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Food and Nutrition Surveillance Systems: Selected Methodological Advances*

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The causal and conditioning factors of malnutrition are seldom the same for different population groups, since they vary in magnitude and nature. For this reason, the actions taken to focus on the problem should also vary according to the regional and local circumstances, and it is essential to be able to count on the appropriate information to formulate, implement and evaluate these measures (Joy and Payne, 1975).

Current information systems in developing countries have many restrictions and deficiencies, particularly in collection, speed of transmission and the analysis and interpretation of the data (WHO, 1971). Moreover, the information is not analyzed in an integrated fashion to give a comprehensive view of the food and nutrition situation or to predict and follow closely the changes over time.

At the moment, the establishment of a multisectoral Food and Nutrition Surveillance System (FNSS) seems to present one of the most promising alternatives for responding to this need for relevant and timely information in developing countries (WHO, 1976; Aranda-Pastor, 1977; Aranda-Pastor and Kevany, 1977; WHO, 1980).

The FNSS should assure the continuous collection and analysis of the data with the appropriate feedback at different levels. Also, it should provide the elements necessary for the process of planning and evaluating the nutritional impact of the plans, programs and projects. The surveillance system should supply permanently updated information on the food and nutrition situation of the population, particularly of the high-risk groups, and of the conditioning factors.

Operational sequence

The experience gained in launching surveillance systems in the Central American area is currently revealing the necessity of following an operational sequence that is in line with the resources and infrastructure of each country (Aranda-Pastor *et al.*, 1978; Aranda-Pastor *et al.*, 1980a). The following stages are suggested:

1. Initial assessment, on a regional level if possible, of the nutritional status of the population, and of the type and quality of the information currently collected by all the sectors participating in the FNSS.
2. Preliminary design and organization, and training of the personnel.
3. Field testing and implementation in a pilot area.

The FNSS data flow system is based on a horizontal structure, and it functions on three different levels (Fig. 1): the *local* level is responsible for the collection of data generated by the community, for verification and transmission to higher levels; the *regional* level supports and supervises the local level and has the responsibility of analyzing, in an integrated manner, indicators from the local level data and recommending or taking the appropriate measures. Next, the *central* level of the system receives the data periodically for its multisectoral analysis and interpretation. Finally, the results, along with the necessary recommendations, are presented at high levels of decision making. The design of the system allows a two-way flow of data. Information, with the different degrees

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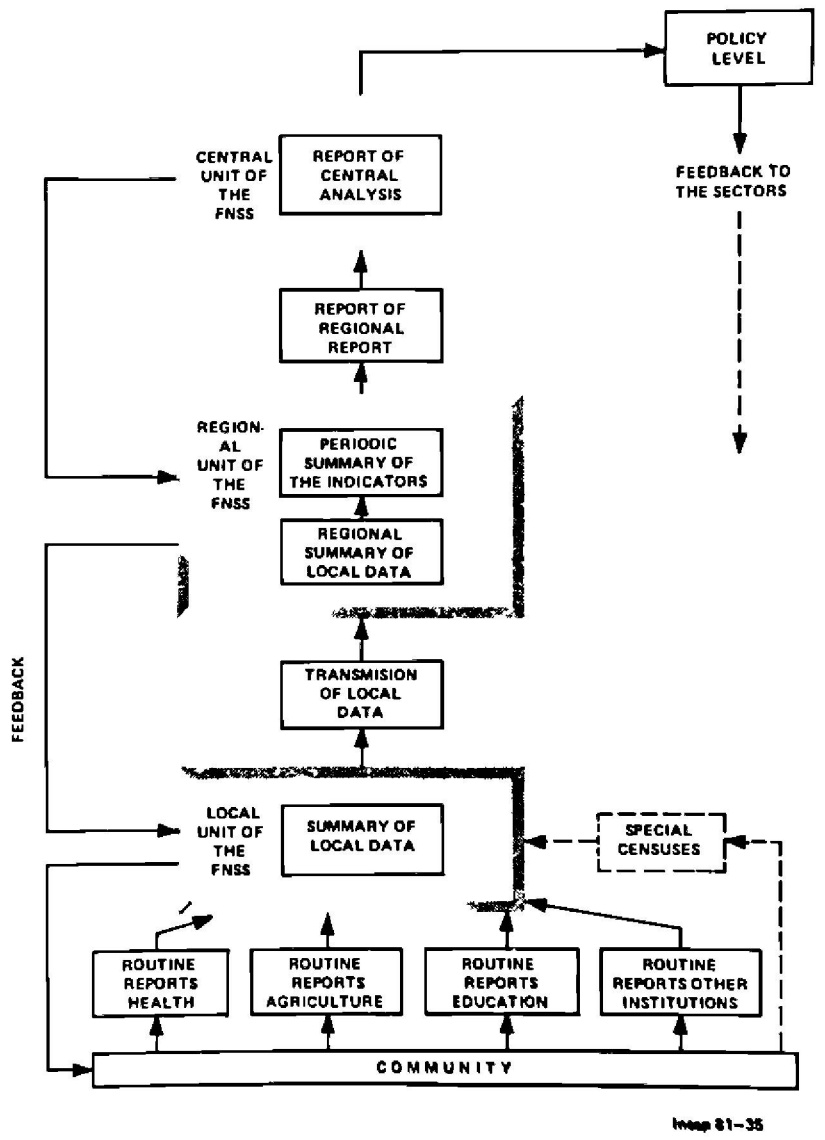

