History and Early Development of INCAP<sup>1,2</sup>

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Abstract
Nevin Scrimshaw was the founding Director of the Institute of Nutrition of Central America and Panama (INCAP), serving as Director from 1949 to 1961. In this article, he reviews the history of the founding of INCAP, including the role of the Rockefeller and Kellogg Foundations, the Central American governments, and the Pan American Health Organization. The objectives pursued by INCAP in its early years were to assess the nutrition and related health problems of Central America, to carry out research to find practical solutions to these problems, and to provide technical assistance to its member countries to implement solutions. INCAP pursued a strategy of selecting promising Central Americans for advanced education and training in the US who assumed positions of leadership on their return. After this early phase, talented non-Central Americans of diverse origins were brought to INCAP, as well as additional researchers from the region. Growth of INCAP, as reflected in its annual budget and in the physical plant, was rapid and this was accompanied by high scientific productivity. Several field studies were launched that contributed impetus and design elements for the Oriente Longitudinal Study, which is the focus of this supplement.  J. Nutr. 140: 394–396, 2010.

Introduction
In the early 1940s the Rockefeller Foundation supported the establishment of an Institute of Nutrition for Food Analysis in Mexico and the Kellogg Foundation (KF)<sup>3</sup> funded similar institutes in Cuba and Colombia. The Minister of Health (MOH) of Guatemala requested help in establishing an Institute in Guatemala and was told that it should be for all of the Central American countries and that it should not be limited to food analysis. The KF agreed to provide fellowships for advanced training of staff and equip the building for a Central America Nutrition Institute on the condition that the Pan American Health Organization (PAHO) accept administrative and fiscal responsibility.

PAHO agreed and the MOH of Guatemala convened a meeting of the MOH of all 5 Central American countries and Panama; also attending were representatives of the KF, PAHO, and the Rockefeller Foundation. The latter agreed to train agronomists to work with the new institute. The countries agreed to pay an annual quota of $ 8500 upon legislative ratification of the agreement. Guatemala promised to provide a suitable building and the KF to provide $100,000 for initial equipment, supplies, and some basic books and journals as well as to pay $15,000 annually for 3 y to PAHO for the salary, travel, and a secretary to the Director. KF also agreed to provide fellowships to eligible Central Americans for a special 1-year master’s degree program in nutrition with Professor Robert Harris at the Massachusetts Institute of Technology (MIT) to prepare future staff members.

Only Guatemala, El Salvador, and Honduras ratified the agreement at first, nominated fellowship candidates, and began paying the annual quota. At age 30, I was selected to be the director of the new institute, but I was in the second year of a 3-year medical residency and research studies at the University of Rochester and could not take up the position until the summer of 1949. After his time at MIT, Guillermo Arroyave, a Guatemalan, spent 3 mo in my laboratory at the University of Rochester to learn the ultra-micro methods for determining nutrients in capillary blood that I was using for a study on nutrition in pregnancy at the time. He then went to Guatemala 2 mo ahead of me to set up the laboratory.

Institute of Nutrition of Central America and Panama’s first building
The government of Guatemala had arranged for the Institute of Nutrition of Central America and Panama (INCAP) to occupy a small adobe building belonging to the University of San Carlos in the Botanical Garden. When I arrived in July 1949, the floor, laboratory plumbing, and gas had not been installed. The building had 3 laboratories designated for food analysis, agricultural and food chemistry, and clinical biochemistry plus a small dark room, medium-sized rooms for the field team, and a...
library-conference room as well as small offices for the director, assistant director, secretary, and a storeroom.

An international inaugural ceremony was held on September 15, 1949, Central America’s Independence Day, attended by Ministers or Directors of Health of the countries signing the original agreement, members of the diplomatic corps representing the proposed member countries, and a few others. In the next few years, Costa Rica, Panama, and Nicaragua ratified the agreement and began paying their quotas.

We started the first year with a basic operating budget of $25,500 plus supplies, equipment, and a few journals and books provided by the KF grant. Quotas soon rose to $12,500 and later $62,500. Raquel Flores built what became the best nutrition library in the developing world and Guillermo Palma maintained and expanded it.

