I-1445

THE SCHOOL AS A DATA SOURCE FOR FOOD AND NUTRITION SURVEILLANCE SYSTEMS IN CENTRAL AMERICA AND PANAMA

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THE ROLE OF INDICATORS IN FNSS

Comprehensive and efficient food and nutrition surveillance systems (FNSS) should collect information not only on the nutritional status of population groups (i.e. weight and height), but also on indicators describing the food situation at the national and regional levels [1-3]. National and family availability of energy and nutrients can be measured by food balance sheets and family food consumption surveys respectively. Furthermore, FNSS should also make available data on the socio economic factors determining food and nutritional status, as well as data on constraints limiting the expansion of relevant governmental programmes. The availability of these data is important for decision-making at the normative and operational levels in food and nutrition planning.

Table 1 illustrates the role of different indicators in analysing various food and nutrition situations or in FNSS. The first column of the table contains indicators and/or instruments frequently used to assess the food and nutrition conditions of population groups [4]. The second column indicates food and nutrition conditions specifically measured by each of the indicators and/or instruments listed in the first column, and the third column presents indicators that may help to pinpoint causes of food and nutrition problems. Although not included in table 1, a fourth column would logically include indicators of whether a specific problem described in column 2 has been adequately tackled by government programmes. For example, the government response to problems concerning agricultural credit to small subsistence farmers can be monitored by information on (a) the total amount of money allocated to the purchase of staple foods, (b) the evolution of supporting prices to basic grains, (c) investments, and (d) the development of governmental capacity to store foods.

This paper is a summary of national experiences from Costa Rica, Panama, and Nicaragua, and INCAP's research programme supporting food and nutrition surveillance systems (FNSS)

CHARACTERISTICS OF DATA SOURCES

Two basic premises should orient the selection of the data sources and indicators for FNSS. First, the purpose of FNSS is not to screen individuals for action programmes such as food aid, but rather to identify target communities and/or families for government-supported social and nutrition activities. The second premise is that FNSS data should allow as much useful disaggregation as possible with the aim of improving the targeting of communities and/or family types. Therefore data sources, such as a census, in which valid estimates can be obtained for the smallest political-administrative units, are preferred to national surveys in which sample frame and size usually preclude inferences other than at the national level or at still grossly disaggregated urban or rural levels. The information systems of government services are alternative data sources to sample surveys. However, problems with the procedures of data collection, quality control systems, and, in certain government services, the representativeness of data thus collected limit the usefulness of such data.

The indicators of nutritional status, such as weight, used in FNSS are usually generated by the health sector. The following may explain this pattern:

1. For many years the health system has been collecting weights of children under five, and there is usually a system of data flow from the local level to the central level.
2. The personnel who design FNSS frequently work in public health, and therefore the system design is largely based on indicators provided by the health sector.

The usefulness of indicators from the health sector has been questioned. Validation studies conducted in El Salvador reported that clinic anthropometric data overestimated the true prevalence of malnutrition occurring in the communities covered by the health services. However, with respect to classifying magnitudes of growth retardation, the clinic anthropometric data ranked the regions within the country similarly to the sample field surveys [5]. Furthermore, the health personnel reported accurately the true prevalence of malnutrition in children attending the clinics [6].

TABLE 1. The value of different data, instruments and indicators in the analysis of food and nutrition situations

Indicators or instruments measuring food and nutrition conditions	Food and nutrition conditions	Indicators of determinants of food and nutrition problems
Food balance sheets (National availability of energy and proteins)	National availability of foods	1. Percentage of households with less than 5 hectares of land 2. Number of training courses and technical assistance visits to farmers according to products and size of farms 3. Amount of agricultural credit by products and size of farms 4. Percentage of the production of staples marketed through government services 5. Percentage of post-harvest losses by products and size of farms 6. Balance of food imports and exports
Family food consumption surveys Income and expenditure surveys (Family availability of energy and nutriments)	Local availability of foods	7. Distance to food-selling centres 8. Subsidies to the food-marketing system
	Purchasing power of families	9. Percentage and total number of families below the poverty line 10. Price of foods and other basic goods 11. Economic value of subsidies
	Decisions about food selection	12. Schooling of heads of households and spouses 13. Percentage of advertisement time for nutritionally adequate and non-adequate foods
Anthropometric, biochemical and clinical surveys Mortality and morbidity reports Food consumption surveys on individuals	Primary health care	14. Availability, distance, and coverage of the health service 15. Coverage of immunization programmes
	Environmental sanitation	16. Percentage and total number of households with no potable water 17. Percentage and total number of households with an adequate system for excreta disposal 18. Percentage and total number of households with an inadequate system for excreta disposal

Source: Modified from Arenales [4].