FIG. 1. Simplified diagram of the flow of data of the FNSS.

of complexity of analysis at each level, goes from the local level, through the regional, and reaches the central level from where the information returns in a stepwise manner to the various units which comprise the system in such a way as to reach the community.

Selected Methodological Advances

1. *Demographic Sourcebook*

As stated earlier, an assessment of the nutrition problem at the regional level is the first important step in establishing a surveillance system. One of the methodological advances in this respect has been the development of a Demographic Sourcebook for each one of the six countries of the Isthmus (Teller and Diaz, 1980). This document emphasizes the importance and relevance of socio-demographic information from Census, Vital Statistics and Household Surveys, not only for the nutrition planning process but also as fixed data that a FNSS needs at the regional level.

The Demographic Sourcebook satisfies several of the information needs that are not always available from the health, agriculture and education sectors for a FNSS (Table 1). As a document that is updated periodically, it contains: (i) demographic data that permit the construction of indicators on the size and distribution of the poorer strata of the population at high nutritional risk and their socioeconomic characteristics; (ii) maternal/child risk factors (e.g. mortality and fertility); and (iii) rates and indices of growth, density and distribution that are important basic data for indicators of per capita food consumption and availability, and of age-sex specific nutritional requirements.

2. *Special censuses*

Often a surveillance system requires socioeconomic or demographic data that are not available in either the National Census or the Civil Registry, or are not sufficiently recent or reliable for local area analysis. It is particularly important to have reliable information at the local level on fixed data that will permit:

(a) To establish the size of at-risk groups, by local unit and by seasons (if there are important seasonal migration flows).
(b) To find out about the social and economic composition of the population at risk.
(c) To calculate vital rates, particularly infant and child mortality, which, in the absence of anthropometric and dietary surveys, may serve as indirect indicators of nutritional status.

In various areas in Central America, two types of special censuses have been tested. A *censo relámpago* (household enumeration) has been carried out in those areas of the FNSS which have been subject to substantial changes in the size and composition of the population as a result of immigration or emigration induced by agrarian reform and colonization programs, or by political and military events.

The other, the *nutritional census*, was designed as an instrument for the detection of malnourished children through periodic home visits and the taking of anthropometric measurements there. In the purely census part of the questionnaire, short and simple questions were included on the size and composition of the family, its occupational and educational characteristics, and maternal obstetrics history of live births, surviving children, present pregnancy or lactating state. These data are easily converted into socioeconomic, demographic and maternal/child indicators in order to identify groups of families at high risk (Table 2). This type of census serves as base line data used not only to monitor community and individual level nutritional change, but also to select communities, families and children that need special attention or multisectoral interventions.

As in the *censo relámpago*, local, trained volunteers are able to carry it out. It is being demonstrated that these persons, with a minimum of formal education and barely able to read and write, have become good census takers that obtain adequate data.

TABLE 1

Trends in selected sociodemographic indicators useful in Food and Nutrition Surveillance, Guatemala and Costa Rica, 1960–1980*

Indicator or index	Years	Guatemala	Cota Rica
Infant mortality rate	1960	91.8	68.6
	1965	92.6	69.3
	1970	87.1	61.5
	1975	81.0	37.9
Child mortality rate (1–4 years)	1960	33.5	6.9
	1965	33.5	6.0
	1970	27.0	4.6
	1975	28.0	2.1
Total fertility rates (average no. of live births per woman)	1965–1970	6.4	5.6
	1970–1975	6.1	4.7
	1975–1980	5.7	4.0
Average annual population growth rate	1965–1970	2.8	3.0
	1970–1975	2.9	2.5
	1975–1980	2.9	2.3
% Change in population economically active in agriculture	1963–1973	21.3	9.7
Nutritional density (total population by land area in basic grains)	1964	6.3	8.5
	1973	5.3	9.1

* These data are also available disaggregated by lower administrative units, social class and ethnic group.

