One such source would be a household survey which collects quantities of food items consumed or acquired. Consideration of the survey data as the basic statistics pertaining to the food availability element does not, of course, necessarily imply using them directly as the estimates of food availability. They should rather be used as inputs or starting points in a process of adjustments that will have to take into account conceptual differences, judgements regarding data quality and also the consistency in relation to the inputs or estimates for the other elements of the food balance sheet. The use of the survey data in this manner should help to reduce the reliance on the residual or balancing approach in arriving at the food availability estimates, while also allowing more flexibility in handling the other elements for which the basic statistics are poor.

II. HOUSEHOLD SURVEYS

The main objective of household food consumption or dietary surveys is to collect data on the quantities of food items consumed by a representative sample of households selected from the population. They provide detailed data on food consumed in the household as well as away from home, i.e., any food and beverages, meals and snacks eaten outside the home by members of the household. The information on household food consumption are obtained by weighing and measuring food items to be used before the preparation of each meal (in some surveys, food wasted on the plate also is weighed). Information on food consumed away from home are obtained by interviewing each member of the household. The food consumption data obtained from this type of survey represent an estimate of the quantities actually eaten. The enumerations normally are carried out for a period of two, five and seven consecutive days. This type of survey calls for very careful supervision by the interviewer and close cooperation of the respondents. In general, these surveys are rather complicated and costly to undertake and, therefore, are not always carried out frequently, or even at regular intervals.

On the other hand, the household income/expenditure survey or budget survey, which collects data on food items as an integral part of its broader enquiry on household consumer expenditure and income, is being undertaken on a more-or-less regular basis in many, if not most, countries. These surveys attempt to measure household consumption through the expenditure approach, i.e., the monetary value of the food (as well as other goods) acquired by households. In the past, many of these surveys were confined to household expenditures. Moreover, in developing countries they often covered urban areas only. However, over the years, the trend has been toward nationwide surveys and to cover self-produced food, food acquired through barter, gifts, payment-in-kind etc., - all of which are important factors in rural areas. Furthermore, the practice of systematically recording both expenditure and quantity has become commonplace.

Information on food, whether purchased or otherwise acquired, is normally collected by interviewing household respondents (recall method) or by record-keeping. Since quantities of food that are wasted or lost at the household level, including food fed to pets, food consumed by visitors, etc., are not normally accounted for, the household data obtained tend to reflect consumption levels similar to those obtained from the food balance sheet (food availability) for the nation as a whole. However, it is only the expenditure data that are normally processed and tabulated.

Data on household expenditure from household expenditure surveys are collected primarily for the construction of cost-of-living indices. Hence, from the consumption perspective, the focus is on household acquisition of both food and non-food items (i.e., obtained either from purchases, home produce, hunting, fishing, gathering, or in lieu of

cash income earnings). The food expenditure data, which are collected either by interview or book-keeping methods, therefore, normally refer to food items acquired by the household. The food consumption data obtained from the household expenditure surveys generally reflect the food acquired by, or available to, the household during the reference period. Wastage or losses in the household, such as food fed to pets, leftovers, food thrown away, etc., are not normally accounted for.

The reference period used in collecting the data of food from each sample household is usually one week, one month, or more. Field enumeration is usually carried out for a period of twelve months (i.e., sample households are spread over a period of twelve months). Therefore, overall average estimates of food consumption results refer to average food consumption during the course of a year.

As far as the concept and reference period of the food acquired/available are concerned, the ones adopted by the household expenditure surveys are similar to that of the food balance sheet. A distinction arises in that food balance sheets take account of food available to collective households and institutions, such as military camps, boarding schools, hostels, hotels, nursing homes, homes for elderly people, hospitals, prisons, religious houses, etc., whereas household surveys normally do not.

Thus, in the absence of such information, national estimates of total quantity of the food consumed/acquired from household surveys would be expected to understate the level of total food available for human consumption. This error could be minimized by instead using the estimates of the average per caput quantity either consumed or acquired. This should be calculated by dividing the estimates of the total quantity either consumed or acquired of the commodity in question by the total number of persons in the households. An estimate of total food available for human consumption is then obtained by multiplying the average per caput figures with the estimate of total population.

Information on food eaten outside the household is usually collected in household expenditure surveys. However, the information collected refers to monetary values only. As such, the quantity data exclude the quantities of food eaten away from home. This omission has little effect on the national estimate of average per caput consumption figures for countries where eating outside the household is not a common practice. However, for countries where a significant proportion of food is eaten outside the home, consumption would be underestimated accordingly.

III. COMPLEMENTARY ROLE OF HOUSEHOLD SURVEY AND FOOD BALANCE SHEET DATA IN THE ASSESSMENT OF THE FOOD SITUATION

Although data for a given country from both the food balance sheet and the household survey refer to food availability, the overall per caput estimate obtained from the household survey is not expected to be the same as that from the food balance sheet. The principle reason is that while the food balance sheet refers to the total amount of food available for human consumption in the country, the household survey is confined to the part flowing to the household sector. The difference will therefore depend on the share of consumption in the non-household sector (restaurants, street food, public houses, hospitals, army barracks, etc.). The difference may be smaller in cases where the household survey has attempted to take account of food eaten away from home.