This article reviews experiences on the use of the education system as a data source in FNSS in Central America and Panama, in terms of providing both indicators of nutritional status and information about problems determining existing levels of malnutrition. The strategy used to incorporate this data source into FNSS, including a review of research activities, is also discussed. A companion paper [7], forthcoming in *Food and Nutrition Bulletin*, deals with the use that has been made so far of the data generated from the school system in Central America and Panama.

REINVENTING THE WHEEL

Those acquainted with the pioneer work of Orr and Clark measuring the nutritional impact of school milk programmes on seasonal growth variations [8], and with that of other investigators in more recent years [9], may think that the proposed uses of anthropometric data on schoolchildren are like reinventing the wheel.

The decision in public health programmes in the 1950s to direct health resources to vulnerable groups (mothers and children under five years of age) discouraged nutrition research activities on school-age children. Nevertheless, Bengoa suggested using schoolchildren's height data as indicators of nutritional status for FNSS [10]. Bengoa claimed that a height-for-age measurement when a child enters primary school is the best summary of social, economic, and biological events affecting the nutritional status of that child from conception onwards and even reflects the nutritional conditions in the child's community. Other investigators, such as Guzmán, also conducted research studies on this age group. Guzmán's report on secular changes in the nutritional status of urban Guatemalan children used height data from schoolchildren [11].

The personnel responsible for organizing the Nutrition Information System (SIN) in Costa Rica, motivated by Bengoa and Guzmán's reports [10, 11], incorporated height data from the school into SIN [12] for the following reasons:

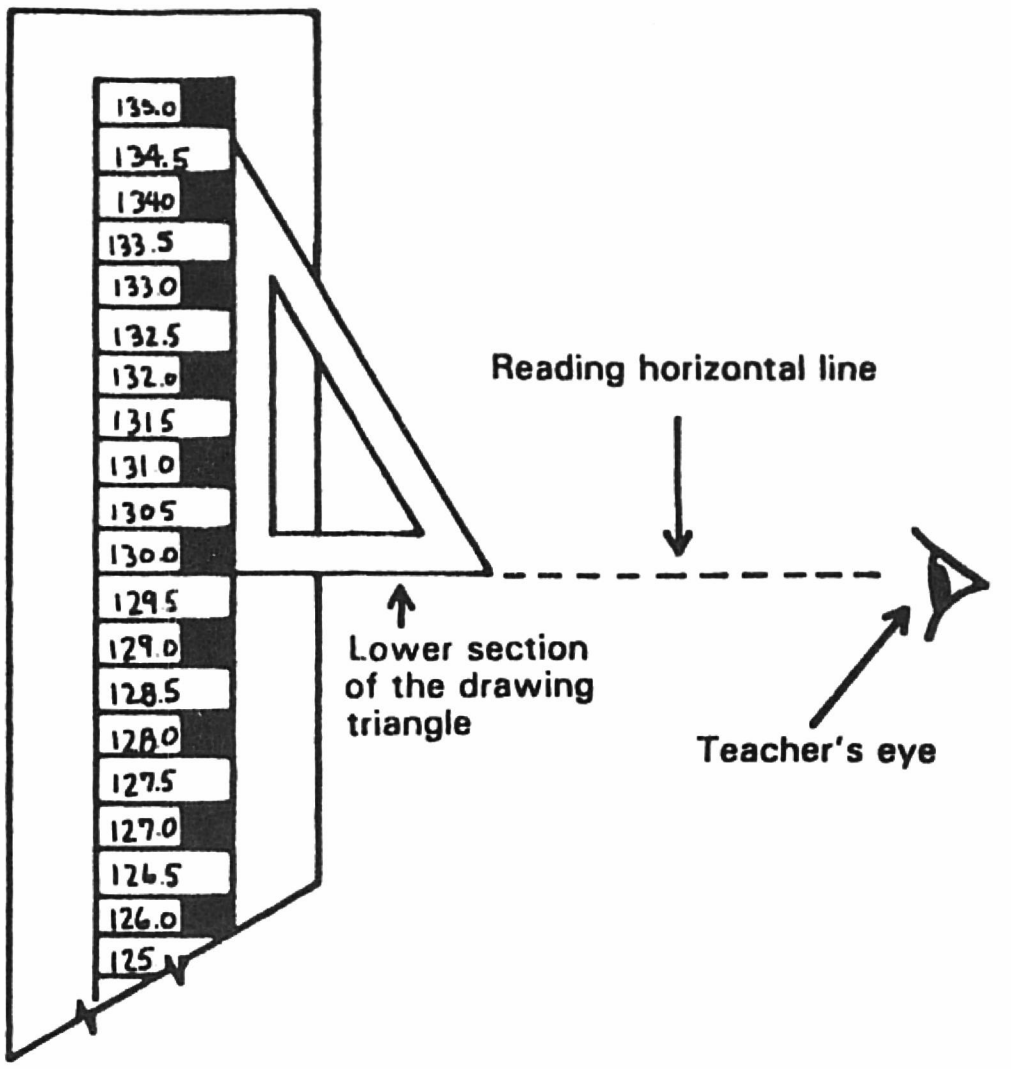
1. The coverage of the school system was much greater than the coverage of the health system. There were around six schools per health post.
2. The instruments and set of instructions were less expensive and more easily standardized for teachers than for community workers from other sectors. Therefore data would probably be more valid and reliable.
3. Data collection activities could be carried out in all schools in one week and all information could be made available at the central level in one month.
4. There were no foreseeable problems concerning cost, infrastructure, etc., that would prevent the activity being carried out on a continuous basis every two years.