Source: *Catálogo Demográfico* (Teller and Díaz)

TABLE 2

Selected socioeconomic, demographic and maternal/child health indicators of high preschool nutritional risk, obtained from simplified nutrition censuses in agricultural communities

Socioeconomic
- Landless agricultural day laborer
- Farmer who cultivates less than two hectares
- Illiterate mother

Demographic
- Father absent, seasonally or permanently
- Three or more siblings under five years of age
- Migrant family

Maternal
- Short (under 3 months) length of breastfeeding, or failure
- Extreme age (under 18, over 40) at pregnancy
- High infant-child mortality history (over 20% of all liveborn children died)

Child
- Over 25% retardation in weight-for-age
- Over 10% retardation in height-for-age

3. *Computer mapping of nutrition information*

When the FNSS is in full operation, as well as during the initial assessment, there will be a large, complex, interdependent volume of data generated on a regular basis which needs to be analyzed and presented to decision makers to enable them to take the appropriate short and long term action to reverse the situation. However, the individuals at the lower level generally do not have the training, and those at the higher level do not have the time to absorb large quantities of data presented in tables. Realizing that the human eye and mind assimilate more efficiently information displayed graphically, a procedure was developed to produce computer-generated maps of the myriad of factors affecting the food and nutrition status of the most needy segments of the population of Central America.

It is important to be able to visualize where certain indicators exceed specified acceptable levels, since many of the factors that condition malnutrition have geographical and ecological components. When several factors show a similar picture, the resulting visual correlation has much more of an impact on

decision makers than do R^2. Besides, a visual presentation allows the decision makers the flexibility to choose their own regionalization.

In Fig. 2 we present one of the factors referred to above: the percent of the population economically active in agriculture and its change from 1965 to 1975. The darker areas are departments with a high percentage of those employed in agriculture; the lighter, a relatively low percentage.

Even though there are several computer packages already available to perform this task, they are usually too complicated and large to be used in the context of the Central American countries. Consequently, a streamlined computer program was written that can be implemented on small machines (16 k memory) and does not require a high level of knowledge of the computer processing to be used.

Final Comments

One of the main obstacles in any surveillance system in a developing country is the inadequacy of the information system. In the operationalization of surveillance systems in Central America, the following obstacles and limitations have been encountered (Aranda-Pastor *et al.*, 1980b):

1. Limited physical and human resources.
2. Lack of a decentralization of activities at the regional operational level.
3. Lack of coordination in the coverage, quality, periodicity and transmission of the data.
4. High turnover in field personnel.
5. Deficient supervision.
6. Lack of more statistical investigation on the value of the present indicators and the quality of the collected data.

In order to overcome some of these problems, methodological advances have been made; the potential advantages have already been detailed in the utilization of existing demographic data and of existing personnel to carry out special directed censuses. Even with the application of new demographic techniques, the smaller the geographic area is, the more reliable the data need to be in doing trend analysis. Training and supervision are key here, and this requires an additional commitment of resources. In the meantime, monitoring of monthly and even trimestral change by community is not always possible.

In spite of the obvious advantages of the visual mapping by computers, there are, nevertheless, several shortcomings to the approach that need to be kept in mind. Since the technique requires the use of a digital computer, it obviously has to be run at the central level. The regional and local levels can only see the results for their area several months after the data was generated in the community, once the central level receives the data, processes them and passes the