**Objectives and principles of INCAP**

At the start I made several firm decisions from which INCAP never wavered in its first 30 years, including the objectives that would guide the work: 1) to determine the nutrition and related health problems of the countries of Central America and Panama; 2) to find practical solutions to these problems through research; and 3) to assist the countries to apply these findings through advisory services and training of personnel at all levels. Certain principles were also established: 1) INCAP must be a Central American Institute, run by Central Americans, and not one dependent on expatriate researchers. This meant training Central Americans from the beginning; 2) research must be directed at identifying and solving regional nutrition and health problems; 3) research proposals must be presented to and discussed by the professional staff before support is approved; and 4) all research must be published promptly, preferably in peer reviewed journals in English and reprinted in Spanish.

**Early years of development**

Each year 1 or more selected staff members went to the United States, supported by a KF Fellowship to obtain a Ph.D. Three key Guatemalan physicians were recruited early: Moisés Behar when he returned from 2 years in the Children’s Institute in Paris, Werner Ascoli with medical and public health degrees from Temple University, and Carlos Tejada after he was the senior resident in pathology at the Massachusetts General Hospital. The Guatemalan physician, Carlos Pérez, served as Director of Country Services and Assistant Director of INCAP before returning to private practice in 1961.

By 1955 we had a large new permanent building provided by Guatemala with many laboratories, offices, an auditorium, and large library. Separate facilities for animal colonies were completed. By the time I left in 1961 after 12 years as Director, the annual budget was approximately $900,000 and the heads of all 7 divisions had doctorates. By the time Behar left in 1974 on INCAP’s 25th anniversary, a second adjacent larger building was under construction by the government of Guatemala for additional laboratories and classrooms for the graduate program and a School of Nutrition and Dietetics and a separate small building had been completed for clinical metabolic studies. The annual budget was nearly $5,000,000.

These developments would have had little meaning unless they were the result of increasing productivity. Far more important than buildings was INCAP research productivity. At the 25th anniversary of the founding of INCAP, a complete bibliography of INCAP publications to date was distributed listing 791 scientific papers in English, almost entirely in peer reviewed publications, 700 in Spanish (many of them translations of the English articles), 4 books, and 154 theses required for professional degrees Central America.

Once Central Americans were clearly the scientific leaders of the Institute, a number of expatriates joined INCAP and made important contributions. These included the American anthropologist Richard Adams; the Swiss Jean-Pierre Habicht and the argentinitian Benjamin Caballero, both with PhDs in nutritional biochemistry and metabolism from MIT; the Spaniard Cipriano Canosa, who initiated the first INCAP studies of nutrition and cognition; the Belgian Ivan Beghin, who developed the Food Policy Division; the Dutch economist Maartin Immink; and the Americans Patricia Engel, Nancie Solien-Gonzales, and other expatriates who became important and productive staff members although each eventually left to become outstanding leaders in the US and Europe as did several Central American staff, notably Reynaldo Martorell and Fernando Viteri.

**Important contributing factors**

In addition to the leadership and enthusiasm of the professional staff, 2 additional factors contributed importantly to the rapid and sustained development of high quality research.

One was the Technical Advisory Committee, made up of remarkably experienced and prestigious U.S. and Latin American scientists. They met for 5 full days each year and interviewed each researcher and reviewed all their research activities. They not only stimulated young researchers but also identified weaknesses and helped correct them. They became strong external supporters of INCAP. In the early years the Technical Advisory Committee included Paul Gorgy of the University of Pennsylvania and discoverer of 3 of the B-vitamins; Charles Glen King, the President of the Nutrition Foundation; Antonio Peña Chavarria, Director of the Children’s Hospital in Costa Rica; William Darby, Head of the Department of Biochemistry and Nutrition, Vanderbilt University; Leonard Maynard, Head of the Division of Nutrition of Cornell University; Henry Sebrell, Director of the U.S. National Institute for Arthritis and Metabolic Disease; Malcolm Merrill, Director of Public Health of the State of California; and in later years, others equally distinguished.