For the purpose of assessing the food availability or consumption levels of the population as a whole, it appears that the food balance sheet is a more appropriate source than those of the household survey. Furthermore, since the food balance sheet is based on frequently updated food and agricultural statistics, the estimate has the added advantage of being available on a more or less current basis.

This does not mean the overall per caput averages from the household survey are not useful. They may well serve to improve the food balance sheet estimates in some respects. This is particularly true regarding the consumption of minor food crops as well as self-produced food (own consumption). Furthermore, broad consistency checks can be made by comparing the consumption patterns (contribution of various food groups to the total) from the two data sets. The principal asset of the household survey is the generation of household-level data that enables an assessment to be made of the variation in food availability among households. Since this variation is not likely to change significantly in the short term, the related data need not be available as frequently as the food balance sheet data.

IV. CONCLUSION

Although both household surveys and food balance sheets provide data on food supply/consumption, discrepancies should be expected between the data obtained from these two sources. In fact, discrepancies are also to be expected between data from different types of household surveys, namely, the income/expenditure/budget survey and the specialized food consumption survey.

Differences in the concepts, definitions and in the methodology used in food balance sheets and in household surveys, are the main reasons for the discrepancies. Food balance sheets provide data on food supplies, while data on food consumption

obtained through household surveys can be classified into two types. The first type, obtained mostly from income/expenditure/budget surveys, are the quantities of food available to or acquired by the household; the second type are estimates of the quantities of food intakes, which is ideal from the nutritional point of view.

Although the survey data refer to averages during the course of a year, the reference year (survey period) used may not correspond to the calendar year which is normally adopted in the food balance sheets. This is not a serious issue since the level of food consumption in the country normally does not change significantly during such a short period.

Food balance sheets measure the total quantity of food flowing into both the household and non-household sectors, without taking into account losses of edible food and nutrients in these sectors. The household surveys normally do not cover food consumption in the non-household sector. Among such surveys only the specialized food consumption surveys take into account losses and wastage at the household level. Therefore, food data derived from food balance sheets should exceed that from household surveys.

Measurement deficiencies also contribute to discrepancies between food balance sheets and household surveys. The reliability of the data from food balance sheets depends on the available range and accuracy of basic statistics, such as production, trade, utilization and population data on which food balance sheets are based. The reliability of data from the household surveys depends on the magnitude of sampling and non-sampling errors.

To summarize, both data sources have their own separate purposes and uses. For assessing food availability/consumption they should be used in a complementary manner. Food balance sheets provide data on the national average of food supplies which are suitable for estimating the overall shortages or surpluses in the food supply of a country. They provide no indication of the food consumption levels of people living in different geographic areas of the country, or in different occupations, or at different income levels. Such supplementary information can only be obtained from household surveys that provide details on the distribution of food consumption among different population groups.

As far as the food consumption levels of the consumers is concerned, food consumption data obtained through household surveys provide a better estimation of the actual level of food consumption, provided that food eaten away from home is included. In the absence of data from household surveys, food balance sheet data provide a good proxy for food consumption levels of the population as a whole.

It is evident that the concept of food consumption data adopted in the household surveys is not perfectly compatible with that of the food balance sheets. To some extent, however, the two sets of data are complementary. For certain commodities a production estimate could best be derived from food consumption surveys. On the other hand, there are commodities for which production, trade and utilization statistics could give a better nation-wide consumption estimate than the data derived from food consumption surveys. Thus, survey data could be considered as a basic statistic pertaining to the food availability element of the food balance sheet.

Using the survey data in the construction of food balance sheets has several advantages. The immediate advantage is that the estimate of food available for human consumption is an independent estimate; consequently its reliability can be, to a certain extent, independently assessed. Moreover, while the residual approach employed in the food balance sheets may still be necessary in some cases, the use of survey data to arrive at an estimate of food availability means that any utilization element could be treated as a residual depending on the situation.

For instance, typically the basic data on stocks and waste are rather limited. The food consumption figure from household surveys could be used as an indicator in arriving at plausible estimates of these two elements. For example, where the results of a household survey indicate the consumption of a particular commodity has increased, and the production and trade data do not suggest such a rise, this might be an indication of a large withdrawal from stocks. Moreover, because most food is perishable and household food waste is relatively small, the estimates of per caput food available for human consumption from food balance sheets have usually been used as an approximate level of food actually consumed. This may work reasonably well in developing countries, but in developed countries, this approach can overstate the level of consumption because the amount of food spoilage and waste in catering establishments is rather high. Household survey data may prove useful in such instances for adjusting the waste component in the food balance sheet.

In cases of minor food crops, such as fruits and vegetables, for which production statistics in many developing countries are rather limited or unavailable the consumption figures from household surveys may be used to arrive at production estimates, particularly in light of the perishable nature of these foods.

Moreover, because household surveys usually include all food items, estimates of average per caput calorie consumption can be derived and this may in turn be used as an independent check on the estimate of per caput food availability from the food balance sheet. In principal, the difference between the two figures should be minimal and their trends should be similar.