PRACTICAL EXPERIENCES IN CENTRAL AMERICA AND PANAMA

The Costa Rican experience has motivated other Central American countries to incorporate school height data from censuses into their FNSS. Furthermore, it has promoted the development of research activities aimed at simplying procedures for using school height data as a core source of information for FNSS.

The first census of children's height (CSCH) upon entering the first grade of primary school was conducted in Costa Rica in 1979 [12]. A cardboard measuring instrument (fig. 1) was devised and sent folded in an envelope to all teachers throughout the country. The cost per unit of the measuring instrument was less than US$0.50. A written set of instructions with clear drawings was developed and presented to teachers (figs. 2 and 3); after measurement errors were detected by trained supervisors, teachers were asked to suggest clarifications of paragraphs and/or drawings. Their suggestions were included in the final version of the set of instructions sent to schools.

Teachers were also provided with a precoded form, which included information on the location of a child's school, name, age, and sex; a space was provided for entering the values of height measurements obtained for each child.



The reading in both cases will be 130.0 cm

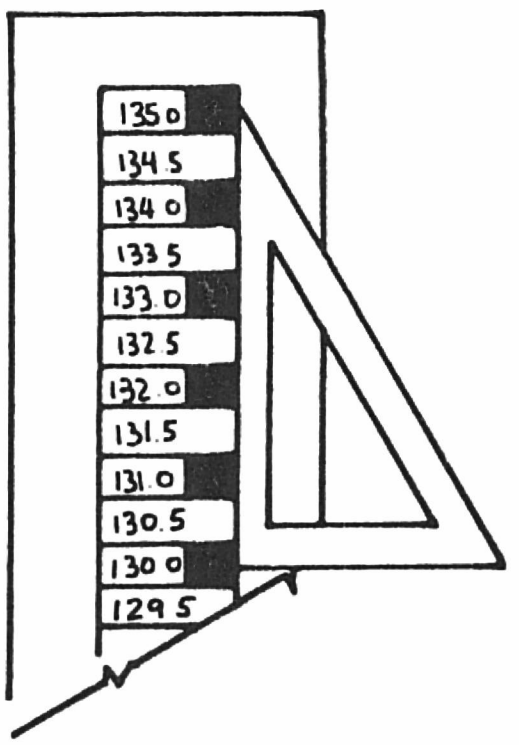


FIG. 1 Cardboard measuring instrument and reading instructions given to teachers. Nutrition Information System (SIN) Costa Rica, 1979

A quality control system showed that the measurement error of teachers in obtaining height was 2.1 per cent [13] a rate that falls within acceptable limits for this kind of measurement [14]. A subsequent validation exercise was conducted in Guatemala in which the criterion used to ascertain the measurement error was an estimate of the prevalence of height retardation. This exercise showed that teachers, given an adequate set of instructions, estimated almost the same prevalence of height retardation as did experienced field anthropometrists — that is, 24.5 per cent and 24 per cent respectively [15].