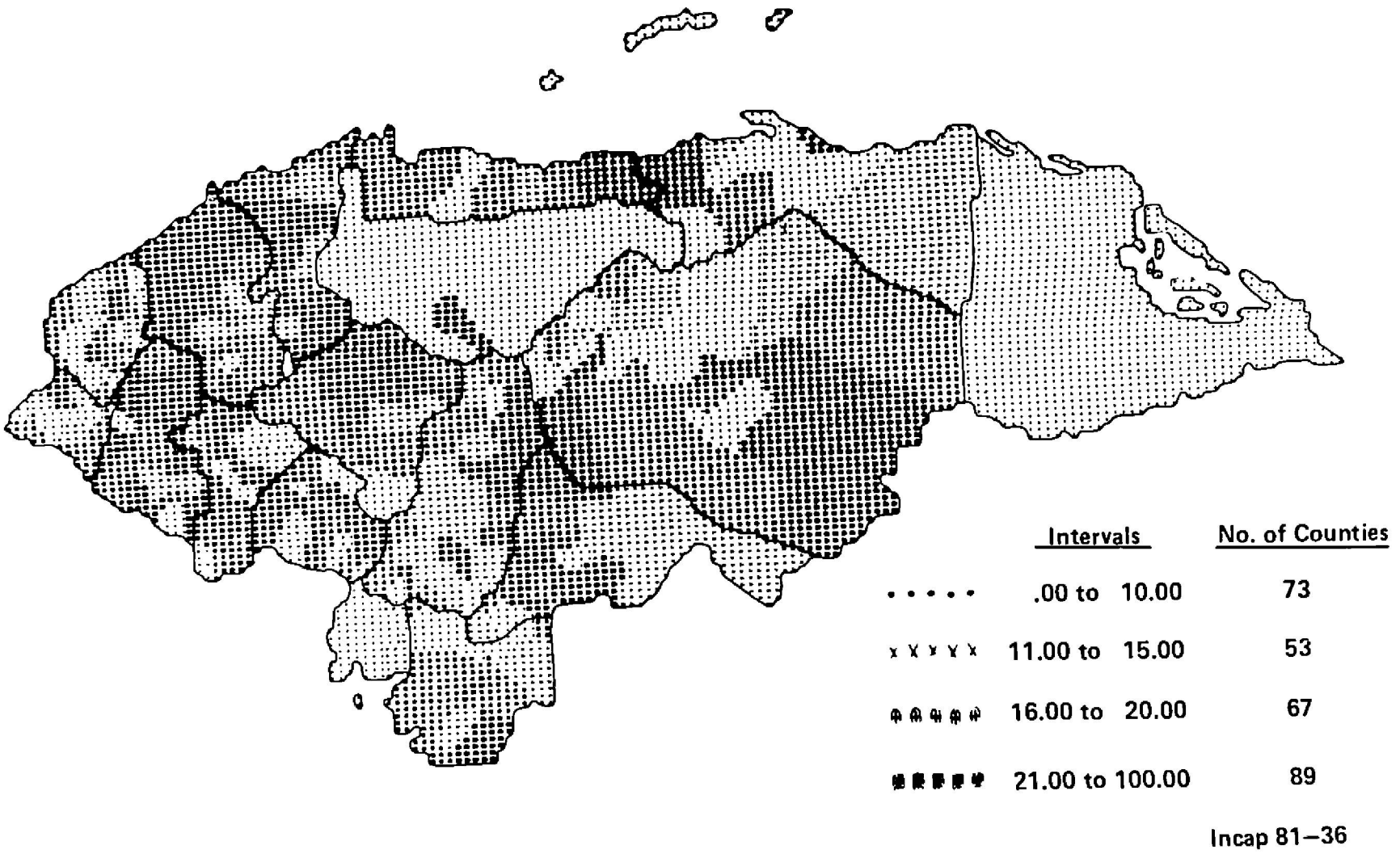

FIG. 2. Percentage of deaths to children 1–4 of total deaths, by county, Honduras, 1973.

maps down. Another risk to be avoided is that the use of the computer tends to "legitimize" bad data, due to the fact that many persons feel that if it comes out of a computer it is bound to be correct.

One of the greatest shortcomings is the lack of direct and periodic data on local food consumption, morbidity and nutritional status of the non-clinic population. Since the developing countries cannot expect to carry out monthly surveys on these topics, more practical ways must be found to measure these factors directly. The alternatives are basically to collect it vertically through special cross-sectional surveys, or horizontally utilizing the personnel that already exist in each sector. Our preference is for the latter, and in doing so, basic service personnel can become better motivated and knowledgeable about the intended purpose of the information through increased personal contact with families in the process of periodically obtaining data on these factors.

In conclusion, in spite of the short time that food and nutrition surveillance systems have been functioning, their operationalization has permitted different administrative levels to become more integrated multisectorally. This has been conducive to a more technical and integral assessment of the malnutrition problem, and to the involvement of several different sectors in its solutions.

Summary

Currently many countries, particularly those in the third world, are feeling the necessity of establishing multisectoral surveillance systems to assure the continuous collection and analysis of information which permits the feedback required to plan and evaluate the impact of nutrition programs.

The experiences acquired in setting up these systems have shown the importance of following an operational sequence which is in line with the resources and infrastructure existing in the countries. Additionally, obstacles and limitations encountered are presented.

At the same time, the usefulness of certain specific methodological advances is discussed. These advances include, among others, quick and streamlined censuses to characterize the groups at risk and a simplified process for the presentation of information by means of computer-generated maps which allow high level decision makers to visualize the geographical distribution of the constellation of factors related to the food and nutrition problem.

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