The other factor was the appreciation and encouragement of a strong research agenda by Fred Soper, the Director of PAHO until 1959, and Marcel Candau, his Deputy, who became Director General of the WHO in 1953. Soper was succeeded by Abraham Horwitz of Chile who was Director until 1975. He too gave unwavering support to INCAP and its programs. When he retired he devoted the rest of his life to nutrition including chairing of the Subcommittee on Nutrition of the United Nations System.

**Early longitudinal community-based studies**

While it is also known for its laboratory and clinical metabolic studies, INCAP developed early on an exceptional capacity to carry out community dietary and nutrition studies of all types. Some of these were short-term interventions such as double-blind, controlled investigations of the effect of vitamin B-12 or antibiotics on child growth, as well as a comparison of the ability of animal and vegetable protein to promote child growth. At the same time, INCAP was developing an exceptional capacity for long-term, community-based studies, extending over years. I will describe briefly 2 of the studies that preceded and in one way or another led to the highly successful and important Longitudinal Oriente Study, whose findings are to be reported in this symposium.
The Four Village Study

The purpose of this study was to determine as accurately as possible the cause of death of children ≤5 y of age in 4 contiguous villages and compare the findings with the causes of death reported by the government in its official vital statistics (1). A field worker in each village recorded the detailed circumstances of each death, viewed the body of the deceased child, and obtained a history from the mother. Arrangements were made for them to report to the responsible physician in another location who could ask them to return for more information. The village record reported 40% of the deaths due to “worms” and the remainder to diarrhea or respiratory disease. Those reported as dying due to worms (because large Ascaris worms in the stools were obvious) actually died with the classical symptoms of kwashiorkor. Moreover, it was evident that here would have been almost no deaths from respiratory disease or diarrhea if these children had been well-nourished. This contributed importantly to INCAP’s pioneering identification of the synergism between malnutrition and infection in the undernourished and impoverished and led to the 1959 review (2) and 1968 WHO monograph (3) that brought wide recognition that infection worsens nutritional status and that malnutrition commonly exacerbates infections.

The Three Village Study

The objective of this study was to compare the effects on growth, morbidity, and mortality when children under 5 were given a nourishing supplement daily once breast milk was no longer adequate as a sole source of food with those receiving optimal medical care but no supplementary food (4–12). In a similar control village, the town was helped with civil projects to facilitate identical data collection but received neither additional food nor medical care beyond that provided by the government. Two field workers in each village were responsible for anthropometric, morbidity, and mortality data collection. The supplement was the micronutrient-fortified, protein-rich beverage, INCAPARINA, complemented by a banana for additional calories.

The results in the village in which the children received supplementary feeding were clear. Growth improved significantly and morbidity and mortality rates decreased compared with the other 2 villages. To everyone’s surprise, the availability of high-quality medical treatment had no effect on growth or morbidity. It is ironic that the original design called for a 4th village to receive both supplementary food and increased medical care beyond that provided by the government. Field workers in each village were responsible for anthropometric, morbidity, and mortality data collection. The supplement was the micronutrient-fortified, protein-rich beverage, INCAPARINA, complemented by a banana for additional calories.

The fall-off in growth of individual children was closely related to the infections they experienced. Any of the common communicable diseases of childhood, especially measles and whooping cough and multiple episodes of diarrhea, were likely to precipitate kwashiorkor in an already poorly nourished child. Whooping cough had the most prolonged effect on growth depression. Mata’s (11) results are described in the classic book “Children of Santa Maria Cauqué – a Prospective Field Study of Health and Growth” and summarized in the paperback published by the International Nutrition Foundation for student use, “Community Based Longitudinal Nutrition and Health Studies” (12). This latter publication also summarizes the Three Village Study and reviews INCAP Longitudinal Oriente Study (1969–77) and its 1988–89 follow-up. Further follow-ups of this study are to be presented in this session. In my judgment, the long-term follow-up of this study is the most important ever on the effects of nutrition in early childhood.

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Literature Cited