Further validation studies carried out in Nicaragua in 1984 have provided unequivocal evidence of the fact that teachers can collect good quality anthropometric data if they are provided with clear instructions. In the

FIG. 2

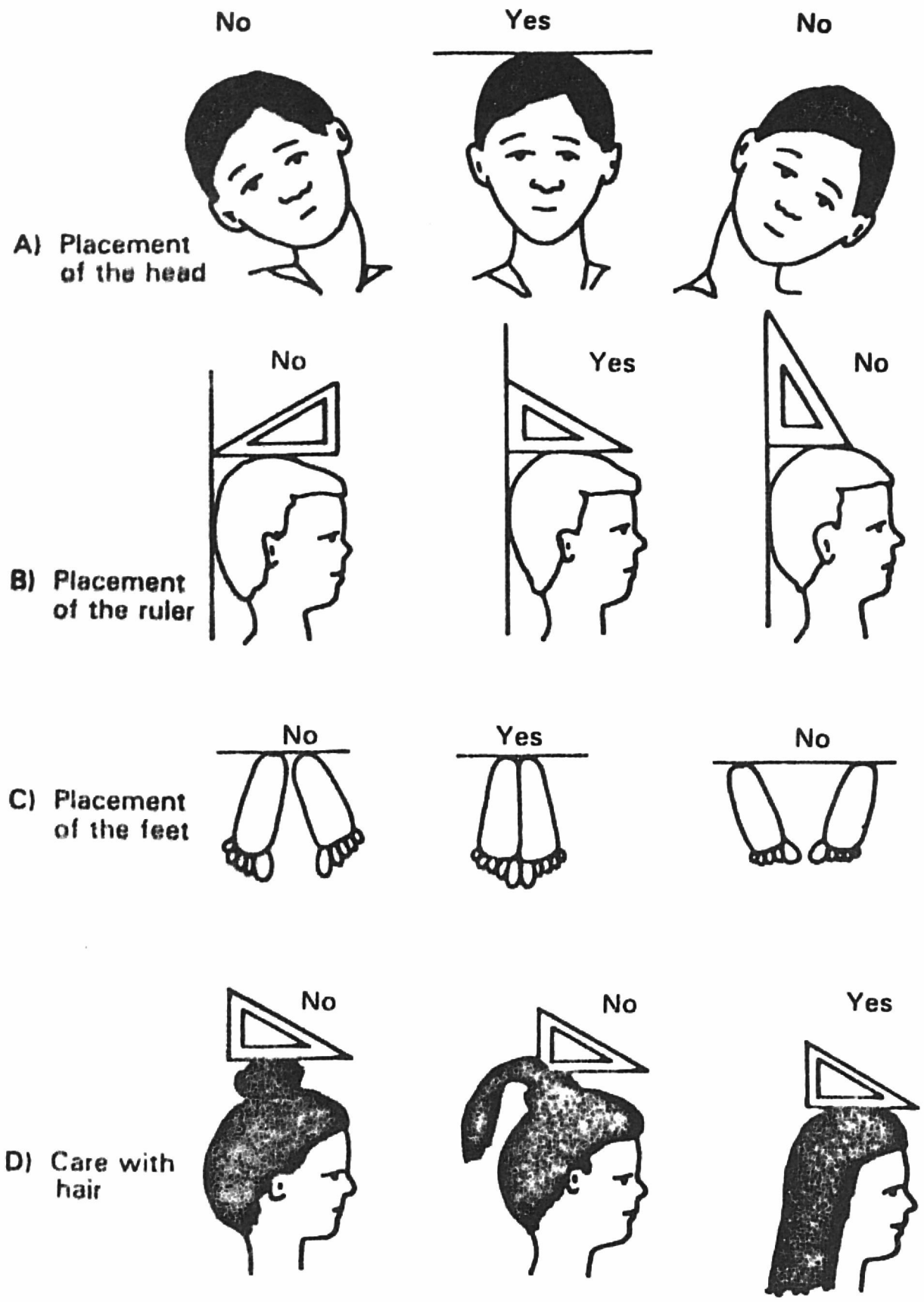
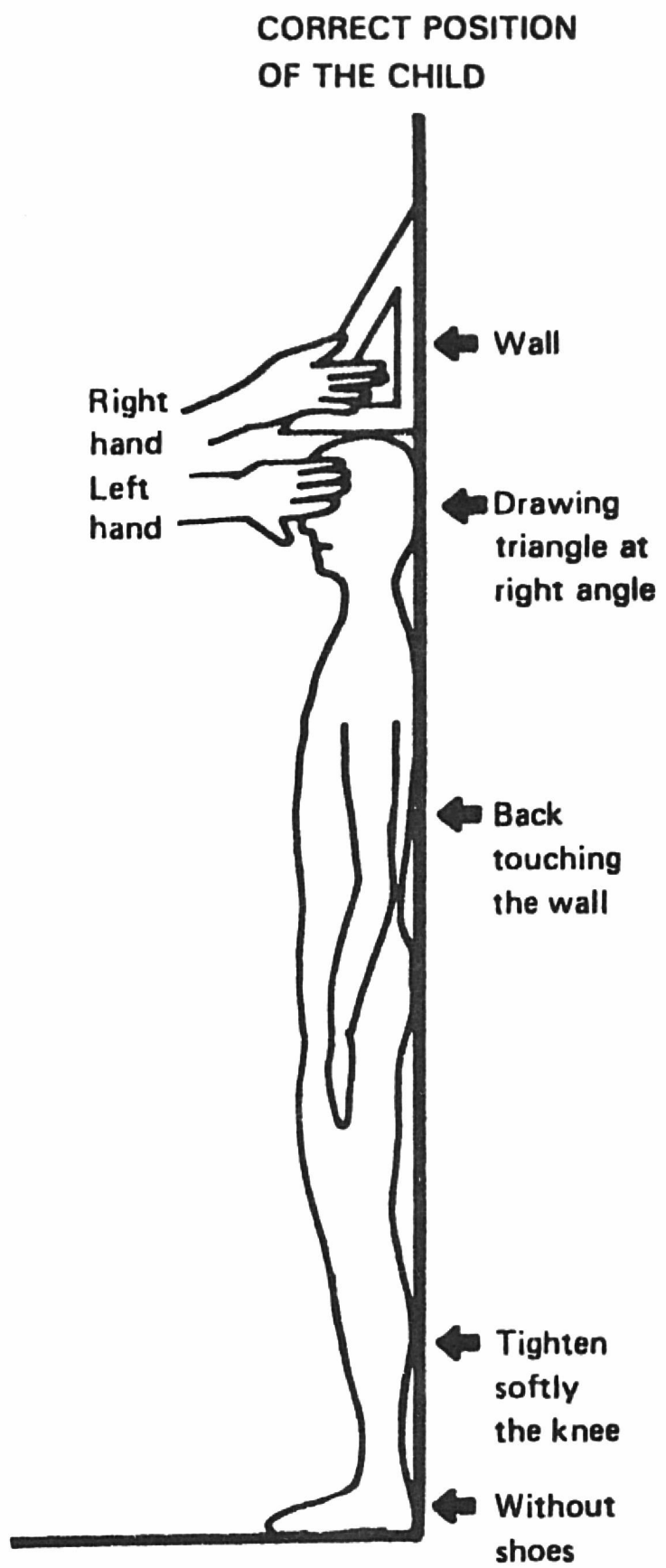


FIG. 3



FIGS. 2 and 3. Drawings of instructions given to teachers for measuring height correctly. Nutrition Information System (SIN), Costa Rica, 1979

Nicaraguan validation experience the agreement between teachers and supervisors was impressive. While the teachers estimated a height of 119.15 ± 6.69 cm (mean ± SD), the supervisors reported 119.12 ± 6.12 [16].

The height data from the 3,000 collection sites (schools) were sent to the capital of Costa Rica, San José, using the data flow system of the Ministry of Education, which in turn passed them over to the SIN staff in San José.

The second census of schoolchildren's height (CSCH), conducted in Costa Rica in 1981, also gathered information on height and socio-economic data from families of all the children measured. The socio-economic form (fig. 4) solicited information on the occupation and education of the household head, family migration patterns, and the number of children under five living within the household. Children were asked to take the form home to fill it out with their parents or guardians as homework. Teachers were given instructions on how to code the socio-economic data thus obtained from the household. In a sample of schools a validation check was carried out in which surveyors were sent to the households to corroborate the information provided by the family. This test clearly

LEARNING TO KNOW MYSELF

1. My name is: _____

2. The name of my school is: _____

3. I live in. _____
province county

4. When I was going to be born, my mother lived in:

_____
province county

5. I was born in the province of _____
name of the province
on the _____ of _____ of 19____.
day month year

6. When the present president of my country was elected,
I lived in: _____
province county

7. In my house there are _____ children
number
younger than I.

8. The person who provides more economic support to
maintain my family is: _____

9. This person attended:
Primary school until _____ grade.
Secondary school until _____ grade.
University until _____ grade.
Never went to school _____

10. The occupation that the person who supports
my family has is: _____

11. Is he or she self-employed? Yes _____ No _____

12. Does he or she have employees? Yes _____ No _____

13. If he/she works for a plantation or a farm, what is
the farm's main product?

FIG. 4. Form used for collecting socio-economic information at the household level, Nutrition Information System (SIN), Costa Rica, 1981.

demonstrated that reliable socio-economic data can also be easily collected through the school system.

A form similar to that used in the 1981 census in Costa Rica, but containing information on household environmental sanitation conditions and access to health services, was developed and used in an evaluation of the nutritional impact of the national school snack programme [17]. In 1983 Costa Rica carried out the third national census of schoolchildren's height and has scheduled the fourth national census for 1985.

In 1982 the Ministries of Health and Education of Panama conducted a national height census of children attending first grade. Teachers from 2,200 schools distributed across the country gathered height information on 58,000 children. The supply of measuring materials to teachers and the cost of data processing amounted to US$8,500, and with this it was possible to map the distribution of malnutrition for the 9 provinces, 66 districts, and more than 14 *corregimientos* into which Panama is politically and administratively divided [18].

A figure similar to that for Panama (US$8,500) was estimated for costs related to materials and data processing in Costa Rica in 1979. However, no estimates were made of the cost of: teachers' time, the professional staff located at SIN and other personnel at the local and central levels, and the technical co-operation with INCAP.

For comparison purposes, a nutrition-sample survey conducted in 1980 [19], which gathered anthropometric data from 2,000 Guatemalan children under five years of age as well as family socio-economic data, had an estimated cost of US$70,000 (including costs for personnel, local transportation and per diem, computers and office supplies, materials and equipment). The latter figure excluded cost for local professionals' time and also technical assistance provided by INCAP to the project. Panama will conduct a CSCH every three years, but no decision has been made yet with respect to the incorporation of socio-economic indicators into the CSCH to be conducted in 1985.

The Ministry of Education of Nicaragua has been gathering anthropometric data from samples of school-age children residing in Regions I and II of the country since 1981. The objectives of this exercise are to determine the magnitude and severity of malnutrition in the different regions into which Nicaragua has been divided, and to ascertain the value for a national FNSS of approaches and indicators collected through the education system. Region I, the northern region of Nicaragua, has been declared a priority area for socio-economic development. Certain counties within Region I are fostering the Integrated Rural Development Programme called PRONORTE, while others are likely to be included in the initial operational area for the

Five Year National Food and Nutrition Plan (1984-1988) supported by UNICEF/WHO. Region I, particularly the counties where both programmes are located, requires a monitoring and evaluation system, which has already been designed. The data generated in the schools form a component of the information system. The instruments have been designed and the preliminary pre-testing took place in late 1983 [16]. Data collection covering all schools in the counties was scheduled to start in March 1985. It is expected that the exercise will be conducted every four years with national coverage.

DISCUSSION

The school system in the Central American isthmus has proved to be one of the major contributors to FNSS of reliable, representative, and low-cost indicators of both the magnitude of nutritional problems and the determinants of malnutrition as evidenced by the experiences in Costa Rica and Panama. The correlation coefficients (r) relating the prevalence of height retardation as shown in the census to estimates for children under 60 months old made from field sample surveys or countr·and district-level mortality rates are actually above 0.70. Furthermore, the communities in the high tercile of mortality levels or height retardation are also the same communities, regardless of the data source (sample surveys, census of schoolchildren's height, mortality records), used to study the magnitude of malnutrition.

The development of food and nutrition planning activities in Third World nations has given professionals from these countries dealing with food and nutrition problems a clearer understanding of the purpose of, and strategies required to organize, an efficient FNSS. Furthermore, the role of indicators likely to be available for such a system is better understood nowadays. The design and operation of FNSS should not proceed without first carrying out operational research and identifying the real data needs of both decision-makers at the normative (political) level and those responsible for action programmes (executive level). Operational research is necessary to evaluate existing sectoral information systems, particularly their potential to provide the required data, and also to identify constraints that need to be overcome.

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